

Design Documentation Guidelines

Preface

The New Zealand Construction Industry Council (NZCIC) is the peak industry body for the building and construction industry in New Zealand. It exists to provide a pan-industry perspective to central government on key issues affecting the majority of interests in the building industry.

The council was formally established in 2003 and emerged from an informal association of organisations that previously operated under the name of the Construction Liaison Group.

The council draws its membership from most of the major trade associations, professional institutes, training organisations, and research bodies that operate in the industry.

Issues of interest to the council include building legislation; training, education, licensing, and registration for building practitioners, the New Zealand Building Code; research and development, including that of standards; value-based procurement; industry sustainability; and issues associated with both urban design and structural design.

The council began development of these design documentation guidelines in 2002 following growing concerns about the impact (and limited understanding) of poor documentation on the building industry in New Zealand. These concerns have also been confirmed by studies undertaken in other countries. The guidelines have been the subject of wide industry consultation, as well as an international search on best practice. They have been comprehensively trialled by practitioners in a variety of disciplines to ensure their practical application.

The NZCIC is grateful for the considerable time and effort generously contributed by the individuals of the working party and their organisations.

The industry has an obligation to the clients who contract their services to ensure that they know what they have commissioned and what can be expected for the fees charged. Transparency and fair play are seen as important to the industry, especially in the tendering and procurement phases.

These design documentation guidelines are recommended for use in all building projects, and are an important component in the overall tendering and procurement process. They are part of a suite of guidelines and best practice for the industry as well as for client groups and decision makers. Suggestions for their improvement as a result of their use are always welcome.

New Zealand Construction Industry Council

Design Documentation Guidelines

Endorsement

“The BIA notes the development of the NZCIC guidelines and commends them to the attention of all concerned with activities leading to the construction of buildings. The guidelines will prove a useful reference guide, especially for those who seek to communicate the elements involved in the documentation of building designs. Comprehensive documentation and understanding of the roles of the various disciplines involved can only improve the chances that a building, when constructed, will comply with the New Zealand Building Code.

The quality of a building as built will depend not only on the quality of the documentation, but on whole chain of activities from initial planning to handover. Guidelines outlining each step in the design and documentation process will go a long way to effecting improvement in the end result. It must be remembered that the design and construction of a successful building requires the successful integration of a range of inputs in addition to good documentation. People with know-how, experience, and the ability to deal with situations, the management of risk, adequate financing and resources, and an appropriate concept are all essential ingredients.”

New Zealand Building Industry Authority

Design Documentation Guidelines

Preamble

Introduction

The ultimate aim for all involved in designing and constructing buildings should be to enhance the quality of our built environment.

The design is one part of this process, and these guidelines will set a benchmark to which all parties involved in a project can refer. Careful identification of client brief and needs, together with advice by consultants to the clients on the most advantageous outcomes, are important ancillary functions that should be linked to these guidelines. The commentary below provides background on the development of the guidelines and outlines how the guidelines may be used.

The guidelines are intended as general checklists and benchmarks to define the design process for 'building' projects, as distinguished from civil works, industrial processes, and infrastructure projects. They are not intended to provide a definitive solution to the design process and should not be regarded as a replacement for detailed briefs, carefully developed in open consultation between client and service providers. They will need to be updated from time to time to reflect best industry practice.

The guidelines are intended to be tailored to the appropriate level of project complexity and service agreed with the client; the tick boxes can be used to define the service and directly relate it to the design process.

Background

The quality of design documentation is critical to the success of any building project.

Buildings today are very complex in all facets, including form, structure, services, and cladding. Building elements are much more tightly designed than in the past. This has resulted in a situation where 'standard' building details often do not apply to a large portion of a project.

The time frame for delivering projects has also reduced significantly in recent years. All stages of the programme have reduced, from the design phase through to the completion of the project, putting increased pressure on all players. Due to increased complexities, there are now more disciplines involved in the planning, design, and construction of buildings. Greater levels of expertise are required.

