

PORT ROAD MOTORWAY ALLIANCE – A CONSULTANT’S PERSPECTIVE
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1. INTRODUCTION

The motorway between the Gateway Motorway and the Port of Brisbane is the first alliance contract for Coffey, a consulting company that specialises in geotechnical, pavement, environmental and water resource engineering. Leighton Contractors, PPK, and Coffey joined forces with Queensland Motorways Ltd (QML), the operator of the Gateway Bridge and client for the project, to form the Port Road Alliance in December 2000.

Whilst the project is not yet complete, it currently

- Is six months ahead of schedule in a 30 month schedule that commenced late,
- Provides the client with an extra bridge structure to grade separate Lindum Road, and hence remove the only set of traffic lights on the Motorway,
- Is about 10% below its construction budget after allowing for the extra bridge,
- Has excellent performance on a number of non financial objectives related to the environment, the community, quality and traffic,
- Has no disputes to resolve or claims for variations,
- Has smiling faces all around.

2. BACKGROUND

Coffey has provided specialist inputs in design and construction of road infrastructure works in all states of Australia and in Asia. We have worked extensively in contractor-led teams since the late 1980’s, when VicRoads began using design and construct contracts to build major freeway and highway works. Our inputs relate to embankment and bridge foundations, earthworks, pavement design, ground retention design, excavatability, tunneling, water issues, and construction and environmental testing.

In 1999, I was approached by a long term client, Tom James in Leighton Contractors who had returned to Queensland after many years in Melbourne. Tom wanted us to join the Leighton team to bid for a new motorway between the Gateway and the Port of Brisbane. During his time in Melbourne Coffey and Leighton worked together on design and construct contracts for Western Ring Road and South Eastern Arterial upgrade.

QML, a private company wholly owned by the State of Queensland through its Department of Main Roads, proposed that the major part of this project would be delivered by alliance delivery methods. Coffey was invited into the Leighton team because of its track record in delivering innovative solutions in geotechnical, pavement design and construction testing. We agreed to be part of the Leighton team, knowing little about the detail of alliancing, but with a strong belief that working in good design and construct teams always resulted in good projects. Leighton had already teamed with PPK for the civil/structural design and environment/community aspects of the project.

3. LEARNING WHAT ALLIANCING INVOLVES

The team came together in Brisbane and quickly developed a common culture focused on success, developing the theme that this project was “building more than just a road”. How true this has been. Unlike any normal design and construct tender the focus was not on price at that stage, but how could we develop the team that the client would have greatest confidence in to successfully deliver the project. The team included foremen, designers, project engineers, landscape specialists, community and environmental specialists, the project manager designate, and senior management from each alliance partner.

We had several workshops together, with our alliance coach guiding us through the key principles of alliancing.

In simple terms, when the alliance forms all parties, including the client, remove their old corporate banner and wear a single alliance banner. All alliance members are focused on

best for project outcomes, and not individual or corporate outcomes. The contracts are structured so that the alliance partners have no right to sue each other, and project risks are managed by project specific insurance. The financial model ensures that all parties either win together or lose together. Any variations are agreed unanimously by the Alliance Leadership Team (ALT), which includes senior management from each alliance partner. These factors quickly focus the team to the best for project outcomes.

Our alliance tender team focused on team building, understanding the critical issues for the project and what our approach to solving these issues would be. We developed a vision of what an outstanding outcomes for this project would look like when completed, including how each stakeholder would view the outcomes and their treatment during project implementation.

The individuals quickly developed mutual respect for the skills and way of thinking each member brought to the team. There were no dominant members telling the team how things must be. We all made our contributions and developed into a tight knit team that had a high level of self belief that we could build the best road in Queensland, and that we would do it under budget and ahead of time. No element of the project would be compromised, including the community and environmental elements.

Having been shortlisted down to one of four teams, we faced a half day interview with the client's selection panel, who were also being guided by a specialist alliance coach. This panel included senior QML representatives with whom we hoped to spend the next two years in our first alliance.

Being from Victoria, we quickly established two principles that have been maintained to this day. Firstly Victoria builds excellent roads, and is respected for these achievements in other states. Secondly sport is a language that most people speak even if the dialect differs. I believe we have probably shared as many tales about rugby and AFL as we have about our differing experiences in road construction. Brisbane's first success in the 2001 AFL Grand Final did not go unnoticed, even by the rugby supporters.

I believe an outstanding feature of the people who are involved in this alliance is they are able to enjoy themselves, whilst sharing an absolute passion for success. These are two elements that probably apply to any successful team, and are not things taught during our formal education.

During the half day interview our proposed approach to the various technical and non technical issues surrounding the project were explored. We openly talked of the strong bond we forged in the team from previous successful projects and our early workshops.

