

A428 CAXTON COMMON TO HARDWICK IMPROVEMENT



Close Out Feedback Report

December 2007

Report No. BAM.1200/C10/027

Revision: 1

A428 CAXTON COMMON TO HARDWICK IMPROVEMENT

Close Out Feedback Report

Author: Steve Draper

Checker: Tim Healey

Approver: Steve Draper
For Capita Symonds Limited

Approver: Adrian Savory
For Edmund Nuttall Limited

Report no: BAM.1200/C10/027 Rev. 1

Date: December 2007

Contents

1	Introduction	1
2	Summary Review of Workshop Outcomes.....	2
3	Continuity with Great Barford Bypass.....	8
4	People and Participants	10
5	Design and Construction Issues	11
6	Operation of the Contract and Procedural Issues.....	12
7	Conclusions and Key Learning Points	14

Annexes

1 Introduction

- 1.1 This Report encapsulates the outcomes of the Close Out Workshop for the A428 Caxton Common to Hardwick Improvement, which was held on 6th September 2007.
- 1.2 The A428 scheme was packaged with the A421 Great Barford Bypass and the ECI contract (comprising Option C of the NEC Engineering and Construction Contract) was awarded in April 2004, following successful Public Inquiries for each scheme. The Package budget was £112m and both schemes involved off-line construction works and were of similar length and complexity.
- 1.3 The A428 scheme consisted of 7.7 kilometres of new dual carriageway, one new grade-separated junction, three overbridges, one footbridge and a pumping station.
- 1.4 The A421 scheme was opened to traffic on 24th August 2006 and the A428 scheme on 24th May 2007, respectively.
- 1.5 The Workshop was attended by the following representatives:
- | | |
|------------------------------|--|
| Highways Agency: | David Ball, Jim Stephens, Tim Hughes |
| Edmund Nuttall: | Steve Fox, Adrian Savory, Richard Gethin |
| Capita Symonds: | Tim Healey, Steve Draper, Sinathurai Gunasekeram |
| Parsons Brinckerhoff: | Bob Bird, Graham Venables, Steve Binkuweir |
| Jacobs: | Richard Canning, Andrew Diamantis |
- The Facilitators were David Ball and Tim Healey.
- 1.6 Chapter 2 contains a summary review of the Workshop outcomes. Chapters 3 to 6 draw out the improvements to process and practice identified following the execution of these two schemes that should be used on future ECI contracts. Chapter 7 then concludes with the Key Learning Points.

2 Summary Review of Workshop Outcomes

1. Continuity with Great Barford

1.1 *What went well:*

- Timing worked well for design continuity but not so well for construction;
- Design for Maintenance requirements were known;
- Public relations forums, newsletters, ceremonies;
- Partnering workshops;
- Able to weed out poor suppliers at Great Barford and replace them at Caxton;
- Pre-Road Safety Audit inspections avoided show-stoppers delaying road opening;
- Earlier liaison with utilities at Caxton;
- Smoother Target Cost agreement process.

1.2 *What went not so well:*

- Inadequate report/responsibility on failed Jerol signposts at Great Barford;
- Continued cracking of Omnia Planks at both Great Barford and Caxton;
- Earlier meetings needed with third parties e.g. Cambridgeshire County Council on signs.

2. Discharge of Roles

2.1 *What went well:*

- Good timely legal advice from Highways Agency on Cambourne unadopted roads;
- Road space bookings were managed to avoid clashes with other Highways Agency/Cambridgeshire CC planned works.

2.2 *What went not so well:*

- Ongoing support over land rights/issues, land reference schedules, queries etc;
- Processing of Compensation Events;
- Project Board meetings were not timed to particular issues/milestones, no agreed brief;
- The Designer's Site Representative quality verification role could be better integrated with that of the Supervisor.

3. Relationships and Partnering

3.1 *What went well:*

- Stakeholders brought into the process (however, this takes effort, particularly Stats);
- Meetings with SSR aided approvals;
- Close liaison with developer/landowners and Highways Agency support facilitated temporary diversions which significantly reduced Contract duration and costs;
- Co-location in Phase 1B between Contractor and Designer and visiting by Employer's Agent aided Value Engineering and identified significant VE savings in advance of agreeing the Target Cost, to the full benefit of the scheme;
- Employer's Agent was invited to all meetings.