Design documents provide the critical ties between all parties in a building project. However, there has been a lack of definition of design documentation that all parties can rely on.

Who has created the guidelines?

The document has been drafted by a working party endorsed by the New Zealand Construction Industry Council (NZCIC) – formerly the Construction Liaison Group. The working party has consulted widely to ensure that the guidelines are workable and will benefit the entire building industry, especially with representatives from the following organisations (alphabetically):

- ACENZ (Association of Consulting Engineers of New Zealand)
- HERA (Heavy Engineering Research Association)
- IPENZ (Institution of Professional Engineers New Zealand)

- NZBSF (New Zealand Building Subcontractors Federation)
- NZIA (New Zealand Institute of Architects)
- NZIOB (New Zealand Institute of Building)
- NZIQS (New Zealand Institute of Quantity Surveyors)
- PCNZ (Property Council of New Zealand)
- PMI (Project Management Institute)
- RMBF (Registered Master Builders Federation)

The guidelines have been co-ordinated in process and terminology to be consistent for all participants in the building industry. The Guidelines have strong support from the professional bodies listed above, and there is a shared intent that the Guidelines become an industry wide best practice document.

What is the purpose of the guidelines?

The purpose of the Guidelines is to:

- define clearly design responsibilities from the outset and communicate these to all parties involved in the project;
- define the scope of design service with the client and communicate this to all parties to the design process;
- provide a 'level playing field' in achieving appropriate remuneration for the standard of design service required; and
- provide a quality assurance reference for users.

How are the guidelines used?

The guidelines outline the design process that all building projects go through irrespective of the procurement methodology or programme. The guidelines differentiate the design process and deliverables into the following five phases:

- concept design
- preliminary design
- developed design
- detailed design
- construction design

A brief description of each phase is provided at the end of this preamble.

Design is an evolutionary process, developing from a set of client driven objectives. Within each of the stages there can often be substantial changes. Ideally however, the fundamental elements of the previous stage should not be overturned.

These guidelines address the design process up to where there are design documents a contractor can directly 'build' from. As such, they do not cover the physical construction or commissioning phases of a project.

The guidelines can be used to define the responsibilities of the various parties throughout the design process (tick-boxes have been provided for easy definition of scope). The level of service provided by a 'designer' could be curtailed at any of the stages. The parties completing the design process will need to carry out the remaining steps in a co-ordinated manner to achieve an effective design.

The document has separate guidelines for the primary design disciplines of architecture, structure, HVAC services, fire protection, hydraulic services, fire engineering, electrical services, and electrical ancillary services. The input from other specialist 'designers', such as geotechnical, acoustic, vertical transportation, and wind consultants, will need to be effectively co-ordinated with the design team. Separate guidelines have not been created for these specialist consultants.

How important is co-ordination in the design process?

The thorough co-ordination of design documents between disciplines is considered to be the single most important issue confronting the industry. The guidelines emphasise the need for a relatively formal co-ordination of the information each discipline provides at the completion of each design phase.

To assist the design practitioner, sample co-ordination checklists have been put together. The sample co-ordination checklists have been developed on the basis of the architect having the primary role of design co-ordination, as this has traditionally been the case for most building projects. However, the role of primary design co-ordination may be undertaken by the principal consultant or any party commissioned to do so. It must be emphasised that all design disciplines have a responsibility for design co-ordination.

The sample co-ordination checklists are generic and are not exhaustive. Therefore design teams are encouraged to develop appropriate co-ordination checklists to suit the needs of each project.

Can the Guidelines be used to define the level of service required from design consultants?

The guidelines can be used to define the level of design services. However, the services provided by design consultants on building projects often extend beyond the design process. Design consultants' services may include management and administration tasks, for example, design management, preparation of conditions of contract, tender evaluation/negotiations, resource and building consent applications, and construction monitoring or observation. Therefore, the guidelines can only be used to define a part of the service provided by design consultants

What is the Impact of the procurement methodology on design documentation?

