

Neutral Citation Number: [2008] EWHC 2220 (TCC)

Case No: HT-04-314 & HT-04-238

IN THE HIGH COURT OF JUSTICE
QUEEN'S BENCH DIVISION
TECHNOLOGY AND CONSTRUCTION COURT

Royal Courts of Justice
Strand, London, WC2A 2LL

Date: 29 September 2008

Before :

MR JUSTICE JACKSON

Between :

Multiplex Constructions (UK) Limited

Claimant

- and -

(1) Cleveland Bridge UK Limited

Defendants

**(2) Cleveland Bridge Dorman Long Engineering
Limited
(No. 6)**

**Mr Roger Stewart QC, Mr Paul Buckingham, Mr Gideon Scott Holland and Miss Alice
Sims (instructed by Clifford Chance LLP) for the Claimant**
**Mr Adrian Williamson QC, Mr Simon Hargreaves and Miss Lucy Garrett (instructed by
McGrigors LLP) for the Defendants**

Hearing dates: **10th March 2008 to 16th September 2008**

Judgment

Mr. Justice Jackson:

This judgment, which contains an important lesson for court users in chapter 37, is divided into five parts and 38 chapters as follows:

PART 1 – GENERAL	
Chapter 1	Introduction
Chapter 2	The claimant’s factual evidence
Chapter 3	The defendant’s factual evidence
Chapter 4	The admissibility of Mr Taylor’s evidence
PART 2 - SCOTT SCHEDULE 1	
Chapter 5	Schedule 1A
Chapter 6	Schedule 1B
Chapter 7	Schedule 1D
Chapter 8	Schedule 1E
Chapter 9	Conclusion re schedule 1
PART 3 - SCOTT SCHEDULE 2	
Chapter 10	Preliminaries up to 15 th February 2004
Chapter 11	Go Data
Chapter 12	The variations comprised in variation notice SV399
Chapter 13	The side letter
Chapter 14	How much black steel was required in order to construct the bowl as originally specified?
Chapter 15	How should work in progress be valued?
Chapter 16	Bowl steel quantities to be valued as at 15 th February
Chapter 17	Other pre-15 th February valuation issues
Chapter 18	The saga of China steel and the purchase order
Chapter 19	Certification date
Chapter 20	How much bowl steel was CB required to fabricate under the lump sum provision of the Supplemental Agreement?
Chapter 21	How much bowl steel did CB in fact fabricate under the lump sum provision of the Supplemental Agreement?
Chapter 22	Reimbursable costs
Chapter 23	Steel purchase costs under schedule 1 (f)
Chapter 24	Design and drafting after 15 th February
Chapter 25	CB’s claim for variation instructions after 15 th February
Chapter 26	CB’s claim for temporary steel not returned by Multiplex
Chapter 27	Other post 15 th February valuation issues
Chapter 28	Conclusion re schedule 2
PART 4 SCOTT SCHEDULE 4	

Chapter 29	Schedule 4A
Chapter 30	Schedule 4C
Chapter 31	Schedule 4D
Chapter 32	The three migrated claims
Chapter 33	Did CB's repudiation cause delayed erection in August?
Chapter 34	Schedule 4E
Chapter 35	Schedule 4F
Chapter 36	Conclusion re schedule 4
PART 5. CONCLUSION	
Chapter 37	The lesson to be drawn from this litigation
Chapter 38	The overall result

PART 1. GENERAL

CHAPTER 1. INTRODUCTION

1. This is the final round of the long running litigation between Multiplex Constructions (UK) Ltd ("Multiplex") and Cleveland Bridge UK Ltd ("CB"). Multiplex are the main contractor who constructed the new National Stadium at Wembley. CB were the steelwork subcontractor. Matters did not proceed smoothly and each party lost confidence in the other. By agreement, CB's role under the subcontract was substantially reduced in February 2004 and was further substantially reduced in July 2004. On 2nd August 2004 (by which time CB's obligations were limited to a fraction of their original scope) Multiplex and CB parted company in acrimonious circumstances. Both this court and the Court of Appeal have held that it was CB who repudiated the subcontract. After 2nd August Multiplex employed Hollandia BV ("Hollandia") and Hollandia's sister company, Zuid-Nederlandse Staalbouw ("ZNS") to perform CB's repudiated obligations.

2. The present litigation has been brought, essentially, to draw up the final account between Multiplex and CB. The court is being asked to assess (a) the total sums owed by Multiplex to CB for work done and materials supplied and (b) the damages owed by CB to Multiplex for defects and for repudiation.

3. This action has many unusual features, including the following:

- i) The principal obligation which CB repudiated was the obligation to fabricate certain steel for the bowl of the stadium. This steel (referred to by all counsel as "the repudiated steel") was fabricated by ZNS at much lower cost. It is therefore common ground that Multiplex made a substantial gain as a result of CB's repudiation of its principal obligation. In their written closing submissions Multiplex quantified this gain at about £2 million (as demonstrated by Mr Williamson at day 36, pages 98 – 99). CB contend that Multiplex's gain is substantially higher.

- ii) Multiplex's original position was that, because the subcontract was so attenuated by 2nd August 2004, damages for repudiation would be modest. Multiplex's claim for damages for repudiation (after giving appropriate credit) was only some £3 million. However, that position changed dramatically following Multiplex's victory on the repudiation issue. In schedules 4A to 4F served in August 2006 Multiplex claimed to have suffered losses totalling no less than £25 million as a result of CB's repudiation.
- iii) After two rounds of preliminary issues (both of which have gone to the Court of Appeal) to determine questions of principle, the parties have been unable to agree quantum. Instead, at considerable cost (and, I suspect, contrary to sensible legal advice on both sides), the parties are asking the court to value almost every aspect of the steelwork, apart from the arch.

4. The history of the litigation to date. Both parties commenced proceedings in 2004, following the parting of the ways. On 10th December 2004 the two actions were consolidated. Multiplex became claimants and CB became defendants in the consolidated action. CB's parent company, Cleveland Bridge Dorman Long Engineering Ltd, became second defendants in the consolidated action. At a case management conference on 5th December 2005, I had a constructive discussion with leading counsel as to how the disputes might most economically be resolved. A set of nine preliminary issues was formulated by counsel, the answers to which (it was hoped and expected) would enable the parties to resolve their differences. A tenth issue was subsequently added to the list at the request of counsel on both sides. The trial of preliminary issues 1 to 10 commenced on 25th April 2006 and lasted for a month. On 5th June 2006 I gave judgment on preliminary issues 1 to 10 ("judgment 1"): see *Multiplex Constructions (UK) Ltd v Cleveland Bridge UK Ltd* [2006] EWHC 1341 (TCC). Judgment 1 dealt with a number of issues concerning the interpretation and effect of the Heads of Agreement (dated 18th February 2004) and the Supplemental Agreement (dated 16th June 2004), both of which amended the terms of the original subcontract. Judgment 1 also rejected CB's case that there was an oral agreement fixing the value of CB's work as at 15th February 2004 and dealt with the repudiation issue. On 27th April 2007 the Court of Appeal gave judgment upholding this court's decision in relation to issues 1 to 10, in so far as they were challenged on appeal ("CA judgment 1"): see *Multiplex Constructions (UK) Ltd v Cleveland Bridge UK Ltd* [2007] EWCA 443 (Civ).

5. While this court's judgment on issues 1 to 10 was making its way through the Court of Appeal, Multiplex served amended schedule 4 pleadings transforming their case on damages for repudiation, as mentioned above. Multiplex's new case included the proposition that, at the time of repudiation, CB were responsible for designing and fabricating temporary works for the roof. At the request of the parties, I agreed to try a further preliminary issue ("issue 11") to determine whether that proposition was correct. On 31st January 2007 I gave judgment to the effect that, as at the date of repudiation, CB were not responsible for the design or fabrication of temporary works for the roof ("judgment 2"): see *Multiplex Constructions (UK) Ltd v Cleveland Bridge UK Ltd* (No. 2) [2007] EWHC 145 (TCC). On 21st December 2007 the Court of Appeal gave judgment upholding my decision that, as at the date of repudiation, CB were not responsible for the fabrication of roof temporary works, but reversing my decision in respect of responsibility for the design of roof temporary works. The Court of Appeal held that CB remained responsible for the design of roof temporary

works (“CA judgment 2”): see *Multiplex Constructions (UK) Ltd v Cleveland Bridge UK Ltd* [2007] EWCA 1372 (Civ).

6. Preparation for main trial. Whilst the parties were battling out the eleven preliminary issues at all levels, their enthusiasm for the main fray never wavered. All thoughts of reaching a sensible settlement after resolution of the preliminary issues (as canvassed at the December 2005 case management conference) were seemingly jettisoned. The parties served pleadings, witness statements and evidence for the main trial, due to start in March 2008. CB pleaded their claim for payment in respect of work done in Scott schedule 2. Multiplex responded with a rival version of Scott schedule 2, setting out Multiplex’s valuation of the work. Multiplex pleaded their claim for damages, alternatively abatement for defects in Scott schedule 1 and their claim for damages for repudiation in Scott schedule 4, to all of which CB have responded. Two recent decisions of this court concerning the pleadings are *Multiplex Constructions (UK) Ltd v Cleveland Bridge UK Ltd* (No. 4) (“judgment 4”) [2008] EWHC 231 (TCC) and *Multiplex Constructions (UK) Ltd v Cleveland Bridge UK Ltd* (No.5) [2008] EWHC 569 (TCC) (“judgment 5”). Judgment 4 dealt with CB’s application to re-re-amend Scott schedule 2. Judgment 5 dealt with Multiplex’s application to re-amend Scott schedule 4C.

7. The pleadings and their appendices fill several shelves. The total trial bundle (as expanded during the trial) occupies about 550 ring files.

8. The trial. The parties have raised many hundreds of separate issues requiring decision. The volume of evidence is such that if all matters were to be explored in what may be called “the old style”, the trial would have lasted for well over a year. The parties did not wish to incur costs on that scale. Accordingly they entered into a “chess clock” agreement, whereby the trial would commence on 3rd March (subsequently put back to 10th March) and finish by the end of May, with the time available being shared equally. The trial duly proceeded on that basis and was concluded on Wednesday 28th May. The consequence of this accelerated programme was that many matters were touched upon very briefly at the oral hearing and much of the evidence has been left to my private reading.

9. Post-trial hearings. Whilst judgment writing during June and July I held a number of post-trial hearings, for which purpose I provided to the parties numerous draft chapters of the judgment. The purpose of these hearings was twofold: first, to seek counsel’s assistance in checking my calculations or doing further calculations or agreeing figures as appropriate; secondly to discuss with counsel the impact of my draft decisions on other issues in the case. Occasionally it emerged that matters requiring decision by the court had not been dealt with at the trial. Those matters were sometimes argued out at the post-trial hearings and were sometimes agreed between the parties (with certain encouragement from myself). In a case such as the present, where there is a complex skein of interrelated issues, such a procedure can lead to considerable saving of time and costs, as it did in this case. I pay tribute to counsel and solicitors for the co-operative and constructive approach which they adopted at these post-trial hearings. As a result, by the end of July (two months after the end of trial) all consequential calculations had been carried out and the parties knew what sums were being awarded in respect of each head of claim and counterclaim in the various Scott schedules. Issues concerning interest and the position in respect of retention monies (which were not explored during trial) were resolved in September. Those matters will be dealt with in the final chapter of this judgment.

10. This judgment. In the course of this judgment I shall give bundle references or transcript references on those occasions where I believe that they may be of assistance to the parties. These references will be tedious to general readers (who obviously do not have the transcript or bundle) but I suspect that such readers may be few in number.

11. Definitions. In this judgment I shall use the following definitions, all of which were used by counsel and the parties during the trial:

“Acecad” means Acecad Software Ltd.

“Babtie” means Babtie Group Ltd (which was acquired by Jacobs Engineering in or around August 2004).

“Black steel” means raw steel, which has not entered the fabrication process.

“Bridon” means Bridon International Ltd.

“Buyouts” means materials, items or services which CB purchased from third parties.

“Carve-out steel” means steel fabrication which was removed from CB’s subcontract by the Heads of Agreement and the Supplemental Agreement.

“Cleveland Group” means the group of companies of which CB forms part.

“CMHS” means Coloured Modified High Solids (a type of paint)

“CN” means “change notice”.

“CVI” means confirmation of verbal instruction.

“DLT” means Dorman Long Technology Ltd.

“East Lane” is the name of a storage yard near to Wembley.

“Enob” means Enob Fire Ltd.

“Fast Track” means Fast Track Site Services Ltd.

“Go Data” means the software system of that name, which was created by Acecad and is discussed in chapter 11 below.

“Interregnum” means the period between the date when the Heads of Agreement were executed and the date when the Supplemental Agreement was executed. (During this period the parties operated under the regime of the Heads of Agreement, but in anticipation that that would be superseded by a Supplemental Agreement then under negotiation.)

“Leave-out steel” means steel which could not be erected until after the arch had been raised in June 2004.

“Lump sum” means a defined sum for which work and materials are to be provided. (Two lump sums are of principal relevance in this litigation, namely (i) the original

subcontract price and (ii) the sum of £12 million specified in the Supplemental Agreement.)

“Lump sum risk” means the risk that the actual quantity of steel required to construct the bowl as originally specified would exceed the allowance made in CB’s tender. That allowance is set out in the subcontract documents at D2/289.

“Lump sum risk factor” means the factor by which rates of payment in respect of the bowl must be reduced, once the actual steel quantities are known, in order to reflect the lump sum risk.

“Lump sum works” means the works which, under the Supplemental Agreement, CB agreed to carry out for £12 million.

“Migrated claims” means those claims which were originally within Scott schedule 4D, but have been transferred to Scott schedule 4C.

“Mott” means Mott MacDonald Ltd and its related companies.

“NDT” means non-destructive testing.

“Oakwood” means Oakwood Engineering Services Ltd.

“Palace of Industries” is the name of a storage yard near to Wembley.

“PC Harrington” or “PCH” means PC Harrington Contractors Ltd.

“Phoenix” means Phoenix Electrical Company Ltd.

“PMS” means piece monitoring system (one function of Go Data).

“PISA” or “Permasteelisa” means Permasteelisa (UK) Ltd and related companies.

“Purchase order” is a reference to Multiplex’s purchase order no. 74010, which was sent to CB on 26th May 2004.

“Pyramid” means Pyramid Builders Ltd.

“Retrofit” means work done to correct or amend (a) steelwork drawings or (b) pieces of fabricated steel (a process explained by Mr Hutchinson, whose evidence is summarised in chapter 3 below).

“RFI” means “request for information”.

“Runway girders” means those girders upon which the moving roof of the stadium slides, when opening or closing.

“Sandbergs” means Sandberg LLP.

“SGT” means Shanghai Grand Tower (a steel fabrication company in China).

“Side letter” means the letter from Multiplex to CB dated 20th August 2002, which CB rely upon as entitling them to additional remuneration.

“SMM” means the Standard of Measurement.

“Supplementals” mean the numerous written submissions which counsel lodged during the trial, by way of supplements to their opening and closing written submissions.

“Tighe” means Jack Tighe Ltd.

“Toblerones” means the triangular trusses which formed the middle sections of turning struts used to raise the Wembley arch.

12. The background facts. The background facts are set out in paragraphs 1 to 94 of judgment 1.

13. Appendices to this judgment. Appendix 1 is a summary of the court’s decisions in respect of certain items in Scott schedules 1B and 1D. Appendix 2 is a set of simple sketch plans of the stadium, upon which are marked certain features of the structural steelwork. These plans will assist the reader to follow the discussion of Scott schedules 1, 2 and 4.

14. After these introductory remarks, I now turn to the evidence called at the current trial. In the next two chapters I shall outline the factual evidence which has been called. I shall not summarise the expert evidence. Instead, I shall refer to the expert evidence as and when necessary in the course of addressing Scott schedules 1, 2 and 4. The expert witnesses were: Dr Franco Mastrandrea, Multiplex’s quantity surveying expert; Mr Peter Hart, CB’s quantity surveying expert; Mr Martin Hunter, Multiplex’s expert on construction programming and delay; Mr John Crane, CB’s expert on construction programming and delay. All four experts were men of experience in their respective fields and were qualified to give expert opinion evidence for the assistance of the court.

CHAPTER 2. THE CLAIMANT’S FACTUAL EVIDENCE

15. In this chapter I shall set out a very brief outline of the claimant’s factual evidence. The full witness statements span 490 pages, supplemented by many appendices. It is not feasible to replicate all this material in the judgment, although I bear it in mind. I shall not summarise the evidence of Ms Munoz or Mr Theos (although I bear it in mind) since Multiplex’s claims in schedule 4E fail on liability.

JOSEPH ATKINS

16. Mr Atkins is a paint inspector and project manager with long experience in the construction industry. He was employed by Enob between 2003 and 2007, principally working on the Wembley project.

WITNESS STATEMENT

17. Enob was the subcontractor who applied intumescent paint to those pieces of steel which required such a coating. Intumescent paint provides a fire protective coating, and is to be distinguished from the ordinary paint which was applied by another subcontractor, Tighe.

Intumescent paint has a thicker consistency than decorative paint, it is softer and so is more easily damaged.

18. Pieces of steel were delivered to Enob's premises at Scunthorpe, duly painted by Enob, allowed to cure and then transported from Scunthorpe to site. After erection some touch-up work is always required to rectify damage caused through handling, transport and erection.

19. Enob was originally engaged as subcontractor by CB. Following the execution of the supplemental Agreement Enob was engaged directly by Multiplex.

20. Much of the steel erected as at 2nd August had extensive damage to paintwork, which Mr Atkins attributes to CB's poor handling and CB's failure to protect the paintwork. Also on 2nd August much steel was lying around the site, at East Lane or at Palace of Industries. The paintwork of this steel had extensive damage, which Mr Atkins attributes to poor storage handling and transport.

21. Enob's men spent much time repainting areas of damaged paintwork. This work was recorded on daywork sheets. In addition Mr Atkins kept a "blame sheet", which identified the party responsible for the damage under repair. This blame sheet is at T34/79-112. It has seven columns on the right hand side, one for each of the candidates, namely CB, Hollandia, change instructions by the engineer, Phoenix, Pyramid and Tighe. Mr Atkins also took photographs of the damaged steel and these are in the bundle, immediately after the blame sheet.

22. Mr Atkins then discusses individual items in schedule 1A. I shall refer to that detailed evidence later when addressing the claims in schedule 1A

CROSS-EXAMINATION AND RE-EXAMINATION

23. Mr Atkins was cross-examined and re-examined on day 9.

24. Enob did a great deal of work on the Wembley project, both as subcontractor to CB and as subcontractor to Multiplex. Most of that work had nothing to do with the defects claim in schedule 1A.

25. During the period up to 22nd June, when steel was loaded onto lorries at Scunthorpe, some of the loading was done by Enob and some was done by CB. Mr Atkins recollects hearing of the changed arrangements after 22nd June, whereby Multiplex would organise the loading of steel at Scunthorpe and the unloading of steel at the two London storage yards.

26. In many instances the surveillance checklists in the bundle, which purport to support schedule 1A claims, relate to different daywork sheets. Quite often those documents refer to steel sent by ZNS from Holland and so any defects in that paintwork cannot be the responsibility of CB. (The documents in this category were identified in cross-examination and self-evidently cannot support a claim against CB.) The surveillance sheets were quality control documents, produced for the purposes of the warranty given by the paint manufacturer.

27. I shall refer further to Mr Atkins' cross-examination in respect of individual items later, when addressing the claims in schedule 1A.

TIMOTHY BICKNELL

28. Mr Bicknell is the senior commercial director of Multiplex (UK), having been employed by that company since 28th February 2005. He has no direct knowledge of events before that date, but he has gained an understanding from reading the documents.

WITNESS STATEMENT

29. Mr Bicknell provides in paragraph 8 a helpful list of the contracts entered into between Multiplex and Hollandia/ZNS. He considers that the percentage addition for overheads and profit under these contracts was on the high side, but that this is understandable given the commercial situation in which Multiplex was placed.

30. In 2006 and 2007 there were disputes between Multiplex and Hollandia about payment. Those disputes were resolved by a series of commercial settlements. Mr Bicknell sets out the details of those settlements and the sums paid to Hollandia in paragraph 14.

31. Multiplex had subcontracts with Permasteelisa (“PISA”) for the design, supply and installation of external cladding, internal bowside cladding and turnstiles. PISA were delayed in carrying out their work and claimed both an extension of time and loss and expense. PISA’s claim was settled for £28,123,647, which sum was split across the three sub-contracts. The delay to PISA was caused in part by CB’s repudiation.

32. Multiplex spent a substantial amount of staff time dealing with issues caused by CB’s repudiation. Multiplex incurred additional insurance costs as a result of the repudiation.

33. At the end of the project, Multiplex arranged for the temporary steelworks to be sold off as scrap. Mr Bicknell does not believe that CB would have made any profit, if the steel had been returned to CB and they had sold it as scrap.

CROSS-EXAMINATION AND RE-EXAMINATION

34. Mr Bicknell was cross-examined and re-examined on days 15 and 16.

35. In August 2004 Mr Ong sent an email to colleagues (QC 55/204) stating that costs and losses recoverable against CB should be recorded and should be collated in a separate folder. However, Mr Bicknell has never seen any such folder.

36. Multiplex’s tender included a 7.5% mark up for site management. The same mark up for site management is added to Multiplex’s damages claims in schedule 4. Multiplex’s allocation records show that Multiplex devoted substantially more resources to the project following CB’s repudiation than were allowed in the tender. However, those allocation records do not show what the staff were doing.

37. Multiplex claim additional insurance costs, because the project overran and Multiplex had to pay additional insurance premiums.

38. On Wembley Multiplex charges its client 3.8% for off site overheads. This covers head office, IT, human resources, etc.

39. The additional preliminaries claimed in schedule 4E are derived from Multiplex's CHEOPS system. Mr Bicknell accepts the overlap which Dr Mastrandrea has identified in relation to the prolongation period.

40. In the course of cross-examination Mr Bicknell went through the documents relating to Multiplex's disposal of 3,000 tonnes of temporary steel as scrap. Hollandia were asked whether any part of the temporary steel belonged to them and they said no. Mr Bicknell does not know what part of that temporary steel belonged to CB.

41. Mr Bicknell maintains his view that Permasteelisa were delayed in part of because of CB's repudiation. Permasteelisa's loss and expense claim was settled for somewhat more than the figure shown in their August 2006 claim document. The reason is that there were other claims as well.

MARCELLUS BOKS

42. Mr Boks was ZNS project manager for Wembley from mid-August 2004 to March 2006.

WITNESS STATEMENT AND EVIDENCE IN CHIEF

43. Mr Boks worked closely with Mr Montijn and he reported to Mr Van Rooijen.

44. ZNS was engaged by Multiplex to finish off fabrication of the bowl and PPT. Hollandia was engaged to fabricate the roof.

45. In relation to the roof, ZNS loaned Mr Boks to Hollandia. Mr Boks assumed responsibility for the permanent works, while Mr Montijn was responsible for the temporary works.

46. When CB withdrew, they had completed about 80% of the design and drafting of the bowl permanent works; about 80% of the design and 70% of the drafting for the fixed roof.

47. Due to lack of assistance from CB and lack of information, it took ZNS/Hollandia approximately 8 weeks to establish the status of the design and drafting of permanent works. Missing or incomplete retrosquad drawings and missing or incomplete connection designs were a handicap. One major task was to bring B or C status drawings up to A status.

48. Hollandia engaged CB's former sub-contractors, Oakwood and DLT, as well as CB's independent checker, Jacobs Babbie. At a meeting in September Oakwood provided to Hollandia a status report, showing the design and drafting of the roof as at 3/8/2004.

49. Hollandia's permanent works team was divided into a roof team and a bowl team. Both teams had regular meetings.

50. The design and drafting of the bowl permanent works was complete by about December 2004. The design and drafting of the roof permanent works was mostly complete by October 2005.

51. Hollandia made a number of changes to CB's design, to cater for flexibility and tolerances. The changes to roof connection design were repetitive. So the red dots on the

defendants' supplemental 1A slide 11, although correct, give an exaggerated impression of the amount of changes.

52. Hollandia and Multiplex changed CB's erection methodology, in order to speed up the process.

CROSS-EXAMINATION

53. Mr Boks was cross-examined on days 10, 11 and 12 (his evidence being interrupted by other witnesses interposed).

54. Mr Boks was aware that roof fabrication had been omitted from CB's subcontract, that both CB and Hollandia had tendered for it and that Hollandia had been successful.