3.2 *What went not so well:*

- Bourn Overbridge pier finish and mis-understanding HA requirements in respect of spend forecasting in April 2006 caused strained relations when problems occurred;
- TOD requirements on journey time reliability were not communicated clearly or early enough.

3.3 *Suggested Improvements for Future Schemes:*

- Immediate response needed when problems occur or lack of understanding by any party (e.g. by convening a meeting), problems must be seen as project-wide issues rather than belonging merely to one organisation;
- All correspondence in or out of site should be sent round to the whole team (including HA Representative) in the Dayfile;
- Complete open-book approach by all suppliers;
- More escalation of issues to Highways Agency Project Leader needed to resolve issues with stakeholders and reduce risk of delay e.g. Environment Agency.

4. Procedures

4.1 *What went well:*

- Close liaison with landowners and Environment Agency ensured issues raised at Public Inquiry were addressed;
- Large Value Engineering savings were identified ahead of Target Cost agreement.
- Obtained Supplementary SRO to relocate the footbridge, which saved significant sums of money and time off the critical path programme.

4.2 *What went not so well:*

- Late ECI (i.e. awarded post SoS decision) constrained design options and limited Value Engineering etc;
- Ownership of updating land reference plans is not clear and was not properly established by the Team;
- Re-alignment of Hardwick junction could have led to Orders challenge and the risk was not flagged up early enough at higher level;
- Little preparation time for OGC4 and lack of transparency on both purpose and output.

4.3 *Suggested Improvements for Future Schemes:*

- Pursuit and implementation of supplementary Orders bringing Value Engineering to the scheme (e.g. Hardwick Footbridge relocation);
- Value Engineering opportunities can arise after Orders had been made prior to Contract award and to take this forward buy-in was need from Highways Agency, who took a cautious approach;
- Prepare for OGC process in good time;
- Design process for adoption of new standards needs to be recorded and a clear change control process required.

5. Phase 1B

5.1 *What went well:*

- Value Engineering produced effective cost savings, apportioning risk between Employer and Contractor (e.g. Hardwick Interchange remodelling) in advance of Target Cost agreement.

5.2 *What went not so well:*

- Stop/Start as a result of short-term funding issues before NTPTC issued;
- Understanding of the Orders process by the Team;
- No scope for Phase 1B design bonus, given the inherited budget.

6. Design and Approval Process

6.1 *What went well:*

- Financial benefit with using the same Design Team;
- Delegation of certificate signatories;
- Evolution of "traffic light" coded system for design review submissions.

6.2 *What went not so well:*

- Too many certificates, HA Procurement to consider rationalisation;
- Protracted and cumbersome AIP approvals procedure, can SSR consider streamlining?;
- Protracted EA land drainage consents for culverts meant working at risk, improve by introducing national HA/EA service level agreement;
- Improve understanding of environmental time constraints on the construction programme (this didn't affect us but could have done!).

8 Construction

8.1 *What went well:*

- Impact of major maintenance scheme east of Hardwick (required with little notice) mitigated by re-programming/resourcing;
- Proactive Contractor involvement avoided delays and additional cost on major SU diversions;
- Finished 3 months early by careful and continuous programming, which aided higher spend profile requested by Highways Agency;
- Quality control drilled down to foreman level to ensure a culture of high quality workmanship in all areas;
- Good staff morale achieved by incentives e.g. half day off per month if no accidents, £50 bonus for safety suggestions, consultations, good welfare provisions;
- Use of HA's latest KPI Toolkit.

8.2 *What went not so well:*

- Poor quality control in manufacture of Omnia planks led to cracking in spite of quality audit undertaken following earlier problems at Great Barford.