The input of the designers into the construction procurement methodology and construction is important in the quest for better buildings. Therefore, the appropriate design consultants should be involved in this process.

The determination of construction contract procurement and conditions of contract, methodology of pricing or tendering, and execution of those contracts should be defined at an early stage of the design process, so that the documentation can be arranged accordingly.

How do the guidelines relate to the management of the design process?

Design management may be undertaken by any of the design consultants: client, project manager, contractor, or specialist design manager. Because of the varied nature of how project teams are structured, the task of design management is not addressed in these guidelines. However, the following comments are provided:

- Design management may overlap with some of the design processes listed in the guidelines and include the direction of consultants, the chairing and minuting of regular project meetings, administration of the design delivery programme, and managing information flow to and from the client.

- Responsibility for the design management role needs to be confirmed and formalised at the start of the project and the scope of this role either included in the consultant’s service or defined separately.

How do statutory body applications or contractual requirements co-ordinate with this document?

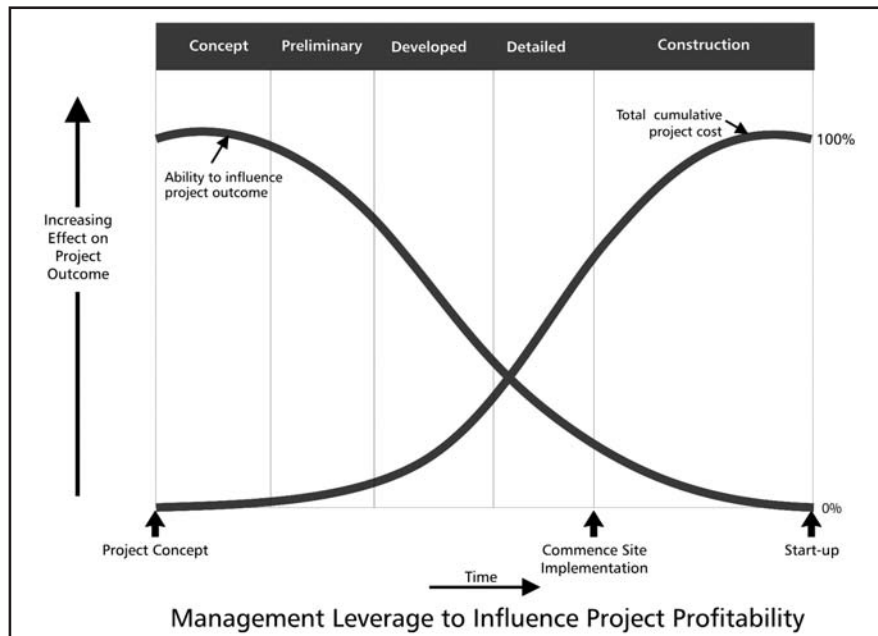
The level of design documentation required for resource consents, building consents, tenders, contract agreements, etc. varies widely between projects, and will need to be separately defined to suit a specific project programme. Therefore, the guidelines do not directly address these consent and contract matters. However, there are commentaries on these issues in the guidelines.

Who controls and sets out the building dimensions in the drawings?

A key to a successful project is good control and ‘set-out’ of building dimensions in the documentation. For building projects the architect generally has responsibility for dimensions. However, on some projects (often light industrial type or specialist buildings) the engineer acts as principal consultant, taking responsibility for dimensions. Therefore, in the concept design phase it is necessary to define who is responsible for dimensions. The dimensional control and ‘set out’ is only defined in the architectural guidelines to cover the majority of the projects. Therefore, on the projects where the engineer is responsible for dimensions, the relevant architectural tasks need to be copied over.

When should ‘value management’ design reviews take place in the design process?

