Re-engineering the construction delivery process
Pacific Motorway, Package Two: A Case Study

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Introduction

The Pacific Motorway Project is the largest project undertaken by the Queensland Department of Main Roads to date. Six major construction contract packages were let within a short time to completely rebuild a 43km stretch of the highway, six or eight lanes wide, between Brisbane and the Gold Coast, without closing to traffic. The intensive work program was carried out over four years from 1997 to 2000. The initial overall project target cost was $630 million.

Each package was designed and documented, and tendered along traditional contracting lines, using the client’s standard contract package based on AS2124. The Project proved to be extremely complex. As the Project and each major package progressed on site, the Main Roads Department identified some inadequacies between the standard contract system and the complex task in hand. Once the problems became apparent, Main Roads moved quickly to address the effects of deteriorating contractual relations by establishing a Relationship Management Unit.

This case study looks specifically at Contract Package Two to illustrate the nature of the overall project complexity and how the contract was successfully delivered.

Data for this report has been collected through questionnaires and interviews with the personnel from the three main parties to the contract, and the designer, and from a paper presented by Mr Alan McLennan at the CIIA Fifth Annual Conference in Brisbane on 11th October 2000 entitled “Relationship Contracting: The Main Roads’ Perspective.”

Project background

Size and scale

Package Two extended from Yatala to Pimpama and comprised approximately twelve kilometres of eight lane motorway, retrofitted to an existing highway corridor carrying 85,000 vehicles per day. The final package cost was $135.4 million. The pre-tender estimate was about $100 million; the original contract sum was $90.7 million.

The main components of the construction contract for Package Two included:

- Temporary works to maintain traffic flow,
- Earthworks and drainage,
- Low maintenance pavements – granular, asphalt and concrete,
- Four interchanges,
- Eleven bridges, including an 80 metre, four span bridge over Pimpama River,
- Barriers, lighting and landscaping, and
- The service road system.

Stakeholders

The three parties to the main contract were:

- Principal: Queensland Department of Main Roads
- Contract Administrator: Egis Consulting Australia Pty Ltd.
- Contractor: Leighton Contractors Pty Ltd.
Other stakeholders were:

- PPK Environment and Infrastructure Pty Ltd were planning consultants.
- SMEC Australia Pty Ltd. was the principal design consultant.
- Pavements were designed by the design section of Main Roads Transport Technology Division.
- Tract Consultants Australia were the landscaping consultants, sub-contracted to SMEC.
- Residential and business communities along the route of the project. An Impact Management Plan (IMP) was devised and became the Department of Main Roads’ “contract with the community”. It set targets for environmental impacts, community relations, safety, industrial relations and so on.
- Public Utilities service providers of water, gas, electricity and telecommunications, sewerage and stormwater.
- Workforce. Industrial Relations were managed by an Industrial Agreement which was set up at the outset of the project.

Procurement Method

The Pacific Motorway Project was unique in the history of the Queensland Department of Main Roads, and was procured using a traditional schedule of rates contract, with general conditions of contract based on AS2124. The Department of Main Roads is an experienced and respected industry client and had used this contract form successfully on many typical road construction projects. However, this Project was complicated by a number of complex issues:

- Severe time constraints at all phases – the political imperative dictated a time frame of four years from conception of the project to completion. By comparison, the Victorian Government counterpart VicRoads undertook a similar volume of work over a nine-ten year programme.
- Land resumption settlement conditions.
- Major service relocations along the highway corridor. Lead times required to carry out relocations, some of which depended on the new work being completed first, inevitably impacted on work flow. The cost of relocating services along the entire route was about $45,000,000.
- Full construction under heavy traffic. 85,000 vehicles per day used the highway. Two lanes of traffic traveling at 80kmh operated during daylight hours.
- Extensive interaction was essential with residential and business communities along the length of the project.

The magnitude of the overall project coupled with the demanding time constraints imposed by the political imperative, presented the Main Roads Department with particular constraints in the approach they could take to procuring the motorway project. It was obvious that no one contractor could build the entire Project and that it would be essential to break down the scope of work into more manageable packages.

Alternative procurement methods such as Design and Construct were considered at an industry workshop held during the planning phase. However, it became obvious that the schedule of rates approach would allow the Main Roads Department to maintain the most control over the end product. In order to deliver consistent results in design terms along the length of the entire Motorway route the
Client needed to be able to specify standards not only for alignments and lane widths, but also for lighting, vegetation and landscaping, crash barriers, acoustic barriers, signage and so on. The need for consistency and the time factor formed the basis of Main Roads’ decision to procure the Pacific Motorway Project by the traditional lump sum method.