8.3 *Suggested Improvements for Future Schemes:*

- SU performance needs close scrutiny by Contractor, requesting removal of poorly performing staff to ensure adequate performance is achieved;
- Particular attention required to achieve good ride quality where carriageway surfacing has to be constructed in several phases;
- Using of fibre reinforcement on concrete access tracks in lieu of rebar requires careful bay and joint detailing;
- Quality Manager to provide structure for management of QA documentation at early stage and ensure the quality process is drilled down through the team;
- Need for alternative permanent formwork solutions.

9 **Public and Local Relations**

9.1 *What went well:*

- Significant number of complimentary reports, letters etc from stakeholders and general public (examples in Annex);
- Considerate Contractor Silver Award received;
- Results from recent audits indicate Gold this year;
- Public Liaison Officer given greater empowerment, including Environmental Manager role thus raising status within team.

9.2 *Suggested Improvements for Future Schemes:*

- Considerate Constructor's code should be incorporated on the back of the site induction passes.

10 **Record Keeping**

10.1 *What went well:*

- Programme for acceptance updated monthly with explanatory notes;
- KPI used as a real management tool.

10.2 *What went not so well:*

- Drift on progress meeting agenda, clearer focus is required to avoid drift.
- Progress meeting minutes not produced in a timely manner

10.3 *Suggested Improvements for Future Schemes:*

- Clear record of landowner meetings required, which land owners can sign up to;
- Timing of production of meeting minutes could be a KPI;
- KPIs need consistency in approach and current understanding clarified.
- KPI on production of key meeting minutes e.g. Progress Meeting within 7 days.

11 **Contract Administration**

11.1 *What went well:*

- Top 10 risks reviewed at monthly progress meetings and other key stages;
- SU risks mitigated resulting in no Compensation Events for delay;
- All Compensation Events agreed with Employer's Agent within 3 months of road opening;
- Final account for Phase 2 (Section 1) close to submission (10/09/07);
- Community relations log and associated graph tracking number provides a clear audit trail.

11.2 *What went not so well:*

- Financial reporting - cleared definition required;
- Too much financial reporting required in different formats conveying very similar information, needs standardisation and simplification;
- No Compensation Events have been approved by SRO since the start of the works and the Contract does not recognise this requirement.

11.3 *Suggested Improvements for Future Schemes:*

- Quantum checks to identify differences between preliminary and detailed design output prior to construction issue drawings (i.e. check against Target Cost), to allow timely challenge/re-design which is less costly than construction creep;
- Clear definition of exceptional price rise inflation risk;
- Ownership of risk requires clear definition;
- Authorisation of forward buying needs to be pursued to obtain better value for money;
- Early teach-in needed for standard reporting (including accruals) and to improve the definition of EVA percentage.

12. **Health, Safety and Welfare**

12.1 *What went well:*

- Over two year period, 911,000 man-hours worked without any reportable accidents, achieved by yellow/red card system;
- Safety signs placed in usual places e.g. toilet booths, throughout offices, competitions, safety word search, Best Employee Poster;
- Seasonal tool box talks;
- Half a day per month off given to all operatives in recognition of unblemished Health & Safety record, this included supply chain;
- High welfare standards encouraged feel good factor and high morale;
- Task safety reviews developed to control Health & Safety issues on minor activities.

12.2 *What went not so well:*

- Near misses dealt with where appropriate but not recorded adequately.

12.3 *Suggested Improvements for Future Schemes:*

- Incentive mechanism needs to incorporate near misses, with gradings.

13. **Contract Close**

13.1 *What went well:*

- All outstanding works expected to be complete by end September 2007;

- Health & Safety file provided in draft on day of road opening, final within 3 months of opening;
- 30% savings in design costs between Great Barford and Caxton;
- Key handover information provided within 3 months of road opening;
- Direct management of archaeology saved costs.

13.2 *What went not so well:*

- Lack of co-ordination with MAC for handover/commissioning of pumping station;
- Late request for finger signs to public footpath diversions from Rights of Way officer.

13.3 *Suggested Improvements for Future Schemes:*

- In spite of out-turn being £280k below Target Cost, the Gain Share is only £70k (25% of saving) and although £2m+ under Budget there is no Budget bonus - the pain/gain mechanism needs review;
- Certificate process for handover to MAC also needs to address handover to County Council;
- Sign-off required for landowners to accept accommodation works.