‘Value management’ (VM) reviews at the appropriate stage(s) of the design process may assist in achieving successful projects. However, reviews undertaken too late can be ineffective and adversely impact on programme and costs. The sketch below graphically illustrates the opportunity of early reviews. Generally VM reviews should be carried out at the end of the concept and/or preliminary design stages, when the design has been co-ordinated between the design disciplines and there is a consistent basis for a cost estimate. The necessary revisions that are identified as part of the VM review can then be input to the start of the next design phase.



Why include safety in design guidelines?

Considering safety upfront during the design process can have a positive impact on the safety of the construction process. Efficiencies can be gained through fewer injuries and less down time and through better communication and coordination, resulting in a more effective and efficient design and building programme.

Designers should aim to:

- identify the significant and unusual health and safety hazards relevant to the design, and consider how the building may be safely constructed and maintained;
- consider the risk from those hazards that may arise as a result of the design;
- if possible, alter the design to avoid the risk or, where this is not reasonably practicable, follow the remainder of the hierarchy of risk control process.

Designers should be aware of the hierarchy of risk control – eliminate, isolate, minimise – that underpins the modern approach to health and safety management.

The contractor is normally responsible for managing health and safety risks during the construction of a project.

Summary

Good design documentation is a critical key to successful projects. These guidelines provide a basis for defining the scope and responsibilities of the design team creating the documentation.

Design Documentation Guidelines –

Appendix

Description of the design phases:

- i. **Concept design** generally involves the application of a design ‘idea’ to the practical provision of a facility. It represents a phase where sufficient design concepts are developed for the client to be able to establish the feasibility of the project, the development potential of a site, or to be able to select a particular conceptual approach that the client wishes to pursue. The concept design phase may be used to define or verify the brief and may often involve the testing of different approaches/options. During this phase, ideas (concepts) are developed through open interaction by the team of the key elements of the project.

At the end of this phase, the basic building blocks of the project are defined in general terms and co-ordinated between the design disciplines.

Concept and preliminary design phases are often combined on less complex projects.

- ii. **Preliminary design** generally involves the further refinement of the preferred concept to facilitate testing it against inputs from the team, including cost estimates and regulatory approval. This may provide sufficient information for the communication of the design to a third party for marketing or consultation purposes.

During this phase the project concepts are developed into firm schemes, where the relationship and sizes of spaces and facilities are defined and co-ordinated between the design disciplines. However, resolution of individual details that do not impact on the key elements is generally left for the next design phase. At the end of this phase, the project should be clearly defined.

- iii. **Developed design** is the phase where the scope of each component in the design is clearly defined and co-ordinated. This may involve production of detailed information, including sketch details of all significant componentry and their interrelationships. The developed design phase is where the individual technical experts prepare the necessary documentation to define the scope of all building elements. Major input is required by all designers.

The completion of the developed design is a critical point in a project. The scope of the project is fully defined. As a result, cost estimates can be prepared on an elemental basis. Developed design generally provides sufficient information for the client/user to clearly understand the aesthetics and functionality of the building, internal spaces, and facilities.

On some projects the developed design documentation is issued for building consent and/or ‘Guaranteed Maximum Price’ (GMP) tender. Co-ordination between the design disciplines is therefore critically important at the end of this stage.

- iv. **Detailed design** generally provides a level of documentation that clearly defines the design, specification and extent of all building elements. The design should be comprehensively co-ordinated with other disciplines. However, the documents produced in this phase may not directly be able to be ‘built’ from. Changes to anything but detail at this stage are very disruptive and expensive and often result in further problems as, by now, the project has become very complex and it is hard to identify all the ramifications of changes. Detailed design is the phase most commonly used to obtain a tender for the construction of the works.
- v. **Construction design** is where the requirements defined in detailed design documents are integrated with changes that may occur during the tender and contract process and with construction requirements such as site conditions, proprietary and performance design elements, erection requirements, and fabricated shop drawings to create drawings that can be directly ‘built’ from. (Note: shop drawings are produced during this stage.)