The Project was broken into six major packages. Numerous contracts were also tendered for discrete elements of the Motorway. Tendering for major contract packages involved a two stage process.

Stage One involved ‘prequalification’ procedures for contractors who expressed interest in tendering for these packages. Due to the risks involved with such large packages, builders’ financial capacity to undertake $100m+ projects were assessed as part of this process. As a result, six contractors were prequalified to bid on the available packages in the second stage of the tendering process.

The prequalification process resulted in highly competitive tenders being received for all major packages of the Project. Leighton Contractors were the successful tenderer on Package Two.

Risk Management

Historically, when dealing with typical infrastructure projects, the Department of Main Roads has transferred significant risks to contractors through traditional forms of contract. Main Roads’ personnel, and contractors are highly familiar with the schedule of rates process. Though the Pacific Motorway project presented a much more complex situation, Main Roads’ sophisticated risk management services meant that the risks were not unknown to tenderers before they prepared bids. In the extremely competitive Australian construction market, contractors may adopt various strategies in their attempts to win the job.

Pre-tender phase

The pre-contract phase was undertaken in a very restricted time frame. Initial planning work on the Motorway Project as a whole was carried out by PPK Environment and Infrastructure over a period of a year and included:
- Preparation of concept design
- Review of environmental factors
- Initial community consultation, and
- Definition of scope of work.

The Impact Management Plan, which became the Main Roads’ contract with the community, was produced during this planning phase.

SMEC Australia Pty Ltd were engaged for the detailed design of Package Two. Consistent with the project as a whole, consultants were under extreme time pressures from the outset. As an example, the design engineers had only three weeks from the time of commissioning to submit a review of the original planning study in order to identify any deficiencies in the planning.

By that stage, design for Package Three had already commenced by another consultant. SMEC’s review included preliminary estimates on this design and identified a shortfall between the budget and Main Roads’ planning layouts. As a result, design standards were reviewed for some aspects of the overall works. No compromise was allowed on standards for pavements and alignments.
Construction phase

The enormity of Pacific Motorway Project, with six major projects under construction at the one time inevitably created some difficulties in co-ordination. Some delays in decision-making on individual projects were perceived by some participants as lack of delegation, and as non-collaborative.

For example, as Package Two progressed, the parties to the contract faced various difficulties which complicated their interrelationships and positions. From the contractor’s point of view, these were unscheduled delays, inadequate documentation and a non-collaborative approach by the Principal’s personnel. From Main Roads’ perspective the failure of the contractor to deliver the specified quality product was a major cause of frustration.

The following factors occurred during the delivery of Package Two and combined to place heavy strain on the project objectives:

- Relocation of Public Utilities Plant along the route was not completed before construction commenced. However, this is an oversimplification as some relocations were dependent on construction being completed.

- Wet weather. Above normal rainfall was experienced during the construction period. The extension of time clause in the contract was invoked each day rainfall in excess of 5mm was recorded. This amounted to 105 days.

- Documentation. Numerous claims were related to a perceived lack of documentation. The adequacy of the documentation has not been ascertained by this research, however a feature of the project which caused contract management difficulties was the perceived long lead time in turning round the contractor’s design queries. The Contractor saw the RFI process as preventing direct dialogue between themselves and the principal designer. However, the RFI process was set up to handle queries and resolve them at appropriate levels, cost effectively. Some more complex issues took five to six days to turn around. Requests for information followed a process from the Contractor to the Contract Administrator, to the Main Roads Major Project Division to the Transport Technology Design Manager to the Design Consultant, and then back again. The contractor did not have open access to the designer for reasons of project control as well as to maintain the cost of consulting. According to Main Roads’ information, the volume of RFI’s on Package Two may have seemed to be high, but relative to the magnitude of the contract it was no higher than for more typical contracts. Many RFI’s were contractor generated and not a result of inadequacies in design and documentation.

- Contractors were concerned that temporary works for the maintenance of traffic flow were designed by the consultants rather than by the contractor who actually had responsibility for traffic management. However, if this had been a concern at the outset, contractors were within their rights to submit an alternative tender. Main Roads were concerned that the quality of materials used in temporary
pavements was inadequate to meet project specifications and sought rework when necessary.