14. **Application of Great Barford Learning Points**

- Management of SU's by Contractor was better on Caxton because the Team controlled and directed the Stats operations in accordance with HA Guidance;
- Supervisor's role and discharge of duties on site was better defined on Caxton;
- Financial delegation for Compensation Events approval enabled it to be more efficient on Caxton but it was still not perfect.

15. **Learning Points from Caxton to take forward to Future Schemes**

- Packaging of Schemes works;
- Start off with the correct Budget;
- Standardise Cost Reporting;
- Clearer focus on Financial Forecasting needed;
- Standardise bridge designs wherever possible;
- Recognise aspects that might affect made Orders;
- Ownership of Land Interest Plans to be better defined, especially when Orders have been confirmed prior to ECI Contract Award;
- Highways Agency review required on Ecological and Archaeological mitigation to avoid excessive/ disproportionate spend;
- Stronger line to be taken prior to Orders/Public Inquiry to avoid over-engineered footbridges (the footbridge was a requirement of the County Council and included in the draft Orders);
- Earlier and closer liaison with County Council about directional signing issues;
- Initiatives to create team 'feel good' factor;
- ECI requires greater input by Highways Agency Project Leader and more resources needed to increase his site presence as recognised by Nichols Report;
- Early and strong action required to engender and maintain close partnering;
- Incentivisation for Contractor needs to be improved;
- Better use of KPIs as a management tool;
- Appointing a strong Public Liaison Officer avoids complaints and issues dragging on.

3 Continuity with Great Barford Bypass

- 3.1 The packaging of the A428 Caxton scheme with Great Barford Bypass paid dividends in respect of design input continuity. With the exception of the Structures Team Leader, all key design staff transferred to Caxton when Great Barford was winding down. However, deferring the start of construction of the subsequent scheme by a few extra months would have made more efficient use of the Contractor's site-based resources and capture of the lessons already learnt.
- 3.2 The over-arching benefit was that Great Barford was opened on time; whilst Caxton was opened 3 months early with a forecast out-turn 3% below the Target Cost.
- 3.3 Other perceived benefits from the packaging of schemes are:
- Continuity of design resources and standardisation of design detailing;
 - Design Creep at Great Barford was approximately 4%, which reduced to 1% for Caxton;
 - Saving in direct costs through standardisation of construction preferences and detailing;
 - Improved working relationships and turnaround of documents with TAA saved time and increased programme certainty;
 - Reduction in site investigation costs, in particular for pavement since FSBM (as used at Great Barford) was ruled out early;
 - Improved control over archaeological mitigation and approvals process;
 - Improved speed of handing over completed archaeological areas since no watching brief;
 - Improved processing of ecological licenses, giving more time certainty;
 - Continuous improvement in forecasting accrued costs and spend profile;
 - Cost coding structure was made to fit back-to-back with the CON H Form;
 - Better management of Statutory Undertakers due to resource continuity;
 - Sub-contract continuity, in particular structural steelwork and surfacing.

Phase 2 Design Cost Comparisons (September 2007)

Discipline	Barford	Caxton
General Management	191,090	123,267
Drainage	175,275	89,641
Alignment	81,170	58,740
Geotechnical	88,948	50,336
Structures	436,211	382,124
Pavement*	9,170	7,116
Other Roadworks	215,792	158,964
Environmental*	49,673	53,526
Design Changes	107,867	27,735
Designer's Representative on Site	430,619	408,845
Head Office Support	164,944	135,174
Sub-Consultants	121,809	55,904
TOTAL	2,072,568	1,551,372

* Elements included in Sub-Consultants Costs

- 3.4 Technical issues where there was no clear improvement between the two schemes included the integrity of the Jerol passively safe signposts and the continuing problem with cracking of the Omnia permanent formwork planks. However, these could be considered to be non-scheme specific and require a “national” approach.
- 3.5 Early buy-in from third parties is essential to avoid occurrence of late changes to the works. In particular, there is a problem agreeing directional traffic signfaces and locations with the local highway authority on the non-trunk road elements of the scheme.

