

Discussion document: Accelerated Construction the secrets to success

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Accelerated Construction (AC) uses advanced planning techniques and innovative design to significantly reduce design and construction periods, while reducing construction costs and increasing construction quality.

AC is achieved through innovative design solutions and, in the experience of WSP experts, there are three core areas that need to be focussed on during design that are key: advanced planning, design for construction and collaboration.

Advanced planning

A high degree of planning is required to identify, minimise and, where possible eliminate risks, with a particular focus on construction programme risk. On AC projects the time frame for construction is such that significant delays aren't acceptable.

Risk workshops early in design are used to identify high risk and labour-intensive activities. The output provides designers with areas of focus that offer the maximum benefit to the construction programme.

The key to early planning is ensuring all investigations that influence design and construction are undertaken to a level appropriate to the risk. For example, early engagement with service providers combined with excavating trenches at regular intervals along the project, ensures services are correctly located and identified. Unknown services during construction pose significant programme and safety implications.

The planning process requires all key stakeholders to be engaged from the outset of design. This ensures that all parties are aligned from the beginning. Everyone is aware of the timeframe and has the opportunity to state their design requirements, providing firm scope for the designers.

Design for construction

Perhaps the most important area is ensuring that the design team maintain a focus on producing a design that is buildable within given time frames, and that buildability influences design decisions.



The designer needs an awareness of the implications that design decisions have on the construction programme and the constraints within which the contractor will have to work on site. The primary focus for the designer should be to produce simple and efficient designs. The designer should maximise construction tolerances, clearly articulate the construction sequence and design precast elements to suit crane capacities and lift locations. The designer needs to carefully consider the site and look to identify site yards, site access and crane locations. Contractor input is beneficial early in the decision-making process to verify the designer's constraints and assumptions.

Understanding construction and maintenance risks is a key factor in design for construction. Designers undertake risk assessments and mitigation exercises, to remove, mitigate or accept identifiable risks, with significant remaining risks highlighted to the constructors via the construction drawings.

This approach may require the final design to not necessarily be the optimal technical solution but achieves a lower cost and programme risk profile. An example being pile positions for bridge replacement. In an ideal situation piles would be positioned so they are evenly loaded, whereas an accelerated construction philosophy would place piles where they can be constructed early and offline.



Collaboration

Collaboration between the client, designer and contractor is a crucial aspect of accelerated construction. It is important that a collaborative working environment is formed at the beginning of the project and that all parties align themselves with the project objectives.

Collaboration with the key stakeholders at an early stage allows stakeholders to set out their design requirements, key project decisions can then be made efficiently and, minimising the risk of last minute design brief changes.

To achieve this collaborative environment requires commitment from all parties to the wider project objectives. A proactive designer, a responsive and decisive client combined with an experienced and proactive contractor is crucial for delivering AC.

Paradigm shift required

For AC to be adopted on projects throughout New Zealand a change from the traditional approach to project procurement and delivery is required. For this reason, the decision to adopt AC needs to be made in the very early stages of the project so that it is structured correctly and that the social and economic benefits can be considered during the funding stage.

It is important to establish project objectives that focus on minimising disruption and optimising the value of the works through innovation and integrating constructability through all stages of design. The objectives form a basis on which a collaborative working arrangement between all stakeholders can be formed. The benefits of AC can then be maximised through the design process and ensure that project decision making is in line with the project goals.

Innovation and the quality of design are very important for AC. The practice of selecting consultants needs to move away from selection based on lowest fixed price, placing greater significance on attributes and resourcing. Engaging the designer on a time charge basis for the initial scoping and information gathering phase is crucial in de-risking the subsequent phases of the project. Once the design is sufficiently scoped the designer can be engaged on a Lump Sum basis.

AC requires advanced planning during the design, physical works tender and pre-construction phases to de-risk the job. There is insufficient time during the construction period for this to occur. The selection of designer is critical to ensuring the solution is capable of being constructed within an accelerated timeframe. The tender process must force the designers to maximise the buildability of their solution thereby shortening the construction period.

The physical works tender needs to be set up to force the constructors to consider buildability, such as crane locations, site compound and access, and develop a fully detailed construction programme which forms part of the tender evaluation. This can be achieved by adopting an interactive tender process, having contractors present their construction methodology to the tender evaluation team, which should include representatives of the design team.

Potential applications

AC should be considered for projects where construction would cause significant disruption to the public or the economy. The basic principles of advanced planning, design for construction and collaboration are transferable to all projects.



Key factors in determining if a project is suitable are:

- Early completion of the project returns high benefits from day one after completion
- The project causes significant cost implications from delay during construction
- The project causes significant time dependent costs during the construction period (e.g. Temporary Traffic Management)
- There are social drivers such as public scrutiny and public perception

The approach lends itself to any works on major transport routes, particularly those critical to the local and national economy, producing benefits that are self-evident, not least of which, being satisfied stakeholders.

Another application could be disaster relief. Damage to local roads, plant and utilities could be readily repaired using elements prefabricated outside the disaster region and transported to site, thereby reducing the local labour demand whilst increasing productivity and reducing the recovery period.

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