Information from CB

55. Mr Boks had no direct dealings with CB. He does not know whether CB supplied better information or more orderly information to Multiplex than Multiplex passed on to Hollandia. However, it appears from the documents put in cross-examination that this may be the case. Mr Boks did not see any quality packs supplied by CB. These would have been useful. Mr Boks did not see the roof design detailing brief. This would probably have been useful, although Mr Boks noted in re-examination that the document was somewhat out of date.

Truss T7

56. Hollandia dealt with truss T7 in a different manner from that intended by CB. Hollandia preferred to bring truss T7 to site in larger pieces. This was not just a matter of preference. It meant that the final quality of truss T7 was much better. It would also be much quicker.

Design and detailing work

57. As the new erector, Hollandia had to review CB's connection designs. This was a considerable task and it continued beyond September.

58. In relation to the design and drafting work done by CB before repudiation, Mr Boks' estimate of percentage completion is lower than CB's estimate. However, in making his assessment Mr Boks did not differentiate between original design and variations made by Mott/Multiplex.

59. Hollandia had to complete the design and detailing of the bowl. This was mainly a matter of securing approvals from Mott (who were rather slow). It took until December 2004.

60. In relation to the roof, the changed moving roof loads which were notified to Hollandia meant that they had to review their design of the connections for the roof permanent works.

61. In late September Mott issued new load cases for the roof or PPT. This information included information on disproportionate collapse (a complex matter which rumbled on until

March 2005). The new load cases meant that Hollandia had to go back over their previous designs and check them for the new loadings.

62. There were two substantial reasons why Hollandia took so long to complete the permanent works connections designs for the roof. First, there were design changes made by Mott. Secondly, changes which Hollandia made to the erection methodology led to changes to the permanent works connections designs. In the course of cross-examination on day 12 Mr Boks was taken through a large number of documents relating to these matters. In many instances Mott was issuing additional or varied information about loads (either actual loads or possible loads in disproportionate collapse scenarios). This late and varied information caused much frustration both to Multiplex and Hollandia.

63. One example which was looked at in some detail was Hollandia's connection design for the connections between the north and south roof. The four connections in this category occur at the junctions of truss T2 with rafter R10, truss T3 with rafter R12, truss T4 with rafter R21 and truss T5 with rafter R23. These connection designs, which Hollandia produced on 22nd April 2005, involved very extensive calculations: see T22/166-381. The connection designs for T2 and T5 were mirror images of each other. The connection designs for T3 and T4 were mirror images of each other. So in effect two very substantial calculations were required.

64. In addition to the above matters, however, there were some items of roof design which had not been taken on board by CB, in particular the walkways in the roof.

Schedule 4C: claim 3: completion of bowl connection design

65. Many of the hours claimed for by Multiplex in appendix A relate to the period after the bowl connection design was complete. Many of the Hollandia daywork sheets relied upon by Multiplex do not make it clear whether they relate to the bowl or the roof. Many of the Oakwood daywork sheets relied upon by Multiplex expressly refer to the roof. Thus they cannot be relevant to bowl connection design.

66. Mr Boks cannot really help the court about the items in appendix C to schedule 4C. These matters were dealt with by Mr Montijn.

RANALD McGREGOR

67. Mr McGregor was Multiplex's project manager, who was responsible for the steelworks package and (from November 2003 onwards) was responsible for the entire stadium. He reported to Ashley Muldoon, the project director.

WITNESS STATEMENT

68. In 2003 CB set up a "retro squad", based in Darlington, to update drawings in respect of which changes had occurred. The retro squad used AutoCAD (two-dimensional), instead of X steel (three-dimensional) as used by Oakwood. The retro squad had difficulty in keeping up with the changes.

February to July 2004

69. During the early part of this period Multiplex engaged Hollandia to carry out an audit of the roof.

70. Following the Heads of Agreement, Multiplex sub-let all the PPT steel (1,326 tonnes) and all the roof steel. In relation to the bowl, CB sub-let 673 tonnes and Multiplex sub-let 1,073 tonnes. Multiplex sub-let the “carve out steel” (PPT steel and 1,073 tonnes of bowl steel) to ZNS, because their price was more competitive than that of Ilements (the only other company with capacity).

71. Since Multiplex were responsible for fabricating the “carve out” steel under the Heads of Agreement and the Supplemental Agreement, they relied upon CB supplying the permanent works designs and drawings timeously.

72. At the end of June Multiplex exercised its option under the Supplemental Agreement to remove erection from CB and transfer that function to Hollandia. Hollandia took over CB’s labour force through the company Fast Track.

73. In July Mr McGregor concluded that CB had completed about 70% of the design for the permanent and temporary works (paragraph 23).

74. CB had arranged for SGT in China to fabricate the steel for phases 13 to 17 of the bowl and for all upper tier rakers except phases 11 to 15. SGT did not complete their work, so that the steel shipped back from China comprised black steel, partly fabricated steel and fabricated steel.

Events after 2nd August 2004

75. In the first 2/3 months Mr McGregor spent most of his time dealing with issues arising from CB’s repudiation.

76. The outstanding fabrication work was undertaken by ZNS in Holland. Accordingly all steel procured by CB and requiring fabrication was transported to Holland.

77. As to the steel pieces which had already been fabricated by CB, these steel pieces had to be located. This too was a major task. CB’s Go Data system did not enable steel to be traced effectively. ZNS created a database of all steel received from CB. When steel pieces were needed for erection and could not be found, ZNS had to re-fabricate them.

78. On 12th August Hollandia were instructed to complete the design and drafting for the bowl, PPT and roof. The database was frozen in October. Fabrication and delivery of missing steel commenced in early November. Steel erection rates improved after then.

79. ZNS engaged the MME Group to do non-destructive testing which CB would have done but for the repudiation.

80. Mr McGregor required separate teams to be formed to deal with the outstanding tasks concerning steelwork. The structure of these teams was set out in Mr McGregor’s Steel Team Organisation Chart.

81. Understanding the status of CB’s connection designs was a substantial task. Much information was missing, which Hollandia needed. On 31st August CB provided two hard drives, which were meant to hold all the latest drawings and X steel models as at 2nd August. However, some information was missing and Clifford Chance chased this during September.

82. It was not until 24th September that Hollandia had received sufficient design information from CB, so that they could start work on the roof. Because CB's design was incomplete Mr McGregor instructed Hollandia to review all the fabrication drawings for the roof.

83. After CB's repudiation Hollandia, Oakwood and Multiplex had difficulty in understanding the status of CB's retro squad's work. On occasions it turned out that steel erected was not in accordance with the latest drawing revision.

84. Hollandia explained to Mr McGregor that, using CB's design, it would not be possible to achieve the required tolerances for the roof. Accordingly Hollandia made certain changes to CB's roof drawings and the assembly of truss T7. Hollandia also amended CB's drawings where these were defective. Hollandia completed CB's roof designs and, where necessary, ensured that roof connection design calculations were brought up to A status. Mr McGregor accepts that there were also certain design changes to the roof made by Mott. Multiplex has given credit for those matters in its claim against CB.

85. Hollandia proposed changes to the methodology and sequence of the south roof, which were duly adopted. This led to a saving of time.

86. The arch layback was a major operation, which required much planning. It was finally undertaken in November 2005. The arch was moved from 112 degrees up to 109 degrees while CT17 was connected to the PPT, and then the arch was moved back to its final resting position at 112 degrees. Hollandia discovered when planning this operation that restraint lines 1 and 5 would clash with CT 17 during the layback operation. Hollandia had to devise a solution to this problem.

87. The Bridon cables had been found to be twisted before CB's repudiation. Hollandia developed a method of removing the kinks in those cables which was duly implemented (as described by Mr McGregor in paragraphs 221 to 227).

Delay

88. From August to November Hollandia's erection rates were low, largely due to the right pieces of steel not being available. Hollandia was able to deal with this problem during the steelworkers' strike (21st August to 26th September). CB's repudiation resulted in significant delay to steelwork between August and November. This caused delay to four subcontractors, including Fagioli, who provided jacking equipment for lifting and restraining the arch. Fagioli's jacks were needed for much longer because of the delay caused to the arch layback by CB's repudiation.

CROSS-EXAMINATION AND RE-EXAMINATION

89. Mr McGregor was cross-examined on days 13, 14 and 15 (with video link evidence interposed). On days 13 and 14 large sections of Multiplex's recent letter of claim against Mott were put to Mr McGregor in cross-examination. Mr McGregor considers that the assertions in that letter are true. Indeed he had some input into the content. On the other hand CB were also at fault. CB were certainly disrupted by the flow of design changes, which continued into 2004. On the other hand, they should have coped with those design changes better.

90. Mott were slow in answering RFIs. They delayed in providing information which CB needed in respect of the PPT and spring thickness and they subsequently changed that information. This is detailed in Mr Gettins' analysis (prepared for Mr McGregor) and in Multiplex's recent letter of claim against Mott.

91. Mott were also at fault in the provision of information for the bowl. The connection forces were not finalised in the schedules which Mott issued in May 2003. Indeed the discovery of deficiencies in Mott's design by other parties was a feature of the way in which design works were iteratively developed throughout the project.

92. CB were right to appoint a retro squad to deal with design changes coming from Mott. However, CB should have employed X steel draughtsmen in the retro squad.

93. CB should have achieved an output of 400 tonnes per week, despite the design changes which were coming through. This was a figure which CB referred to at meetings and said was achievable. There were 9 tower cranes at Wembley, not just 4 (the figure assumed in Multiplex's calculation in schedule 2). It is true that CB also had to erect pre-cast pieces using the cranes, and that there were rather more pre-cast pieces than steel pieces. It is also true that in spring 2004 CB had other tasks on site. These included removing turning struts, assembling rakers and assembling PPT panels on site. It is also true that CB could not use cranes when out of service or when used by other trades. Nevertheless Mr McGregor maintains that CB could and should have erected 400 tonnes per week during that period.

94. Mr McGregor does not accept that CB's output up to July should be assessed by reference to Hollandia's subsequent performance. It is true that Hollandia did not achieve 400 tonnes per week. However, Hollandia were hampered by missing steel pieces and the consequences of CB's repudiation. Also Hollandia were erecting the last part of the bowl, which was more difficult, so that their efficiency was likely to be lower.

95. During the spring of 2004 Mr McGregor had various discussions with Hollandia. Mr McGregor's notes record both those discussions and his thoughts about matters. If Hollandia were going to take over erection, they would need also to be responsible for erection engineering. However, CB would be part of Hollandia's erection engineering team.

96. In June Multiplex decided that all steel pieces fabricated by CB should be transported to East Lane. This was because CB had often been delivering the wrong pieces of steel to site, which delayed erection. Both CB and Multiplex were involved in the loading operation at Scunthorpe. Multiplex controlled the stockyard at East Lane. The steel pieces there were laid out in an orderly fashion. The majority of steel delivered to East Lane was properly tagged.

97. Steel for the roof was dealt with separately. Roof steel fabrication was removed from CB's subcontract in February 2004. Subsequently Hollandia was awarded the contract for fabricating roof steel. Accordingly Multiplex told CB to deliver to ZNS in Holland the black steel which CB had procured for the roof. Mr Rogan's email of 28th June records an instruction to deliver that steel to ZNS as quickly as possible, so that ZNS could sort it out in their yard. Mr McGregor does not recall giving such an instruction. On the other hand, he does not recall responding to express disagreement with Mr Rogan's email. The roof steel was delivered to ZNS approximately during the period June to August.

98. Other steel was also being delivered by CB to ZNS. Mr Van Gils often telephoned Mr McGregor to complain about the disorganised state of the steel.

99. Mr McGregor attended the meeting on 13th July, at which an orderly handover of erection from CB to Hollandia was discussed.

100. In July (after it had been decided that Hollandia would take over as erector) Mr McGregor told Mott that Hollandia would be responsible for erection engineering. In his powerpoint presentation on 2nd August Mr Montijn stated that Hollandia would take over erection engineering.

101. Mr McGregor was not involved in the snagging exercise carried out after CB ceased erecting and (subsequently) after CB left site. Mr McGregor understood that Mr Rogers inspected the paintwork of steel and that subsequently Sandbergs carried out an audit of the defects identified. This was done with a view to making a claim against CB.

102. Mr McGregor estimates that overall CB had completed 70% of the permanent works design when they left the job. This estimate relates to all of the permanent works design, not to that portion which was outstanding on 15th February. Mr McGregor does not agree with Mr Whelan and Mr Gettins (both working for Multiplex) who considered that CB had completed the connection designs for the bowl.

103. After the departure of CB, Mr McGregor was involved in the transmission of information from CB to Hollandia. Mr McGregor also was one of those who liaised extensively with Hollandia. All documentation received from CB was duly passed on to Hollandia. Unfortunately, however, the information provided by CB was seriously inaccurate and deficient. This problem emerged progressively.

104. Multiplex asked for a list of steel, showing where every piece of steel was and what its status was. None of the material supplied by CB or their solicitors satisfied this requirement. Such information as CB did provide was very inaccurate. (Mr McGregor was taken through some of the key correspondence on this issue in re-examination at day 15/ 113 – 126.) Multiplex and Hollandia had great difficulty in finding steel pieces. They also had difficulty in determining whether steel pieces had been fabricated to the latest drawing revisions.

105. The information provided by Enob in respect of steel coming from their premises was also very inaccurate.

106. Multiplex and Hollandia did not have any real difficulty in identifying steel which had been erected or which was stored on site or at East Lane. They could go and look at it. Also most of the steel stored on site and at East Lane had tags. The real problem was in finding steel which was stored at other locations. The Go Data lists provided by CB were inaccurate and incomplete.

107. The defendants' supplemental 7.2 appears to be generally accurate, but that only relates to on-site work.

108. Multiplex set up a team (comprising Kevin Cumberland and others) to locate and sort out steel. When they got down to work, they found that they had a substantial task.

109. Hollandia did not erect much steel in early August. They had a major task in taking over mid-way through the project. Hollandia were still mobilising on site and they had to go through a learning curve. There were industrial relations difficulties in that period. Also Mr McGregor vaguely remembers an incident when a raker was dropped in the course of erection. After that the strike occurred and no steel could be erected for several weeks. Hollandia used the strike period to make sure that they would be in as good a position as possible to proceed when the strike ended.

110. As can be seen from the photographs, Hollandia removed a quantity of temporary steelwork from site between August and October.

111. At the end of the strike Hollandia were not starting from scratch. They had gained considerable knowledge by then. Also at that point they had enough steel to be getting on with.

112. Mr McGregor's diary note of 20th October records that there was a large amount of steel at East Lane (East Lane was a logjam and Multiplex needed another yard). However, the fact that Multiplex had a significant amount of steel did not necessarily mean that they had the right steel.

113. In relation to schedule 4E, Mr McGregor accepts that many of the problems relating to CB's repudiation had been overcome by the end of November 2004. However, some problems lasted longer. Mr McGregor accepts Mr Williamson's analysis of Hollandia's post 28th September performance, as set out in supplemental 17.

114. In a number of documents in the autumn of 2004 Mr McGregor expresses frustration about Hollandia's performance. It is true that he was concerned about specific issues or problems as referred to in those documents. However, overall Mr McGregor thought that Hollandia were doing a good job in difficult circumstances.

115. On 30th April 2005 Hollandia provided a forecast of future engineering costs for the temporary and permanent works. Thereafter Hollandia kept Multiplex informed of changes to the forecast by means of budget deviation forms.

116. Hollandia's total engineering costs were about £10 million. In their claim letter against Mott, Multiplex say that £2.6 million of that sum arose from Mott's design changes. Mr McGregor cannot explain why, despite that claim, some £9.2 million of the engineering costs are claimed against CB.

117. In 2006 Mr Muldoon had some heated correspondence with Hollandia, blaming them for unnecessarily fabricating some 400 tonnes of steel, worth about £480,000. That steel was sitting unused at East Lane. Mr McGregor disagrees with the criticisms which Mr Muldoon made of Hollandia in that correspondence.

JOHANNES DE MEIJER

118. Mr De Meijer is a logistics engineer employed by Hollandia, who was on site from mid-July to 1st November 2004.

WITNESS STATEMENT AND ORAL EVIDENCE IN CHIEF

119. Mr De Meijer had responsibility for updating the erection database, which tracked steel erected.

120. Fast Track (Hollandia's erection subcontractor) had their own database for keeping track of erected steel. This was an excel spreadsheet set out by phases. This was the only information available to Mr De Meijer.

121. Fast Track prepared call-off lists, setting out the steel required for each phase. To prepare the call-off lists Stephen Keys of Fast Track used their database in conjunction with the overall drawings.

122. On arrival Mr De Meijer saw steel all over the site. The database told Mr De Meijer what steel had been erected, but not the location of fabricated steel. Mr De Meijer improved the database, so that it disclosed the erection status of steel and the location of fabricated steel not yet erected.

123. Much crucial information was missing at the beginning of August. During August Oakwood carried out a survey of erected steel. They told Mr De Meijer their findings and he updated the database accordingly. There were many inaccuracies in the database. CB appeared to have maintained it well until the end of June, but not updated it since then.

124. Examples of the entries made by Mr De Meijer can be seen in the version of the database contained in the O bundles. On 29th September a missing piece of fabricated steel (mark no. 1605759) was located on a trailer. It was part of a raker for phase 16 and its entry can be seen at 02/1/14. That piece of steel was duly erected on 30th September, as recorded in the entry at 02/1/29. So the database was a constantly changing electronic record, which was kept as up to date as possible.

125. When Mr Keys produced his call-off lists for phases, many pieces of steel required could not be located. Hollandia had a difficult task in locating this steel. Kevin Cumberland of Hollandia arrived in early September and took charge of the search. A particular difficulty was that freight lists for steel delivered to site were missing. Furthermore, the hard stamps on some steel were obscured by paint and tags were missing from the steel. The search for missing steel was carried out by a team.

126. The steelworkers' strike did not interfere with Mr De Meijer's work. Indeed the hunt for missing steel was easier during the strike.

127. On 20th September Mr De Meijer sent the database, as updated, to Mr McGregor. On 28th September Mr De Meijer issued a list of missing steel re phase 11.

128. On 12th October the database in respect of the upper tier of the bowl was frozen. A further batch of steel was then found and the updated database was re-frozen on 14th October. ZNS were instructed to re-fabricate steel indicated as missing at that point.

129. When pieces of steel were found after 14th October, decisions had to be made whether to use them or to continue with re-fabrication.

CROSS-EXAMINATION AND RE-EXAMINATION

130. Mr De Meijer was cross-examined and re-examined on day 8.

131. Mr De Meijer's original function, when he arrived on site, was to help Fast Track with logistics and the ordering of steel.

132. It was not until the beginning of September that Mr De Meijer was given the database. By then Hollandia were 3 or 4 weeks into their erection contract. Mr De Meijer worked on the database and continued updating it until 1st November, when he left site.

133. Mr De Meijer did not see the delivery notes recording CB's deliveries of steel to East Lane, and so far as he is aware Hollandia did not see those delivery notes. They are now in bundle V11. Those delivery notes would have been very useful information for Hollandia concerning the steel at East Lane. The quality record documents at tab 4 of that bundle would not have been useful information for erectors, but they would have been useful for anyone doing retrofit work.

134. In cross-examination Mr De Meijer was asked to look at some of the drawings which CB maintain that they supplied to Multiplex in July, pursuant to requests made at the "orderly handover" meeting. Steel which CB had erected was highlighted. Drawings like this were lying around the office. It would have been very helpful if Mr De Meijer had been given a complete set of such drawings.

135. CB's siteworks register is at R5/54-80. Mr De Meijer never saw this. It would have been very useful information for any new erector.

136. All in all, it appears that CB gave a great deal of information to Multiplex, which Multiplex did not pass on to Hollandia. That information would have been extraordinarily useful to Hollandia.

137. On the other hand, it was not Hollandia's duty to identify and sort out the steel. CB should have provided a decent record of all steel and its locations. Hollandia were not aware of all the locations where steel was stored. Indeed Mr Cumberland (when he was in charge of the searching team) found pieces of steel at various locations other than East Lane. Steel pieces on trailers were hard to identify because often their hard stamps had been obscured and their tags were missing.

138. In a memo dated 15th September Mr McGregor queried whether Mr De Meijer was getting all the help he needed. It is correct that he needed all possible help. The memo also suggests that ZNS fabricated some pieces of steel twice, because they were lost sight of after original fabrication.

139. Mr De Meijer has never seen the final version of the database. The final version of the database should reveal when each piece of steel was erected and, in respect of each piece, whether it was fabricated by CB or Hollandia. The database does not, however, include the dates of fabrication.

140. It would be possible from the database to identify missing steel that delayed erection. But the database does not show how much time people spent searching for pieces of steel.

141. Normally it takes 4-6 weeks to fabricate steel pieces. However, if Hollandia make a particular effort and steel is available, that period can be reduced.

142. There was some debate between counsel and Mr De Meijer about the significance of table 2 in the second joint statement of the planning experts. This table shows that in November and December 2004, very little of the steel erected was “repudiated steel” (i.e. steel which CB should have fabricated but which, in the event, Hollandia fabricated because of CB’s repudiation). On the other hand, Mr De Meijer does not know how much of the steel left on site by CB required work to be done to it before the steel could be erected.

JACQUES MONTIJN

143. Mr Montijn is manager of Hollandia BV’s engineering department. From the end of August 2004 until April 2006 he managed Hollandia’s erection engineering team, which was responsible for erection engineering and design of the temporary works for the roof.

WITNESS STATEMENT

144. In March 2004 Mr Montijn dealt with the roof audit required by Multiplex. On 30th June he learnt that Hollandia would be taking over erection from CB with effect from 28th July.

145. At meetings with Multiplex on 22nd July and 2nd August Mr Montijn explained that Hollandia was studying an alternative erection method. Hollandia believed that they would save time by building the south roof starting from the middle, rather than the outside. He also said that they were thinking of a similar method for the north roof.

146. Following CB’s departure, Hollandia encountered substantial problems because of documents and information not supplied by CB.

147. CB took over CB’s subcontractors (Oakwood, DLT, TGP), but initially had some difficulty getting relevant documents from them.

148. CB’s design of temporary works was 80-90% complete. CB’s methodology for the south roof was 75% complete. CB’s methodology for the north roof was 60% complete. The design of the moving roof was less than 10% complete. CB’s design of the arch load transfer was 90% complete.

149. As Hollandia were stepping in they had to review the whole of CB’s design in any event. This was a substantial task.

150. The arch had been lifted when Hollandia arrived. However, Hollandia was responsible for moving the arch from its temporary position to its final position. There was a problem because of a clash between restraint lines and CT17. There was also a problem because certain arch lifting cables twisted.

151. Mr Montijn sent Multiplex weekly progress reports until the end of 2004, but then stopped as he was receiving no feedback.

152. Mr Montijn’s erection engineering team grew in view of the size of their task. Hollandia hosted three days of roof workshops from 22nd to 24th September 2004.

153. Hollandia prepared an erection model. This model was important for virtually all the engineering and design work which Mr Montijn’s team did.

154. Mr Montijn's team produced the tolerance philosophy for the roof. Their views were set out in a tolerance report dated 5th April 2005.

155. In a second witness statement Mr Montijn gives a detailed account of the design and drafting which Hollandia undertook (a) for the erection engineering for the roof and (b) for the temporary works for the roof. I take all of that helpful exposition into account, but I will not reproduce it in this judgment.

156. Mr Montijn amplified that second statement briefly in chief by commenting on the defendants' slides (supplemental 1A). Slide 5 shows the re-phasing. This was done for several reasons. In particular, Hollandia changed the erection sequence. Truss T7 was extracted from other phases and made into a separate phase. This did not mean that all the drawings changed, although the models had to be remade. This was not a huge task. There was a change in the assembly method for T7, because the parts were drawn in such a way that it was not very practicable to transport or assemble them. Indeed, in July CB said that they wanted to change the method of assembling T7. A further reason for the change made by Hollandia was to improve quality control and tolerances.

157. Slide 7 shows trusses being erected set low, instead of set high. This had the effect of reducing movements in the roof.

158. Slide 8 shows the changes made by Hollandia in the method of erecting the north roof. CB's method involved hanging the north roof from CT 17, which would have involved substantial difficulties. Hollandia by contrast supported the north roof on temporary towers. Slide 8 is wrong to show a new joint introduced where the LEB approaches the PPT. In fact Hollandia modified an existing joint at that location.

CROSS-EXAMINATION AND RE-EXAMINATION

159. Mr Montijn was cross-examined and re-examined on days 12 and 13.

160. On 12th March 2004 Multiplex instructed Hollandia (i) to audit CB's design and erection methodology for the Wembley roof; (ii) to produce its own erection methodology for the roof; (iii) to produce a budget for item (ii); (iv) to audit and report on the Wembley roof.

