The Norman River Bridge, Fully Integrated Alliance Contract

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**Introduction**

The existing single-lane bridge over the Norman River at Normanton was in a state of rapid deterioration when the Queensland Minister for Main Roads and Transport announced in December 1998 that a new bridge would be in place by the start of the wet season in the following year, that is, within twelve months.

To meet the tight time frame set by this political imperative, Queensland Department of Main Roads took a pioneering approach to infrastructure procurement by adopting a fully integrated alliance contract with a private sector construction company.

Barclay Mowlem Construction Limited, selected as the alliance partner, were highly experienced with private sector alliancing contracts such as the Comalco Bauxite Upgrade Project at Weipa.

The design and construction of the bridge itself was not unique – what was remarkable about the project and what made it a success was the adoption of the alliance contract, the individuals who were involved in making it work and the relationships among them. This case study looks at how the key performance indicators of time, cost and quality can be achieved by non-traditional delivery methods.

**Definition of a Project Alliance in the Construction Industry**

In a project alliance, the participants (client, designer, contractor and so on) form themselves into an integrated team to deliver the project.

The alliancing approach to construction projects is intended to align the objectives of the project and the commercial objectives of the parties in a collaborative relationship to create an environment of co-operation, respect and trust. Rather than focusing on reasons for non-performance as is the case in conventional contracting, the essence of alliancing is performance as a total team responsibility.

Some aspects of alliancing are:

- The establishment of a single integrated team where people are selected on a ‘best-for-project’ basis regardless of employer.
- Project direction provided by an alliance board comprising equal representation from each alliance participant.
- A non-adversarial team culture which engenders a commitment to common objectives and outcomes, mutual trust and respect.
- Commercial structures which provide for payment of direct costs as defined in detail in the contract.
- A willingness to share profit and losses. Overall financial rewards are determined by performance, with incentives for meeting quantifiable performance indicators such as savings in time and money.

Successful alliancing is heavily dependent on the individuals involved and the spirit within the team. However, the commercial drivers are ultimately important in project success. Issues such as risk allocations and remuneration directly affecting
the parties’ bottom lines are used to encourage co-operation. Adjustment of these commercial drivers should be provided on very limited grounds only.

**The Project Background**
The Gulf Region of far north western Queensland makes a significant contribution to the State’s economy through the mining, live cattle export, prawn fishing and tourism industries. The Normanton-Karumba road is a strategic route which services these industries and links the region’s interior with the Port of Karumba on the Gulf of Carpentaria.

The Norman River Bridge is a vital link in the transportation network for road trains and other heavy transport vehicles to deliver their loads to the port. The bridge provides the only crossing of the Norman River during the wet season.

The original single-lane six-span bridge was opened to traffic in 1967 but suffered a partial failure in 1972 and became the subject of many inspections from that time. The volume of commercial vehicles using the bridge continued to increase and it was found that road trains and semi-trailers were producing effects in excess of the design load. The rapidly deteriorating state of the existing bridge meant that the structure was in danger of catastrophic failure in flood conditions.

On 8th December 1998, at the beginning of the northern wet season, a load limit of 80% legal axle loads was imposed on bridge users and the Minister for Transport and for Main Roads, the Honourable Steve Bredhauer announced the construction of a new two-lane bridge, and approaches, for completion by December 1999. In the meantime, a temporary Bailey Bridge was installed and the loading restriction removed.

**Project Summary**
The Alliance Contract between Barclay Mowlem and Main Roads pertained to the bridge structure only. The approach roads were procured under a separate contract. The bridge is a concrete structure using both insitu and precast systems. It is 144 metres long, and two lanes wide with a pedestrian walkway on one side.

The final construction value of the bridge was $4.6 million. The construction phase took five months, with completion 17 days ahead of schedule. All parties interviewed agreed that teamwork, communication and management all contributed to the early completion of the project.

**Client Business Needs**
The constraints placed on the Department of Main Roads are summed up by the following excerpt from the Parliamentary Public Works Committee Report.

“Given the state of the old bridge and the increased demands for access Main Roads was forced to replace the structure as a matter of high priority. The challenge for Main Roads was to find funding for and complete the planning, design and replacement of the bridge structure, as well as the
planning, design and construction of the approach road works before the
1999 wet season.