4 People and Participants

- 4.1 Highways Agency has still not clearly defined the financial delegation for acceptance of Compensation Events by the Project Leader and consequently, even following road opening, none of the submitted quotations have been formally approved.
- 4.2 The relevance and visibility of the Project Board and the timing of its meetings needs to be thoroughly reviewed to make it more effective.
- 4.3 The role and functions of the Supervisor's Site Representatives needs to be defined to avoid duplication and improve working relationships and understanding of the issues. Some modifications to certificates in the DMRB and in the ECI Contract need to be amended to acknowledge team working rather than individual company responsibilities. If Highways Agency seeks better team working on site, these certification issues should be addressed.
- 4.4 A proactive response between all parties is necessary to deal with any contentious matters that arise, such as major non-conformances, so there is no perceived cover up and the Employer is given proper assurances.
- 4.5 The booking of road space, intelligence of and interaction with adjacent roadworks needs to be better managed with the MAC and local highway authority. An urgent major maintenance scheme on the existing A428 dual carriageway immediately east of Hardwick meant reprogramming of the works and the concurrent construction of Cambridgeshire's A1198 Papworth Everard Bypass affected work at Caxton Gibbet roundabout.
- 4.6 Providing traffic management measures to achieve TOD's required journey time reliability through the roadworks can have major cost and time implications for the works. This matter needs to be addressed much earlier in the design and construction process.
- 4.7 The Highways Agency Project Leader should be used to add weight to help obtain essential approvals and consents from TAA and the Environment Agency to avoid delays.
- 4.8 The Works Information gives the ECI Contractor responsibility for producing Land Interest Plans and handling land queries up to the end of the Defects Correction Period. Highways Agency should reconsider this requirement since land issues traditionally drag on for many years. It may be better if it is assigned to the Employer's Agent.
- 4.9 The Considerate Constructor's code should be incorporated on the back of site induction passes to enforce the ethos of safe working.

5 Design and Construction Issues

- 5.1 Downward delegation to the Contractor's Project Manager and the Design Manager for signing design and construction certificates on Caxton has made the process much less cumbersome than that at Great Barford. However, the number and frequency of certificates to be submitted is still excessive and far too bureaucratic. SSR needs to consider rationalising them, particularly in light of the team working issues relating to Designer's and Supervisor's site representatives discussed earlier.
- 5.2 Improvement of the design review process occurred through the development of a "traffic light" system so that the Supervisor's comments could be ranked in order of importance.
- 5.3 The process for signing off AIP's for structures needs to be streamlined. It currently relies on completion of the final Geotechnical Report and this document is not usually ready at the beginning of the design process. It is vital that the two are decoupled as otherwise unnecessary and pointless delays to approvals can occur.
- 5.4 Highways Agency should enter into National Service Level Agreements with Environment Agency and other key statutory bodies to obtain key approvals within a defined timescale.
- 5.5 The management and payment of Statutory Undertakers works would be better undertaken as part of the Contract rather than by Highways Agency. This would enable poor workmanship and associated disruption to the main works to be corrected. Although the 18% discount would probably be lost, this would be offset by the greater efficiencies afforded by direct management.
- 5.6 Greater care need to be taken with the laying of surface course at locations where there are traffic management phases so that the ride quality is optimised.