161. Mr Montijn started working on the project with a team of 5 or 6 people. By May they had completed item (i), the roof audit. Mr Montijn wanted a larger budget to cover the design of erection engineering. In order to carry out that task, Mr Montijn started increasing the size of his team. On 1st May the project number 32861 was assigned to erection engineering (preparation) and that number appears on a number of later invoices for erection engineering.

162. Mr Montijn's team increased to 22 in July. By July Mr Montijn had agreed with Mott that Hollandia's finite element analysis was acceptable for erection engineering. By early July Mr Montijn knew that Hollandia would be taking over erection and his team had already done some work in that regard. On taking over as erector, Hollandia had to check CB's erection engineering methodology and temporary works design to ensure that they were safe and fit for purpose. This would have been a full check, because there are not many low risk elements in the stadium.

163. On 2nd August there was a meeting at which Mr Montijn delivered a power point presentation on the proposed changed methodology and sequence for erecting the south roof. Hollandia proposed to erect the south roof from the centre outwards, rather than from the outside inwards. This meant that roof erection could begin before the whole of the PPT was constructed. In that presentation Mr Montijn noted that CB's method was feasible. However, Hollandia's proposed changes would save both money and time.

164. The arch load transfer was a major operation in prospect. The load of the arch had to be transferred from temporary restraint cables to CT17. This involved rotating the arch to a more upright position (producing slack in CT17 so that it could be connected to nodes at each end) and then rotating the arch to its final position, so that the whole load was carried by CT17. The load of the arch was then taken by the PPT and concrete cores C3 and C10 (the two cores nearest to the foundations of the arch at either side of the stadium). One major problem which emerged in late 2004 was that cores C3 and C10 (constructed by PC Harrington) were not strong enough to take the load during the arch layback operation.

165. In early 2005 Hollandia developed a new methodology for erecting the north roof, which (amongst other benefits) overcame the cores problem. This involved erecting the north roof supported on temporary towers, rather than hanging from CT17. This enabled most of the north roof to be erected before the arch load transfer. It also overcame the problem identified in section 6 of Hollandia's April 2004 audit report (viz that CB's method of erection was not feasible, given the tight tolerances). This new approach to erecting the north roof was a substantial change of methodology.

166. Hollandia were being paid on a cost plus basis. They incurred extra costs when changes were made to erection methodology or when changes (affecting erection) were made to the permanent works.

167. In April 2005 Hollandia gave Multiplex a budget figure for all engineering work in respect of both permanent and temporary works. Thereafter Mr Montijn prepared budget deviation forms to explain cost changes in respect of erection engineering. A number of these were reviewed in cross-examination. One particularly serious development affecting costs occurred in September 2005: the weight of the moving roof increased by 210 tonnes (approximately 20%).

168. Mr Montijn was cross-examined and re-examined about a number of the claims contained in or transferred from schedule 4D. I will refer to that evidence later, in so far as necessary after I have considered CB's threshold defences to those claims.

ASHLEY MULDOON

169. Mr Muldoon is a director of Multiplex and was the project director responsible for the Wembley Stadium project.

WITNESS STATEMENT

170. In January 2004 Mr Muldoon approached ZNS. Multiplex subsequently arranged for ZNS to fabricate the steelwork carved out of CB's subcontract. In March Multiplex engaged Hollandia (ZNS's sister company) to undertake an audit of CB's design and construction plan for the roof.

171. CB performed badly and lost control of steel deliveries in early 2004. On 22nd June Mr Muldoon convened a meeting of Multiplex staff, at which it was decided that CB should be required to deliver all steelwork currently in storage to the East Lane yard.

172. Multiplex removed erection from CB by giving 28 days notice under the Supplemental Agreement on 30th June. Relations with CB deteriorated. When CB repudiated on 2nd August, Mr Muldoon telephoned Hollandia and arranged for them to step in.

173. CB's repudiation caused substantial difficulties and delays. Multiplex worked with Hollandia to overcome these matters. Finding and organising the steel which CB had fabricated was a particular problem.

174. CB were unco-operative in handing over design information. Multiplex instructed their solicitors to assist in pressing for the release of design information, and even then there were delays before the information was handed over. Mr Muldoon identifies (and quotes huge extracts from) the relevant correspondence.

175. CB's workforce on site at the end of July numbered about 200. Hollandia took over this workforce, but had problems in getting them motivated. There was a strike in late August and September. This provided Hollandia with some preparation time, which was convenient.

176. The hunt for steel continued for a period, but eventually it was necessary to "draw a line" and to fabricate steel pieces which could not be found.

177. Mr Muldoon considered that the effects of CB's repudiation began to be overcome at about the end of October.

178. It did not prove practicable to agree a fixed price for erection with Hollandia. So Multiplex reimbursed Hollandia for erection work on a costs plus basis. On 24th August Mr Muldoon and Mr Jongejan (of Hollandia) signed a memorandum of understanding. This is also known as contract WP 2760 or the 'MOU' or the 'erection contract'.

179. Multiplex agreed with Hollandia fixed prices for the fabrication of the steel for the fixed roof (contract WP 2765) and for the moving roof (contract WP 2756).

INITIAL CROSS-EXAMINATION AND RE-EXAMINATION

180. Mr Muldoon was cross-examined and re-examined on day 20.

181. Relations with the workforce were difficult after CB's departure, because the workers came from the Darlington area and they were sympathetic to CB. This culminated in the strike, which started in late August.

182. So far as the steel was concerned, the problems were missing pieces and pieces which could not be identified for want of tags. On 12th August Mr Muldoon wrote to Hollandia instructing them to fabricate missing bowl steel which was critical (QC 54/16). The list accompanying that letter was generated by Hollandia's and Multiplex's teams on site.

183. Multiplex were due to complete by 30th January 2006. They would receive a bonus if they completed four months early.

184. Mr Muldoon considers that sections 6.2 and 6.3 of Mr Crane's report fairly summarise progress in the areas of the tunnels, core 3 and core 10 in the summer/autumn of 2004. The leave-out steel in those areas could not be erected until the slabs had been laid. (Mr Muldoon later qualified this evidence, in that where the slab was not suspended, it would have been possible to erect steel off pile caps before the slab was laid). Steel could not be erected within a couple of metres on either side of the cores until the cores had been constructed. P C Harrington ("PCH") were constructing the cores and the tunnels. Multiplex made various complaints against PCH for delay. There was plenty of steelwork to be erected in areas away from cores 3 and 10.

185. Throughout the period August to November 2004 Mr Muldoon was delivering positive reports about progress to the Multiplex (UK) board, to the effect that Multiplex would complete on time. In order to achieve this, he had it in mind that acceleration measure would be necessary. By the time of the November board meeting "we had substantially sorted out the issues in relation to the repudiation, which were trying to find the steel, and to get hold of the relevant design and drawings and information" (day 20, page 63).

186. Mr Muldoon's reports appearing in the board minutes do not refer to any concerns about missing steel. However, the monthly project reports, which were also given to the board, would have referred to that matter.

187. Up until February 2005 Multiplex Ltd (the Australian holding company) was presenting a positive picture to its shareholders about the Wembley project. It first reported the likelihood of substantial losses on Wembley in May 2005. At that point Multiplex Ltd took the dramatic step of asking for its shares to be suspended. This led to the shareholders in Australia bringing a group action against the directors for fraud.

188. In 2006 Mr Muldoon wrote to Hollandia, making a claim for steel which had been fabricated unnecessarily. Mr Muldoon's letters on this matter were drafted by Richard Ackland, a Multiplex quantity surveyor who was working on the Hollandia account. This claim was made in good faith.

189. Multiplex's Scott schedule 2 sets out a reasonable assessment of the costs which CB ought to have incurred in erecting such steel as they did erect between February and June 2004. That assessment does not take into account CB's other activities on site, in particular erecting pre-cast planks, raising the arch, removing the arch turning struts, assembling PPT panels and rakers on site (in so far as such work was done during that period).

190. Multiplex's recent detailed investigation of their claim against Mott shows that some of CB's complaints in 2004 about design changes were justified. However, CB were also at fault. At the time CB repudiated they were in total disarray.

191. Mr Muldoon also dealt with CB's claim for category 1 buyouts in his oral evidence. I will summarise that evidence as necessary when dealing with schedule 2.

FURTHER CROSS-EXAMINATION

192. Mr Muldoon was recalled for further cross-examination on day 29, following the late disclosure by Multiplex of obviously relevant documents concerning progress.

193. In a press release dated 4th August, approved by Mr Muldoon, Multiplex asserted that there was a considerable amount of steel on site and that CB's departure would not cause delay. This set out what Mr Muldoon then believed. "There was a lot of steel and it was a matter of making sure that steel was identifiable and it was the steel we needed in sequence" (day 29/131-132). Mr Muldoon gave an optimistic report on progress to Mr Roberts (head of Multiplex Australia) on 9th August.

194. At a meeting with KPMG, Multiplex's auditors, in September 2004 Mr Muldoon expressed the view that Multiplex would complete by September 2005.

195. Contrary to Mr Muldoon's evidence on day 20, the monthly project reports (now disclosed) do not express concern about missing steel. Instead they identify the following causes of delay during the repudiation period: industrial relations; problems with cranes; Hollandia's resources; Hollandia's performance; bad weather.

196. The Peer Review Team's report of November 2004 (not disclosed) concluded that the project would be completed on time.

197. In May 2005 the Peer review Team reported that there had been substantial slippage since February 2005 and that the site team were at fault in a number of respects. Mr Muldoon did not agree with their conclusions.

NATHANN PERKINS

198. Mr Perkins is an engineer who was employed by Multiplex as design co-ordinator for steelwork at Wembley between 2002 and 2004.

WITNESS STATEMENTS

199. CB's erection rate was low during the first half of 2004. Multiplex personnel believed that a significant factor in CB's poor performance was the disorganised manner in which steel was being delivered to site.

200. Mr Perkins dealt with the problems of China steel, much of which had to be shipped back un-fabricated. Some 1,000 tonnes was never returned from China.

201. Mr Perkins attended meetings with CB about "leave out" steel (i.e. steel not erected, so as to make room for arch erection). Mr Perkins was not satisfied that CB had proper control of their stock of fabricated steel.

202. On 22nd June Multiplex decided that all fabricated steel should be transported to a stockyard at East Lane, which was near to the Wembley site. Mr Perkins and Mr Petaccia organised the deliveries. Mr Perkins organised the East Lane stockyard, so that steel pieces for each phase were grouped together.

203. Exhibit 1 to Mr Perkins' second witness statement sets out the locations where fabricated steel was stored on 22nd June and the locations where that steel was stored on 2nd August. It can be seen that during that period some 4,500 tonnes of steel were transported from other locations to East Lane.

204. CB's delivery notes were most unsatisfactory. Often steel was delivered that was not listed. Often the information given on delivery notes was inaccurate. In paragraphs 27 and 28 Mr Perkins lists deficiencies in delivery notes relating to 31 steel pieces.

205. Mr Perkins dealt with the loading of steel at the Corus yard in Scunthorpe. He noticed much damage to paintwork, for which CB was responsible.

206. Mr Perkins has done an analysis of the 20 change notices, for which CB are claiming additional payment on the basis that they were bowl variations after 15th February. That analysis is set out in paragraphs 42 to 107 of his witness statement. He rejects most of CB's claims for additional payment.

207. Mr Perkins has examined Scott schedule 1A. He is satisfied that CB is responsible for the damaged paintwork and the other problems which necessitated repainting with intumescent paint (paragraphs 108 – 120).

208. In relation to Scott schedule 1D, Mr Perkins has prepared a table to demonstrate that (contrary to CB's case) the remedial work done by Hollandia was not work attributable to variation instructions. Fast Track did the remedial work itemised in schedule 1D and they often ticked the 'client' box on the site modification sheets. They did this because they had been asked to do the work by representatives of their client, Multiplex. They were not apportioning blame as between Multiplex and CB.

209. Following CB's repudiation Multiplex had a massive task in determining the location and status of steelwork fabricated by CB. In mid-August Hollandia were instructed to start sourcing and fabricating missing steel pieces which were needed for phases 11 to 18 and 21 to 28.

210. At the time of repudiation the drafting of bowl steelwork was about 90% complete. Finishing off this work was a substantial task for Mr Perkins and Oakwood. (See paragraphs 136 and 160 – 166.)

211. It was difficult to determine the status of retro squad drawings, because Mr Perkins lost contact with Colin Hutchinson of CB. Also CB's retro squad had been using autoCAD (which was two-dimensional) rather than X steel.

212. Following the repudiation Multiplex requested all outstanding design information. CB were very slow in providing this.

213. Mr Perkins and his colleagues liaised closely with Hollandia and Oakwood, to assist them with their design work. From the beginning of October Mr Perkins was heavily involved in co-ordinating the siteworks instructions process.

CROSS-EXAMINATION AND RE-EXAMINATION

214. Mr Perkins was cross-examined and re-examined on day 16.

Deliveries of steel

215. All 4,500 tonnes of steelwork delivered to East Lane between 22nd June and 2nd August came from CB. So East Lane was not holding any of the steel fabricated by ZNS or any of the steel from China.

216. The steel pieces incorrectly described on delivery notes (24 steel pieces in paragraph 27 and 7 steel pieces in paragraph 28 of Mr Perkins' witness statement) form part of a very much larger number of steel pieces delivered in that period. Nevertheless there was a much bigger problem: steel on delivery notes was not arriving and steel was arriving not on delivery notes. So Mr Petaccia decided to disregard CB's dockets and to do his own stock take of all steel that arrived at East Lane from CB. Multiplex used the information from this stock take for developing their own database.

217. The steel was laid out in an orderly fashion at East Lane. Mr Perkins drew a plan showing how the steel should be laid out. A tidier version of that plan is at QC 92/207. Multiplex did not know exactly what steel they had and did not have until mid-August.

218. Mr Perkins did a lot of work at the Corus yard, supervising the loading operation. He saw to it that steel was loaded up in erectable sequence and for one phase at a time.

219. CB did not have the right pieces of steel in erectable sequence.

220. Mr Perkins used a colour code on his spreadsheets to indicate the importance of missing steel pieces. Red meant critical. Amber and green meant progressively less important. Multiplex had to fabricate critical steel which they could not find.

Wrongly painted steel

221. Mr Perkins recalls that a number of columns and (he thinks) beams were painted with ordinary paint, when intumescent paint was required. The use of intumescent paint was the subject of a provisional sum in CB's subcontract. Multiplex issued general arrangement drawings on 30th October 2003, which clearly identified the steel members requiring intumescent paint, but CB did not comply. Mr Perkins appreciates that CB may have had a claim in respect of the late issue of drawings which showed where intumescent paint was required, but he understands that that claim was compromised by the Heads of Agreement.

222. In relation to the quantification of this claim Mr Perkins was shown the defendants' supplemental 12. Obviously Mr Perkins could not say whether that document (prepared by counsel) was accurate. However, he confirmed that all work done by Jack Tighe in stripping down the wrongly painted members would have been recorded on daywork sheets.

The twenty change notices

223. Mr Perkins was cross-examined at some length about the twenty change notices reviewed in paragraphs 42 to 107 of his witness statement, for which CB are claiming additional payment. I will take this evidence into account, when addressing CB's claim for variation instructions in chapter 25 below.

Schedule 1D

224. Mr Williamson took Mr Perkins to the documentation in respect of item Hol 15 in schedule 1D. This is a claim for £10,850 in respect of replacing the bottom flange of upper tier raker section, so as to enable tubular brace to be erected. The work is said to have been instructed by site works instruction SW 063. It can be seen that the site record sheet corresponding to SW 063 (M1D-1/73) contains no figures for labour or materials, but merely a round sum total at the bottom of the page. This figure is carried across to schedule 1D,

where it is described as “estimate”. Furthermore, schedule 1B (paintwork following on after remedial work to steel) contains no item corresponding to SW 063. On the basis of these documents Mr Williamson suggested that the remedial work alleged in Hol 15 simply was not done at all. Mr Perkins denied this and said that the work was definitely carried out. Multiplex actually saw the work being done. In the alternative, Mr Williamson suggested that if the work was done, then it was the subject of other site records; it never gave rise to the financial claim for £10,850 which appears in the site record sheet at M1D-1/73. Mr Perkins was less confident about this point and he could not explain the anomalies in the documentation.

225. On some site modification sheets (e.g. nos 403 and 404) the words “new requirement” have been written against the ‘Client’ box at the bottom of the page. These are Hollandia’s records. As far as Hollandia were concerned, Multiplex were the client. Site modification sheets 403 and 404 relate to a change which was offered to CB in January/February 2004, when they were asked to re-detail certain column base plates. The variation pre-dated 15th February. At the time of repudiation CB had not carried out this work.

GERARD ROGERS

226. Mr Rogers did not sign any witness statement. He gave all his evidence orally on day 10. I shall summarise the gist of that oral evidence, drawing together evidence in chief, cross-examination and re-examination.

227. Mr Rogers was in charge of the team at Wembley painting steelwork with ordinary paint (as opposed to intumescent paint). The purpose of ordinary paint was to protect steel against corrosion. The purpose of intumescent paint was to protect steel in the event of fire. Initially Mr Rogers performed this function in his capacity as site manager employed by CB. After CB left site, Mr Rogers performed essentially the same role as an employee of Jack Tighe Ltd (“Tighe”).

228. CB applied ordinary paint to steelwork at their yard in Darlington after fabrication and before transportation to site. Mr Rogers and his team on site touched up damage subsequently caused to paintwork. Some damage was bound to be caused during loading, transport, unloading and erection.

Schedule 1B: items JT 1 – 376

229. These are claims by Multiplex for painting steel after the site modifications in schedule 1D had been carried out. The daywork sheets in bundles T67-69 relate to this work. They were created in Tighe’s office.

230. The documentation suggests that sometimes Tighe’s work was done before the site modifications. This suggests to Mr Rogers that there have been some mistakes in recording dates. Nevertheless it is the case that some gritblasting and preparatory work may have been done by Tighe before the modification work to steel.

Schedule 1B: item JT 377

231. Item JT 377 is a claim for damage to paintwork during storage, transport, erection and the period after erection. Multiplex claim the costs of remedial paintwork to phases 11 to 18 and 24 to 26. The back up documents can be seen in bundles M1B-1 and following.

232. Some of the paintwork done in this category could be described as normal touch up, but certainly not all of it. Mr Rogers accepts that there were many opportunities for paintwork to be damaged in the period after initial coating at Darlington. He also accepted that the site was congested and some trades did not show much respect for the work of other trades. Some of the work was done in October 2005, a year and a quarter after CB left site. During that period any number of parties might have damaged the paintwork.

233. There are many photographs in the bundle (some of which were taken by Mr Rogers) showing damage to steelwork. Mr Rogers was asked about a number of the photographs in cross-examination. He accepted that the photographs alighted upon by Mr Williamson show damage for which CB could not be responsible (work done by Hollandia, post 2nd August variations by the client, etc, etc).

Schedule 1B: item JT 378

234. Item JT 378 is a claim in respect of CMHS paint applied by CB, which subsequently discoloured yellow. This was the subject of a report by Sandbergs dated 18th July 2005 (T5/375).

235. On looking at the correspondence put in cross-examination, Mr Rogers can see that CB used the paint which Multiplex instructed them to use. Before Multiplex gave that instruction, CB warned them that it was liable to yellow and chalk with time. The remedial work carried out by Tighe was to apply an additional coat of Sigmadur.

Schedule 1B: JT 380

236. Item JT 380 is a claim based upon CB's application of the wrong paint. CB applied ordinary paint to a number of columns, which ought to have received intumescent paint. However, Mr Rogers does not know when the relevant drawings were issued to CB.

237. When the problem came to light, Mr Rogers' team did a survey to identify the columns affected. They then blasted the paint off those columns back to bare steel and applied appropriate primer. It was then for Enob to apply intumescent paint to those columns.

238. According to Mr Rogers' witness summary, a number of items are wrongly attributed to JT 380. Mr Rogers must have had a reason for saying this to the solicitors, but he cannot now explain without going through all the documents.

239. Some of the daywork sheets relied upon by Multiplex under JT 380 appear to relate to removing incorrect coating so that a different coating can be applied. But others of those daywork sheets (e.g. daywork sheet 1284 at M1B-12/60) appear to have nothing to do with this subject matter. Indeed some may be referring to ordinary site touch up.

MICHAEL SCANLON

240. Mr Scanlon was Multiplex's project manager responsible for Pyramid's work package.

WITNESS STATEMENT

241. Pyramid installed the blockwork. They provided labour, plant, materials and partial design for levels B2, B1 and S0. By SV 867 (25th July 2004) Multiplex instructed Pyramid to carry out blockwork for the upper floors.

242. The programme for Pyramid's work (CPIP) was based on CB's anticipated erection of steel. It was envisaged that Pyramid would carry out phase 1 of their work between 2nd February and 9th October 2004, and phase 2 between 10th January and 1st April 2005. Pyramid could not start their work in an area until the steel had been erected, the floor planks installed and the concrete toppings poured.

243. Pyramid commenced work on 2nd February, but were much delayed by reason of the slow progress of erection. They started level B1 on 16th February, two weeks later than planned. Levels S0 to S4 should have been handed over to Pyramid in February and March. In fact they were handed over between April and July.

244. After, and as a result of, CB's repudiation on 2nd August Pyramid's progress became even slower. They were unable to make any significant progress in August. Their poor rate of progress continued through September and October, as evidenced by their progress reports. In October they removed resources from site, in order to reduce preliminary costs.

245. In their progress report of 19th November 2004 Pyramid complained that areas continued to be restricted. Their slow progress continued in December. Pyramid's work should have lasted for a total period of 45 weeks. In fact the work took very much longer. Pyramid suffered both delay and disruption. Pyramid made a financial claim, which Multiplex settled. Mr Scanlon believes that the settlement reached with Pyramid was reasonable.

CROSS-EXAMINATION AND RE-EXAMINATION

246. Mr Scanlon was cross-examined and re-examined on day 8.

247. Pyramid were already in delay before 2nd August 2004. Pyramid's July progress report shows that some of that delay was caused by steelwork and some was caused by other matters (e.g. design issues and problems with mechanical, electrical and plumbing ["MEP"] sub-contractors).

248. By letter dated 28th August Multiplex identified 28 areas where Pyramid could get on with work, but collectively that did not amount to a great deal of work.

249. Pyramid made very little progress during August and September. Paragraphs 16-18 of Mr Scanlon's statement give an impression of substantial progress at the upper levels, but that is not correct. The quantities to be erected at levels S3 and S4 were substantially reduced during that period, so that the percentage completion increased without any blockwork being erected on levels S3 and S4.

250. On 16th September Pyramid sent in their claim for extension of time plus loss and expense. They referred to non-availability of working areas, which arose from late steelwork. By letter dated 17th September Pyramid complained about being delayed by other trades. This bunching up of trades arose because of the late steelwork.

251. Pyramid reduced their resources on site in early October. Although the rate of steelwork erection then was much higher, there would be a time lag before areas became available to Pyramid. Other trades had to follow the steelwork. The time lag could be 6-8 weeks, or more if MEP works went before blockwork.

252. That same time lag may also explain why Pyramid made very little progress on site during November and December (a period when Multiplex plead that the delay to steelwork caused by CB's repudiation had ended).

253. Mr Scanlon explained by reference to the drawing at T17/1 why the upper tier steelwork (phases 11 to 18) needed to be erected before the blockwork at level S5 could be constructed.

JAN STAM

254. Mr Stam is a director of Hollandia UK Ltd

WITNESS STATEMENT

255. Hollandia mainly do construction management. In relation to Wembley, Hollandia subcontracted steel fabrication to their sister company, ZNS.

256. Mr Stam was involved in the audit which Hollandia undertook for Multiplex in March. When Hollandia were engaged to complete erection work, they employed Fast Track to provide the labour and supervision. Mr Stam was construction manager on the project from the end of July to September 2004 and remained closely involved in supervising the project until July 2005.

257. In July Mr Stam noted a high level of damage to painted steel being unloaded at East Lane. He procured a report from a paint specialist about the matter.

258. When Hollandia took over erection, Mr Stam noted that the steel erected by CB was in a very poor condition. Accordingly he recruited painters to rectify or complete the painting of fabricated and erected steel.

259. Mr Stam noticed that CB's workforce seemed to be under-employed and working inefficiently. CB also had a large retrofit squad doing site modifications. Their role was crucial to the progress of erection. Mr Stam is strongly critical of CB's logistics and organisation.

260. At a meeting on 13th July CB promised to provide extensive information. In fact much of the promised information arrived either late or incomplete, which caused difficulties for Hollandia. Furthermore, on many steel pieces both tags and hard stamps were missing.

261. The biggest difficulty which Hollandia faced as at 2nd August was lack of steel available for erection. Therefore several Hollandia teams were devoted to the task of locating and identifying pieces of steel. The laydown areas at East Lane and Greenford Park (both controlled by Multiplex) were well organised. However, at other storage yards and around the Wembley site steel was scattered randomly.

