Browns Plains Interchange: A Case Study

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Introduction
A new traffic interchange on the Mt Lindesay Highway at Browns Plains in Logan City was planned by the Queensland Department of Main Roads to alleviate major traffic congestion which occurred morning and evening around the intersection with Johnson Road. Delivery of the project on or ahead of time at this major intersection was extremely important to the client.

The project was procured by a traditional Schedule of Rates contract and was completed in December 1999, eight months ahead of schedule, by Queensland-based construction company – Bielby Holdings – whose core business is providing infrastructure to the public sector.

The quality of working relationships between the main partners and the solid experience of team leaders for both client and contractor were identified as key contributors to the success of the project.

Project background – overview
Size and scale
The interchange extends for approximately 2.4 kilometres along the Mt Lindesay Highway. The scope of the project included earthworks, drainage and pavements, the building of six bridges, a pedestrian underpass, a major creek crossing, eleven entry or exit ramps, and service roads. The scope of work also included the installation of Reinforced Soil Structure walls with a combined surface area of 6000sqm, traffic signals, signage, lighting and extensive landscaping.

The overall project cost was $30.895 million including land purchase, relocation of services and design costs. The cost of construction was in the order of $24 million.

Traffic management during construction was the responsibility of the contractor. The project was delivered over seven stages, keeping traffic flowing throughout the construction process.

Multiple Stake Holders
Prior to calling tenders the Department of Main Roads was involved in consultation with a large number of stakeholders, including the Logan City Council, local residents, local business people and associations, and commercial property owners.

The preliminary design was discussed with the community by various means including staffed displays at Grand Plaza shopping centre. The design was subsequently modified to address the following key issues identified during the community consultation process:

- Detail design of walls. The proposed reinforced earth wall structure would have a major visual impact on the local environment. The community called for design strategies including aesthetic surface and form treatments which would mitigate the visual effect of such a large structure.
- Landscaping including quality long term plantings was required.
• Additional ramps and other measures were included to improve local accessibility.
• Cross-highway pedestrian access in the vicinity of Helen Street.

In addition, the owners of the Grand Plaza Shopping Centre sought inclusion of an exit ramp which would directly service Grand Plaza Drive. The Department of Main Roads negotiated with Grand Plaza for a capital contribution to finance the ramp. The shopping centre owners agreed to a contribution capped at $1,000,000.

Once awarded the contract, Bielby Holdings continued the work of managing stakeholders through community liaison including:
• Open forums held at the local RSL club.
• Open door policy at the site office.
• Mail outs to local community to keep residents and business owners informed of progress.

Time
Construction commenced later than originally planned as the design of additional features, resulting from consultation, extended the design phase. The contractual date for completion was May 2000.

With extensions of time due to unseasonably wet weather, the final date for completion was scheduled for August 2000. An early completion bonus of $200,000 was offered as incentive for completion on or before 17th December 1999, which Bielby Holdings achieved.

Technical items
• RSS Walls
The civil design called for walls to be constructed as Reinforced Soil Structures. This system employs concrete panels which interlock to form the face of the walls. In this case, the solution developed required the concrete panels to give the appearance of stretcher bond whereby coloured banding could be achieved. Bielby Holdings worked to overcome the inconsistency between structure and aesthetic by developing a custom panel which incorporated “dummy” joints.

The Contractor delivered the modified RSS system on a lump sum design and construct basis. Terry Cogill of Bielby Holdings had previously worked with the Landscape Architect who produced the design concept for the walls and was familiar with how he worked. Bielby was proactive in developing and supplying sample panels of the coloured concrete which assisted the client to make definitive decisions regarding colour choices.

• Services
Relocation of services resulted in variations to the contract as service information available was not consistent with actual conditions.

For example, at the major intersection of Mt Lindesay Highway and Johnson Road, the contractors located 11 existing service lines rather than the two which were
documented. The solution required a 2400mm diameter drainage line to be tunnel bored below the existing services whilst maintaining traffic flow overhead.

**Procurement Model**

**Schedule of Rates**

The Department of Main Roads engaged consulting engineers to produce plans and contract documents prior to calling tenders for the construction and engineering works.

A pre-qualification system for both design and construction operates in the Department of Main Roads. Service providers are pre-qualified in terms of financial, management and technical capability and the project is graded in terms of complexity and cost. This project attracted Main Roads’ highest rating. Bielby Holdings as pre-qualified tenderers were selected as their tender was conforming and provided best value to the Principal.

This project featured a combination of methodologies:
- Schedule of rates contract for 80% of the scope of work.
- The remaining 20% of the scope of work involved construction of the RSS walls. This component was procured by means of a lump sum Design and Construct contract.
- The general conditions of contract included both standard and purpose-drafted conditions and specifications.
- The client and contractor also entered into a non-contractual partnering agreement.