From the half day session we were shortlisted to be one of two teams to spend a two day workshop with an expanded QML team including technical people who would work in the alliance if we were successful. This involved about 50 people in total and we worked through various project issues in integrated teams, as if we had started the project.

We established a range of Key Performance Indicators (KPIs) for areas such as community and environment, as well as for engineering outcomes. We established management structures and key members of the Integrated Alliance Team (IAT) that would manage the project. This included staff from Main Roads and the other alliance partners.

The Alliance Leadership Team (ALT) was also formed as the senior management entity that would take ultimate responsibility for the success or failure of the project, and provide leadership and guidance to those who would live the project for the next 30 months. My role is primarily as an ALT member, which involves at least monthly trips to the project for formal progress meetings. My technical background, experience and passion for innovation has been useful to constantly challenge the designers and peer reviewers that they are achieving best for project outcomes and not just standard solutions.

Within a few days of completing the two day workshop we were selected as the team to go forward to the TCE stage. In debriefing, we discovered that our alliance was the only one to include a geotechnical/pavement engineering specialist as a full alliance participant, suggesting that our partners had made some smart strategic decisions when they formed our team.

4. THE TCE PHASE

From December 2000 we had about three months to develop a Target Cost Estimate (TCE) for the project. During the first selection phase our only costing involved submitting to the client what the normal break even costs were for each business (known as Limb 1 cost), plus the amount of profit and overhead contribution (known as Limb 2 costs).

The TCE phase was more like a normal design and construct tender, except each party would be paid at cost (Limb 1) against a budget, to produce the TCE. If an acceptable TCE could not be reached the client could take all the design work back to the team, which had come second to allow them the opportunity to develop an acceptable TCE.

From the concept design and design brief, we had to develop a design adequate for detailed costing, and then detailed costing to establish the TCE. All costings (Limb1) were independently verified by a third party to ensure the TCE is an accurate reflection of a competitive market price, but margins (Limb 2) could not be altered from the BAU margins for each participant.

The financial model for the project centred around the TCE. Each alliance partner had a budgeted Limb 1 contribution within the TCE. The limb 2 for each partner was established, and fixed as a lump sum, based on the budgeted inputs. If extra work was required by any party then they would be paid for all extra work at cost (Limb 1), but without extra profit.

If the project value exceeds the TCE then there is a 50/50 sharing of this overrun between the client and the other alliance partners. This eats into the Limb 2 profit component and can potentially erode up to all of the profit of each partner.

If the project cost is less than the TCE then there is a 50/50 sharing of the savings that becomes known as Limb 3. This changes to a 70/30 split in favour of the client after a certain value of underrun. The Limb 3 bonus pool can be enhanced or eroded by up to a further 10% for the other alliance partners depending on project outcomes on the non cost KPIs for environment, community traffic and quality.

The Coffey/PPK cost input to the job is relatively small. In the case of Coffey it is about 2% of the total project budget. However our team split the limb 3 bonus 80/10/10 between Leighton / PPK / Coffey in recognition of the significant cost saving the consultants could derive from design innovation. The split on the overrun side was adjusted so that we all lost an equal proportion of our profit for every dollar of project cost overrun.

For Coffey this meant we could potentially double our profit for a 10% cost underrun, or lose all our profit for a significant cost overrun. This sort of commercial arrangement certainly focuses all parties onto key project outcomes of constructability, cost and time.

The TCE team developed the site facilities and then moved into these facilities as one. There was more involvement of the construction engineers and foremen than a normal tender. An enormous amount of innovation was required to take the concept design toward the vision the team had established.

As the process proceeded, the brief continued to grow, and the cost grew with it. The cost went well past the original budget, and created the most stressful period of the project. The alliancing principles were being tested severely, particularly given that we were all very new to the process.

We worked with the client to redefine the scope of work that really was needed, and then finally achieved sign off on the TCE, about one month behind schedule. We were relieved that we had passed this critical phase, but fearful that the final agreed price was well below what it would cost. The team started the detailed design and construct phase with this substantial challenge ahead, but never retracted from the vision as a means to cut cost.

5. THE DELIVERY PHASE

Once the green light was given on the TCE the team had to lift to the challenge of catching up on time and reducing cost without compromising the outcome.

A lot of time was spent on design, including active involvement of the construction staff who were eager to contribute but equally eager to start construction. All design had to be approved by Main Roads nominated peer reviewers, who were not involved in the alliance on a daily basis. The team was constantly challenged by the alliance coach to “breakthrough” conventional thinking and strive to achieve outstanding outcomes.

