engineering new zealand
te ao rangahau

ASSESSING PROJECTS.

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Introduction

This guide provides engineers with an adaptable framework for assessing a new project or when a project unexpectedly changes during its lifecycle. It's divided into several key sections including:

- concept sketches
- risk considerations
- contract writing.

Each section provides guidance and examples to help you effectively assess engineering projects.

Assessing projects is about assessing the various risks of the proposed project and an appropriate fee to cover the risk, time, and expense involved with completing the work. The expenditure of time on risk management should be directly related to the probability and consequences of failure. Often, reasonable judgements based on experience can be made without exhaustive analysis. Sometimes, however, we face projects requiring a more rigorous risk assessment to inform our decision-making.

The first step in assessing a project is to consider whether it is worthwhile for the company to undertake the work. This step is frequently missed and can lead to poor outcomes if you quote for and win an unsuitable project.

A good quality assessment leads to a robust fee proposal and contract that clearly communicates the scope, assumptions, and terms of services. Failing to assess a project adequately can lead to underestimated costs, missed deadlines, and strained client relationships.

Engineering New Zealand offers courses covering these topics in more detail.[1]

Considering risk

When planning a project, thinking about what could go wrong is crucial. Every project has its challenges, and we need to spot them early. By identifying these risks upfront, we can make better decisions, use our resources wisely, and have backup plans ready. This also helps in keeping everyone involved on the same page. In short, checking for risks helps us complete our projects smoothly and avoid surprises.

Something to remember before you start a project – you do not have to agree to do the work and you may determine some clients are best avoided. You can refuse the work.

The table below shows a simple but robust initial assessment framework.

	Yes	No	Mitigation
Have you frequently undertaken this type of work with good results?			
Do you have suitably qualified and experienced staff/technologies?			
Can you clearly explain the potential liabilities associated with this project?			
Is the risk and liability reasonable for the project?			
Are the H&S hazards and risks known and addressed?			
Does the client have a good track record with you?			
Do you have a good chance of getting the job?			
If you get a big job or the project creeps, will it affect your normal work?			
Who is running the project? Some project managers or clients like long meetings. Have you factored in time for meetings throughout the different project phases?			
Other			

1 www.engineeringnz.org/courses-events

Contracts

Poorly written or non-existent contracts can lead to concerns received by Engineering New Zealand, usually arising from frustration about the client's expectations versus what the engineer thinks they are obliged to deliver. Those expectations are normally contained in the scoping section of the contract. We recommend using a standard contract like the Short Form Agreement (SFA).[2] The SFA is widely understood, used by engineers throughout New Zealand, accepted by clients, and has known liability levels. Make sure you read the SFA guide.[3]

When writing the contract, you should always ensure that you define:

- **The parties involved** – details for the consulting engineer and the client. Consider the client as the entity you will pursue for payment. It can be worth checking the ability of the client to pay the invoice.
- **The project** – describe the details – for example:
  - project type: eg new build, renovation, extension, alteration (specify details), report only
  - proposed site address (including legal description if available)
  - client details: Name, contact information
  - architect/designer details: (if applicable)
  - project timeline: Expected timeframe for design and construction.
- **Duties** – specifically, what work you're undertaking and in what timeframe. Be precise and avoid generalities. For example:
  - timeframe to start and complete the design work
  - potential for variations
  - travel costs
  - any pre-construction site visits and meetings with contractors (usually for more complex projects)
  - design calculations
  - drawings, specifications
  - construction monitoring – make sure you spell out that the level of construction monitoring can change depending on (for example) the quality of the contractor's work
  - producer statements and other paperwork (this can be more than expected).
- **Assumptions** – what are you assuming? For example:
  - We assume that drainage surveys are available.
  - We assume that geotechnical information is to be supplied.
  - We assume that the client will directly engage any additional specialists required.
  - We will not be responsible for tanking and waterproofing.
  - We have not included pricing for the design of _____
  - We have/have not considered time for additional checking by external firms, either high-level review or full peer review.
- **Payment terms** – You should clearly define your expectations for the payment schedule and invoicing procedures. For example:
  - Are you charging fees before work begins?
  - Are you staging payments with progress?
  - Is payment expected before certain documents are released?
  - What's your hourly rate for variations/scope changes?
  - Do you have additional fees for construction monitoring?
  - If you're engaging other design professionals, do you expect payment of their fees on invoice?
- **Contract terms** – the terms and conditions on the SFA are typically fit for purpose. Remember you can put in terms for termination of the contract.
- **Acceptance** – Both parties should sign the contract before work commences.

2 www.engineeringnz.org/engineer-tools/engineering-documents/contracts/
3 www.engineeringnz.org/documents/1820/Guide_to_the_ACE_New_Zealand_Short_Form_February_2019.pdf

Concept sketches

A concept sketch is a simplified, often hand-drawn representation of a project or component. It conveys initial ideas, project scope, and design intent before detailed drawings and specifications are developed. Concept sketches are typically created during the early stages of a project and serve as a visual aid in discussions with clients, stakeholders, and team members.