Known minimum timeframes for planning and native title and cultural
heritage negotiations meant that construction could not begin until mid-
1999, reducing the construction period to about five months.”

The alliance contract delivery method was chosen for the Norman River Bridge in
order to accelerate pre-construction negotiations and the procurement and
construction processes. The alliance approach enabled the project team to run
various aspects of the project concurrently thus saving time.

**Procurement Process**

The main features of the procurement process were as follows:

- The procurement process for the bridge involved a series of workshops to
  select the alliance partner. Each stage of the selection process was evaluated
  by a panel which included an independent expert party. A probity auditor
  was present during all panel sessions and at the structured interview
  workshops.

- Invitation to the first stage was open to all bridge contractors pre-qualified by
  Main Roads at a high level. Two contractors were short-listed in the second
  stage. Stage three included a structured workshop with each of the
  prospective alliance partners. Barclay Mowlem was selected on the basis of
  their demonstrated skill and experience in the alliancing approach.

- An independent industry expert was appointed by Main Roads to review the
  target cost estimate. Due to the evolving nature of the project, this was
  finalised only days prior to start of construction.

- Alliance governance was provided by a project alliance board made up of two
  senior representatives each from Main Roads and Barclay Mowlem
  respectively. This meant that control of the project was the responsibility of a
  “virtual” organization which was a separate entity from either the Department
  of Main Roads or Barclay Mowlem Construction Limited. Standard
  conditions of contract were replaced by a purpose-written Project Alliance
  Agreement. The four-person board met on site monthly and all board
  decisions had to be reached unanimously.

- Performance was attached to a risk/reward regime agreed by the alliance
  participants to achieve their mutual goals. Performance was rated monthly
  against key criteria, such as savings in time and money. Meeting these
  criteria translated into financial reward for the alliance partners.
Pre-alliance phase

It was recognized that the success of the project would depend largely on the ability of the client and contractor to work together, and the contractor’s competence in the field of alliancing. An independent facilitator worked with the Department of Main Roads and prospective alliance partners to create a learning environment.

Barclay Mowlem’s track record of successful alliance contracting in the private sector fulfilled one of the selection criteria which led to that company’s appointment as Main Roads’ partner in the Norman River Bridge Alliance.

Personnel for the project from both Main Roads and Barclay Mowlem were assessed and selected on their capacity to work co-operatively and pro-actively and to resolve issues in a non-adversarial way. This approach from the outset meant that those involved understood the challenges of the project. All parties were called on to apply their knowledge and skill and at the same time were required to question many traditional practices. For Main Roads personnel with no previous experience in an alliance environment, this required a cultural change from the conventional “them and us” approach.

The alliance was built on a “best for project” approach which required substantial will and enthusiasm on the part of the participants. The composition of the on-site project team was based on experience and personality traits suitable to a collaborative approach in a dynamic environment. Both the Project Manager and the Site Engineer were Main Roads personnel, while the Site Superintendent and the Foreman were from Barclay Mowlem. The labour force was supplied by Barclay Mowlem.

During the pre-alliance phase, the Project Alliance Agreement was formulated under the guidance of an external project management consultant. An interim agreement allowed the proponents to work together to resolve project requirements. During this interim period, direct costs to the contractor were reimbursable.

![NORMAN RIVER BRIDGE ALLIANCE ORGANISATIONAL CHART](image-url)

Fig. 1. Organisational Chart.
Pre-construction phase
Due to time constraints, it was essential that pre-construction activities took place within an effective time frame. As well as the planning and design of the bridge and approaches, it was necessary to set the process for land acquisition in train. At the same time, Main Roads developed an Environmental Management Plan, and a Cultural Heritage Management Plan which was developed in conjunction with traditional owners.

In terms of indigenous cultural heritage, one side of the river at the proposed site was deemed disturbed land with little traditional cultural heritage value. The greater portion of this site was undisturbed. However, European cultural heritage requirements were of significance. As a result of community consultation, it became clear that the proposed bridge and approaches would need to be located upstream of the site originally chosen. The community wanted to retain historical features such as the mooring sites in the river, the jetties where supply barges docked and a culvert built of hand-sawn stone. A boat ramp with significance to the community would also have been removed and replaced in a new location if the alignment which was originally proposed was adopted.