The ALT meets on a monthly basis and it has been interesting to observe how the team has risen to the challenge to be outstanding. In any month there have been issues that seemed to have reached intractable positions. Upon returning one month later the team had thought of different ways to address the problem and delivered a completely different and better solution. This approach has become part of the culture.

I have observed that even as the design costs approached and exceeded budget, there has been no pressure to reduce the design effort. Even though direct cost savings were not clearly visible and in some cases the better designs had higher cost outcomes, the team continued to strive for excellence.

As construction proceeds costs savings continue to flow. Clearly the designers combined with construction staff inputs have delivered efficiency in design. The ready availability of designers to resolve any issues that arise during construction has also ensured ongoing efficiency.

Many new innovations were created in comparison to the original concept design, and also in comparison to long established Main Roads practices. The team constantly challenged “sacred cows” as a means to generate new and better ways to deliver solutions. An example is the use of segmented precast piling instead of single length post tensioned piles. Whilst the cost saving for this project was moderate, the opportunity for substantial savings (potentially several million dollars per annum) on other Main Roads projects is substantial.

The Port Motorway project has achieved many other firsts for its industry, including third party accreditation for quality, safety, and environmental management. It has extensively used GPS survey methods mounted onto plant to remove a large component of field survey. It will deliver a standard of road architecture and landscaping not seen before on QMRD projects. These are to name a few.

A most pleasing aspect of the alliance is that it allows all energies to be focused into positive outcomes for the project without spending time and effort arguing or planning how to develop or reject claims for variations. The commercial and legal arrangements ensure the win/win lose/lose philosophy works. There have been no issues that have created major conflict, and even where disagreements occur, everyone acknowledges that it is because we are striving to deliver better outcomes for the project. Whilst there have been clear increases in the scope of work on which the TCE was based, these have been balanced by some opportunities which have meant they could be absorbed. No-one has spent time preparing claims for variations.

This is best highlighted by the fact that the alliance team proposed the inclusion of an additional bridge to remove the only set of traffic lights proposed for the Motorway,

within the target cost estimate. The direct cost of this bridge is about \$5m, and effectively reduces the Limb 3 cost under-run. In the case of Coffey, its \$150,000 contribution represents a major project for most of our offices. However, all alliance members acknowledge that the building of this bridge will substantially enhance the project for the road users, the community and the client.

6. SOME TECHNICAL ISSUES

The Port Road Motorway links to the Gateway Motorway as a fully grade separated interchange just south of the Gateway Bridge. It extends eastward approximately 4km, where it joins Lytton Road. A new grade separated link road allows access to and from Lytton Road.

Much of the road alignment traverses low lying mangrove swamp, underlain by deep soft clay soils. Higher sections of embankment required an early works package to install wick drains and surcharge. Much of this in ground cost was removed from the majority of the alignment by lowering the embankments as close as practicable to the 1 in 100 year design flood level. Lightweight polystyrene fill has been used for parts of the alignment. A post construction design settlement of 200mm has been adopted for the 40 year life.

Much of the piling has utilised 350 square precast segmented piles, with some composite piles used where there are large bending moments.

Construction involved the use of geofabric and rockfill to rise out of the swamp. This was then capped with select CBR 15 filling to produce a select subgrade. In the areas west of the Oxbow swamp where the foundations are sound, the pavements comprise 200mm of cement treated basecourse (CTB), overlain by variable thicknesses of asphalt, typically comprising about 265mm. In the settling areas a trial section of CTB has been constructed and surcharged to establish how it will perform after 200mm of settlement.

The pavement designs in this area are currently full depth asphalt with no CTB, but the results of this trial are yet to be evaluated to establish whether CTB may be an acceptable option. The extensive Victorian experience with CTB and asphalt pavements is being applied in the design. Falling Weight Deflectometer (FWD) tests have been conducted on CTB and have been successful in being able to demonstrate moduli in excess of the assumed design moduli of 5000Mpa.

7. CONCLUSIONS

After being involved as a geotechnical and pavement specialist in many design and construct projects over the past 13 years, I have driven Coffey to employ a very proactive approach to innovation in design.

The Alliance process on Port Motorway has taken innovation to a new level of excitement and commercial value to Coffey. We have been able to share some of the benefits including extra profits created by this innovation. Our people, together with the staff of our alliance partners, have been able to experience the enjoyment and satisfaction of working inside an excellent team, and delivering an outstanding outcome for all stakeholders.

I have personally found the alliance to be a great learning experience and have brought the principles of teamwork and achieving outstanding outcomes into our business. I can actively and honestly convey to all members of our industry the facts behind this project, and encourage decision makers to actively embrace alliancing as a way to lead our industry to becoming outstanding.