

PP19 Hopwood Clock Tower Refurbishment



The refurbished Hopwood clock tower approaching completion.

Project: Hopwood Clock Tower Refurbishment
Publication date: 2010
Client: Palmerston North City Council
Architect: Craig Moller Architects
Structural Engineer: David Smart Consulting
Contractor: Higgins
Specialist Contractor: McMillan & Lockwood
Region: Palmerston North
Sector: Public Building
Tender: Early Contractor Involvement
Final Contract Value: \$1.7m
Construction timescale: August 2006 – March 2007
Form of Contract: NZS 3910

In our 19th Pathfinder Project, we investigate how the team that successfully refurbished the Hopwood Clock Tower in Palmerston North used Early Contractor Involvement to eliminate risk and drive innovation at this landmark project in the centre of Palmerston North.

Background

The \$1.7m refurbishment of the Hopwood Clock Tower in the centre of Palmerston North was successfully completed in 2007. The original Clock Tower in the City Square was donated to the City by local businessman Arthur Hopwood in the 1950s and was originally built to house the clock that was previously in the Main Street Post Office Tower. During the City Heart refurbishment of the City Square in 2006 the Clock Tower was assessed against the current Building Code and required a significant amount of strengthening and refurbishment works to be carried out to bring the structure up to the Code.

The project involved removal of the crown of the tower, renewal of the weakened tower columns and foundations and the necessary reinstatement works. The approach adopted by the client, Palmerston North City Council (PNCC), was to use Early Contractor Involvement (ECI) to proactively manage out the varying risks and potential uncertainty that could affect the refurbishment project in the busiest part of the City. These risks included space and time constraints; general public and site safety; power and gas supply to the CBD running underneath the Tower; and local stakeholder engagement.

As part of the ECI process, the local contractor, McMillan & Lockwood, were appointed as specialist subcontractor to the project based on their extensive experience and expertise of undertaking similar refurbishment and structural strengthening work in the past.

Challenges Faced

Ground conditions & utilities

The project team encountered a number of complexities during the project with two rooms in the basement of the Clock Tower housing an 11Kv power substation and a high pressure gas reduction system which both supplied gas and power to Palmerston North CBD.

Managing risk

As a result there was a significant risk associated with potential power outages to businesses and the local community as well as the associated difficulties of transporting piling equipment to an already space constrained site.

Typical traditional solutions were ruled out

The location of the utilities also eliminated the original piling solution that had been planned to strengthen the foundations for the Clock Tower as well as the utilities substation. To counteract this, the project team demolished the basement and created a wooden structure to protect the utilities during the rebuild process and then used a raft slab design to build the new foundations for the tower.

Successful Outcomes

Pre-planning is key

From the start of the project pre-planning was critical to mitigating the risks associated with the refurbishment of the Clock Tower. An integral part of this process was establishing the methodology for the work before starting work on-site. The methodology was developed in a series of workshops that engaged all members of the project team including the client to enable all risks to be considered and for the project team to establish a process that would minimise risk as well as aiding build-ability. These meetings continued on a weekly basis throughout the project and provided a positive focus and proactive approach for the project team.

Enabling the project team to understand and contribute to the risk identification and build-ability issues encouraged shared ownership within the project team and a real team working environment on the project.

As part of the pre-planning Barry Robin, the Project Manager for McMillan & Lockwood took members of the project team to a similar refurbishment scheme that he had recently been involved with at Massey University where a similar design and aluminium frame had been used successfully. This commitment to pre-planning enabled the project team to use the lessons from previous projects to assist in developing and evolving the methodology used on the Clock Tower refurbishment.

Use of offsite & tower crane sections

Following an assessment of the existing structure it was decided that the Clock Tower needed to be demolished and renewed. This enabled the project team to utilise the ECI process to identify the most appropriate methodology and given the mitigating risks and space constraints a pre-fabricated section solution was chosen which delivered both considerable cost savings as well as delivering the project up to six months earlier than originally planned.

