HOPWOOD CLOCK TOWER – ECI ENABLES INNOVATION

The team that successfully refurbished the Hopwood clock tower used early contractor involvement (ECI) to minimise risk and drive innovation in this landmark Pathfinder project in Palmerston North.

By Peter Cunningham, Chief Executive, Construction Clients' Group

Local businessman Arthur Hopwood donated the original clock tower in Palmerston North's city square in the 1950s. It was built to house the clock from the Main Street Post Office tower. During the recent refurbishment of the city square, the clock tower was assessed against the current Building Code, and significant strengthening and refurbishment was found to be needed. This $1.7 million refurbishment was successfully completed in 2007.

The project involved removal of the crown of the tower, renewal of the weakened columns and foundations and reinstatement works. Palmerston North City Council used early contractor involvement (ECI) to proactively manage out the potential risks, such as space and time constraints, general public and site safety, power and gas to the CBD running underneath the tower, and local stakeholder engagement.

As part of the ECI process, local contractors McMillan & Lockwood were appointed for their experience and expertise in undertaking similar refurbishment and structural strengthening work.

Preplanning mitigated risks

Preplanning was crucial 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 it began on site.

Workshops engaged the client and all members of the project team. They considered all risks and established a risk minimisation strategy that aided buildability. These meetings continued on a weekly basis and encouraged shared ownership and a team environment throughout the project.

As part of the preplanning, Barry Robbin, project manager for McMillan & Lockwood, took the team to Massey University where he had been involved in a similar design and an aluminium frame had been used successfully.

This commitment to preplanning enabled the team to use the lessons from previous projects to help develop the methodology used on the clock tower refurbishment.

Overcoming complexities

The project team encountered several complexities during the project. Two rooms in the basement of the clock tower housed an 11 kV power substation and a high-pressure gas-reduction system. Both utilities supplied gas and power to Palmerston North's CBD, so there was a significant risk of power outages to businesses and the local community.

The original piling solution to strengthen the foundations had to be modified, and there were difficulties in transporting the piling equipment to an already space-constrained site. To counteract this, the basement was demolished and a wooden structure created to protect the utilities during the rebuilding process. A raft slab design was then used to build the new foundations for the tower.

Tower crane sections acted as a scaffold

Following an assessment of the existing structure, it was decided that the clock tower needed to be demolished and renewed. The ECI process was used to identify the most appropriate methodology. The prefabricated section solution chosen saved money and shaved up to 6 months from the timeframe.

The precast sections were hung from tower crane sections constructed on the inside of the tower and acted as a scaffold as the new panels were put in place and sealed. Constructing the tower from the base to the top section took 3 weeks.

Hopwood clock tower before refurbishment (top) and afterwards (bottom).

Using tower crane sections enabled the team to deliver this solution safely, quickly and cost-effectively. The tower crane sections were removed after construction.

The original 35-tonne lantern section was cut away from the original structure. The lantern was then renovated using LED lights and self-cleaning glass before reinstating this iconic structure.

ECI delivered innovative and safe solution

The ECI approach enabled the team to reinstate the clock tower in an innovative, safe and productive way. Maintaining stakeholder engagement with the general public, power companies and local businesses also enabled them to accommodate an improvement in utility services to Palmerston North's CBD.

Rob Cuff, project manager from Palmerston North City Council, was delighted with the approach taken. He says it highlights the importance of getting the buildability methodology agreed before starting on site. The council has subsequently used ECI on other projects.

Some key innovations

Preplanning and setting the risk mitigation methodology enabled the project team to develop the most appropriate methodology and to understand and contribute to the risk identification process. This encouraged shared ownership and individual accountability of risk – an approach that works well where risks are high.

Because of time and space constraints, prefabricated panels were chosen for the new tower section. Off-site manufacturing minimised health and safety issues and improved productivity on site. The precast sections maintained the shape of the structure and provided the increased strength required for earthquake protection.

An innovative solution to a common issue was to hang the precast panels for the clock tower from tower crane sections. These acted as a scaffold frame while the panels were joined and sealed. Clip-on and cantilever scaffolding was also used during this process.

Success factors

The early contractor involvement approach adopted by the team facilitated:

- communication and preplanning, including improved team buy-in, plus management and mitigation of risk before starting on site
- continuous review and evaluation between members of the project team, which drove innovative solutions such as the revised foundation work and the use of precast panels
- sequential planning and management, which drove time and cost savings and enabled several aspects to be undertaken in parallel
- stakeholder management including engaging with the Hopwood family, the general public and power companies.

The Hopwood clock tower renovation project has provided a great example of the benefits of ECI and how significant risks can be managed and mitigated by involving the project team in early decision-making. This enabled them to use their experience and expertise in developing a successful solution and methodology for the construction process.

Project	Hopwood clock tower refurbishment
Client	Palmerston North City Council (Rob Cuff)
Structural engineer	David Smart Consulting (David Smart)
Architects	Craig Craig Moller Architects
Contractor	Higgins (Ray Edwards)
Specialist contractor	McMillan & Lockwood (Barry Robbin)
Region	Palmerston North
Sector	Public building
Final contract value	$1.7 million
Tender	Early contractor involvement
Construction timescale	August 2006–March 2007
Form of contract	NZS 3910

Precast sections being put in place.

Replacing the renovated lantern section.

KEY INNOVATIONS

- Preplanning and setting the methodology to address risk mitigation.
- Use of off-site manufacturing.
- Innovative use of tower crane sections.

KEY LEARNINGS

- Communication and preplanning key to success.
- Setting the right methodology can drive innovation.
- Sequential design and buildability planning enabled time savings.
- Stakeholder management very important.