Features of the schedule of rates contract used in this project:
- The client bears the risk on quantities by guaranteeing the quantities in the schedule to ±10%.
- Contractors’ rates have to hold over that range. Once over 10% of the tendered rate the rates may be revised and applied to that quantity which is above 110%. If actual rates are below 10%, an increase in rates is negotiable for recovery of contractor’s overheads.
- An allowance for movements in the Consumer Price Index.
- Joint measurement and agreement of quantities by client and contractor for progress payments.
- Penalties – liquated damages defined in the contract.
- Reward – bonus for early completion by a fixed date.

**Management Methods and Techniques**

**Partnering**

In its Research Report, *Partnering: Models for Success*, the Construction Industry Institute Australia identified the principal benefits of partnering as:
- Reduced exposure to litigation
• Improved project outcomes in terms of cost, time and quality
• Lower administrative and legal costs
• Increased opportunity for innovation and value engineering
• Increased chances of financial success.

The Department of Main Roads and Bielby Holdings adopted Partnering on the  
Browns Plains Interchange project as a management process to foster cooperative  
and mutually beneficial working relationships. Strategies of commitment and  
communication allowed team members to work to the common good of the project. 
The partnering agreement was not mandatory, neither was it legally-binding. Bielby 
Holdings’ manager described the process as “well worth it”.

Key elements:
• Shared understanding of and commitment to common goals.
• Shared awareness of the spread of risk and reward.
• Less confrontational atmosphere.
• Team members required to put the necessary effort into all levels of  
  communication.
• Problem-solving mechanism - targeting the facts rather than the people –  
  dispute avoidance.

The partnering charter included monthly meetings to respond to the results of  
questionnaires. These addressed key project objectives. Responses were measured  
on a scale of 1-7. If responses to a question varied by a factor of 2 or more, the issue  
was discussed, thus obliging partners to communicate on a formal level. However,  
issues were generally resolved at the work face as they arose. Personnel from both  
client and contractor groups were located on site and maintained high levels of  
direct communication.

**Delivery Team Structure**

The contractor, sub-contractors and the client all contributed as one team to work to  
the common good of the project throughout the construction phase.

The collaborative approach was engendered by both the client’s Resident Engineer  
and the main contractor’s project manager who as a Director of Bielby Holdings had  
a monetary stake in the project. Both key people were located on site full time and  
demonstrated an open communication style.

As well as the hands on expertise of management, another advantage which is  
possible with a smaller private construction company is that all personnel on the  
project are known to each other.

The major subcontractor on the project, bridge builder J.F. Hull Holdings, were  
selected as a proven supplier. Terry Cogill pointed out that Bielby Holdings does not  
seek alternative prices as the two companies have a successful track record of  
working together on several projects.
Information Management

- Construction phase

During the construction stage, frequent deviations in set outs were identified. For example, problems would arise with discrepancies in levels such as service roads not tying in. The cause of these discrepancies is reputed to be a shortcoming of the software which does not ‘close’ satisfactorily.

To overcome this the contractor’s surveyor worked around the clock to ensure controls points closed. This allowed the work to flow without the necessity to refer back to the design consultant’s office to get problems resolved. Usually, communications and requests to the design office could take 48 hours or more to be resolved.

- Operation and Maintenance phase

Following the completion of construction, “as built” drawings were produced by the designers and forwarded to Main Roads for archiving.

Success Factors

- Previous experience

Bielby Holding’s core business is the delivery of infrastructure projects for the public sector. The skills and experience of specific personnel involved, notably on the part of Main Roads’ Resident Engineer and Bielby’s Project Manager were important to the success of the project’s construction phase. Experienced personnel benefited the project in the following ways:

- Strength of leadership from the client’s Resident Engineer set the high standards for the project.
- Main contractor took a proactive stand on problem-solving.
- Resident Engineer’s ability to make informed decisions prevented prolongation of approval time.

Bielby Holding’s management now applies examples of problem-solving from this project to reinforce learning opportunities to their young engineers.

- Quality of working relationships and team commitment

Trust and respect were engendered within the project team through the experience and communication styles of team leadership for both client and contractor. The client’s Resident Engineer responded to the contractor’s problem-solving culture by being willing to listen and making informed decisions.

Continuity of personnel also contributed to the success of the project. The complexity of the project required continuity of knowledge of how various issues were to be, or had been, resolved.

- Financial reward
The contractor company achieved its projected profit and was able to benefit further by attaining the early completion bonus of $200,000. Early completion of the project also benefited the client through reduced costs of administering the project.

- **End users satisfaction**
The local community and the transport industry are now experiencing improved accessibility and fewer delays with respect to traffic movements.