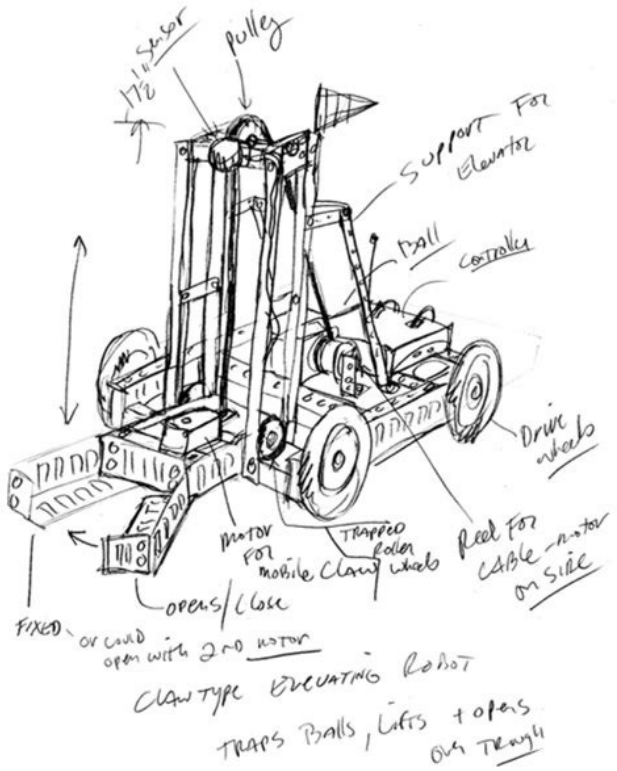
Benefits of concept sketches

Enhanced communication:

Concept sketches bridge the gap between technical jargon and layperson's understanding. They provide a visual context that words alone cannot achieve, ensuring that clients and stakeholders grasp the project vision early on. As an example, consider explaining a new bridge design. A concept sketch can show the overall shape, key features, and integration with the environment, making it easier for non-engineers to understand and provide feedback.

"A picture is worth a thousand words" is especially true in engineering, where visual representations can simplify complex ideas.

Figure 1: Advanced concept sketch.



Clarification of scope

Before diving into detailed plans and specifications, a concept sketch helps delineate the project scope. This early visualisation aids in identifying potential issues, setting realistic expectations, and aligning everyone's understanding of the project objectives. For instance, in a building renovation project, a concept sketch can illustrate the proposed changes and layout adjustments, ensuring that all parties agree on the extent of the work before detailed planning begins.

Cost and time efficiency

Investing time creating concept sketches can save significant resources later in the project. By resolving design issues and confirming the project scope early, you can avoid costly changes and delays during the detailed design and construction phases. In the case of urban infrastructure projects, early concept sketches can highlight potential conflicts with existing utilities or structures, allowing for proactive solutions.

Foundation for detailed design

Concept sketches serve as the foundation for detailed design work. During the initial stages of a product design, multiple concept sketches can be created to explore different design approaches, enabling the selection of the most feasible and appealing option.

They provide a clear starting point that guides the development of more comprehensive plans, specifications, and models. For example, in designing a new transportation system, the concept sketches of routes and stations will inform the detailed engineering drawings and simulations required for project approval and construction.

Example: urban park redesign

Imagine you are tasked with redesigning an urban park. Starting with a concept sketch, you illustrate the key elements, such as walking paths, seating areas, playgrounds, and green spaces. This sketch helps communicate your vision to the city council and local community. It also allows for early feedback, such as the need for more shaded areas or additional amenities. By addressing these concerns early, you can refine the design before moving on to detailed plans, thus ensuring that the final project meets the community's needs and expectations.

For more information about concept markups, see the additional resources at the end of this document.

Conclusion

Integrating the guidelines in this document can help engineers navigate project assessment, fee proposals and contract writing effectively. The framework emphasizes risk assessment, concept mark-ups and clear contracts.

Concept mark-ups in the early stages allow engineers to identify challenges and design flaws, leading to accurate fee proposals and risk mitigation. This proactive approach improves project outcomes and fosters continuous improvement.

Well-defined contracts are crucial. By clearly articulating the scope of work, assumptions, payment terms, and other key details, engineers can establish a solid foundation for a successful client relationship, manage expectations, and protect their interests.

Additional resources

Concept design and drawing

Institute of Structural Engineer's Plan of Work document

Archisoup – Concept Design

MIT's free courseware information – Design Handbook: Engineering Drawing and Sketching

Engineering Drawing and Design (book)

Engineering drawing YouTube course

Robotics, V. (24, 06 14). Overview of the engineering design process. Retrieved from Scout Life

Contracts, Producer Statements and concerns

Engineering New Zealand contract law for non-lawyers webinar

Engineering Contracts

Engineering New Zealand Managing Complaints

Working with Producer Statements course

Practice Note 1 – Guidelines on Producer Statements

Risk and quality

Engineering New Zealand – Temporary Works Risk Course

Practice Note 14: Structural Engineering Design Office Practice

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