6 Operation of the Contract and Procedural Issues

- 6.1 Unlike Great Barford, Phase 1B for Caxton was effectively undertaken twice because the scheme was referred for regional prioritisation in December 2004 and then reinstated in March 2005, when the NTPTC was issued. This stop/start approach to procurement should be avoided, though it is acknowledged that availability of funding can never be completely guaranteed at any one time. Consequently, the Phase 1B budget had to be increased because of this interruption.
- 6.2 The Caxton scheme had been taken through Public Inquiry prior to ECI Contract award and so there were constraints to innovation and Value Engineering options without revisiting the made Orders. It was decided to produce supplementary Orders to relocate the Hardwick Footbridge and divert the public footpath it serves, principally for buildability reasons. Understanding of the Orders process within the Team was limited and all parties need greater exposure to Statutory Procedures. However, the supplementary Orders were successful and the Employer did receive the full benefit of the design change.
- 6.3 Another Value Engineering exercise involved the remodelling the Hardwick Interchange, within the CPO boundaries, by reducing the skew angle of the dumbbell link across the new mainline and the width of the overbridge. The ensuing change to the Side Roads Order could have possibly led to a challenge and this was not realised at the time. Although this risk did not materialise, any changes to schemes that might affect the Orders need to be flagged up and the risk of failure and effect on the programme assessed. (It should be noted that there is less risk if such Value Engineering is undertaken when there is a Phase 1A).
- 6.4 New Standards are regularly issued following ECI Contract award and the justification for adopting new standards or not needs to be recorded and a proper change control process introduced if implemented.
- 6.5 Adequate notice needs to be given for undertaking the OGC4 review (prior to road opening) and this did not happen at Caxton, resulting in insufficient preparation time and unavailability of key design and construction staff. In addition, the value of this process and transparency of outcome was questioned.
- 6.6 In reality, there is little scope on ECI contracts to receive a design bonus upon completion of the package and Highways Agency should look again at its incentivisation mechanisms.
- 6.7 Progress meetings can get unnecessarily protracted due to wandering off the agenda and the chairman should be unafraid to exercise greater control. Minutes of meetings could be produced within a timescale defined in a site-based KPI.
- 6.8 Clear records of meetings with landowners should be produced, listing agreed accommodation works, which can form the basis of a signed agreement.
- 6.9 Financial control needs to be improved in relation to the Target Cost, which can be done through comparing quantum of the preliminary against the detailed design.
- 6.9 For the Employer to realise the full benefit of packaging, authorisation of forward buying by the ECI Contractor needs to be pursued to obtain better value for money. Currently, a separate NTPTC is required for each scheme in the package.

- 6.10 There are no clearly defined Employer requirements for Earned Value Analysis (EVA). Highways Agency needs to provide an early teach-in for contractors and substantially rationalise the reporting procedures. There are far too many forms providing essentially the same information, which could be easily compressed onto a single sheet.
- 6.11 Ownership of risks (Employer or Contractor) should be more clearly defined, based on who is best able to manage them.
- 6.12 Handover of the scheme can be frustrated by late changes and requests for additional works and this can only be resolved by earlier and better stakeholder communication.
- 6.13 Representatives of the MAC were not present at the testing commissioning of the Hardwick Pumping Station and this has delayed handover. The maintaining agent needs complete buy-in to all M&E inventory and the Highways Agency Project Leader needs to encourage active participation.
- 6.14 The certificate process for handover of the works to the MAC takes no account of the elements of the scheme that will be taken over by the County Council. Separate Health & Safety files for each end user could be considered.

7 Conclusions and Key Learning Points

- 7.1 The main message to convey is that packaging of schemes works. Highways Agency should take every opportunity to tender and award more packages since the benefits have been clearly demonstrated on this A421/A428 package.
- 7.2 If the ECI contract is awarded after the Public Inquiry, then greater attention needs to be paid to the scheme orders whenever Value Engineering is undertaken. For this reason, it is better that ECI contracts are awarded prior to draft Orders publication so that innovation and cost effective designs can be promoted without jeopardising the Statutory Process.
- 7.3 Financial control of the contract needs to be improved, including setting out with a realistic budget, standardising cost reporting and forecasting and improving the incentivisation mechanisms.
- 7.4 The approval process of Compensation Events within Highways Agency does not meet contractual timescale requirements and this needs to be resolved urgently.
- 7.5 The partnering ethos needs to be engendered between all parties early and maintained for the duration of the Contract.
- 7.6 More initiatives to value the individual contributions of staff are needed to create a 'feel good' factor.
- 7.7 Appointment of a strong Public Liaison officer does assist in the successful delivery of the scheme(s).
- 7.8 Early and effective liaison with key stakeholders helps the agreement of scheme details and avoids late changes and additional works.
- 7.9 In summary, the A428 Caxton Common to Hardwick Improvement was a very successful project and all parties deserve credit for its achievements. The comments in this Report are the result of honest critical review to identify where further improvements can be made for future schemes.