DELIVERING FOR QUEENSLAND

Technical Note 219

Design Constructability Assessments

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Queensland Government

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Preface

Constructability is a critical part of the department of Transport and Main Roads' project development framework. It ensures that designs are practical, buildable, and cost-effective, while proactively identifying risks that could impact project objectives, safety, delivery timeframes, or cost outcomes.

The department is introducing an enhanced suite of practices to strengthen constructability across its infrastructure portfolio. These practices represent a change in the way constructability is managed, providing:

- Consistent processes across projects,
- Improved tools and support for departmental delivery areas, and
- Clearer accountabilities for project managers, designers, Contract Administrators and stakeholders.

Together, these practices create a comprehensive framework for embedding constructability in project development.

This document focuses on the **Design Constructability Assessment** undertaken by Design Consultants. The complementary practices, listed below, are addressed in the internal chapters of the *Transport Infrastructure Project Delivery System* (TIPDS).

1. **Design Constructability Assessment** – A formalised and improved process for designers to conduct constructability assessments and workshops at key design stages. (Detailed in this document)
2. **Constructability Reviewer (CR)** – An impartial, expert reviewer engaged to provide independent assurance on complex or high-risk projects. (Detailed in the internal *Constructability chapter*)
3. **Interactive Tendering Guidelines for TIC-CO projects** – Structured tender processes that help:
    a. industry better understand the project and its risks to reduce assumptions and improve tender submissions, and
    b. the department choose the right partner for delivery. (Detailed in the internal *Interactive Tendering chapter*)

4. **Early Market Engagement: Constructability Input** – A structured process where non-binding feedback from industry is sought to strengthen constructability early in the project lifecycle. (Details can be found in the internal *Market Engagement chapter*)
5. **Early Engagement of Contract Administrators** – Involving contract administrators early to review design constructability from a contract management perspective. (Detailed in the internal *Contract Administrator Engagement chapter*)

Together, these practices are intended to improve project outcomes by identifying construction risks early, encouraging design-for-delivery thinking, and supporting more efficient, safer project execution.

Design Constructability Assessment requirements

1 Introduction

1.1 Purpose

This document outlines a structured process for Design Consultants (designers) engaged by the department of Transport and Main Roads to conduct constructability assessments during the planning and design of infrastructure projects.

This guidance could also be applied by internal departmental design teams.

The aim is to improve delivery outcomes by embedding construction expertise early and consistently in the process.

1.2 Scope

The design constructability assessment process is intended to be used by designers to review their own design outcomes.

1.3 Definition of constructability

Constructability refers to how well a project's design supports practical and efficient construction and maintenance. It seeks to improve project objectives such as cost certainty, program certainty, safety, quality and environmental compliance.

The proposed constructability assessment process aims to:

- Identify construction and maintenance challenges early.
- Minimise the need for costly design changes during construction.
- Encourage innovation and maintain construction flexibility.
- Support collaboration between design and construction stakeholders.
- Improve productivity.

1.4 Assessment methods

Two methods are proposed for design constructability assessments:

- **Constructability workshop (workshop)**:

  A structured, collaborative session involving multiple stakeholders. It includes prior review of design documents and often a site inspection, followed by a facilitated workshop to identify and record issues in a constructability review register.

- **Constructability assessment (assessment)**:

  A desktop-based examination conducted by an experienced and independent reviewer. Typically, more cost-effective, but less collaborative in nature.

The table below compares the advantages and disadvantages of these 2 constructability assessment methods, helping project teams select the most appropriate approach based on project complexity, budget, and stakeholder involvement.

Table 1.4 – Advantages and disadvantages of constructability assessment methods

	Constructability workshop	Constructability assessment
Advantages	• Involves stakeholders • Broader range of issues • Facilitates discussion • Good for complex problems	• Cost-effective • Structured analysis • Checklist friendly • Simple logistics
Disadvantages	• Higher cost • Off-topic risks • Limited solution time • Coordination required	• Reviewer limitation • Less collaboration • Perceived as formality

1.5 Outcomes and deliverables

The following deliverables are required from both constructability workshops and assessments:

- Structured issues / review register capturing all constructability issues raised and tracking their resolution.
- Summary reports consolidating outcomes, recommendations, and actions for integration into future project improvements.