262. In early August there was an incident when a raker fell from its crane onto a temporary frame. That frame had not been bolted in place as it should have been, but luckily the frame stayed in place.

263. The factors which delayed Hollandia in erecting bowl steel between August and November 2004 were: (a) steel availability and logistics; (b) congestion of bowl area; (c) the design and fabrication of steel by CB, which required a large number of connections to be welded. In the case of girder T17 and the main roof girders, Hollandia arranged for these to be sent to Holland for welding.

264. The steel erectors' and welders' strike lasted from 21st August to 26th September. This enabled Hollandia to concentrate on locating steel. Once the strike ended, Hollandia erected steel which had been found during that period. Indeed, as a result of this there was a peak in steel erection during the week after the strike. The strike did not have a meaningful impact on steel erection progress.

265. From 7th November onwards there was another peak in steel erection. Once Hollandia were erecting steel fabricated by ZNS, they were able to make better progress. By then Hollandia's earlier difficulties were largely overcome.

266. Between August 2004 and May 2005 Hollandia carried out 259 items of work, both to complete CB's work and to rectify defects in CB's work. These items are set out in Scott Schedule 1D. Hollandia carried out each item of work pursuant to a Site Work Instruction ("SWI") given by Multiplex. Mr Stam rejects CB's various defences to these claims for the reasons set out in paragraphs 36-97 of Mr Stam's witness statements.

CROSS-EXAMINATION AND RE-EXAMINATION

267. Mr Stam was cross-examined and re-examined on day 10.

268. Mr Stam was the sole Hollandia representative at the handover meeting on 13th July. Some of the information promised at that meeting was provided to Hollandia. Mr Stam remembers receiving a few of the handover files. He expects that all the contractual files went over to Holland.

269. Hollandia prepared "toilet roll" lists of the steel they needed on site. They prepared these manually, by referring to the drawings. The immediate priority was to erect steel to fill the gaps, which had been left to enable the arch to be lifted.

270. This was a particularly difficult job, because Hollandia were taking over a part completed project. The site was congested. There were difficulties with the unions in the period leading up to the strike. The workers were not very co-operative during that period.

271. A tower crane dropped a raker on Friday 13th August. The tower cranes were taken out of service for the rest of that week and all the following week. Tower cranes had to be used for lifting the rakers and the steel for the PPT, because the crawler cranes and hydraulic cranes could not reach that height.

272. In July there was an agreement between CB and Hollandia for the secondment of some of CB's management to Hollandia. Hollandia terminated that agreement on 25th August.

273. There was no agreed programme between Hollandia and Multiplex until the end of 2004. As at August 2004 there was no erection sequence agreed between Hollandia and Multiplex. There was no agreement that CB would deliver their materials (i.e. bowl steel) to comply with any particular erection sequence.

Defects

274. On the 27th July there was a walk round the site. A snagging list for the south side of the stadium was prepared, signed by CB, Multiplex and Hollandia (QC 48/2-5). A similar snagging list was prepared for the north side.

275. Scott schedule 1D sets out Multiplex's claim for the cost of remedial work done by Hollandia in respect of CB's defects. Mr Stam was taken through a number of the documents supporting schedule 1D. He accepted that without knowing the date of erection, one cannot know which company made any given erection error.

276. In a number of instances the work in schedule 1D appears to be due to changes instructed by Multiplex to Hollandia. Some items in schedule 1D appear to be Hollandia completing work which was unfinished when CB left site (e.g., in respect of one group of items, filling notches).

277. Mr Stam cannot say why a number of items in schedule 1D have estimated figures rather than actual costs. He does not know why Hollandia's dayworks sheets were not signed by the paying party in accordance with industry practice.

278. Mr Hall was correct in saying (Hall 1, paragraph 94) that a number of the rakers were very long. Mr Stam does not know about any agreement which CB might have reached with Multiplex, the Engineer and Architect that rakers would be fabricated in pieces and then welded on site. If there was such an agreement, that might explain why Hollandia had to field weld rakers (the subject of a number of claims in schedule 1D).

279. In respect of Holl 10 (SW 57) it looks as if Hollandia were fitting new fin plates, not modifying existing fin plates fitted by CB.

280. Claim 4 in schedule 4C (design costs in respect of the schedule 1D defects) is so large that it looks a bit "out of whack" (day 10/46). A number of items in claim 4 are very unlikely to relate to the schedule 1D defects, since the design work is pleaded as having been undertaken after the remedial work on site.

PHILIPPUS VAN GILS

281. Mr Van Gils is a project manager at ZNS.

WITNESS STATEMENT

282. Before CB's repudiation Mr Van Gils was leading the ZNS team which was fabricating steelwork for the PPT (1,247 tonnes) and bowl (1,030 tonnes) pursuant to contract WP 2755. This contract had been entered into on 11th May 2004, following negotiations earlier in the year. Under this contract ZNS had no design or procurement responsibilities. CB provided the steel and workshop drawings to ZNS. ZNS completed all the fabrication of bowl and PPT steel for which it was responsible under contract WP 2755.

283. When CB repudiated, they failed to complete about 2,385 tonnes of bowl steelwork for which CB were responsible. ZNS undertook the fabrication of this steelwork pursuant to contract WP 2755-1, and Mr Van Gils continued to head the fabrication team. This was an extremely difficult project, because ZNS were not told where part fabricated steel was or what was the status of that steelwork.

284. Multiplex first instructed ZNS to undertake this work by letter dated 12th August. ZNS/Hollandia and Multiplex then spent a great deal of time locating bowl steel fabricated by CB and determining the status of that steel.

285. About 651 tonnes of China steel came back to the UK without being fully fabricated. This arrived at Felixstowe and was sent to ZNS in Holland to complete fabrication.

286. Lack of information caused difficulties for Mr Van Gils and his team. They needed to know the status of erected steel and the location of all fabricated and part fabricated steel. Hence it was agreed that Mr De Meijer would expand the database to incorporate information gathered.

287. Much of the steel not sent to site was at CB's Darlington factory. The remaining steel pieces were at different locations, which proved difficult to find.

288. The database was frozen on 15th October. Steel found after that date was only used if this did not cause severe disruption to the fabrication team.

Transport of steel

289. Mr Van Gils arranged for the transport to Holland of steel, whose fabrication CB had failed to complete. He engaged Alpha Trans to transport most of the steel to Holland and Rijnart to transport most of the steel back to the UK after fabrication. Under the deed of release Multiplex paid £260,572 in respect of transport.

Receiving, sorting and storage

290. ZNS had to sort out and store the steel delivered by CB. That steel was in a poor state. Part fabricated steel, black steel and scrap steel were mixed together. Many of the part fabricated pieces of steel were not effectively identified by tags. Mr Van Gils discussed his difficulty in identifying steel pieces with Mr McGregor by telephone on a number of occasions.

291. Mr Van Gils arranged for extra storage facilities in Holland. He also arranged for a gang of men to unload and sort the steel. Approximately 90 tonnes of steel were arriving per day from the UK. In all 3,698 tonnes were received. After sorting, this was found to comprise 1,313 tonnes of unusable scrap steel; 1,734 tonnes of non-China bowl steel; 651 tonnes of bowl steel which had come back from China partly fabricated.

292. ZNS claimed £327,707 for receiving, sorting and storing steel. This sum was reduced under the deed of release.

Reviewing the status of part fabricated steel

293. Mr Van Gils inspected the part fabricated steel at Darlington in early September and found it in a chaotic state. Reviewing the status of part fabricated steel was a major task.

Under the deed of release ZNS were paid an additional 10% of the fabrication cost for performing this task.

Black steel

294. ZNS had to purchase 686 tonnes of black steel, in order to complete the fabrication of bowl steel. As can be seen from the deed of release, ZNS claimed £494,377 for this purchase of steel, representing the cost to ZNS plus 12.5% for overheads and profit.

Fabrication and coating

295. With the help of subcontractors, ZNS completed the fabrication of part fabricated steel. This was a slow process because new information about the status of the steel kept being provided to the fabrication team.

296. ZNS fabricated approximately 2,385 tonnes of bowl steel under contract WP 2755-1. As can be seen from the deed of release, ZNS claimed £1,841,433 for fabricating and coating that steel. There no significant changes to the design and drafting of that steel.

297. Following a survey of erected steel, ZNS fabricated steel pieces which were missing or which were found to be necessary because erected steel was out of tolerance. As can be seen from the deed of release, ZNS claimed £433,257 for additional fabrication. This included £58,677 for missing bolts and £299,183 for additional works to the PPT to enable proper connection with the rakers.

Non-destructive testing (“NDT”)

298. CB did not supply records to indicate whether steel had undergone NDT. Accordingly ZNS arranged for NDT to be carried out. ZNS claimed £66,826 for this, which was the cost to ZNS without any uplift.

CROSS-EXAMINATION AND RE-EXAMINATION

299. Mr Van Gils was cross-examined and re-examined on days 9 and 11.

Schedule 4A: Head 1: Transport

300. Mr Williamson challenged the assertion that scrap steel was delivered to ZNS and suggested that (as asserted in Multiplex’s original unamended pleading) it was roof steel that was delivered. Mr Van Gils did not accept this.

301. Mr Williamson drew attention to Mr Rogan’s email to Mr Van Gils dated 28th June 2004, stating: “last week we were clearly instructed to get out all steel as quickly as possible and ZNS would sort in their yard into phases. If MPX/ZNS want anything different we need to know.” Mr Van Gils does not agree with that email, but he did not reply to it at the time saying that ZNS needed something different. In any event that email relates to roof steel, not bowl steel.

302. ZNS charged an uplift of 12.5% for overheads and profit. Mr Van Gils does not accept that ZNS’ usual uplift was 7.5%. ZNS did not have an usual uplift.

Schedule 4A: Head 2: Receiving, sorting and storing steel

303. The roof steel was delivered to ZNC and arrived in a more or less organised state.

304. The bowl steel was delivered both to ZNC's and ZNS's premises (both at the Fijnart industrial park). Contrary to Mr McGregor's note of 13th October (S3/366) this was not well organised and numbered. The schedule at V12/2-3 lists the deliveries made by CB to ZNC/ZNS between 31st August and 26th October 2004. There were 174 deliveries during that period. The first 40 or 50 deliveries were quite well organised and their accompanying despatch notes were satisfactory. The remaining loads were not well organised and the accompanying despatch sheets did not give proper information. (Examples of both categories of despatch note were identified in cross-examination and re-examination respectively.) The photographs show some pieces of steel which were properly marked with their numbers. The photographs also show quantities of scrap steel which were delivered. (Photographs in both categories were examined in cross-examination and re-examination respectively.)

305. The activities set out in paragraph 59 of Mr Van Gils' witness statement (receiving steel, sorting it, craneage, storage, transport) are part of the normal tasks of a fabricator. They are often included in ZNS's rates. But they were not included in the rates on this contract with Multiplex.

Schedule 4A: Head 3: Reviewing Status of Part-fabricated Steel

306. Because so much information was missing, it was a substantial task to marry up steel pieces with drawings and to identify the stage which part fabricated pieces of steel had reached.

307. To compensate Hollandia for this, it was agreed that Multiplex would pay an extra 10% in respect of all the steel which Hollandia fabricated for the bowl (2,385 tonnes). This 10% "inefficiency rate" is shown in Hollandia's final account (M4A-2/370).

Schedule 4A: Head 4: Steel Materials

308. This is a claim for CB's failure to deliver all the raw steel which Multiplex had paid for. Mr Van Gils does not know how much raw steel Multiplex had paid for in their dealings with CB.

309. In order to fabricate the 2,385 tonnes of steel required for the bowl, ZNS had to purchase 686 tonnes of raw steel, in addition to that which ZNS received from CB.

310. In respect of steel plate purchased by Hollandia, Mr Van Gils does not agree with the exercise done by Mr Williamson in defendants' supplemental 9. Mr Van Gils has corrected Mr Williamson's figures and that corrected sheet is now placed at the front of the supplemental 9 bundle.

Schedule 4A: Head 5: Fabrication and Coating

311. Appendix 1 to schedule 4A is Multiplex's list of repudiated steel (i.e. the steel which it is said that CB failed to fabricate and ZNS fabricated instead). Mr Hall's schedule in response to appendix 1 (X3, tab 10) was put to Mr Van Gils in cross-examination. Mr Van Gils accepted that in a number of instances which were put to him Mr Hall in his schedule had correctly interpreted Hollandia's database. Mr Van Gils accepted that a number of the

steel pieces listed in appendix 1 are not items which CB wrongly failed to fabricate. See day 9/98-128.

312. The first piece of steel explored in cross-examination (1102499) was further explored in re-examination. (Mr Hall puts this in the category “cancelled – see Holl database”.) This was shown as a piece of steel which Hollandia could not find on a list sent by Hollandia to Multiplex on 28th September. There came a time in October when the database had to be frozen and ZNS had to fabricate pieces of steel which could not be found. It appears from the entry at QC 82/226 in relation to floor beam 1102499 (“germaakt en vervallen”) that this piece of steel was duly fabricated by ZNS and later found to be unnecessary when the original was found. Hollandia charged Multiplex £180 for this item. The price was a reflection of both steel weight and complexity.

313. Similar comments may apply to pieces 1101448 and 1101582, which Mr Hall puts in the category “fabricated and delivered by CB”.

Schedule 4A: Head 6: Additional Fabrication Works

314. Appendix 6A to schedule 4A lists additional works fabricated by ZNS for which Multiplex are claiming. Appendix 6B is a schedule of ZNS’ invoices to Multiplex in respect of those additional fabrication works. Schedule 6B was produced by one of Mr Van Gils’ colleagues under Mr Van Gils’ supervision (day 9/131). The schedule at X3/tab 8 is Mr Hall’s schedule in response to appendix 6B. A number of Mr Hall’s comments in column 7 of his schedule were put in cross-examination and accepted by Mr Van Gils. Mr Van Gils accepted that a number of the items listed in appendix 6 either related to the PPT (not CB’s responsibility under this head) or for some other reason did not fall within the category permanent bowl steelwork. See day 9, pages 133-150.

General

315. When taking on contract WP 2755-1 Hollandia were in a good commercial position, because they were already engaged by Multiplex on contract WP 2755. Nevertheless Hollandia did not find Multiplex a soft touch in negotiation.

DAVID WATKINS

316. Mr Watkins was Multiplex’s construction manager on site during the relevant period.

WITNESS STATEMENT

317. In his witness statement Mr Watkins is critical of CB’s low productivity during the period after 15th February 2004. Their average erection achieved was 200 tonnes of steel per week. In paragraphs 8-9 Mr Watkins opines that CB should have achieved that production rate with a labour force of 56 men. In fact CB are claiming for 200 men on site during the period. Therefore they were not all working on erection, or not working properly.

318. Mr Watkins discusses design changes re bowl steel. Change notices numbered below 2000 relate to changes instructed before 15th February 2004. So CB had full knowledge of these changes, when they provided the February programme.

319. Mr Watkins cites examples of CB’s inefficient working, delivery of incorrect steel, failing to identify steel correctly or losing steel. CB delivered steel to site that was not in

accordance with the current design and this generated much retrofit work on site. Indeed many steel pieces erected by CB were defective. An audit in July revealed many inaccuracies in CB's as-built drawings.

320. CB salvaged much of the steel from their temporary works when they left site. The slings and shackles which CB left on site were consumable items, which a contractor would not expect to re-use after a project.

321. On 30th June Multiplex decided to remove CB's on-site responsibilities. On 1st July Mr Watkins attended a meeting with CB to discuss the handover. CB did not do all that was promised.

322. CB's repudiation on 2nd August caused many problems for Multiplex. There were difficulties identifying what steel CB had fabricated, in tracing pieces of steel and in identifying those pieces of steel which Multiplex or Hollandia found. CB's steel database proved to be seriously deficient.

323. Between 2nd and 21st August the primary reason why little steel was erected was Hollandia's difficulty in locating and identifying steel. Between 21st August and 26th September the steelworkers were on strike. Erection speeded up for a period after the strike, then slowed down by the week starting 24th October, because the steel buffer (which had accumulated during the strike) was largely exhausted.

324. In October Hollandia froze the steel database and re-fabricated pieces of steel which could not be found. Steel erection rates improved by the second week of November, because by then Hollandia were in control of the project. Delays to steelwork caused delays to other subcontractors, namely Bison, Pyramid and Permasteelisa. The bowl erection works were on the critical path of the project. CB's repudiation on 2nd August delayed bowl steel erection between August and November, which caused a corresponding delay to overall completion.

CROSS-EXAMINATION

325. Mr Watkins was cross-examined on days 7 and 8.

326. Mr Watkins was challenged about his estimate that only 56 men (using 2 cranes) were required on site to achieve CB's average erection rate of 200 tonnes per week in the period post 15th February. He accepted that a number of factors (such as crane availability or weather) could affect the erection rate. It was put to Mr Watkins that the rate of output assumed in his present calculation was substantially higher than (a) the estimate which he gave at a meeting in March 2004, (b) the output assumed in the calculations in his first witness statement and (c) output which he had put forward as reasonable in oral evidence at the first trial. Mr Watkins made a number of points in response. In particular, the figures under discussion are all averages. The actual erection rate is heavily dependent upon the weight of steel pieces being erected. It takes much longer to erect 20 pieces of steel weighing 1 tonne each, than 1 piece of steel weighing 20 tonnes (even though heavier steel has to be lifted more slowly). The calculations in his present statement are directed to what labour force is required to achieve a specified output. His earlier calculations were directed towards assessing what output the actual labour force ought to have achieved.

327. In addition to erecting steel for the bowl, CB also had to erect precast planks (in large number) for the bowl. CB's men also had many other tasks on site: fabricating and erecting

the arch, welding panels for the PPT and so forth. In addition, the rakers had to be assembled on site, but Mr Watkins regards that exercise as part of bowl steel erection. The work which CB was doing on site between February and June 2004, in addition to erecting bowl steel, is summarised in CB's monthly progress reports (which were put in cross-examination).

328. Mr Watkins accepted that Hollandia did not achieve the output proposed in paragraph 8 of his witness statement, but Hollandia faced substantial difficulties, including the recalcitrant labour force whom they inherited from CB.

329. Mr Watkins criticised CB for allowing steel to be delivered to site without the tags which should have been attached. He accepted, however, that the more usual procedure of hard stamping was prohibited by the terms of the sub-contract.

330. Change notices with a number below 2000 related to variations instructed before 15th February. Those with a number above 2000 were intended to relate to variations instructed after 15th February (for example CN 2066 referred to on the daywork sheet at V13/273). Those in the 5000 series were accepted by CB as relating to their own defects. It was CB who assigned CN numbers to variations.

331. The history of CN 2081 was explored in detail in cross-examination with the aid of a model. On 11th December 2003 Multiplex issued drawing 513S-06WD22425 to CB, which showed amongst other matters the tops of rakers, where louvres were to be fitted and waterproofing was required. On 30th January 2004 CB issued an RFI, requesting urgently information as to the position of louvre supports, waterproofing details and loadings for louvre supports. Multiplex responded on 10th March, attaching sketches from their consultants. These gave details about the fixings of louvres and showed that collars of steel were to be placed around the tops of rakers for waterproofing purposes. On 11th March Multiplex sent a fax to CB, stating that the steel collars were to be 10 mm thick and explaining how they should be welded. Multiplex stated in the fax that some pieces of steel may arrive on site without these details incorporated, in which case the necessary welding should be done on site. Mr Watkins indicated his understanding that payment for this variation (CN 2081) was covered by the Supplemental Agreement, since the RFI pre-dated 15th February.

332. About 20 CB men on site were engaged upon retrofit work.

333. Mr Watkins accepted that on 22nd June Multiplex instructed CB to move all steel to East Lane, where it came under Multiplex's control. CB made written complaints about the way in which steel was unloaded at East Lane. As can be seen from the photographs taken in July, a substantial quantity of steel was also stored on trailers on site.

334. On 30th June Multiplex gave notice to CB that erection would be removed from their subcontract. Multiplex required an orderly handover. Multiplex required a mass of information from CB. CB did not supply it. In relation to this issue, Mr Watkins was asked to look at the defendants' supplement 7.2 (and the underlying contemporaneous documents) over night. This document purports to set out how CB provided all of the information requested of them at the "orderly handover" meeting on 13th July 2004. Having considered that material Mr Watkins did not suggest that CB failed to supply the relevant information in July. Instead he criticised CB for having failed to supply much of that information earlier.

335. Mr Watkins was challenged about his assertion that CB's repudiation was a cause of delay in the period 2nd August to early November. He accepted that there was a mishap on 13th August when Hollandia dropped a raker. As a result, the tower cranes could not be used between then and 20th August, although mobile cranes could be used during that period. After that there was a strike until 26th September, during which no steel could be erected.

336. Mr Watkins accepted that Hollandia faced a major task in taking over erection mid-contract in late July. The preliminary steps which Hollandia had to take were set out in some Multiplex internal documents, explored in cross-examination. Hollandia also had to deal with the problem of large quantities of steel being delivered to site and to East Lane. Also Hollandia had to deal with difficulties with the unions. The unions had been unco-operative from the time that Hollandia took over, and matters came to a head with the strike.

337. Mr Watkins maintained, however, that CB's failure to identify steel was a major cause of delay for Hollandia. A huge quantity of steel had been delivered by CB to Enob, to East Lane and to site. Indeed some deliveries continued after 2nd August.

338. On 12th August Multiplex instructed Hollandia to fabricate some critical pieces of steel. Hollandia was later instructed to fabricate more steel, which Multiplex and Hollandia had looked for but been unable to find.

339. Hollandia re-started erection after the strike on 28th September. Mr Williamson suggested that they were effectively starting from scratch, but Mr Watkins maintained that Hollandia's learning curve had been begun before the strike. An internal note of Mr McGregor suggested that Hollandia had not got their act together on 20th September.

340. Mr Watkins accepted that there is no reference in the contemporaneous documents to shortage of steel impeding progress. Nevertheless, it is his recollection that this was the case.

341. Mr Watkins was cross-examined briefly about Multiplex's defects claim. He recalled a walk around the site on 27th July when two snagging lists were produced, one for the north side and one for the south side (in bundle QC 48). It was decided that Sandberg would provide an independent audit of the paintwork. Multiplex, Hollandia and CB conducted a status audit of the steelwork erected.

342. Mr Watkins was cross-examined briefly about CB's claim in respect of non-returned temporary works (by reference to aerial photographs and CB's asset register at T21). Multiplex retained the toblerone sections at the end of the project, but CB retrieved the black steel which formed part of the temporary works. CB also removed the stillages supporting the arch. The aluminium scaffold towers were not part of the permanent works nor were they temporary steelwork. The bow shackles and lifting equipment were not part of the temporary works.

RE-EXAMINATION

343. Mr Watkins said that Mr Petaccia or Mr Perkins would be in a better position than he was to answer a number of the questions that had been put in cross-examination.

344. In respect of CN 2081, CB would have known before 15th February that they would have to provide some support for the louvres etc, even though the actual details did not come until later.

345. A lot of steel delivered by CB was left on the ground and unidentifiable. That was the position at the end of June and in July and August.

346. Mr Watkins was aware in a general way of the Sandberg reports re paint defects, but it was not his role to chase these matters up.

MULTIPLEX WITNESSES WHOSE STATEMENTS WERE READ

MATTHEW HEWITT

347. Mr Hewitt was Multiplex's general foreman structure from 2003 to October 2004. From then until October 2005 he was site manager for the south structure. Thereafter he held various other positions on the Wembley project.

348. CB's workforce was inefficiently organised and appeared to be under-employed.

349. Mr Hewitt recalls that prior to June 2004 CB failed properly to protect the paintwork on steel (both intumescent and decorative). He saw many instances of damage to that paintwork. For example, unprotected steel was tied to trailers with ratchet chains. Also CB preferred to use chains for loading and unloading. Indeed in their method statement they specified a preference for protected chains.

350. By 22nd June 2004 (date of the East Lane instruction) approximately one third of the bowl steel had been erected by CB and approximately one third of the bowl steel had been delivered to site or to yards in the Wembley vicinity. CB controlled Palace of Industries yard. A significant proportion of the steel arriving from CB's yards appeared to have seriously damaged paintwork (as illustrated by Mr Hewitt's 19/7/2004 photographs).

351. A significant proportion of the erected steelwork by CB had substantial damage to paintwork (as illustrated by Mr Hewitt's photographs of late 2003/early 2004). CB failed to protect steelwork against damage either during or after erection.