These circumstances led to the project increasingly becoming characterised by deteriorating contractual relations. Alan McLennan (2000) notes that the traditional form of contract emphasises the separation of the roles of the contract parties and when used in complex circumstances, encourages the maximisation and protection of individual positions. This in turn leads to self-serving behaviours and adversarial relations. Factors which clearly indicated a worsening of the situation were:

- Registration of a large number of variations, claims, and issues.
- High quantity and tone of correspondence.
- Parties were taking actions to maximise individual positions.
- Dealings between protagonists were negative.

The strategy of using the traditional schedule of rates form of contract on the extremely complex Pacific Motorway project, while based on the necessity to maintain consistent standards, had created a confrontationist project climate in which a high level of conflict was likely to develop, with consequent adverse effects on budget and schedule.

**Department of Main Roads’ initiative to embrace Relationship Management philosophies**

Deteriorating relationships between the parties on the Package Two contract developed over eighteen months. Ongoing antagonistic dealings between the Principal, Contract Administrator, and the Contractor were being experienced. Similar difficulties were being experienced on some other Pacific Motorway contracts.

In response, Main Roads established a Relationship Management Unit under the direction of a senior officer who reported directly to the Director-General. The purpose of the Unit was to:

- strengthen relationships as the first step in addressing all the contractual issues.
- reinforce commitment by all parties to these goals, and to
- focus on project delivery.

In the management of Package Two, the Unit was involved in routine facilitation. Although the Unit stood outside the contract and outside the project organisation, it played an increasing role in facilitating the process for resolution of issues and disputes. The Unit worked to establish a partnering agreement on Package Two and used monthly follow-up meetings to work on relationships before turning the focus on to dealing with the prevailing contractual issues.

**Relationship Management**

Following the creation of the Relationship Management Unit, the Package Two contract progressed toward a successful project outcome. Monthly relationship management meetings were held from April 1999 and June 2000. Commitments were made and agreed by the participants to the principles of communication exchange, resolution of issues, review of progress and mutual understanding. Over the course of ten successive meetings, proponents experienced a marked degree of
change in quality of relationships. The style of conflict resolution moved to a more collaborative approach. Similarly, the level of trust experienced between the parties improved significantly.

As McLennan (2000) points out, the achievement of project goals and objectives still depends on the effectiveness of the rational project management procedures, but underpinning the success has to be strong cultural forces working between the people of all parties and stakeholders. He suggests that open communications, effective sharing of information, co-operation, trust, commitment and positive expectations are all pre-requisites for successful project delivery regardless of the type of contract used.

Achieving these attributes called for a radical change in culture in the project environment. The subsequent positive influence on dealings between the parties to the contract was welcomed by all concerned.

Project Outputs — Indicators of Success

The Department of Main Roads established a “Learnings” group almost immediately the contract was completed. The Learnings project is not due for completion until July 2002, however findings are progressively being incorporated into Main Roads policies, procedures, processes and specifications.

Time

Despite the problems which were experienced on Package Two for the first eighteen months of the program, and the weather conditions, the contractors completed the project earlier than the date for Practical Completion. The tender was originally awarded to Leighton Contractors on 19th December 1997 and the original date for Practical Completion was 18th November 1999. Due to wet weather the date was adjusted to 21st March 2000. The actual date for completion was 24th February 2000. The project took 26 months instead of the originally projected 23 months.

Cost

The final project cost was $135 million. The Department of Main Roads’ pre-tender estimate for Package Two was about $100 million.

Quality

The overall level of satisfaction with the project felt by the client organisation at project completion was high. End users are extremely satisfied with the outcome. Consultants and contractors achieved an average level of project satisfaction. One measure of quality used on projects such as this is the quality of the pavement ride to the user. The Contractor achieved a high quality ride for highway users. The contract included a quality bonus as a performance incentive.

Issues highlighted by this case study

One size does not fit all

This case study highlighted the problems associated with the traditional contract type to cope with complexities presented by such a major infrastructure project. Also the contracting environment has become very complex and traditional
delivery systems are not always optimal in achieving good results across financial and delivery performance requirements, and in addressing the diverse needs of stakeholders. The adoption of the Schedule of Rates Contract and AS2124 had the effect of creating a culture of blame and low trust.

Risk

The risks were not unknown to contractors at the time of tender. Tenderers had the option of submitting alternative tenders if they identified unacceptable risks. However none of the prequalified tenderers took this up, all submitting conforming tenders.