The documentation does not need to be stand-alone for this activity. Constructability issues / risks may be captured as a component of an existing project Risk Plan or Safety in Design register – that is progressively developed and updated as the project phases progress.

1.6 Minimum constructability requirements by project stage

A structured approach to constructability assessments is needed based on project value and complexity. The table below outlines when a workshop or assessment should be conducted based on the project type and design stage.

Table 1.6 – Departmental minimum requirements for constructability assessments

Design stage^	Options analysis	Business case	Preliminary design	Detailed design	Contract documentation
Major Project#	Workshop	Assessment	Workshop	Workshop & Assessment*	Assessment
Type 1 Project#	Workshop	Assessment	Workshop	Workshop & Assessment*	Assessment
Type 2 Project#	Workshop or Assessment		Workshop or Assessment		Assessment
Type 3 Project#	Workshop^ or Assessment^		Workshop or Assessment		Assessment

Refer to the department's *Project Classification Guideline* for more information

* Workshop typically completed at nominally 15–30% detailed design. Assessment typically completed at 85% detailed design

^ Not apply design stages apply to every project

Note on design stage percentages

The indicative percentages referenced for conducting constructability workshops (e.g., 15–30% detail design) and assessments (e.g., 85% design design) are provided as a guide only. The actual timing should be determined based on the project's complexity, risk profile, and progression of design deliverables. The intent is to ensure that constructability input occurs when it can most effectively influence the design, not to prescribe a fixed percentage threshold.

For Type 2 and Type 3 projects, where either a workshop or assessment is specified:

Choose a workshop when:

- There are significant interfaces with existing infrastructure.
- The project includes complex traffic staging, constrained site access and/or multiple stakeholders.
- Environmental approvals risk – particularly the timing of EPBC Act approvals and Waterway Barrier Works Permits.
- Temporary works in sensitive environments – e.g., floodplains, river crossings or tidal zones.
- There is complex:
  - Public Utility Plant (PUP)
  - geotechnical conditions
  - structures, and/or
  - construction methodologies.

Choose an assessment when:

- The project is low complexity or already well defined.
- Time and budget constraints limit broader engagement.

1.7 Continuous constructability during design development

Constructability is a continuous discipline to be embedded in day-to-day design, not a one-off checkpoint.

This document establishes the minimum requirement (assessments and/or workshops) and typical timing, but it does not replace the designer's ongoing obligation to consider how the works will be built as the design matures.

The Designer may wish to undertake additional structured or unstructured constructability assessments to improve the overall design outcome.

> An example of additional constructability assessments: The Designer may propose to undertake a constructability assessment at the initial project review stage to identify issues at project inception, i.e., review the design from any prior stages. This process is optional but would be beneficial especially for high value / high complexity projects or where accelerated delivery is required.

Design teams must document key assumptions and decisions, test feasible construction options as information emerges, and promptly flag emerging buildability risks or information gaps. The Design Manager is accountable for actively managing constructability between formal reviews, closing out actions before review gates, and capturing lessons learned. Apply professional judgement to commission interim checks or additional expertise where project risks warrant it.

> Constructability cannot be separated from the estimating process outlined in the *Project Cost Estimating Manual* (PCEM). Design staging, access, temporary works and methodology decisions directly influence the project cost and risk. Constructability reviews should therefore, where practical, be undertaken in parallel with estimating, risk and value engineering activities to ensure consistent, informed decision making.

1.8 Roles and responsibilities

Transport and Main Roads project managers are responsible for selecting and coordinating the various constructability processes outlined in the preface, noting that the minimum processes outlined in this document are not optional.

The Design Consultant is responsible for scheduling and executing constructability assessments at the appropriate design stages. Design Consultants must also lead the preparation of materials and respond to identified issues. The constructability assessment process provides feedback for consideration by the designer. In doing so the participants are not taking responsibility or accountability for the design – this always remains with the Designer.