352. CB failed to deliver steel to site in the proper sequence. As a result some steel (in particular fishbelly rakers) remained outside for many months and the paint turned yellow. CB's deliveries of steel were extremely inefficient. They omitted steel which was immediately required and included steel not currently due for erection. This caused congestion in and around the site. The steel delivered was not properly identified.

353. CB's retrofit team was kept busy correcting errors from poor fabrication or erection and rectifying damage suffered during transport. Often CB erected steel before errors had been corrected. Then the retrofit team had to take the steel down again, in order to modify it (six examples given in paragraph 64).

354. Mr Hewitt and his colleagues on site provided information to the QS team for the purpose valuing CB's work.

355. By 2nd August CB had erected about 40% of the bowl steelwork. CB failed to provide as-built drawings of the steel they had erected. CB failed to provide proper information about steel fabricated when they left site. As a result, Multiplex had a lengthy task in determining what steel had been fabricated by CB and where it was.

356. Mr Hewitt makes detailed comments about individual items in schedule 1, which I take into account but do not reproduce in this summary.

KEVIN CUMBERLAND

357. Mr Cumberland is Hollandia's manager of UK operations and was formerly a consultant working for Hollandia.

358. In late August 2004 Mr Cumberland was asked to assist a Hollandia team reviewing the steel which had been fabricated by CB. This proved to be a very difficult task. There was no single comprehensive database available from CB, so Hollandia produced one.

359. Mr Cumberland visited CB's Darlington works and a number of other locations where CB's steel was being fabricated, painted or stored.

360. Mr Cumberland describes in some detail the difficulties which he encountered in auditing and identifying the steel fabricated by CB.

361. Hollandia's database was frozen on 11th October. Mr Cumberland continued his hunt for missing steel after that date and sometimes it proved practicable to use the steel which he located after the "freeze" date.

MATTHEW DAVIES

362. Mr Davies is employed by Bridon International Ltd ("Bridon") as project manager. Bridon supplied to CB wire strand cables which would attach the north roof of Wembley Stadium to the arch.

363. CB installed the Bridon cables. On completion of the arch lift in June 2004, it was found that four of the cables had become twisted. The arch lift should not have proceeded if there was any evidence of a turn in the cables.

364. On the instructions of Hollandia, Bridon undertook remedial works to repair the twisted cables. Bridon charged Hollandia for this work at their standard rate.

SHANE KELLY

365. Mr Kelly is the company secretary and financial controller of Multiplex.

366. Mr Kelly explains Multiplex's payment procedures and their CHEOPS system.

367. Multiplex engaged Hollandia to complete the erection of structural steel on a cost-plus basis. The terms of this engagement were set out in a memorandum of understanding entered into in April 2005 (the "MOU"). In December 2005 Multiplex carried out an audit of the costs which Hollandia were incurring and recording. The outcome of that audit was satisfactory.

CHRISTOPHER ONG

368. Mr Ong was Multiplex's commercial manager responsible for Wembley Stadium up to March 2006.

Scott Schedule 1A

369. CB's subcontract included a provisional sum of £1.6 million for fire protection works to bowl steel. CB employed Enob to achieve fire protection by applying intumescent paint.

370. Pursuant to the Supplemental Agreement Multiplex assumed responsibility for "fire protection" as from 15th February 2004.

371. On 27th July 2004 Multiplex agreed to employ Enob to do fire protection work with effect from 1st July 2004. Multiplex paid Enob on a monthly basis for fire protection work carried out after 1st July. Those payments included the various sums claimed in Scott schedule 1A.

Scott Schedule 1B

372. CB were responsible for the application of ordinary paint, as part of their lump sum works.

373. After CB's repudiation, Hollandia completed the application of ordinary paint to bowl steel pursuant to its erection contract (WP 2760). Hollandia employed Tighe, their subcontractor, to do that work. Multiplex paid Hollandia on a monthly basis for the work done by Tighe. Those monthly payments included the various sums claimed in Scott schedule 1B.

Scott Schedule 1D

374. The works carried out by Hollandia pursuant to contract WP 2760 included remedial works necessitated by defective design, fabrication and erection on the part of CB.

375. The monthly payments made by Multiplex to Hollandia included the various sums claimed in Scott schedule 1D.

Scott Schedule 1E

376. Multiplex paid Hollandia for the repair work carried out by Bridon to the twisted Bridon cables. Before Multiplex made such payments, Mr Ong's team validated the documentation provided by Hollandia.

Scott Schedule 4A

377. Multiplex engaged ZNS to fabricate, treat and deliver the remaining bowl steelwork following CB's repudiation of the subcontract ("the repudiated steel") pursuant to contract WP 2755-1.

378. ZNS carried out this work between August 2004 and October 2005. Multiplex paid £3.53 million under contract WP 2755-1 pursuant to a compromise agreement, which was reached with ZNS after commercial negotiations.

Scott Schedules 4C and 4D

379. After CB's repudiation Hollandia completed (i) the design and drafting of the permanent works and (ii) design of temporary works together with erection engineering.

Hollandia carried out this work as a variation to contract WP 9050. This was a costs-plus contract.

380. Hollandia claimed £10,402,193 for this work, but accepted £10 million in settlement following commercial negotiations.

Scott Schedule 4E

381. Multiplex incurred substantial costs as a result of delays incurred between 2nd August and 7th November. These costs are itemised in paragraphs 56 to 61.

Scott Schedule 4F

382. Multiplex failed to fabricate all the China steel which they were required to fabricate pursuant to item 1 of purchase order 74010. Therefore ZNS completed the fabrication of that China steel.

383. ZNS carried out that fabrication work pursuant to contract WP 2755-1. In their dealings with ZNS Multiplex did not distinguish between China and non-China steel fabricated under contract WP 2755-1. However, Multiplex draw that distinction in Scott schedules 4A and 4F for contractual reasons.

RICARDO PETACCIA

384. Mr Petaccia was a Multiplex employee, who dealt with steelwork matters in and after June 2004.

385. Mr Petaccia selected the East Lane stockyard, to which much of CB's steel was moved after 22nd June 2004.

386. Mr Petaccia noted that much CB steel stored at Scunthorpe had damaged paintwork. Mr Petaccia was responsible for the East Lane stockyard. He noted that much of CB's steel arriving had considerable damage to paintwork. The steel was unloaded using steel chains and straps. The East Lane site was well organised.

387. There was great difficulty in finding pieces of steel, because the steel was not properly marked and identified.

388. In July Mr Petaccia met Jan Stam, to discuss the logistics of Hollandia taking over erection.

389. After CB's repudiation on 2nd August ZNS took over CB's off-site responsibilities. In July and August Multiplex and Hollandia received lists and a database from CB. Unfortunately the database was not accurate. Multiplex gave what help they could to Hollandia in locating missing steel.

390. Following CB's repudiation Multiplex leased additional storage facilities in the Wembley area. This was because much steelwork was not ready for erection and there was no place on site to store it.

391. In August the priority was to erect steel as quickly as possible, after identifying what steel CB had so far erected. Hollandia produced call-off lists, identifying the steel which

they needed next for erection. Sometimes steel members had to be re-fabricated, because they were needed urgently and were missing.

392. Hollandia used the period of the steelworkers' strike (21st August to 26th September) to sort out the steel on site and in the holding yards.

KEES VAN ROOIJEN

393. Mr Van Rooijen is the sales manager for Hollandia BV.

394. Between March and June 2004 Hollandia carried out an audit of the fixed and moving roof for Multiplex.

395. Mr Van Rooijen and his colleagues had meetings with Multiplex to discuss taking over erection. Mr Van Rooijen made it clear that, because of the many uncertainties, Hollandia could not quote a fixed price for erection. That always remained the case.

396. Hollandia understood that CB's designs were nearly complete, although this turned out not to be so.

397. Hollandia took over erection responsibility in early July, following a conversation which Mr Van Rooijen had with Mr Muldoon on 28th June ("28th July" in paragraph 16 being a misprint). Despite the urgings of Mr Muldoon, Hollandia were not willing to enter into a fixed price subcontract for the remaining erection and design work at Wembley.

398. On 2nd or 3rd August, following CB's cessation of work, Multiplex asked Hollandia to take over all the work that CB were not willing to complete. Hollandia assembled an appropriate team to do this.

399. CB were unco-operative after 2nd August and refused to provide information. On CB's instructions, Oakwood refused to provide information to Hollandia. Hollandia asked Multiplex for the current design and drafting work in early August, but did not receive it until late August. Even then the information was not complete and up to date.

400. Multiplex had considerable difficulty locating steel fabricated by CB. The steelworkers' strike provided an opportunity for Hollandia to locate and organise steel. If there had been no strike, that period would not have been very productive.

401. The various contracts made between Multiplex and Hollandia were:

- i) Contract WP 2755, made on 11th May 2004: fabrication of bowl and PPT steel for which Multiplex were responsible under the Supplemental Agreement.
- ii) Contract WP 9050, made in March 2004: roof audit.
- iii) Contract WP 2755-1, made on about 12th August: fabrication of repudiated steel and outstanding China steel, following CB's repudiation.
- iv) Contract WP 2765, made on 8th November 2004: fabrication, painting and delivery of steel for fixed roof.

- v) Contract WP 2756, made on 30th November 2004: fabrication, painting and delivery of steel for moving roof.
- vi) Memorandum of understanding (“MOU”) or contract WP 2760, made on 24th August 2005: erection.

402. Mr Van Rooijen rejects the suggestion that these agreements were unreasonable. Multiplex had no real choice, once CB had stopped work on the project.

JOHN CALDON

403. Mr Caldon is a partner of Sandbergs. Mr Caldon rejects the various criticisms made by Mr Patterson. Mr Caldon’s witness statement diminishes in importance following Multiplex’s abandonment of claim JT 379.

BENJAMIN KEENAN

404. Mr Keenan is in-house counsel and company secretary of Multiplex Constructions (UK) Ltd. His witness statement deals with the history of Multiplex’s disclosure.

CHAPTER 3. THE DEFENDANTS’ FACTUAL EVIDENCE

405. In this chapter I shall set out a very brief outline of the defendants’ factual evidence. The full witness statements span 650 pages, supplemented by many appendices. It is not feasible to replicate all this material in the judgment, although I bear it in mind.

WILLIAM FORREST

406. Mr Forrest is employed by CB as proposals manager.

WITNESS STATEMENT

407. Mr Forrest manages the CB team which produces estimates for tenders. In his statement he describes CB’s usual procedure for preparing such estimates. However, he was not involved in preparing the Wembley tender.

408. The material take off exercise (“MTO”) for Wembley was undertaken by Oakwood. This involves listing all the finished pieces of steel which will need to be fabricated and erected.

409. When CB departed in August, they left behind temporary buildings, plant, tools, equipment and temporary works necessary for carrying out the remaining on-site works. Multiplex failed to return these items. These items are as described in paragraphs 154 to 156 of CB’s schedule 2.

410. As set out in paragraph 155B of schedule 2, CB regularly tender for projects which involve the use of temporary steelwork. When CB have temporary steelwork in their possession which they can re-use, this enables them to put in a lower tender.

411. The temporary works from Wembley would be particularly suitable for the Antwerp Ring Road project, for which CB are currently tendering. That project will require some 7,000 tonnes of temporary steelwork. In tendering for Antwerp Mr Forrest would have allowed £300 per tonne as the cost of modifying the Wembley temporary steel for re-use.

412. If CB do not get the Antwerp contract, then the Wembley temporary steelwork could be used for motorway bridge temporary works, for example on the M74 project for which CB are proposing to tender.

CROSS-EXAMINATION AND RE-EXAMINATION

413. Mr Forrest was cross-examined and re-examined on day 24.

414. The Antwerp project is the construction of a massive bridge. CB have tendered for the approach section, which will require about 26,000 tonnes of steel. CB are now on a short list of two for this work. A decision is expected by the end of May.

415. Part of CB's tender for Antwerp is at QC 46/131. The temporary works detailed on this page comprise towers, cross beams, long beams bracings and jack supports. A summary of the temporary steel comprised in the Antwerp tender is at QC 90/153 – 154.

416. Approximately 90% of the Wembley temporary steel would have been suitable for re-use on the Antwerp project. Antwerp would require 7,000 tonnes of temporary steel, which is substantially more than the Wembley steel. Going through the assets register, Mr Forrest believes that the various items which should have been recovered from Wembley would have had a use at Antwerp. Many towers would be required at Antwerp, ranging in height from 4 to 16 metres. The toblerones might have been used for these towers.

417. In a tender it is typical to allow 10 – 15% of fabrication costs as the residual value of temporary works. In the Antwerp tender CB have allowed 15%.

ROLAND GREEN

418. Mr Green is a construction superintendent employed by CB.

WITNESS STATEMENTS

419. Mr Green was in charge of the workforce erecting the bowl steelwork.

Work on site

420. Mr Green rejects Multiplex's criticisms of CB's steel erection efficiency. First, he could see that many men were engaged upon tasks other than bowl erection. He estimates that about 40% of CB's labour force were working on erecting the bowl.

421. There were many reasons why CB could not achieve the planned steel erection rates. These included design changes and late information; the need for extensive site retrofit and reworks; defective work by PC Harrington ("PCH") in relation to embedment plates, core

tops, holding down bolts and core walls missing or built to wrong height; delays by PCH in completing stairs within the cores; lack of crane availability; inadequate and unsatisfactory lay down areas; restricted access to the site.

422. In addition delays in raising the arch held up steelwork erection. There were leave out areas in the north bowl where turning struts would be placed. There were leave out areas in the south bowl, where the arch lay on the ground. Also the temporary works for the arch took up a great deal of space inside the stadium.

423. The lay down areas provided by Multiplex to CB were not large. They were often changed (necessitating movement of steel) and they were generally muddy. Because of design changes CB often had to store steel off site for substantial periods.

424. By reference to his diary, Mr Green gives a week by week account of the period 16th February to 27th June and the causes of delay or disruption each week.

Orderly handover

425. On 29th June Mr Green and his colleagues were extremely disappointed by Multiplex's decision to remove erection from CB. Nevertheless Richard Thomas instructed everyone that they should provide total co-operation during the handover period and that is what they did.

426. As instructed, Mr Green finished off as many areas as possible and carried out snagging of the bowl. He never heard any criticism of the handover process from either Multiplex or Hollandia.

Mr Green's visits to stockyards managed by Multiplex

427. After CB left site Mr Green spent a couple of weeks going round stockyards at Wembley looking for allegedly missing steel. He noticed many examples of bad handling practice at East Lane. Steel was being lifted by chains without any protection. Steel was being stacked, so that one piece was on top of another.

Temporary Steel left behind by CB for Multiplex

428. When CB departed, they left on site a substantial quantity of temporary works, as detailed in the assets register.

429. At a later date Mr Green made arrangements to inspect the temporary works which Multiplex's solicitors said were available for collection. On attending at East Lane, Mr Green was shown seven metal containers holding various items which were either unusable or belonged to other contractors. He prepared a report about this matter.

Schedule 1

430. Mr Green disagrees with Multiplex's schedules 1A, 1B and 1D. He provides detailed comment on those items in his first witness statement. I shall refer to that evidence as necessary, when addressing schedule 1.

Schedule 2

431. Mr Green disagrees with paragraphs 30 and 31 of Multiplex's schedule 2. He provides detailed comments on that pleading in paragraphs 56 – 79 of his second witness statement.

CROSS-EXAMINATION AND RE-EXAMINATION

432. Mr Green was cross-examined on days 21 and 22, and re-examined on day 22.

433. CB did not use chains when offloading or handling painted steelwork. CB only used chains for lifting or handling temporary steel. Mr Hewitt's evidence about CB using chains and about Mr Green admitting to this practice is incorrect.

434. There was some damage to the paintwork on steel during transport to Wembley, but this was not as extensive as alleged. On 19th February one load of steel came to site having been loaded on unsuitable timber, but this was a one off incident. The steel was secured on lorries either with wagon straps (similar material to car seat belts) or with chains laid over rubber packing.

435. Although the project was based on "just in time" delivery, Mr Green still needed a lay down area. One can never erect steel straight off the wagon. He needed "something more than the size of a postage stamp 2 feet deep in mud" (day 21/125). Also CB needed an area for retrofit work to steel.

436. There were many instances when steel came to site out of sequence. Mr Green believes that this was because certain pieces of steel were unavailable as a result of design changes.

437. The Vee struts came to site unpainted. They had to be welded on site before they could be painted.

438. Mr Green accepts that there were instances when steel was erected unpainted, but these instances were very rare.

439. CN 2086 concerned a variation to the diagonal bracing. He does not know when the variation was instructed.

440. The entries in Mr Green's diary (bundle S26) record his frustrations and the problems which he encountered on site. These diary entries were reviewed at some length in cross-examination (day 21/139 – 171). Many of the entries relate the wrong steel being delivered or to pieces of steel which could not be found. Mr Green made two principal points about these diary notes. First, they recorded problems at the time of writing. If a vital piece of steel was found soon afterwards, Mr Green would not go back and amend his diary note. Secondly, in his diary he blames all problems on "Darlington". However, Mr Green's subsequent investigations have revealed that most of the problems for which he was blaming Darlington were in fact caused by design changes.

441. Some of the retrofit work instructed on site did not get recorded in the site works register.

442. Mr Green was referred to the witness statements for adjudications 2 and 3. Mr Allison's statement has annexes recording the progress achieved as at 27th July on works which CB had intended to carry out. Mr Green is unable to comment on a number of these

items. Welding the Vee struts is shown as being in progress. Mr Green helpfully drew a sketch plan illustrating what this entailed.

443. Mr Green's second witness statement for those adjudications has annexed to it a record of work being done in weeks 92 – 95 (G6/182.2 – 182.5) These weekly sheets record the number of men working on the various tasks and Mr Green was able to confirm those records.

ANDREW HALL

444. Mr Hall is a project manager employed by CB.

WITNESS STATEMENTS AND ORAL EVIDENCE-IN-CHIEF

445. Mr Hall's three witness statements span a hundred pages and present something of a challenge for the précis writer. Mr Hall deals in some detail with the individual items of claim in the Scott schedules. I shall refer to that evidence as necessary when dealing with those formidable schedules. At this stage, however, I shall focus upon the more general parts of Mr Hall's statements.

446. Mr Hall was CB's project manager for the bowl. He was based on site at CB's offices in Elvin House.

447. Fire protection (by intumescent paint) was covered by a provisional sum in CB's sub-contract. Although this item was deleted from CB's scope of work by the Supplemental Agreement, CB continued to do this work after 15th February 2004, and this was treated as part of CB's reimbursable costs.

448. The rakers were too long to deliver to site in final form. Accordingly CB developed a methodology in conjunction with the Architect, the Engineer and Multiplex, whereby CB would fabricate and transport the rakers in pieces before welding them together on site. The welding of rakers was still work in progress, when Multiplex instructed CB to cease on site work.

449. Mr Hall does not accept Multiplex's criticisms of CB's efficiency in the period after 15th February 2004. Many factors hampered CB's work, including: bad weather; disruption caused by the arch sterilising half the site until it was raised; the impossibility of erecting steel near the arch foundations (the "leave out steel"); much late information from Mott and numerous variation instructions; the need to lift one pre-cast plank for every piece of steel erected; errors and delays in concrete work by PCH; loss of use of tower cranes; inadequate lay down areas.

450. In June 2004 Multiplex established storage facilities near the stadium at Palace of Industries and East Lane. They initially told CB that these yards were for leave out steel. Subsequently Multiplex required all manufactured steel to be delivered to these yards by the end of June. Mr Hall was considerably annoyed by this decision, which led to chaos. The operation also caused damage to paintwork as a result of (a) extra handling and (b) bad handling by Multiplex or their subcontractors. Mr Hall agrees that by 2nd August fabricated steel had been transported to Multiplex's various storage facilities, as set out in exhibit 1 to Mr Perkins' second witness statement.

451. On 29th June Mr Hall learnt that CB had been given 28 days notice that they would be replaced as contractor. Mr Hall ensured that there was an orderly handover and that all necessary information and documents were given to Multiplex. This is detailed in the defendants' supplemental 7.2, which Mr Hall helped to prepare.

452. Snagging lists were prepared jointly by Multiplex and CB when CB ceased to be erector. Any defects in the erected steel ought to have been spotted during those joint inspections. It is unlikely that CB caused defects in erected steel, which are not included in the snagging lists.

453. When they departed, CB left some temporary steelwork on site. This included the arch turning struts, stillages for the PPT trusses and raker assembly, steel anchoring at ground level the temporary restraint cables for the arch and probably other temporary works for the arch.

CROSS-EXAMINATION AND RE-EXAMINATION

454. Mr Hall was cross-examined on days 19, 20 and 21. The cross-examination was interrupted by various witnesses who were interposed. He was re-examined on day 21.

455. CB encountered difficulties with Enob, because CB had contracted to provide a regular flow of work for Enob. Because of the design changes there was an accumulation of painted steel in Scunthorpe which could not be delivered to site in erectable sequence. Accordingly, in late 2003 or early 2004 CB hired from Corus a yard in Scunthorpe for storage purposes.

456. CB's internal emails in May and June 2004 refer to a number of pieces of steel which were missing or which could not be found on site. Mr Hall considers that these problems arose from the excessive number of design changes.

Work done by CB after 15th February 2004

457. Mr Hall gave his best recollection of that work by reference to the contemporaneous documents shown to him by Mr Stewart. I shall refer to that evidence, when dealing with CB's claims in schedule 2.

Variation work

458. A great deal of retrofit work was carried out on site. Some of the variations referred to in Mr Hall's second witness statement were instructed before 15th February and some were instructed after that date. I shall revert to that evidence when assessing CB's variations claim.

Damage to paintwork

459. Multiplex at all times controlled the yards at Palace of Industries and East Lane. They are responsible for the damage to steelwork occasioned by Multiplex's requirement that all steel be delivered to East Lane. Mr Hall visited the East Lane yard once during August. He could see the Palace of Industries yard every day from his office window.

460. Mr Hall accepts that his calculation about the number of relevant steel pieces at East Lane (statement 1, paragraph 42) was wrong, although in line with Go Data. I shall revert as

necessary to Mr Hall's more detailed comments about schedules 1A and 1B, when I come to deal with those schedules.

Orderly handover

461. During July three or four CB engineers went round the site with drawings and they coloured up those steel members which had been erected. CB gave the coloured up drawings to Multiplex and they are now to be found in bundles R1 to R22. The claimant's supplemental 5 indicates that in a very few instances there were inconsistencies between those drawings and Go Data or CB's database.

462. As a separate exercise CB prepared snagging lists for the north bowl and the south bowl. These snagging lists were separate for the snagging lists contained in the inspection, release and handover certificates prepared as each section of the bowl was handed over by CB.

Events after 28th July

463. CB originally intended to keep a presence on site after 28th July. CB staff would remove temporary steel not required by Multiplex, would sell scrap steel, would liaise with the follow on contractor and would generally protect CB's interests.

464. Mr Hall cannot give any estimate of the weight of temporary steel which CB left on site, when they departed. Mr Hall does not know about the site asset register. That was prepared by the commercial people. Quite a lot of steel was left, including sheds, plant and tackle.

Schedule 4A

465. Mr Hall did not himself deal with the steel sent to Holland, so the comments in his third witness statement are not based upon personal knowledge. He does not believe that CB would have sent 1,300 tonnes of scrap steel to Holland. Furthermore, looking at the photographs, Mr Hall does not accept that the steel sent lacked hard stamps. Such markings would not always show up in photographs taken from an angle. Mr Hall accepts that if the steel arrived at ZNS in the state described by Mr Van Gils, then a fabricator would make an extra charge for dealing with it over and above his normal rates.

466. In paragraph 72 of his third witness statement Mr Hall doubted Multiplex's claim to have transported 3,698 tonnes of steel to Holland. However, looking at CB's own records (which indicate a similar total), Mr Hall has no reason to doubt that figure: see day 20/151-152.

467. In relation to Multiplex's claim for steel pieces for the bowl fabricated by ZNS, there was detailed debate between Mr Stewart and Mr Hall about whether ZNS really needed to fabricate these pieces. Schedules and counter-schedules were brandished on each side. I shall refer to this evidence as necessary, when dealing with schedule 4A claim 5.

KEN HUDSON

468. Mr Hudson is a senior project engineer employed by CB. During the Wembley project he was senior project engineer – DLT (permanent works design).

WITNESS STATEMENT

469. Mr Hudson worked as permanent works design engineer for CB up until repudiation. Subsequently he performed the same function for Hollandia, having been seconded to Hollandia by DLT.

Connection designs not A status

470. Some permanent works connection designs for the roof were returned by Mott as not being at approval status "A". As at 2nd August 2004, none of these were returned as approval status "C". Those that were approval status "B" fall into two types, namely type A (CB have responded and are awaiting formal approval) and type B (the only fault in the connection design is that it does not include revised loading resulting from new primary design information coming after the date of submission). Examples of each category are set out.