Main Roads designers commenced work on the design of the bridge soon after the announcement of the new bridge was made. As with any bridge project, the Main Roads design team’s main objective was to provide a structurally sound and functional facility. However, the river was in flood during the early design phase and it was not practicable to carry out geotechnical investigations until the floodwaters subsided. Assumptions had to be made at the outset in order to progress the work. Once tests were able to be carried out, it was necessary to radically change the substructure design to suit the foundation conditions.

The interim Project Alliance Agreement allowed Barclay Mowlem and Main Roads to work together to develop a design which was best for purpose and best for the location. The Alliance was able to identify alternative ways of overcoming site constraints and keeping costs down. The initial design had been more expensive to build than the final design.

Once the target cost estimate was finalised and agreed upon, the project team was charged with delivering the project for that price. The project commenced on site on 6th July 1999 immediately following proclamation of the resumption of the land in parliament.

Construction Phase
As well as having a compressed time frame, the construction phase was characterised by the physical constraints of building on water using floating plant. In addition, the Norman River is inhabited by estuarine crocodiles which presented a novel health and safety issue for the alliance.

Once on site, project team members were initially uncomfortable with the project reporting lines. However most adapted to the alliance concept readily. Practical
application of the concept helped those involved to understand the issues. A member of the Project Alliance Board acted as primary coach for the Project Manager to enable him to function effectively in the Barclay Mowlem system.

The Project Manager was directly accountable to the Board, answering to Barclay Mowlem and Main Roads senior staff. He had total control over the contractor’s workforce as well as financial delegation over Barclay Mowlem’s purchasing system. Under the Project Alliance Agreement he prepared and submitted progress claims and variations.

One key member of the on-site project team who was reluctant to embrace the alliance concept had not been a participant in the pre-alliance workshops. Other team members felt the project would have derived further benefit if this team member had been included in the workshop environment.

The project environment and time constraints meant the project team had to proactively look for better ways to do things. The alliance framework supported the project team to resolve certain issues more efficiently. Issues which would have been dealt with in a sequential way on a project with a longer time frame were dealt with simultaneously on the Norman River Bridge project.

For example, potential acid sulphate soil from excavation of pile liners was a latent hazard which required the project team to come up with a preventative measure in a matter of days. The alliance sought a “permit to pollute” from the Environmental Protection Agency for disposal of potential acid sulphate soil. Due to the project’s priority status within Main Roads, this was able to be expedited. In the meantime, the project team’s solution was to dispose of the soil at the bottom of the stream as soon as it was excavated in order to avoid oxidization of the sulphate and thereby maintain water quality with no danger to marine life.

Throughout the project, a high level of trust existed amongst the team members. Team chemistry was reflected in the collaborative style of conflict resolution. In comparison with conventional contracting, many areas of potential dispute simply did not arise because both parties were involved co-operatively rather than in adversarial positions.

The Project charter provided an excellent tool to measure performance against objectives throughout the project. Actual outcomes were assessed against clearly set out desired outcomes and required outcomes on a monthly basis.

**Project Outputs – indicators of success**
The Norman River Bridge was completed 17 days early on 22nd November 1999. The project was delivered within the target cost estimate, and the private sector alliance partner collected an early completion bonus.

Management and involvement of major sub-contractors can significantly impact on alliance outcomes and the ability of the alliance team to control the outcomes. Had
the major piling subcontractor been selected along project alliance lines rather than on traditional competitive tendering lines, further favourable outcomes in respect to both relational and financial issues may have resulted for the alliance partners. For example if the subcontractor been an integral part of the “team” the contractor’s early completion bonus may have been higher.

Overall it is perceived that the level of satisfaction with the project is very high from the point of view of all stakeholders. Both alliance partners are happy with the project outcome. The completion of the bridge averted large-scale inconvenience to the local communities and prevented major financial losses to other major stakeholders – state export industries and the transport industry.

Conclusion
Because of the urgent nature of the bridge project, Main Roads considered an alternative delivery process. The conventional delivery process requiring documentation, and tendering carries a time penalty which was not sustainable by the requirement for completion within the year. The alliance approach also had the advantage of allowing Main Roads a greater ability to vary the scope of work than a conventional process would have allowed as well as reasonably flexible access to the contractor’s resources.