All participants (Transport and Main Roads, Designer, Constructability Advisor and external stakeholders) are expected to contribute constructively and raise practical concerns. All issues should be captured in the issue register and resolved or tracked to resolution.

The following table summarises the key roles and responsibilities for constructability assessments across each design stage, ensuring clarity on who is accountable for initiating, leading and contributing to the process.

Table 1.8 – Roles and responsibilities (design constructability assessments)

Design stage	**Options analysis**	**Business case**	**Preliminary design**	**Detailed design**	**Contract documentation**
Functional Specification	**C7521**	**C7522**	**C7523**	**C7524**	
Transport and Main Roads Project Manager	• Decide if a workshop or assessment is required (refer to Table 1.6). If not otherwise nominated in the tender documents, a workshop shall be deemed to be the default option. • Participate in workshops / assessment as required. • Facilitate departmental Subject Matter Expert (SME) and external stakeholder attendance at workshops as required. • Ensure constructability is considered in global project risk assessments. • Decide whether to complement the process by: – Engaging an independent Constructability Reviewer – Engaging the Contract Administrator early – Undertaking early market engagement – Undertaking interactive tendering processes – Delivery Strategy Analysis (choosing the procurement and contract type for construction)				• Verify that all constructability issues are closed out before tender release.

Design stage	Options analysis	Business case	Preliminary design	Detailed design	Contract documentation
Functional Specification	**C7521**	**C7522**	**C7523**	**C7524**	
Design Consultant	• Ensure constructability workshops / assessments are held at appropriate design maturity. • Provide resources to undertake and facilitate workshop / assessment. • Provide design inputs for constructability assessments & workshops. • Incorporate feedback into project reports. • Ensure risks are registered and actions are assigned.				• Close out issues before tender release. • Confirm contract documents reflect constructability outcomes.
SMEs and External Stakeholders	• Contribute discipline expertise to assessments / workshops. • Identify risks and suggest mitigations.				• N/A

1.9 Resource requirements

Constructability reviews rely on the right mix of experience and perspectives. Each review should include personnel with appropriate construction, design and project management experience to ensure recommendations are practical, balanced and achievable.

Design Consultants are required to provide suitably qualified resources with recent construction and delivery experience (a Constructability Advisor) to attend each workshop and undertake constructability assessments. These resources may be from within the design consultancy or outsourced but must be independent of the project team undertaking the design.

The level of resourcing will vary depending on project complexity, but the following principals apply.

1.9.1 Constructability workshops

Workshops are collaborative sessions designed to explore design solutions, staging, and construction risks in a multidisciplinary setting.

It is recommended that workshops are conducted with 6–12 participants.

Table 1.9.1 – Typical constructability workshop participants

Role	Typical Experience / Function
Constructability Advisor	Leads the constructability discussion and provides experienced, construction focused insight into staging, temporary works, safety, access, sequencing, utilities and other delivery aspects.
Project Manager (Transport and Main Roads)	Coordinates and chairs the workshop, ensuring outcomes are recorded and issues are tracked to resolution.
Design Manager / Lead Designer	Presents the current design solution, constraints and assumptions. Integrates constructability feedback into subsequent design revisions. Presents lessons learnt from previous projects.
Contract Administrator	Provides input on contract interfaces, risk allocation, and potential documentation or sequencing issues that could affect delivery.
Construction Supervisor / Inspector / Engineer	Contributes field-based experience on construction methods, site logistics, and safety in design considerations.
Traffic Management Designer	Advises on constructability related to traffic staging, access and maintaining network operations during work.
External Stakeholders	Invited where their infrastructure or operations may interface with the project – for example, Queensland Rail, Local Councils, Transurban, Utility Providers or adjoining project teams.
Facilitator (optional)	For complex or multi-disciplinary workshops, an independent facilitator may be engaged to manage discussion and ensure focus on constructability outcomes.

1.9.2 Constructability assessments

Assessments are targeted reviews completed by a Constructability Advisor with appropriate construction experience, using available design documentation, reports and models.

Constructability assessments are not a technical design verification processes, which typically require a different SME skillset.