Roof design as at 2nd August 2004

471. As at 2nd August 2004 the design for permanent works connections of the fixed roof was 90% complete. Connection designs had not been submitted for the walkways or the moving roof. Three minor design issues were also outstanding: (a) node connections – eyebrow cable to PPT; (b) node connection –eyebrow cable to pyramid struts and forestays; (c) T7 soffit cable clamps.

The Hollandia period

472. In the period when Mr Hudson was working for Hollandia, he checked Hollandia's new calculations for roof permanent works connections. He produces as appendix 1 an analysis of the calculations which he checked. It can be seen from this analysis that those calculations almost all arise out of (i) revised loading information or (ii) Hollandia's revised erection methodology.

(i) Revised loading information

473. The most significant permanent works changes which occurred were (a) increased moving roof loads and (b) revised loadings to the PPT. As to (a) moving roof, the concept changed from bogie system shown on Mott drawings to toothed track system. Further revised loads were issued in January 2005 as a result of a series of design developments.

474. As to (b) PPT, Mott provided additional loading information after CB's departure following Mott's consideration of disproportionate collapse. As a result of this Hollandia had to review and change a number of permanent works connections to the PPT.

475. There were many other more minor changes made to the primary design. These affected permanent works connections.

(ii) Changes by Hollandia to erection methodology

476. Because of Hollandia's decision to erect the south roof set low instead of high, it was necessary to redesign the four principal connections between the transfer trusses and the LEB.

477. The connections of the runway girders to the PPT were revised on account of Hollandia's new erection sequence and philosophy. It was also necessary to revise the connection between T7 and the PPT and the connections between the rafters and the PPT.

478. Many other instances are set out in appendix 1 to Mr Hudson's statement.

CROSS-EXAMINATION AND RE-EXAMINATION

479. Mr Hudson was cross-examined on days 17 and 18.

Outstanding approvals

480. Mr Hudson was asked to comment on Mr McGregor's analysis of outstanding approvals for fixed roof connection designs as at August 2004. That analysis (QC 58/98-104) shows 29 connection designs not yet submitted for approval, 4 connection designs at C status and 59 connection designs at B status.

481. Mr Hudson considers that if there were 29 connection designs still to be submitted, that does not mean that a huge amount of work needed to be done on them. Quite often the matter can be resolved by a comment or a discussion with the engineer. As to C status designs, CB's records indicate that no connection designs were still at C status. So there is a difference here between Multiplex's records and CB's records. Looking more generally at Mr McGregor's list of B and C status connection designs, that does not indicate any major outstanding work. The work required could be minor. In respect of the four trusses spanning the pitch, CB were awaiting the final FEA information from Bennets, their FEA specialist subcontractor.

482. Mr McGregor's analysis gives an exaggerated impression of the amount of work outstanding. In many instances the same calculation was simply repeated.

483. Turning to the "type B" category in Mr Hudson's analysis in his witness statement, in the instances reviewed in cross-examination Mott's revised information was provided in December 2003 (i.e. well before 15th February 2004).

State of design as at 2nd August

484. The permanent works connection designs of the fixed roof were 90% complete as at 2nd August. As to the moving roof, CB had only done some work in relation to the buffers (which would prevent the moving roof falling onto the pitch). That ran above truss T7 and close to TR2. The connection designs for the buffer could not be completed because of lack of information from Mott.

Work done by Hollandia after 2nd August

485. The changed loads of the moving roof had a major effect, because as that roof moved it redistributed load throughout the structure. The revised loads to the PPT meant that a number of joints had to be welded instead of pinned. Mr Hudson was shown some documents indicating that Multiplex had given credit against their schedule C claim in respect of the cost of these two matters, but Mr Hudson (who was not involved on the commercial side) was unable to assist in respect of those documents.

486. Turning to Hollandia's changed erection methodology, Mr Hudson made no criticism whatsoever of Hollandia's approach. His task was to develop details which suited the chosen erection method. When pressed in cross-examination Mr Hudson was uncertain whether or not certain revised connection designs were the consequence of Hollandia's changed erection methodology and sequence.

Change notices

487. Change notices CN 2044, CN 2058 and CN 2147 were reviewed. These change notices were issued after 15th February 2004, but arose from RFIs submitted before 15th February 2004.

COLIN HUTCHINSON

488. Mr Hutchinson has worked as a structural design draftsman for 50 years until his recent retirement. From 2001 to 2004 he was employed by CB. From October 2004 onwards he was employed by Oakwood.

WITNESS STATEMENT

489. Jim O'Neil, CB's chief engineer, assigned Mr Hutchinson to head up CB's retrofit drafting team for Wembley.

Retrofit work to drawings

490. It was Mr Hutchinson's task to look at Mott's revised drawings and to ensure that the steelwork drawings were revised accordingly. CN numbers were put on the revised steelwork drawings to show that they arose from an Engineer's variation

491. Mott's drawings lacked detail and sometimes contained incorrect detail. For example, the interface between steelwork and concrete planking was shown incorrectly.

492. CB's system upon receiving a revised Mott drawing was as follows. If the steel piece affected was already in fabrication, then fabrication would be completed and the steel piece would subsequently be retrofitted in order to comply with Mott's revised requirements. If fabrication had not started, then the relevant fabrication drawing would be retrieved and amended. If the information on a Mott drawing was incomplete, then Mr Hutchinson or his colleagues would raise a request for information ("RFI").

493. Some of Mott's revisions required very significant alterations to the detailed steelwork drawings. Furthermore, it would sometimes take much time and effort to understand what changes Mott was making.

494. Mr Hutchinson estimates, on a conservative basis, that it took an average of ten hours work to complete each revised steelwork drawing. For example, the louvre revisions put the retrofit team to much work, doing detailed calculations and raising RFIs.

Retrofit work to steel pieces

495. In the case of steel pieces which went to fabrication before Mott's revisions were received, retrofit work to the steel may be carried out either at Darlington or (if the steel had

already gone to site) at Wembley. If the steel had gone to site, then Mr Hutchinson's team would provide a revised sitework drawing, showing what needed to be done.

CROSS-EXAMINATION AND RE-EXAMINATION

496. Mr Hutchinson was cross-examined and re-examined on day 18.

Mr Hutchinson's period with CB

497. Mr Hutchinson started work on the Wembley project in about February 2003. His team operated at the CB drawing office in Darlington.

498. When a revised Mott drawing arrived at CB's office (having been sent by Multiplex), CB's document controller put a CN number on that drawing. In February 2004 there was a change in the numbering system. CN numbers allocated from then on were all in the 2000 series.

499. Many of Mott's revisions required Mr Hutchinson's team to carry out calculations and to produce new connection designs. After that Oakwood's team did the necessary drafting (i.e. producing revised steelwork drawings). On occasions Oakwood also did some design work.

500. In February 2004 there were emails between site and the Darlington drawing office, in which complaints were made about delays in giving effect to Mott's revisions. As a result steel was arriving at site, which required modifications. The complaint was that this could have been avoided. Mr Hutchinson gained the impression that site had no idea of the volume of amendments that were coming through on the Mott drawings forwarded by Multiplex.

501. It also had to be understood that there came a point when Oakwood could not stop the drafting process. Oakwood's drafting system was automated. Once drafting was underway, the only practical course was for the relevant drawings to be completed and subsequently amended by CB. On these occasions Mr Hutchinson's team produced revised versions of the Oakwood drawings. There were occasions when Oakwood did not tell Mr Hutchinson that they had passed the point of no return (referred to as "lock out") and this caused problems for CB: see Mr Hutchinson's email to Mr O'Neil dated 18th February 2004 (QC5/65).

502. The problems concerning the interface between steelwork and concrete planking (referred to in Mr Hutchinson's witness statement) came to light when features were noticed on Bison's drawings, which were not included on Mott's drawings. Andy Hall instructed Mr Hutchinson to work to the Bison drawings. This meant that the retrofit team had to add (a) vertical plates with holes which would tie into walls and (b) shelf angles which would weld onto beams supporting the concrete planks.

Mr Hutchinson's period with Hollandia

503. Hollandia seconded Mr Hutchinson back to the Wembley project. He worked with Oakwood. He was based in the Wembley site office.

504. Mr Hutchinson helped to organise work by Fast Track in making good incomplete or defective steelwork, which had originally been delivered or erected by CB. Mr Hutchinson prepared the packages of work which had to be carried out.

505. In respect of schedule 1D, item Hol 42, Mr Hutchinson prepared the site modification sheet for that item (M1D-1/191). It bears the site work number SW148. The work required was (i) field welding rakers, (ii) field welding closure brackets to rakers and (iii) removing existing stool and replacing with new stool. The details of this work were illustrated in drawings attached (pages 193-197).

506. The need for SW 148 arose because CB had not done that work before they left the project. After the work had been done, a site record sheet was prepared (M1D-1/192). Mr Hutchinson prepared the top of half of the site record sheet, explaining what had been done. Someone else filled in the bottom half, setting out the names of the people who did the work and time spent. Mr Hutchinson does not agree with Mr Hall's evidence that the raker in question had been fully welded and painted by the end of July 2004.

507. On a number of site modification sheets Mr Hutchinson ticked the "client" box. By that tick Mr Hutchinson was denoting that this was work for which Multiplex, as the employer of Hollandia and Fast Track, would have to pay.

DR ALAN MANN

508. Dr Mann is an engineer, with long experience of structural steelwork, who is employed by Babbie.

WITNESS STATEMENT

Babbie's role

509. Babbie were engaged by CB as third party checker. Babbie's role was to check CB's design work – i.e. design of connections, design of temporary works and erection methodology.

510. Babbie's work with CB covered (a) all of the bowl and the arch erection to its initial temporary position and (b) some work in relation the PPT and roof (which were erected after CB had left).

511. After CB's departure Babbie were re-engaged by Hollandia to act as third party checker. Dr Mann learnt that Babbie would be re-engaged, when he attended a meeting on 2nd August 2004 between Multiplex and Hollandia. Dr Mann subsequently attended two day meetings with Multiplex and Hollandia concerning the roof on 9 – 10th and 23rd – 24th September.

The work of CB and Hollandia

512. Dr Mann regards both CB and Hollandia as very good designers, fabricators and erectors. He considers that both companies did an excellent job during their respective periods at Wembley.

513. The erection of the bowl of Wembley stadium was straightforward. However, the erection of the roof was extremely difficult and involved complex erection engineering. The basic problem was that the roof was large and flexible. Therefore it had to be built to the "wrong" shape, such that it would then deflect into the "right" shape. Parts of the roof had to be built in articulation, in order to avoid temporary overstressing. Temporary works were required, in order to provide additional stability during erection.

514. CB's planned erection methodology for the roof would probably have been slower and less expensive than that finally adopted by Hollandia.

515. Hollandia made substantial changes to CB's designs, erection sequence and erection methodology for the roof. They made these changes because they were required to consider methods of speeding up the erection programme.

516. Whichever method of erecting the roof was adopted (CB's or Hollandia's), there were complicated technical problems to overcome.

517. Delays to the PPT and problems with the concrete cores created difficulties for Hollandia. The concrete cores were of insufficient strength to take the load of CT 17 during the arch layback. The problems with the concrete cores would also have created difficulties for CB. Those cores could not (until strengthened) have taken the load of CT 17 while the north roof was hanging off it (as envisaged in CB's erection method).

518. Changes in the permanent loadings on the south roof (caused by design alterations of the moving roof and by Mott's revision of wind loads) affected site progress and erection strategy during the era after CB had left. Also changes required by Mott in relation to the PPT and disproportionate collapse had a similar effect. Indeed, remedial strengthening works had to be carried out on site to reinforce PPT joints that had already been made.

519. The consequence of changes to erection methodology and changes to primary design was that connection designs had to be re-checked and, where necessary, revised. In some instances articulation had to be introduced.

520. It was inevitable that there would be some duplication of effort. Hollandia did not want to rely over much on CB's previous work. DLT and Oakwood appeared to be co-operating with Hollandia. Dr Mann never gained the impression that Hollandia were facing additional difficulties due to an unhelpful attitude on the part of CB's engineers.

Models

521. The dead load model of the roof ("the model") is a mathematical model of the roof after erection, replicating final loading and geometry. The model can be used to predict what will happen during the stages of erection. It also will also predict what shape members must be made to, so that upon completion the roof will be in the correct shape and stress state.

522. Mott created a model of the roof for their own purposes. CB created a model and verified it against Mott's model. When they took over as erector, Hollandia needed to develop their own dead load model and they duly did so. Hollandia checked their model against CB's model and found a close correlation. This close correlation gave Babbie confidence that the site team had an accurate tool for understanding the erection process.

523. Paul Stellati was CB's modeller. Hollandia's modeller was Sytze Wierda. There was co-operation between CB and Hollandia about modelling; there was liaison between Stellati and Wierda (paragraphs 40 – 41).

Multiplex's claims in paragraphs 30 – 55 of schedule 4C

524. Dr Mann regards Multiplex's complaints in these paragraphs as minor. Most of the points relate to achieving tolerances. Unsurprisingly, CB and Hollandia differed in their approach to achieving tolerances. This was a matter of engineering judgment.

525. Dr Mann does not agree with the criticisms of CB's design for site welded joints in truss T7. The problems which CB encountered in relation to arch construction did not necessarily mean that they would encounter the same problems in constructing truss T7.

Other witnesses

526. Dr Mann agrees with paragraphs 21 to 74 and 99 to 258 of David Taylor's witness statement, paragraphs 43 to 79 of Ken Hudson's witness statement and parts of Chris Wilkinson's witness statement.

CROSS-EXAMINATION

527. Dr Mann was cross-examined on days 16 and 17. There was no re-examination.

528. No-one foresaw the problems of erecting the stadium and the magnitude of the temporary works. That comment applies to Multiplex, CB, Mott, Babbie and probably Hollandia. The fact that no-one foresaw these matters led to the problems of increased costs and delay on the project.

529. Babbie's original contract with CB provided for a fee of £333,000. Babbie's contract with Hollandia was on a cost plus basis. Dr Mann was pleased to be continuing with such an interesting project and he was not particularly bothered about the financial side, so long as Babbie were paid for what they did.

530. Babbie's initial work plan was dated May 2003. Babbie as checker were to be provided with CB's dead load model. Any mathematical model of a structure is a series of idealisations.

State of design work as at 2nd August

531. By the time that CB left on 2nd August, they had more or less completed their design for the bowl, in respect of both permanent works and temporary works.

532. CB had not done any design of the moving roof. That was dealt with much later and the design was substantially changed.

533. As to the south roof, Dr Mann understood that Steve Baron of CB had sorted out most of the permanent works design. CB had also done a substantial amount of work on the temporary works design. The only really tricky area on the south roof was truss T7 and CB had done a lot of work on that.

534. As to the north roof, one of the trickiest problems was connecting the rafters to CT 17. CB probably still had things to sort out on that.

Meeting on 2nd August

535. Dr Mann recalls the meeting on 2nd August. Dr Mann was asked to attend by Mr McGregor and he interrupted his holiday in order to do so. This was the first occasion that Dr Mann met Mr Montijn.

536. Dr Mann recalls Mr Montijn's power point presentation at that meeting. He also recalls that Multiplex were concerned about the programme and wanted to catch up lost time.

537. There was discussion about the roof at the meeting.

The roof

538. A generic problem with the roof was the slender rafters, which needed to be stabilised during erection. Also during the erection phase the gaps would not be the right size for the rafters of the north roof. CB had adopted one solution to these problems. Hollandia adopted a different solution, which involved a different sequence and methodology of erection. CB's solution involved hanging water bags from the pyramids, and then letting water out as necessary. That was quite a smart idea. It would not have mattered if the water bags had swung around.

539. There was nothing wrong with the methodology which Hollandia adopted. Some of the detailed changes which Hollandia made were simply matters of engineering preference. It was sensible for Hollandia to construct the roof in the way that they wanted, because they would take responsibility for it.

540. Some of the problems inherent in erecting the roof and the solutions are illustrated in Dr Mann's sketches SK 1 (drawn on the flipchart on day 16) and his sketches SK 2 to SK 7 produced on day 17. SK 3 illustrates a simple mathematical model and finite element analysis. SK 4 illustrates how pre-sets and pre-cambers overcome the problem of deflection. SK 1 and SK 5 show how the gaps, in which rafters and purlins are to be fitted, change during erection. SK 7 shows how purlins are used to prevent a member buckling under compressive load. SK 8 illustrates an example of small error causing disproportionate failure.

541. There were going to be walkways in the roof. Mott had not designed these as at 2nd August. After Mott had done so, either CB or Hollandia would have to design the connections and the permanent works for the walkways.

542. As at 2nd August, it was going to be necessary to design some hinges in truss T7, so that the truss would not be overstressed during erection.

Models and the need for liaison between CB and Hollandia

543. Hollandia always intended to produce their own model.

544. Mr Montijn's letter to Multiplex dated 15th June explains that the model which Hollandia had prepared was not as sophisticated as Mott's model or CB's model. All three models were prepared for different purposes. CB had already determined the pre-sets and pre-cambers. All that Hollandia needed to do was to predict how the roof would deform as erection proceeded. However, there were still some matters which Hollandia did not understand (as set out in paragraph 8 of the letter). Given time, Hollandia could work out the answers, but Mr Montijn was requesting a dialogue about those matters.

545. In a letter dated 6th August Mr Montijn requested 20 pieces of information. Some of that information would come from Mott, but most of the information would have to come from CB. A dialogue between CB and Hollandia (as requested in Mr Montijn's letter of 15th June) was vital. Eventually such a dialogue took place. Dr Mann was happy about this, because all three models gave more or less the same predictions.

546. At the time of handover a complete and open interchange between CB's designers and Hollandia's designers would have been eminently desirable. There needed to be a transfer of technology phase. Hollandia inevitably had queries which only CB could answer.

547. When Hollandia took over erection, they had to consider the functionality of the temporary works. For safety reasons, they could not simply assume the adequacy of the temporary works.

548. When Dr Mann refers to CB in his evidence, he is really talking about DLT. DLT were the people who were devising the erection methodology for CB.

JAMES O'NEIL

549. Mr O'Neil is employed by CB as engineering manager.

WITNESS STATEMENTS

550. Mr O'Neil was CB's production operations manager for the Wembley project. He supervised the work of the drawing office (including the retrofit team) and he oversaw the fabrication strategy. His first statement spans 93 pages and I only offer a very brief summary.

551. Section 4 of Mr O'Neil's first statement contains a helpful description of the structure of Wembley Stadium, which has not been challenged. Section 5 explains how the construction of the stadium was divided into phases, with each phase being sub-divided into erection groups.

552. Section 6 describes the complexity of the stadium structure and the difficulties caused to CB's design team by (a) late information and (b) Mott's changes to the primary design.

553. Section 7 describes the design function of CB as steelwork subcontractor. Essentially, CB takes the primary design produced by the Engineer, designs the connections between steel members and devises how the structure will be erected. CB then produces fabrication drawings (to enable the steel pieces to be fabricated) and general arrangement drawings (to enable the steel to be erected). CB's subcontractor, Oakwood, used the computer programme X-Steel to produce the fabrication drawings.

554. Section 8 sets out the stage which design and drafting had reached when CB repudiated on 2nd August 2004. In this regard, Mr O'Neil reaches similar conclusions to CB's other witnesses.

555. Section 9 and parts of section 10 set out the dates when pieces of design information were handed over to Multiplex or Hollandia. These sections of the first statement must be read subject to the cross-examination at day 19/62 – 92.

556. Section 11 comments on paragraphs 52 – 55 of Multiplex’s schedule 4C. These comments follow broadly similar lines to Mr Wilkinson’s comments.

557. Section 12 responds in immense detail to claim 4 of schedule 4C.

558. Section 13 provides an account of the Go Data system. This section must be read subject to the cross-examination at day 19/13 – 55.

559. Mr O’Neil’s second statement deals principally with the amount of roof design work carried out between 15th February and 2nd August 2004. He concludes that the roof design and drafting were 15% complete as at 15th February and 90% complete as at 2nd August. Accordingly, between 15th February and 2nd August CB and Oakwood carried out 88% of the roof design work which was outstanding as at 15th February ($75/85 \times 100 = 88$).

CROSS-EXAMINATION AND RE-EXAMINATION

560. Mr O’Neil was cross-examined and re-examined on day 19.

Go Data

561. A large number of internal CB documents concerning Go Data were put to Mr O’Neil and he accepted the following. Go Data was not able to cope with the large number of design changes on the Wembley project. Go Data was also unable to cope with the extensive work done by other fabricators or by other contractors and subcontractors, such as Enob and Hollandia. In order to deal with these matters, much information had to be entered manually into the system. There was concern within CB that steel had reached site without appearing on Go Data. Accordingly CB staff made manual entries, in order to show additional steel on site. In a report dated 24th May 2004 Mr O’Neil stated that Go Data had been overwhelmed by Wembley, although he now regards that sentence as somewhat too severe. Emails of 9th June refer to a discrepancy between site lists and Go Data; Mr O’Neil did not know which was wrong.

Supply of information to Multiplex

562. Mr O’Neil was involved in a deliberate plan to withhold information from Multiplex. This is admitted by Mr O’Neil and evidenced by a number of internal documents put in cross-examination. In early August Mr O’Neil went to Oakwood’s office and saw to it that information was wiped off their computers, although not off Oakwood’s back-up system. Oakwood’s models were brought back to CB. Mr O’Neil witnessed the shredding of Oakwood’s copy drawings in an industrial shredder. DLT withheld their calculations from Multiplex and Mr O’Neil regarded this as fortunate.

563. Clifford Chance wrote to Walker Morris (CB’s then solicitors) protesting about this matter on 23rd August. On 24th August Clifford Chance wrote again requesting ten categories of design information, as identified in a schedule. CB could have provided this information promptly but in fact did not pass it on until various dates in September. Mr O’Neil is not sure whether CB had a “go slow” policy during this period. The information provided in September was both comprehensive and organised, although there were delays.

Claim 4 of schedule 4C and the linked claims in schedule 1D.

564. Mr O'Neil was cross-examined about these claims at day 19/96 – 132. I will refer to that evidence as appropriate when dealing with those claims.

Amount of roof design work carried out between 15th February and 2nd August 2004.

565. The percentages set out in Mr O'Neil's second statement relate to the fixed roof and exclude the moving roof. They do not take account of any work required to secure engineer's approvals. As at 15th February the only sub-contractor doing roof design/drafting work was Oakwood. After considering the documents put in cross-examination, Mr O'Neil accepts that a reasonable estimate of the completion of roof design as at 15th February would be 25% (rather than 15% as set out in his statement).

STEPHEN OSBORNE

566. Mr Osborne, having joined CB as technician engineer about 14 years ago, has been employed by the company in a variety of roles.

WITNESS STATEMENTS

567. Mr Osborne was CB's planning manager on the Wembley project. His function was to plan CB's work scope through design, procurement, fabrication and erection.

568. Mr Osborne assisted the site erection teams in setting up the site load lists. Site load lists were created for each erection group within the structure. The despatch team (i.e. at Darlington or Scunthorpe) would use the site load lists in conjunction with Go Data for loading trailers in accordance with the required erection sequence. A separate load register would record when loads were received on site.

569. An erection progress system was used on site. There were spreadsheets recording details of every piece of steel which had been fabricated. Each day the erection teams would update these spreadsheets to record what they had erected. At the end of each week, Mr Osborne would email these spreadsheets to the fabrication team, who would book the relevant pieces of steel into the "erected" stage in go Data.

570. The difficulties which arose on this project were due to late information and design changes, which meant that erectable work packages could not be delivered to site in the correct sequence.

571. Mr Osborne made certain errors on the site spreadsheets, as explained in his witness statements.

572. Ledger angles were produced locally in Wembley, rather than at Darlington. Thus it came about that there were 6 tonnes of ledger angles not included in Go Data. (The figure of 149 tonnes mentioned in Mr Osborne's first witness statement was an error, as explained in his second witness statement.)

573. Mr Osborne does not agree with Multiplex's allegations of inefficient and unproductive work in the post 15th February period, for the reasons set out in paragraphs 35 to 73 of his witness statement. Furthermore, it can be seen that despite the delays and disruptions CB achieved 88% of their planned production in the period up to 21st April.

574. When it was known that Hollandia would take over erection, Mr Osborne co-operated in effecting an orderly handover. He co-ordinated the delivery of all fabricated steel in CB's possession to Multiplex. Mr Osborne also created a database, detailing all pieces of steel required for the bowl. He discussed and agreed the form of this database with Mr Perkins. Mr Osborne gave the database to Mr Perkins at the end of the 28 day period.