Given that the Department of Main Roads’ contracting environment will continue to increase in complexity and stakeholders will be more numerous and sophisticated, the philosophy of transferring risk will need to be reevaluated. Embracing risk within a co-operative working relationship will be an essential element of any new contracting culture.

Documentation

In order to ensure adequate documentation is provided to contractors, design and documentation of highly complex projects requires adequate time to prepare. The design period was very tight for a project of this magnitude. The constricted time frames allowed little time for review and amendment of documentation. This is an area where government requires more discipline in allocating adequate timeframes.

Rewards for performance

The bonus provisions in this case were weighted to time management. Projects such as this may also benefit from performance bonuses in other areas such as environmental management, traffic management, safety management and so on. The contract for Package 2 included a bonus for early completion. Extenuating circumstances such as wet weather and public utilities plant delays saw the bonus achieved by the Contractor as part of a negotiated settlement with the Principal.

Relationships

McLennan (2000) points out that in a project of the magnitude of Package Two, and the broader Pacific Motorway Project, interactions between people are so numerous and so significant that relationships become central to the delivery process. The effectiveness of relationship management processes in assisting the delivery of the Pacific Motorway Project proved to be a significant learning opportunity for the Department of Main Roads. This experience and the impressive results from the alliance contracting pilot project, the Norman River Bridge, has paved the way for the Department to consider appropriate alternative solutions to the procurement of complex projects.

McLennan nominates the key attributes of any relationship contract as:

- Primary focus on project vision, mission, goals and objectives.
- Win:win:win outcomes for all parties.
- An established relational environment which emphasizes openness, trust and co-operation between all project people.
- Innovative contractual arrangements.
- Client leadership role.
• Access to and contribution by the best resources of each party.
• A clear understanding of individual and collective responsibilities.
• Measurement of the success of the project by key performance indicators.
• Equitable risk/reward balance that aligned the commercial interests of the parties.

He goes on to nominate five essential elements of relationship contracting packages appropriate to complex civil engineering contracting situations:
1. Alignment between contract provisions and relationship processes.
2. Partnering process to establish a co-operative single team approach.
3. Relationship skills, attitudes and values which support partnering.
4. Leadership, drive and commitment to review, evaluate and improve processes.
5. Celebration and praise; recognition of effort.

Conclusion

Prior to the intervention of the Department of Main Roads Relationship Management Unit, morale and relationships between major stakeholders on Package Two were suffering under the pressures of delivering a major project under severe time constraints. Quality on a major highway project such as this was never open to compromise.

The intervention of the Relationship Management Unit was seen as a proactive initiative which assisted the achievement of a successful outcome.

As the Queensland Department of Main Roads work becomes more complex and the expectations of the community higher, the Department will seek to maintain its position as a respected industry client and leader by appropriate utilisation of alternative delivery systems for project procurement. The Pacific Motorway experience has provided the Department of Main Roads with the insights to develop appropriate relationship contracting packages for projects of such complexity.
Completed project delivered Ahead of time  Savings achieved.

Pacific Motorway Package Two
Yatala to Pimpama

Principal MRD

• Severe time constraints - 4 years conception to completion
• Community consultation and interaction over 43km route
• Major service relocations

Client Representative

Contract Administrator 1

Major Contract Package 1

Design and Documentation by Consultants

Schedule of Rates Tender on Documents

Contract Administrator 2

Major Contract Package Two

Major Contract Package 3

Contract Administrator 3

Major Contract Package 4

Major Contract Package 5

Major Contract Package 6

Tender 1

Tender 2

Tender 3

• Difficult site conditions
• Building over existing corridor
• Management of 85,000 vehicles per day

MRD Major Projects Unit

Transport Technology Design Manager

Typical RFI Process, 5-6 days, Time Delays

Design Consultant

Contractor Selected

CA

MRD moved to check the damage
Established a Relationship Management Unit (RMU)

Commitment at high level by Principal’s and Contractor’s representatives to address contractual issues.

Improvement in contract relationships

Time, cost, quality project delivery objectives achieved

Adversarial Approach

Collaborative Approach

Conflict

Collaboration

RCDP Case Package Two

MRU

External to project organisation
Senior Officer reported directly to MRD Director General

• Re-established project goals
• Engendered commitment
• Focus on project delivery
• Strengthen relationships
• Facilitated in dispute resolution
References

² ibid