Typical resource requirements include:

- Constructability Advisor – conducts the assessment and prepares the issue register and summary report.

- Design Manager / Lead Designer – provides drawings, models and clarifications as required.
- Project Manager (Transport and Main Roads) – reviews and endorses the findings, ensuring actions are tracked to completion.

Where required, the advisor may consult discipline specialists (for example, geotechnical, bridge or traffic management) to clarify specific constructability aspects.

1.9.3 Experience requirements for Constructability Advisors

Constructability assessments rely on practical and informed judgement developed through extensive construction experience. While technical qualifications such as an engineering degree or RPEQ registration are beneficial, they are not mandatory. The key requirement is demonstrated capability to identify, assess, and resolve construction challenges during design development.

Constructability Advisors should possess:

- Significant construction experience (typically 10 years or more) in the delivery of road, bridge or rail infrastructure, including exposure to site supervision, staging, temporary works, traffic management, utilities, and stakeholder coordination.
- Experience participating in or leading design reviews, value engineering or constructability workshops, and the ability to document issues, recommendations, and close out actions.
- Ability to translate design into delivery: sequencing, temporary works, access / egress, under-traffic methods, safety and environmental constraints, and cost / program implications.
- Constructability literacy across traffic & operations, geotechnical / pavements, utilities, structures / drainage, and site logistics (proportional to scope).
- Clear, concise communication.
- Collaboration, probity and independence. Declared conflicts; respect confidentiality; maintain an objective stance.

An experienced Contract Administrator, Construction Supervisor or Project Engineer working for the Design Consultant may be an example of a suitably qualified Constructability Advisor.

Where the scope of works becomes more complex or specialised a specialist sub-consultant is typically required. This is generally the case for large or technically complex bridges or extensive soft soil treatments.

For constructability assessments a team of 1–3 people is recommended (Constructability Advisor plus 1–2 SMEs). This can be scaled up for high-risk elements (e.g., major structures, complex staging, significant services relocations).

1.10 Common constructability themes to consider

The following table outlines typical constructability issues and the elements that should be considered as part of any assessment. Additional items should be considered where relevant to the project.

Table 1.10 – Common constructability themes

Issue	Consideration	Elements
Site and access	Adequacy of the contract site and provision of access for construction and maintenance	• Site facilities • Laydown areas • Site access • Property access • Temporary access
Traffic management	Feasibility and extent of traffic management	• Staging and detours • Lane widths • Pedestrians and cyclists • Safety barriers • Speed limits
Temporary works	Feasibility and extent of temporary works	• Pavements • Formwork and falsework • Retention • Erosion control
Geotechnical	Onsite material suitability and design considerations	• Material suitability for design earthworks • Productivity of construction (zoned vs homogenous) • Cost efficiency (imported vs ameliorated vs zoned) • Subgrade treatment selection
Utilities	Impacts on major utilities and utility provider procedures	• Conflicts and relocations • Timeframes and approvals
Flexibility and innovation	Scope for construction flexibility and innovation	• Alternative methods • Earthworks mass-haul strategies

Issue	Consideration	Elements
External interfaces	External interfaces and parties	• Stakeholders • Other projects • Government agencies
Quality, WHS and environmental issues	Management of quality, safety and environment	• Testing • Constructability safety • Dust / noise / vibration • Environmental footprint
Weather impacts	Delays and other impacts due to weather	• Drainage • Earthworks exposure • Flooding • Seasonal effects
Program and milestones	Effects on planning of works and resources	• Constraints • Preloading • Seasonal timing
Resource availability	Availability and suitability of construction resources	• Contractors capacity & capability • Quarries • Long-lead items • Local workforce • Specialist subcontractors
Regional project interfaces & strategic opportunities	Impacts and opportunities arising from concurrent / upcoming projects in the corridor / region. Identify chances to reuse materials, pre-plan long lead time items, share resources, and lift sustainability outcomes	• Shared traffic staging windows • Reuse of materials • Pooled or early procurement of long lead time items (precast pipes) • Borrow / surplus matching across projects to balance earthworks • Joint community stakeholder comms to reduce disruption