CROSS-EXAMINATION AND RE-EXAMINATION

575. Mr Osborne was cross-examined and re-examined on day 24.

576. On looking at the numerous emails put in cross-examination by Mr Buckingham, Mr Osborne accepts that on occasions leave out steel was delivered to site, although not required for erection; pieces of steel were missing from loads; steel was mis-labelled; fabricated steel pieces could not be found; work on phases 11, 12, 15 and 18 was halted or disrupted; steel arrived incorrectly fabricated; time (charged to Multiplex under the costs reimbursable agreement) was wasted sorting out accumulated steelwork and hunting for missing pieces; and so forth. Despite those matters, CB did not always check steel delivered to site because "we trust our fabrication teams" (day 24/49).

577. The load lists recorded where each piece of steel referred to was located and its status. Both the load lists and Mr Osborne's database (compiled in July) were prepared principally from Go Data. However, the Go Data information was supplemented from a number of sources.

578. Go Data did not originally record erected steel. However, CB decided to add this information to Go Data in about February or March 2004. There were problems with this exercise, as evidenced by Mr Osborne's email to Mr O'Neil dated 12th May ("it seems that there is over 1,000 tonnes actually erected which is not booked through ...").

579. There were two types of ledger angles, namely those fitted to beams and those which were bolted onto concrete cores. Ledger angles of the second type were the ones produced locally at Wembley. A quantity of ledger angles were missing on 28th July, but these could have been fabricated quite quickly.

580. Mr Osborne prepared an analysis of what men were doing on site during the period February to May 2004. This is at QC 91/273. It gives a broad indication and is reasonably accurate.

581. During the handover period there was concern about deliveries of steel to ZNS. In an email of 28th July Mr Osborne expressed concern that some of the packing lists were reported to be a shambles.

582. After 2nd August CB's steel materials were spread around the country in various states of fabrication and treatment. It was not an easy task to track this steel down, as evidenced by Walker Morris' letter to Clifford Chance dated 27th August.

DAVID TAYLOR

583. Mr Taylor is a principal engineer employed by Dorman Long Technology Ltd ("DLT"), which is half owned by the Cleveland Group.

WITNESS STATEMENT

584. Mr Taylor worked on the Wembley project in February 2003, reviewing aspects of the arch connection design. In February 2004 Mr Taylor returned to the Wembley project, assisting with the design of north roof connections. He then took on other responsibilities, first reviewing the arch roll-up method statements and then managing the north roof erection design team. By July Mr Taylor was also responsible for the south roof erection design.

585. In September Mr Taylor put forward DLT's proposal to Hollandia to provide continuing design services on permanent works connections and erection engineering.

586. In February 2005 Mr Taylor headed a DLT team that assisted Hollandia with erection design for the north roof and the arch load transfer. After completing design work Mr Taylor continued working for Hollandia in a review role (in connection with the north roof) until October 2005.

587. In paragraphs 19 – 84 of his first statement Mr Taylor gives an account of CB's proposed erection methodology and the different methodology in fact adopted by Hollandia. The remainder of his first statement (paragraphs 85 to 365, spanning 72 pages) are a detailed response to parts of Multiplex's schedules 4C and 4D. I shall refer to these parts of Mr Taylor's statement as necessary, when dealing with those two schedules.

588. Mr Taylor's second statement comprises a detailed response to those parts of schedule 4D which were reintroduced following the Court of Appeal's decision on 21st December 2007. I shall refer to this statement if and in so far as it is necessary to do so, when dealing with schedule 4.

589. There was a challenge to the admissibility of parts of Mr Taylor's evidence, which I shall deal with in chapter 4.

CROSS-EXAMINATION

590. Mr Taylor was cross-examined on day 17. There was no re-examination.

591. Outside the specific periods mentioned in his witness statement, Mr Taylor had no or minimal involvement in the Wembley project.

592. Mr Taylor is a witness of fact, not an expert witness. He has not been shown the requirements for giving expert evidence. He is not independent of CB, having been employed by one of the companies in the Cleveland Group for the last eleven years.

593. DLT were employed by CB on a cost plus basis. DLT were subsequently employed by Hollandia on a cost plus basis. So the basis of their engagement did not really change.

594. In February 2004, when Mr Taylor became involved in the project, his predecessor in relation to north roof erection engineering was Peter Hesford. Mr Taylor was aware that there was concern about the loads which would be imposed by the moving roof and that the weight had increased. He was also aware that some necessary information about the roof was missing. This was bound to cause some delay and disruption. In February 2004 Mr Taylor was also aware that there had been some design changes and load changes to the PPT.

595. Mr Taylor was aware that relations were strained between CB and Multiplex following CB's extension of time claim, but he was not aware of the details. He became

aware of a deal made between CB and Multiplex in February 2004, but he did not see the Heads of Agreement.

596. Between February and July 2004 Mr Taylor was not aware that (as now revealed by the documents) Multiplex were chasing CB for overdue drawings in respect of the roof. Mr Taylor was dealing with permanent works connections and with roof erection engineering. He was not involved in the preparation of fabrication drawings.

597. In July 2004 Mr Taylor received an instruction from Stephen Baron of CB (who was effectively Mr Taylor's boss) that temporary works information should be withheld from Multiplex. DLT did what they were told in this regard. Mr Taylor did not know why the instruction was given. He agrees that from an engineering perspective, full co-operation between CB, Hollandia and Multiplex would have been the best way forward. He knows that subsequently all the information which DLT had was passed on.

598. The documents show that in July 2004 CB and DLT were considering withholding CB's model from Multiplex. Mr Taylor was not consulted about this. In order to use the model, Hollandia would have needed some instructions and information from CB.

599. By July 2004 the design of temporary works for high level erection of the south roof was largely complete. The risk mitigation had been carried out.

600. The route by which any DLT information reached Hollandia was from DLT to CB to Multiplex to Hollandia.

601. Mr Montijn's letter of 6th August 2004, requesting information, was put in cross-examination. Mr Taylor accepts that some of that information would have to come from CB and he believes it was provided in due course. Contrary to Mr Stewart's suggestion in cross-examination, Mr Taylor believes that the information was passed on considerably earlier than November 2004.

602. An article in the Darlington and Stockton Times of 12th August quotes Mr Rogan as saying that CB had done a year's engineering work on roof erection, which would not be handed over. This was probably a reference to calculation reports and drawings. Mr Taylor believes that this information was in fact released fairly soon after the publication of that article.

603. In August DLT approached Hollandia to offer their services. To this end Mr Taylor had a meeting with Mr Montijn and Mr Bouwman on 19th August.

604. Mr Taylor believes that the problems concerning the concrete cores (which would be used for the arch load transfer) were known about by the beginning of August 2004.

605. Mr Taylor was shown a quantity of correspondence concerning professional indemnity insurance matters, but this aspect was outside his knowledge. He did not know in the summer of 2004 that a claim by CB against DLT was contemplated, because of DLT's underestimation of the temporary works. He was unaware of possible problems over the PI insurance cover. Mr Taylor was, however, aware in July 2004 that there was concern within CB and DLT about the extent to which the temporary works for the roof had originally been underestimated.

606. Mr Taylor was asked to look at photograph I6/6, which shows the site on 26th July 2004. Some turning struts can be seen. Their weight would have been about 2 tonnes per linear metre. The toblerone trusses were suitable for re-use. They were unlikely to have suffered serious corrosion. The headers and footers would have been more difficult to re-use.

607. After Hollandia took over, they did a good job. Mr Taylor does not criticise their erection engineering. In relation to north roof erection, both Hollandia's method and CB's method had certain advantages and disadvantages. The water bag system would have had disadvantages requiring consideration. Similar comments could be made about the erection of the south roof. One advantage of Hollandia's methodology was that movement during the erection phase would be reduced.

DONALD UNDERWOOD

608. Mr Underwood is the commercial manager of CB and an experienced quantity surveyor.

WITNESS STATEMENTS

609. Mr Underwood has made three witness statements for the purpose of this trial, namely his fourth, fifth and sixth statements. These statements span 140 pages, although his oral evidence was relatively brief. I shall provide a very brief outline of the witness statements at this stage.

610. Mr Underwood begins with an account of the Go Data system, which generates two principal outputs, namely stock in reports and piece monitoring reports. Reports generated by Go Data's piece monitoring system record the stage which each piece of steel has reached in the course of its life from the planning stage right through to the stage of erection or scrap.

611. Mr Underwood then embarks upon a lengthy discussion about the correct valuation of CB's works (a) as at 15th February and (b) between 15th February and 2nd August 2004. I shall refer to this evidence as necessary when addressing the valuation issues.

612. In the final section of his fourth statement Mr Underwood explains CB's claim for £3,643,191 in respect of temporary works left behind by CB and not returned to CB by Multiplex. The temporary steelwork in question is listed in CB's assets register. That material, if returned in proper condition, could have been re-used on other projects.

613. Mr Underwood's fifth statement is a response to Dr Mastrandrea's supplementary note, which raised queries and issues concerning Go Data. In this statement Mr Underwood gives his further recollection about the saga of China steel (an immensely confused story, which I shall do my best to unravel in chapter 18). Mr Underwood also corrects an error in Mr Osborne's first witness statement concerning ledger angles. The weight of ledger angles, which were included in the bowl but not recorded in Go Data, amounted to 6 tonnes, not 149 tonnes.

614. Mr Underwood's sixth statement sets out the somewhat convoluted history of the "hotel variation", Multiplex's side letter of 20th August 2002 and SV 399. I shall refer to this evidence when addressing CB's variations claim.

CROSS-EXAMINATION AND RE-EXAMINATION

615. Mr Underwood was cross-examined and re-examined on day 22.

616. Despite the documents put in cross-examination, Mr Underwood does not accept that there was a plan in July 2004 to withhold information from Multiplex or that CB's failure to charge for erection engineering at that stage was part of such plan. Mr Underwood cannot now explain the various estimates which he gave of future design office costs.

617. Mr Underwood provided for the board meeting on 23rd July an estimate of £7.7 million as the cost of completing the lump sum works. By the end of July CB had spent about £8 million of the £12 million lump sum. Mr Underwood does not accept that this indicated that CB were heading for a substantial loss, because the £7.7 million projection must have been based on earlier information.

618. Mr Underwood estimates that under the lump sum agreement CB had to fabricate 4,115 tonnes of steel. This is less than the estimate of 5,508 tonnes contained in Mr O'Neil's spreadsheet of February 2004 (QC4/110.4).

619. Mr Underwood does not accept that in its accounting CB has muddled up the costs attributable to code 430A and 430 China. However, there are some anomalies in the figures on CB's documents, as was pointed out in cross-examination. Mr Underwood cannot explain these anomalies. (For a concise summary of Multiplex's case on this issue as put in cross-examination, see the claimant's supplemental 6.)

620. Metal decking was required for phases 11, 12 and 18. By 15th February steel erection was about 41% complete on phase 11 and about 8% complete on phases 12 and 18. The reason why CB claim such a substantial sum for metal decking for these phases in their 15th February valuation, is that the amount of metal decking had been reduced by Multiplex and that was one of the variations compromised by the Supplemental Agreement.

621. Metal decking work done after 15th February was part of the category 1 buyouts.

622. Mr Underwood accepts that CB's approach to preliminaries leads to certain anomalies, as put in cross-examination. However, CB did not make a substantial profit because of Multiplex's provision of tower cranes in late 2003. By then CB had already entered into contracts for the hire of cranes and these were on site.

623. Steel which was retrofitted on site was probably not recorded on Go Data. CB claimed the costs of some retrofitting on site as part of their reimbursable costs. The activities upon which workmen were engaged on site in the period after 15th February were not recorded.

624. Mr Underwood stands by CB's claim in respect of temporary steel left on site. The items are listed in CB's assets register. They did not come back to CB. It is possible that Multiplex moved them off site to holding yards. The temporary steel left by CB included the assembly sheds in the centre of the football pitch, which we can see in the photographs.

CHRISTOPHER WILKINSON

625. Mr Wilkinson is a civil engineer, employed by DLT. At the relevant time he was the general manager in charge of DLT's design office in Darlington.

WITNESS STATEMENTS

Period up to 2nd August 2004

626. On the Wembley project DLT provided engineering management, detailed design and co-ordination of technical information to CB on a secondment basis.

627. Mr Wilkinson had some involvement with the project pre-contract. He became involved again in early 2003, when DLT's design team was being put under pressure because of late and varied information from Mott.

628. Delays to the primary design caused substantial delays to the design and drafting of the PPT. Throughout the summer of 2003 responses to RFIs produced new information about loads and member sizes, not mere clarifications. On 13th October DLT received what were said to be definitive load data, but subsequently changed information continued to come in. The stream of late information and primary design changes concerning the PPT continued up until January 2004: see the summary in Mr Wilkinson's schedule at QC 91/260 – 263. These matters caused delay to the fabrication PPT steelwork. The result was that as at the 2nd August 2004 the erection of the PPT had only just begun.

629. Mr Wilkinson considers that the design of permanent connections for the fixed roof was 90% complete as at 2nd August. This assessment is consistent with DLT's contemporaneous records. DLT's submissions register (QC 50/92 – 106) shows the number of approvals which had been obtained or were outstanding from Mott and Babbie. Mr Wilkinson then gives the same explanation for submissions which were B status as appears in Mr Hudson's statement.

630. The fixed roof design was 57% complete in February 2004. Accordingly between 15th February and 2nd August DLT completed 77% of the fixed roof design work which remained outstanding on 15th February.

631. Turning to the PPT, despite the numerous primary design changes mentioned above, DLT had made substantial progress by February 2004. As at 15th February, according to DLT's spreadsheet records the design of permanent works connections for the PPT was 87% complete. By 2nd August 2004 DLT had completed that work.

Period after 2nd August 2004

632. In the period following CB's departure, Mr Wilkinson and other DLT engineers (Hudson and Kwok) were hired by Hollandia to continue permanent works design for the roof. Mr Wilkinson attended the roof workshop in Holland on 23rd – 24th September. He did some tasks following that meeting, but did not "start work formally" for Hollandia until 11th October. On arrival, Mr Wilkinson found that Hollandia had lots of lever arch files on their office walls. These contained copies of calculations provided to Hollandia by CB.

633. Mr Boks gave an action list (QC 70/248) to Mr Wilkinson, containing fourteen items. Mr Wilkinson discusses these fourteen items at paragraphs 99 – 135 of his first statement. He concludes that some of the work could be described as completion of CB's designs, but most of the work consisted of reviewing and re-designing roof connections to take account of (a) primary design changes and (b) Hollandia's preferences.

634. Item 1 on the action list comprised securing the upgrade of all CB calculations to A status. This task did not take substantial time. Furthermore it was rapidly superseded by the new calculations which Hollandia were producing (see paragraphs 99 and 155).

635. In relation to paragraphs 51 – 55 of Multiplex's schedule 4C, Mr Wilkinson believes that many of the design submissions, design calculations and fabrication drawings produced by Hollandia in relation to the roof arose from (a) primary design changes and (b) Hollandia's revised method of erection.

636. Whilst working for Hollandia Mr Wilkinson never heard criticism of CB's work.

CROSS-EXAMINATION AND RE-EXAMINATION

637. Mr Wilkinson was cross-examined and re-examined on the afternoon of day 18.

Pre-contract events

638. Between February and September 2002 Mr Wilkinson was part of a team assisting CB in relation to their tender. They made a presentation to the funders of the new stadium, because the funders were auditing the main subcontractors.

639. Mr Wilkinson gave to Mr Rogan an estimate of the overall design budget for the steelwork subcontract, including both design of connections and design of temporary works. This estimate was a best guess based upon the steelwork design costs for a complex suspension bridge in the USA. Mr Rogan was looking for costs savings and was trying to bring the budgeted costs down.

Late 2003 to August 2004

640. Mr Wilkinson was next involved in late 2003, when there was concern about Wembley costs escalating. CB had a fixed price contract. Within that there was an engineering budget, out of which they had to meet design and drafting costs, including payments to Oakwood, Consteel, DLT and any other subcontractors.

641. Mr Wilkinson dealt with permanent works design and Mr Baron dealt with temporary works design. Mr Wilkinson was aware that a commercial deal was being negotiated in February 2004, but he was not aware of the details.

642. In relation to the PPT, the variations and late information concerning the primary design caused a chain of delays. Fabrication drawings could not start until the design was complete. Fabrication could not start until the fabrication drawings were complete. Erection followed fabrication. Mr Stewart suggested that the PPT steelwork was fabricated by July, and that delay in erecting the rakers was what held up erection of the PPT. Mr Wilkinson was unable to comment on that suggestion, although he accepted that the rakers were integral to the PPT.

Degree of completion of PPT and roof design as at 15th February 2004

643. The PPT comprised phases 41 – 48. The percentage completion of the PPT design can be seen from the spreadsheets which CB prepared on or around 12th February (contained in bundle T 71). Mr Wilkinson's assessment of 87% is based upon these tables.

644. Mr Wilkinson assesses that the fixed roof permanent works connections design was 57% complete as at 15th February. That assessment does not take into account the small amount of work required to secure status A approvals from Mott and Babbie. So the 57% should perhaps be reduced to 54% or 55%.

Degree of completion of roof design as at August 2004

645. The design of phases 60 and 61 was complete by August. T1 and T6, which comprised these phases, were really boxes rather than trusses. These two members were mirror images of each other and rested on the PPT.

646. Turning to truss T7, this had four cables along the central third of the truss to provide tensile strength. Mott had failed to design the members to which those cables should be anchored at each end. DLT regarded that as part of the primary design. However, in order to resolve the matter, CB had put forward their own proposal for anchoring the four cables. This was one of CB's submissions to Mott. There was minimal work left to do in connection with that anchorage. Mr Wilkinson knows this because he dealt with T7 cable anchorage during the Hollandia era.

647. Mr Wilkinson accepts that if CB had remained after 2nd August, they would have had to deal with items 1, 10 and 11 on Mr Boks' action list. Nevertheless he maintains that the permanent works design of the fixed roof was 90% complete by 2nd August, as set out in his first witness statement.

648. Very little had been done on the moving roof. Mr Wilkinson does not believe that the percentage completion of design for the total roof can be derived from Mr Baron's assessment of contribution factors at QC 70/245. This assessment, which was prepared for an earlier adjudication, was based upon the original June 2002 budget. Nevertheless, if one takes those contribution factors, the inference would be that designing permanent works connections for the south roof involved about three times as much work as designing the permanent works connections for the moving roof.

649. In assessing percentages of design work complete as at 15th February and as at 2nd August, in each case Mr Wilkinson leaves out of account the small amount of work required to achieve A status. So the comparison exercise in his second witness statement to assess design work done between those two dates was consistent. He was comparing like with like.

Provision of design information after 2nd August

650. Following CB's departure on 2nd August, there was no policy decision to withhold information from Multiplex, so far as Mr Wilkinson is aware. Nor was there a policy of withholding information from Hollandia, in order to assist DLT in negotiating a deal with Hollandia. DLT gave to CB all the information which they had.

General

651. Mr Wilkinson agrees with Dr Mann's opinion that everyone involved with the Wembley project underestimated the degree and complexity of the temporary works engineering required.

CB WITNESS WHOSE STATEMENT WAS READ

652. Only one witness on the defendants' side was not required for cross-examination, namely William Patterson.

653. Mr Patterson is a coating inspector, who was employed by Sandbergs in relation to the Wembley project between June 2004 and May 2006. Mr Patterson's evidence is directed principally to claim JT 379 in Scott schedule 1B. This claim concerns defective paintwork recorded in 145 non-conformance reports ("NCRs"). Mr Patterson asserts that Multiplex pressurised him to be unduly critical of CB in those NCRs and that some of the NCRs were altered after he had written them. I need not summarise that evidence because Multiplex (without explanation) abandoned claim JT379 during the course of the trial.

654. Mr Patterson also comments on damage to paintwork more generally. He considers that the degree of damage to paintwork on steel delivered to site by CB was no greater than normal. Normal touch-up work was carried out by CB to the steel which they delivered.

655. After CB left site, a lot of steel appeared to be moved in all directions. This lasted for several months. Multiplex's handling of steel on site was the worst that Mr Patterson has seen. Multiplex took few protective measures. Multiplex handled steel at East Lane badly and without properly protecting the steelwork.

656. Mr Patterson has been shown 5 CDs of photographs, which Multiplex rely upon in support of their claim for damaged paintwork. Mr Patterson took about 90% of those photographs. His detailed comments on those photographs are set out in paragraphs 39 – 44 of his statement. I will bear those comments in mind, when addressing Scott schedules 1A and 1B.

CHAPTER 4. THE ADMISSIBILITY OF MR TAYLOR'S EVIDENCE

657. The question whether Mr Taylor's evidence is admissible arose in the following way. Reid Minty served Mr Taylor's first witness statement on 20th December 2007 and his second witness statement (dealing with issues reinstated by the Court of Appeal) on 24th January 2008. On 5th February Clifford Chance wrote to Reid Minty objecting to numerous parts of CB's evidence. In relation to Mr Taylor, Clifford Chance objected to paragraphs 30, 68-74, 86-128, 143-217 and 219-365 of his first witness statement, essentially on the grounds that these paragraphs contained opinion, comment, argument and expert evidence. Reid Minty responded on 6th February, suggesting that the simplest course was for the evidence to remain in and for the judge to make up his own mind as regards admissibility.

658. At a hearing on 7th February Multiplex's counsel referred to the admissibility dispute in paragraph 3 (a) of their skeleton argument. They stated: "If this matter is not resolved prior to trial, Multiplex considers that it can and should be dealt with at the commencement of the trial." Mr Williamson for CB referred briefly to the issue during the hearing and asserted that CB's factual evidence was admissible.

659. Thereafter the dispute concerning the admissibility of CB's evidence faded from view. Both parties referred to Mr Taylor's evidence (including the disputed portions) in their opening notes. The trial proceeded. Mr Taylor gave evidence on day 17. Immediately after

he left the witness box Mr Williamson commented on Mr Stewart's failure to put his case on schedules 4C and 4D in cross-examination. Mr Stewart responded to the effect that Mr Taylor had not been called as an expert and his evidence about those matters was inadmissible.

660. I did not regard it as satisfactory for this important issue to be left in limbo. Accordingly I directed that the matter should be argued out.

661. Counsel duly prepared skeleton arguments on the issue. In a skeleton argument dated 20th April Mr Stewart contended that paragraphs 30, 68-74 and 85-365 of Mr Taylor's first statement and the whole of Mr Taylor's second statement were inadmissible on the grounds that these passages constituted (a) inadmissible expert opinion, for which permission had not been obtained under CPR Part 35 and (b) inadmissible comment, speculation or argument. It should be noted that Multiplex had not previously objected to Mr Taylor's second statement. In a skeleton argument dated 21st April Mr Williamson contended (a) that Multiplex had lost the right to object to Mr Taylor's evidence by waiver, estoppel or approbation and reprobation and (b) that in any event the evidence was admissible.

662. The matter was listed for argument at 9.45 a.m. on day 22, with three quarters of an hour allowed, so as not to interrupt the evidence. Both counsel urged me not to rule on the issue at that stage, essentially for two reasons. First, the issue may become academic. Secondly, from the point of view of appeal it is better for the issue to be dealt with in the full judgment at the end of the trial.

663. I did not regard it as satisfactory to proceed with a trial without ruling on whether evidence said by counsel to be important is admissible. However, I was persuaded by the combined submissions of counsel on both sides that I should do so in this case. It appeared that neither party would be prejudiced by embarking upon the expert evidence without knowing what factual evidence was admissible.

664. In addressing the issue now, I shall first consider the question of admissibility; I shall then consider questions of waiver, estoppel and approbation in so far as they arise.

665. In relation to admissibility, the first point to note is that Mr Taylor is called a factual witness. He has no experience of giving expert evidence and no knowledge of the requirements for giving expert evidence. He is not independent of CB, having been employed by a company in the Cleveland Group for the last eleven years. See day 17, pages 77 – 78. Permission has not been obtained or sought under CPR rule 35.4 to call expert evidence in relation to the "roof" issues which Mr Taylor addresses. CPR Part 35 constitutes the "rules of court" referred to in section 3 (1) of the Civil Evidence Act 1972.