Alliance contracting is not new but this was the first time it had been undertaken by Queensland Department of Main Roads and a private sector construction company. A Public Works Committee held an enquiry into the procurement of the bridge and concluded that value for money had been achieved. The parliamentary committee were satisfied with the procurement methods used in the project and with the balance of public and private sector involvement for the work.

The Public Works Committee of enquiry into the Norman River Bridge investigated whether the project delivery method led to increased project costs and concluded that while they were of the opinion that a premium had been paid, this should be considered positively in the light of the fact that there were no claims on the project. The costs were broadly comparable with a similar bridge project in a remote area, undertaken by traditional delivery method. While overall rates on this project were lower than the Norman River Bridge project, it was likely that contract variations and the possibility of claims would result in similar overall project costs.

The research on this case study has also pointed to the selection and engagement of major sub-contractors as a weak point in the delivery process. Supply chain relationships are often the key to achieving the traditional performance indicators of time, cost and quality. Given that the accepted process for spending public funds involves open competitive tendering against prescriptive conditions it may prove difficult for the industry and the public sector to embrace alliancing as it may pertain to sub-contractors.

A survey of some of the project participants indicates that both previous experience and continuity of team members contributed to overall project success. Those
project participants surveyed felt that attendance at pre-alliance workshops are imperative not only for project team members but also for senior executives who are likely to make up the membership of Project Alliance Boards. Alliancing concepts are complex and demand a paradigmatic shift in approach for proponents used to an adversarial culture.

Fig. 2. Flow Chart – Project Development.
Appendix A

Comparison with previous studies
The T40 study and the CSIRO report on construction re-engineering identified the attributes which are needed to make the quantum change to re-engineered process. The comparison between these case studies and the Norman River Bridge project is summarised in the following tables.

T40 (Ireland 1994)

<table>
<thead>
<tr>
<th>Success factors</th>
<th>Comment on applicability to Norman River Bridge</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agreed common goals</td>
<td>Client and contractor understood and supported each other’s objectives.</td>
</tr>
<tr>
<td>Simplified process</td>
<td>Client and Contractor formed an alliance. The alliance board established a single point of accountability.</td>
</tr>
<tr>
<td>Re-engineered activities</td>
<td>Project team members appointed on a best for project basis e.g the Project Manager was Main Roads personnel with full control over builder’s workforce and purchasing.</td>
</tr>
<tr>
<td>Workforce commitment</td>
<td>All alliance participants very highly committed to project. Subcontractor not part of alliance team was less committed.</td>
</tr>
<tr>
<td>Partnering with local government</td>
<td>Client consulted with local community and local government closely during project initiation period.</td>
</tr>
<tr>
<td>Tendering on benchmarking</td>
<td>Alliance partners selected on the basis of various criteria.</td>
</tr>
</tbody>
</table>

CSIRO (Mohamed and Yates 1995)

<table>
<thead>
<tr>
<th>Success factors</th>
<th>Comment on applicability to Norman River Bridge process</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strong commitment by the team to improving design and construction workflow</td>
<td>Key project team members highly committed to project development, resolution and completion. Encountered scepticism from team member not involved in early alliance workshops.</td>
</tr>
<tr>
<td>Effective communications between major project participants</td>
<td>Project Manager was key to communications. Board met on site monthly. All board decisions unanimous.</td>
</tr>
<tr>
<td>Positive involvement of customer at early stages</td>
<td>Client heavily involved with design team. Excellent user input. Requirements identified and implemented at planning stage</td>
</tr>
<tr>
<td>Quality assurance techniques</td>
<td>Applied during all stages. Value adding attitude rather than a checking mentality.</td>
</tr>
<tr>
<td>Encouragement of innovation</td>
<td>Main Roads lay groundwork for innovation. Contractor provided expertise in alliance project delivery system</td>
</tr>
<tr>
<td>Improved construction output</td>
<td>Project completed ahead of time.</td>
</tr>
</tbody>
</table>

Appendix B

At the Queensland Premier’s Awards, November 2000, the Norman River Bridge Alliance received the an award for Excellence in Public Sector Management in the category Innovation and Productivity.
References
Legislative Assembly of Queensland, Public Works Committee Report No.66, The Norman River Bridge.