Part of the innovation was to support the pre-cast wall sections from a tower crane section which was positioned on the inside of the tower and acted as a scaffold as the new panels were put in place and anchored in. The process to construct the Tower from the base to the top section took a total of three weeks. Use of the tower crane sections enabled the team to deliver this solution safely, quickly and cost effectively. The tower crane sections were then removed from the Tower post-construction.

Renovating the clock & lantern

The original 35 tonne clock section was cut away from the original structure and lowered to the ground and renovated before being craned back onto the top of the reconstructed tower. To enhance the iconic structure in the centre of Palmerston North a 6 metre high glass lantern was constructed on top of the Tower, using LED computerised lighting and self-cleaning glass.

Summary of Benefits

Pre-planning and setting the methodology to address risk mitigation

Enabled the project team to develop the most appropriate methodology as well as understanding and contribute to the risk identification process which encouraged shared ownership and individual accountability of risk. This approach works well where risks are high and pre-planning is essential to delivering project success.

Use of off-site manufacturing

The team chose to use precast panels for the new tower section due to the time and space constraints. This approach also assisted with health and safety issues and improved productivity on site. The precast sections also maintained the shape of the structure as well as providing it with the increased strength required for earthquake protection.

Innovative use of tower crane sections

In the construction of the new Clock Tower, the precast panels were hung from tower crane sections that acted as a scaffold frame whilst the panels were joined and anchored together providing a truly innovative solution to a common issue. Use of clip-on and cantilever scaffolding was also used during this process.

The Use of ECI

The ECI approach adopted on this project has truly enabled project team to affect the methodology used and the solution delivered to reinstate the Clock Tower in a truly innovative way. Maintaining stakeholder engagement with the general public, power companies and local businesses enabled the team to accommodate an improvement in utilities services to Palmerston North CBD as well as reinstating the Clock Tower safely and productively.





Key principles for repetition

- Use of early contractor involvement to mitigate against risk
- Consider future proofing for utilities
- Managing key stakeholder relationships especially with iconic structures
- Keep open minded when traditional solutions are not appropriate
- Pre-planning is critical to mitigate against significant risk and manage expectation
- Capture & share the innovative practice

Key Lessons & Possible Improvements

Key lessons to take forward from this project have been identified as:

Importance of communication & pre-planning:

ECI was critical to the delivery of this project enabling improved project team buy-in and communication as well as managing and mitigating risk before starting on-site.

How setting the methodology can drive innovation:

The approach and methodology adopted by the team enabled a continuous process of review and evaluation between the project team participants that drove innovative solutions such as the revised foundation work, the use of pre-cast panels and the tower crane sections to hang the panels from in the construction process.

Sequential design & build-ability planning enabled time savings:

By being able to plan and manage sequentially has driven time and cost savings on this project. It also enabled aspects of the project to be undertaken in parallel with each other which also provided associated savings.

The importance of stakeholder management:

This was critical in engaging with the Hopwood family with regards to the renovation of the Clock Tower and with the general public and power companies in the delivery of the project.

Conclusion

The Hopwood Clock Tower renovation project has provided a great example of how significant risks can be managed and mitigated by involving the project team early in the project decision making process. This enables the project team to utilise their experience and expertise in developing a successful and innovative solution and methodology for the construction process. This project has been a good example of how clients can effectively use Early Contractor Involvement to utilise the experience and expertise of their construction supply chain partner earlier in the project decision making process.

Rob Cuff, Project Manager at Palmerston North City Council, commented *"We are delighted with the outcome of this project and with the approach of the project team. ECI has certainly made a difference and we have subsequently used this approach on other projects. It has helped a great deal and highlights the importance of getting the build-ability methodology agreed before starting on site. The public response has been positive and the Clock Tower is an important local icon that sits in the heart of the City Square regeneration scheme."*



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