### Project Outputs – Indicators of Success

- **Time** – Bielby Holdings delivered ahead of time but within the construction industry’s expectation.
- **Cost** – Construction costs increased by around 8.7% due to escalation and extra work required by the client.
- **Quality** was achieved to the specified level.
- **Customer service** – the contractor assisted the Department of Main Roads to achieve their objective of meeting end user requirements with better throughput and access to local amenities.

### Discussion
The project partners agree that the form of contract had a very positive impact on the project. The contractor believes that the Main Roads contract was fair and that risks were allocated to the party most able to take and manage them.

Contractors prefer the Schedule of Rates model of procurement for infrastructure projects because:

- It is “tried and true”.
- More contractors can tender, therefore higher levels of competition benefit the client.
- Prices are not inflated by necessity of contractor to develop design pre-tender.
- The client takes risks on quantities.
- The client takes “fit for purpose” risk.

This model is also viewed favourably by Main roads for most projects in the Metropolitan Area. Design and Construct, as a procurement model for infrastructure, is not favoured because:

- The tendering stage has high costs with each prospective tenderer expending funds on developing schematic designs to a stage where costings can be made. This is particularly difficult where the work is upgrading existing infrastructure in existing corridors.
- The contractor takes all the risks.
- The process can be inefficient, and wasteful of funds particularly with design.
- Unsuccessful tenderers receive little or no remuneration for design effort.
Conclusion

It may be true to say that, in the case of the Browns Plains Interchange project, the foundations for success were laid in the early planning stages of the project when fundamental decisions concerning procurement methods, allocation of risk, and project management were made.

The Schedule of Rates procurement method provided the framework for both parties to make the best use of the conditions surrounding the project particularly project specific variables such as community involvement and consultation, and existing site conditions.

The concept of partnering was also embraced by those involved. This served to foster a non-adversarial environment. However, the knowledge and skill of those involved in the project leadership and their collaborative approach produced significant results in terms of project success.
Appendix A

Browns Plains Interchange
Process Diagram

IDENTIFICATION OF COMMUNITY NEED

CLIENT PROJECT INITIATION

PRELIMINARY DESIGN
by external consultants

COMMUNITY CONSULTATION

COMPLETION OF DESIGN
- Preparation of tender documents
- Schedule of rates
- Risk allocation equitable

TENDER STAGE
pre-qualified tenderers

ACCEPTANCE OF BIELBY HOLDINGS' BID
- Conforming bid
- Provided best value to client

CONSTRUCTION PHASE
- Non-adversarial environment
- Proactive approach to problem solving

OUTPUTS
- EARLY COMPLETION
- FINANCIAL REWARD FOR CONTRACT ACHIEVED
- SATISFIED CLIENT
- SATISFIED END USERS

NON-BINDING PARTNERING AGREEMENT BETWEEN CLIENT & CONTRACTOR
Appendix B

Comparison with previous studies

Comparison with T40 project and CSIRO study

Case Study – The Browns Plains Interchange

**T40 (Ireland 1994)**

<table>
<thead>
<tr>
<th>Success factors</th>
<th>Comment on applicability to Interchange project</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agreed common goals</td>
<td>Client and contractor sought to understand and support each other’s objectives. Entered into non-contractual partnering agreement.</td>
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<tr>
<td>Simplified process</td>
<td>Contractor team established a single point of accountability and worked closely with client.</td>
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<tr>
<td>Re-engineered activities</td>
<td>RFI reduced by proactive problem-solving by contractor and informed decision making by client.</td>
</tr>
<tr>
<td>Workforce commitment</td>
<td>All parties including consultants and subcontractors very highly committed to project</td>
</tr>
<tr>
<td>Partnering with local government</td>
<td>Client liaised with the local authorities at the earliest stage possible. Contractor continued to liaise throughout construction.</td>
</tr>
<tr>
<td>Tendering on benchmarking</td>
<td>Tenders selected on the basis of pre-qualification</td>
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**CSIRO (Mohamed and Yates 1995)**

<table>
<thead>
<tr>
<th>Success factors</th>
<th>Comment on applicability to Interchange project</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strong commitment by the team to improving design and construction workflow</td>
<td>All project team members highly committed to project development, resolution and completion</td>
</tr>
<tr>
<td>Effective communications between major project participants</td>
<td>Communication between contractor and client excellent throughout the construction process. Reporting lines and authority clearly defined</td>
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<td>Positive involvement of customer at early stages</td>
<td>Requirements identified and implemented at tendering stage</td>
</tr>
<tr>
<td>Quality assurance techniques</td>
<td>Integral to suppliers’ businesses – applied through all phases. Value-adding attitude</td>
</tr>
<tr>
<td>Encouragement of innovation</td>
<td>Contractor team produced innovative solution for RSS walls.</td>
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<tr>
<td>Improved construction output</td>
<td>Project completed 8 months ahead of time.</td>
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References