666. The second point to note is that Mr Taylor, like several other witnesses in this case, is a highly qualified and experienced engineer, who was involved for many months in the Wembley project. He is employed by DLT. In that capacity, between February and July 2004 he assisted CB in the design of roof connections and in dealing with erection engineering for the north and south roofs. He managed the north roof erection engineering team. It is not clear whether he managed the south roof erection engineering team. Between February and October 2005 Mr Taylor was engaged by Hollandia to assist in relation to erection engineering for the north roof. In the interval while Mr Taylor was absent from Wembley, Hollandia had taken the basic decisions as to how they would erect the north and south roofs. Mr Taylor's role was to assist with the detailed implementation of those

decisions in relation to the north roof. It is self evident that in order to perform his functions in 2005, Mr Taylor had to understand the decisions which had been made while he was away and to read the relevant documents. It is clear from the evidence that Mr Taylor had many discussions with Hollandia's engineers; the relationship between DLT's engineers and Hollandia's engineers was one of mutual respect. One cannot look at the north roof in isolation from the south roof, not least because of their complex interrelationship. An engineer could not design the detailed erection engineering for any part of the roof, without fully understanding the overall methodology. Furthermore there is a continuing interaction between permanent works connections design and erection engineering. Decisions made in each discipline affect the other. I shall therefore treat Mr Taylor as a factual witness who (a) is possessed of considerable engineering expertise and (b) has personal knowledge of the roof design and erection engineering decisions which were made in the period February 2004 to October 2005.

667. The question then arises as to whether Mr Taylor is confined to giving evidence of fact, without including his expert opinion on matters. Alternatively, can he include statements of professional opinion bearing upon facts within his personal knowledge?

668. This question arises in many fields of litigation, for example professional negligence actions where the defendant is a witness of fact but also wishes to justify his actions by drawing upon his professional experience. This question arises with particular frequency in litigation in the Technology and Construction Court. Most factual witnesses called are possessed of technical knowledge and expertise. In relation to major engineering projects (such as Wembley Stadium or the M6 Toll Road) those factual witnesses are likely to have very considerable expertise. Otherwise they would not have been engaged upon such projects in positions of responsibility.

669. Despite the diligent researches of counsel, there is relatively little authority on the extent to which witnesses, who are possessed of special expertise, can gloss their factual evidence with expert comment.

670. In *Lusty v Finsbury Securites Ltd* (1991) 58 BLR 66 the Court of Appeal held that an architect suing for fees could give opinion evidence as to the value of his work. In *DN v LB Greenwich* [2004] EWCA Civ 1659 the Court of Appeal dismissed an appeal against the trial judge's finding that an educational psychologist had been negligent. One of the issues in the appeal concerned the admissibility of opinion evidence given by the psychologist. Brooke LJ said this:

“ 25. It very often happens in professional negligence cases that a defendant will give evidence to a judge which constitutes the reason why he considers that his conduct did not fall below the standard of care reasonably to be expected of him. He may do this by reference to the professional literature that was reasonably available to him as a busy practitioner or be reference to reasonable limits of his professional experience; or he may seek to rebut, as one professional man against another, the criticisms made of him by the claimant's expert(s). Such evidence is common, and it is certainly admissible. Mr Phillips, who appeared for the claimant at the trial, did not believe he had told the judge that Mr Moreland's evidence on matters of this kind was inadmissible, and neither of the very experienced leading counsel who

appeared in this counsel who appeared in this court was willing to support the judge's view of the matter.

“26. Of course a defendant's evidence on matters of this kind may lack the objectivity to be accorded to the evidence of an independent expert, but this consideration goes to the cogency of the evidence, not to its admissibility. That such evidence was in principle admissible should have been reasonably apparent from the judgments in this court in *ES v Chesterfield and North Derbyshire Royal Hospital NHS Trust* [2003] EWCA Civ 1284 at [24], [31]]-[32] and [41], [2004] Lloyd's Rep Med 90.”

671. As a matter of practice in the TCC, technical and expert opinions are frequently expressed by factual witnesses in the course of their narrative evidence without objection being taken. Such opinion evidence does not have the same standing as the evidence of independent experts who are called pursuant to CPR rule 35. However, such evidence is usually valuable and it often leads to considerable saving of costs.

672. Having regard to the guidance of the Court of Appeal and the established practice in TCC cases, I conclude that in construction litigation an engineer who is giving factual evidence may also proffer (a) statements of opinion which are reasonably related to the facts within his knowledge and (b) relevant comments based upon his own experience. For example, an engineer after describing the foundation system which he designed may (and in practice frequently does) go on to explain why he believes that this was appropriate to the known ground conditions. Or an engineer brought in by a claimant to design remedial works (which are subsequently challenged as excessive) may refer to his experience of rectifying comparable building failures in the past. For example, such evidence may be given in cases about concrete failure through ASR (a world wide problem).

673. With this guidance in mind, I turn to the two witness statements of Mr Taylor. These witness statements include narration of facts which are within Mr Taylor's knowledge, expressions of engineering opinion upon those facts, relevant comments based upon his own experience, statements of opinion on matters outside his expertise, argument and gratuitous comment on matters which are for me to decide.

674. If Multiplex's objections had been raised at the outset of the trial, a pruning exercise could have been carried out and the statements could have been re-drafted by CB's solicitors. Such an exercise is not now realistic. No objection was ever raised to Mr Taylor's second statement until after he had left the witness box. The objections to his first statement were raised in correspondence but then were left on one side until the matter surfaced after his oral evidence was complete. Mr Taylor's two witness statements together span 143 pages. It is not a realistic task for me to append all 143 pages to this judgment indicating which parts are admissible and which are not. I therefore propose to apply the principles set out above and to have regard only to those parts of Mr Taylor's statements which are admissible by reference to those principles.

675. The unfortunate and partisan manner in which Mr Taylor's statements have been drafted tends to reduce the credibility of his evidence. On the other hand, I note that many of Mr Taylor's views were accepted by Multiplex's witnesses, when put in cross-examination. I conclude that the presentation, but not the underlying content, of Mr Taylor's witness statements was unduly influenced by CB's lawyers. Furthermore, Mr Taylor gave his oral

evidence in a fair and candid manner, despite his admitted close connection with CB. These are all matters which I take into account when assessing the weight to attach to those parts of Mr Taylor's evidence which are admissible.

676. Finally, it should be noted that a number of factual witnesses called by Multiplex included expert opinion within their statements (although these statements were drafted in more moderate and appropriate language than that of Mr Taylor). No objection is taken to the admissibility of those statements.

PART 2. SCOTT SCHEDULE 1

CHAPTER 5. SCHEDULE 1A

677. For ease of reference I have numbered the columns of schedule 1A, so that "Item number" is column 1, "Defect" is column 2 and so forth. Any reader of this judgment may find it convenient to do likewise.

678. Schedule 1A comprises claims for abatement, alternatively damages, in respect of defects in the intumescent paint on steelwork. The intumescent paint was applied by Enob at their premises in Scunthorpe, before the steel was sent to Wembley. The original intention was that intumescent painted steel would be sent from Scunthorpe to site when required for erection. In the event, however, numerous pieces of intumescent painted steel accumulated at Wembley, which could not yet be erected.

679. After 22nd June 2004 CB were required to send all fabricated and treated steel pieces to Multiplex's yards at East Lane and Palace of Industries for storage. Between 22nd June and 2nd August 500 tonnes of steel (coated with either intumescent paint or ordinary paint) were delivered to the Palace of Industries yard; 4,500 tonnes of steel (coated with either intumescent paint or ordinary paint) were delivered to the East Lane yard: see appendix 1 to Mr Perkins' second witness statement.

680. For reasons which are in dispute, the paint on the steel stored in the East Lane yard was damaged. In relation to steel with intumescent paint, an Enob team working at Wembley carried out remedial work in order to make good that damage. At a later date the Enob team at Wembley repaired damage to the intumescent paintwork of erected steel.

681. The application of intumescent paint (described as "fire protection") was originally part of CB's subcontract. It was covered by a provisional sum. However, this work was omitted from CB's subcontract by the Supplemental Agreement, with effect from 15th February 2004. See clause 3.1 of the Supplemental Agreement and schedule 3, part A, document 3 (12th entry down the page).

682. Enob was originally engaged as subcontractor by CB. In late July 2004, Multiplex negotiated a new subcontract with Enob, whereby Enob carried out the intumescent painting directly for Multiplex. That subcontract was backdated to 1st July.

683. The foundation of schedule 1A is the contention that CB committed a variety of breaches of contract or negligent acts in relation to steelwork painted with intumescent paint. These breaches of contract/ negligent acts may be divided into six categories. Accordingly Multiplex are entitled to an abatement of payments otherwise due to CB, alternatively damages. See paragraphs 36-44 of the re-re-amended consolidated particulars of claim and the entries in column 5 of schedule 1A.

684. If liability is established, the principles upon which abatement should be assessed are those set out in paragraphs 652 – 654 of judgment 1 (which was not the subject of appeal). In the context of the present case, whether the claim is assessed as a claim for abatement or as a claim for damages, the appropriate measure is the cost of remedial works.

685. I shall treat schedule 1A as a claim for damages, since (subject to the cap) this is Multiplex's preferred basis of claim.

686. Schedule 1A comprises ninety separate claims referred to by the parties as "Enob 1", "Enob 2" and so forth. The ninety first claim (failure to provide a paint guarantee) can be disregarded, since Multiplex concede that such a guarantee has now been provided. It is convenient to deal with the ninety claims in the following six groups, each of which raise common issues:

Group 1: Enob 1 – the cluster of claims re steelwork at East Lane stockyard.

Group 2: Enob 2, 3, 5, 7, 9-20, 22, 24-28.

Group 3: Enob 6, 8, 21, 23

Group 4: Enob 30, 54, 60, 71, 72, 82, 90.

Group 5: Enob 31-44, 46-53, 56-59, 61-70, 74-81, 83-89.

Group 6: Enob 45, 55, 73.

687. The total value pleaded for the claims in those six groups is £796,730.

Group 1

688. Enob 1 is a claim for the cost of repairing damage to the intumescent coating of steelwork at East Lane stockyard. The alleged damage comprises rust staining, strap damage, chain mark damage and dunnage marks (column 2). This damage is said to have been caused by CB's failure to provide adequate protection to that steelwork during storage and/or transport (column 5). The remedial costs claimed are set out in the twelve daywork sheets listed in column 7. Those costs total £81,235. Copies of the twelve daywork sheets appear M1A-1/1-12.

689. The East Lane stockyard was managed and controlled by Multiplex. On 22nd June Multiplex instructed CB that all fabricated steel should be transported to East Lane and Palace of Industries. This decision by Multiplex added an additional stage to the life cycle of every piece of steel so transported. That steel went from Scunthorpe to the designated site soon after 22nd June; it was subsequently re-loaded at East Lane or Palace of Industries, transported once more and unloaded at the stadium. Intumescent paint is relatively soft. Some damage is suffered by intumescent paint on every occasion that steel pieces are moved.

Multiplex's instruction of 22nd June increased the level of damage that was bound to be sustained.

690. Mr Hall asserts (witness statement paragraph 35, oral evidence on day 21) that much of the transportation of steel from Scunthorpe to East Lane was carried out by Multiplex or its subcontractors. This evidence is supported by Multiplex's internal documentation: see Mr Petaccia's email to his colleagues dated 1st July 2004 (QC 35/207-208). Mr Perkins' oral evidence was to the same effect: see day 16, pages 121 – 122.

691. There is contemporaneous evidence that the exercise of unloading steel by Multiplex at Palace of Industries and East Lane was carried out roughly and in a manner which damaged the paintwork: see Mr Thomas's faxes to Multiplex dated 20th and 21st July (QC 43/136, QC 44/48).

692. The evidence of Mr Hall, Mr Green and Mr Patterson establishes that Multiplex handled steel badly at East Lane and Palace of Industries. Multiplex thereby caused substantial damage to paintwork. The evidence of Mr Perkins and Mr Petaccia establishes that some limited damage had previously been caused to painted steel whilst at CB's yards, before starting the journey to Wembley. However, it is quite impossible to separate this damage out from the substantially greater damage to paintwork caused by Multiplex.

693. Mr Atkins asserts that the steel at East Lane had sustained an exceptional amount of damage. It required remedial work which went well beyond normal "touch up". Touching up is normally required to 5-8% of the surface area of steel. In this instance, however, damage affected between 15 and 30% of the surface area of columns and beams. Mr Atkins compiled the twelve daywork sheets totalling £81,235, and he put this down in his blame sheet as to be the responsibility of CB. Further details of the remedial work are to be found on surveillance sheets 148-154 and 162-168, all of which Mr Atkins compiled.

694. Mr Atkins has drawn up a list of all the piece numbers of steel at East Lane, in respect of which Enob repaired the intumescent paint. This list appears as appendix A to schedule 1A. Appendix A is pleaded as being the definitive list of steel pieces which were damaged in storage or transport by CB: see schedule 1A, column 4.

695. Unfortunately, appendix A includes some steel supplied and delivered by ZNS. The ZNS steel arrived with only a primer coat and Enob painted that steel in a shed at the rear of the East Lane yard (Atkins paragraph 27). Mr Atkins accepts that the paintwork on the ZNS steel cannot be the responsibility of CB. By my arithmetic appendix A contains 761 entries, but many of these entries are repetitions of previous entries. Furthermore, in view of Mr Atkins paragraph 27, it is impossible to tell which of these steel pieces are the subject of a claim.

696. Mr Hall contends (witness statement paragraph 46) that appendix A contains about 560 separate items, of which 450 were never at East Lane during CB's time and of which a further 60 are post 28th July variations issued to Hollandia. However, as was demonstrated in cross-examination, that analysis is flawed.

697. The twelve daywork sheets identified in column 7 of appendix 1A were not signed by Multiplex. As Mr Atkins conceded in cross-examination, this was contrary to the normal industry practice that the paying party should sign off any daywork sheets before they were paid.

698. Daywork sheet 25628 relates to “erection damage on the back of a trailer before it goes to Wembley”. The claim is for £2,700. When the daywork sheet was put to Mr Atkins in cross-examination, he made the perfectly fair comment that he did not prepare it. This daywork sheet is unrelated to the subject matter of Enob 1, and I disregard it.

699. Daywork sheets 25631, 25679 and 25682 relate to Enob’s men cleaning down steel during inclement weather. In relation to this work, Mr Atkins explained: “What these men were doing was making good the time of the bad weather. It is a job. It is to keep them working so they are not just sat in the cabin. You give them oilskins to go out and clean areas to make them clean ready for when they are going to apply the intumescent.” Although there was no doubt some benefit from all this cleaning in the rain, I conclude from Mr Atkins’ evidence that this work was primarily an exercise in keeping the men occupied.

700. Daywork sheet 25700 can, in my judgment, be ignored for two reasons: (i) it contains no description of the work which the men did; (ii) the seven surveillance checklists which are relied upon as supporting daywork sheet 25700 (M1A-1/21-27: see the manuscript note at bottom left) all relate to applying intumescent paint to steel supplied by ZNS in a primed state. In relation to this issue, Mr Atkins said in cross-examination that he would need to check his blame sheet. I have done so since he left the witness box. The blame sheet provides no information about daywork sheet 25700, beyond the fact that there is a tick in the CB column.

701. The above exercise eliminates five of the daywork sheets relied upon by Multiplex in relation to Enob 1. The other seven daywork sheets appear to relate to repairing damage to painted steel at East Lane in August and September 2004. However, insofar as that damage exceeded the “normal” paintwork damage requiring touch up, it is quite impossible to say that any of this damage was attributable to the conduct of CB, rather than Multiplex or their sub-contractor, McGee.

702. In the result, I reject in its entirety claim Enob 1.

Group 2

703. Enob 2, 3, 5, 7, 9-20, 22, 24-28 are claims for the cost of repairing damage to erected steel. (Multiplex plead Enob 18 as being in group 3, but Mr Atkins at paragraph 36 re-assigns Enob 18 to group 2 without provoking any objection from CB, so I shall treat Enob 18 as being part of group 2.) CB’s alleged breach is failure to provide adequate protection to steelwork during storage, transport, erection “and subsequently during construction”: see column 5. I construe the final phrase quoted as referring to damage caused to erected steel during the subsequent construction activities. These claims are supported by 21 daywork sheets (i.e. one daywork sheet per claim, except for Enob 17 which has been withdrawn).

704. Mr Green has explained that Multiplex provided laydown areas on site which were unsatisfactory and too small. CB handled steel as best they could within the confines of those areas. I accept that evidence.

705. Mr Atkins asserts that he cannot identify the piece numbers in these 21 claims, because the piece numbers were not visible when the remedial work was carried out. However, the claims relate to steel in phases 11, 12, 14, 15, 16 and 18. Mr Atkins’ blame sheet indicates that CB were the culprits, although without any elaboration of the reasons.

706. The daywork sheets and surveillance sheets relied upon in respect of group 2 are all contained in bundle M1A-1. As Mr Atkins accepted in cross-examination, many of the surveillance sheets put forward by Multiplex refer to the wrong daywork sheets.

707. It is important to note the dates of the 21 daywork sheets the subject of Group 2 claims. One daywork sheet is dated 26th September. Four are dated October. Four are dated November. Five are dated December. Seven are dated January 2005. Thus it can be seen that the remedial work in question was done some time after CB left site.

708. On 30th June 2004 Multiplex gave CB 28 days notice that they would be replaced as erectors. At no point during or after that 28 day handover period did Multiplex complain to CB about visible damage to the erected steel. Furthermore, once the steelwork had been erected, there is evidence that it sustained considerable damage from the activities of other trades: see Mr Atkins' memos to Multiplex dated 15th November and 1st December 2004 and his cross-examination about those memos at day 9, pages 44 – 46.

709. The evidence given by Mr Hewitt and Mr Stam does not establish that CB caused the damage to painted steel which is the subject of the 21 daywork sheets in group 2.

710. It has not been proved that CB are responsible for any of the damage the subject of the 21 daywork sheets relied upon. I reject the claims in Enob 2, 3, 5, 7, 9-20, 22, 24-28.

Group 3

711. Enob 6, 8, 21 and 23 are claims for repainting bolts after they had been retightened. The sums claimed are Enob 6: £1,680; Enob 8: £540; Enob 21: £300; Enob 23: £10,920. The build up of these sums can be seen from daywork sheets 25826, 25817, 25814 and 25819. The total claim in respect of group 3 is £13,440. Dr Mastrandrea reduces this to £13,200 by reason of arithmetical errors.

712. Mr Atkins states that this work was carried out pursuant to an oral instruction confirmed in CVI 1454. He was told by someone (he cannot remember who) that the need for this retightening arose because CB had erected steel out of tolerance. However, that is not a matter about which Mr Atkins has any personal knowledge.

713. Mr Perkins deals with the group 3 claims at paragraphs 113 to 116 of his witness statement. He states that Hollandia carried out a survey the results of which are contained in bundles T58 – T63. This showed that some steel was out of tolerance. Hence the need to loosen bolts, then retighten and then repaint them.

714. I have looked at bundles T58 to T63. They contain, literally, hundreds of drawings, schedules, etc. I cannot marry them up with daywork sheets 25826, 25817, 25814 and 25819. Neither Mr Perkins' evidence nor paragraph E 2.93 of Multiplex's closing submissions help me to do so. Mr Perkins does not deal with CVI 1454 in either his written or oral evidence.

715. The claims in Enob 6, 8, 21 and 23 have not been established on balance of probabilities and I reject them.

Group 4

716. Enob 30, 54, 60, 71, 72, 82, 90 are claims against CB for coating the undersides of the bottom flanges of certain beams, “contrary to the requirements of the drawings”. See schedule 1A, column 2. This disregard of the drawings is pleaded as being contrary to a number of contractual provisions, as set out in column 5.

717. The remedial work to these flanges was carried out long after CB left site. The relevant daywork sheets bear dates in August and September 2005.

718. No drawing or specification has been identified which specifies that the relevant flanges ought not to have been coated. Furthermore, some of the daywork sheets in this group indicate that intumescent paint was being removed from the bottom of flanges for a different reason, namely to facilitate column and beam strengthening by Hollandia. Mr Atkins accepted this in cross-examination: see day 9, page 54, lines 21-25.

719. The claims in group 4 have been abandoned by Multiplex. The fact that these claims were originally included reflects upon the care with which schedule 1A was compiled.

Group 5

720. Enob 31-44, 46-53, 56-59, 61-70, 74-81, 83-89 are claims for the cost of repainting columns that CB had painted to the wrong specification. Intumescent paint was required, whereas CB had applied ordinary paint. See columns 2 and 5 of schedule 1A.

721. Multiplex provided further information in respect of this allegation on 17th January 2007 at H1/159 – 160. It is Multiplex’s case that on 30th October 2003 they issued to CB some 400 drawings (listed at H1/163 – 182), identifying the steel members which required fire protection. Contrary to this instruction, a number of the steel members identified on those drawings were painted with ordinary paint.

722. Mr Muldoon expressed concern about this by letter dated 1st December. In a letter dated 8th December 2003 (relied upon by Multiplex in column 5 of schedule 1A) CB accepted that the first 1,000 tonnes of steel delivered to site could well have been painted to the wrong specification, but asserted that this was because of a late change of instructions on the part of Multiplex.

723. It appears from the analysis in defendants’ supplemental 12 that some of the steel delivered to site in 2003 was indeed painted to the “wrong” specification, but the quantity affected was substantially less than 1,000 tonnes.

724. Mr Perkins, both in his witness statement and in his oral evidence, confirmed the story emerging from the documents. I should add that, in my view, the above account of events is not undermined by Mr Hall’s email of 11th February 2004 (which emerged at a later stage of the trial).

725. The daywork sheets relied upon in respect of this claim contain numerous grid references, but no description of the work being carried out.

726. Mr Atkins stated in his oral evidence that he recollected doing a survey in 2005 and finding that two columns on each level of every phase had decorative paint, when they ought to have intumescent paint, according to the documents in his possession. However, he had no knowledge of what CB’s contractual obligations had been in this regard.

727. Mr Atkins stated that Enob undertook remedial work, to apply intumescent paint to the columns affected, during the period July – September 2005.

728. Against this background, I have to consider the question of CB's liability.

729. Multiplex contend that CB were in breach of contract in that they applied the wrong paint. The measure of damages is the cost which Multiplex subsequently incurred in applying the correct paint. Any claim which CB might have had based upon Multiplex's late instructions in respect of paint specification has been compromised by the Supplemental Agreement.

730. CB contend that they have no liability in respect of this head of claim, because fire protection was covered by a provisional sum in the subcontract. Even if Multiplex have a claim for removing the incorrect paint (as to which see schedule 1B), they cannot claim the cost of applying intumescent paint to the relevant members. This was a cost which Multiplex would have had to incur whenever the work was done. Multiplex would have incurred that cost, even if CB had remained in place and had themselves applied the intumescent paint. See paragraphs 340 – 346 of CB's closing submissions.

731. In my judgment, CB's argument is correct and CB have no liability under this group of claims in schedule 1A. In so far as columns or beams required intumescent paint and that paint was not applied, it always remained the case (a) that such paint would have to be applied and (b) that Multiplex would have to pay for the exercise. Therefore Mr Williamson's contentions in respect of quantum (which would have substantially reduced this head of claim) do not arise.

Group 6

732. Enob 45, 55, 73 are claims for applying intumescent paint to replacement bolts, which had to be fitted because CB had originally fitted the wrong bolts.

733. The locations in which CB allegedly fitted incorrect bolts are not revealed by the pleadings. In respect of these three claims, column 4 of Schedule 1A is simply left blank.

734. These three claims total £10,470. They were not the subject of debate at trial. The principal written evidence comprises Mr Atkins' statement at paragraphs 40 – 41 and daywork sheets 26295, 26309 and 26427. This evidence simply does not establish that CB fitted incorrect bolts (i.e. contrary to specification) at the three unpleaded locations.

735. It should also be noted that Dr Mastrandrea assesses the value of these three claims at nil: see paragraph 2.59 of his report on schedule 1. The sentence in paragraph 2.55 "I have included Enob items 45, 55 and 73 in my valuation" is, I am told, an error. Dr Mastrandrea intended to say "excluded".

736. I reject the claims in Enob 45, 55, 73.

Conclusion

737. Multiplex's claims in Scott schedule 1A are dismissed.

CHAPTER 6. SCHEDULE 1B

738. For ease of reference, I have numbered the columns of schedule 1B, so that the column on the extreme left is 1 and the column on the extreme right (quantum) is 7. Any reader of this judgment may find it convenient to do likewise.

739. Schedule 1B comprises claims for abatement, alternatively damages, in relation to the ordinary paintwork on steel. I use the term “ordinary” in order to distinguish between (a) the ordinary paint which was applied to cover the steel and to prevent corrosion and (b) the special paint (intumescent paint) which was applied to provide fire protection. The paintwork the subject of schedule 1B is sometimes referred to in the documents as “decorative” paint, but that term caused consternation to Mr Rogers and I shall avoid it.

740. The application of ordinary paint to steel formed part of CB’s subcontract works and was covered by the original subcontract sum. Following the execution of the Heads of Agreement and the Supplemental Agreement, the application of ordinary paint to bowl steel remained part of CB’s responsibility. This painting fell within schedule 1 (b) of the Supplemental Agreement. Indeed, when I come to address schedule 2, I shall have to value the ordinary paint which was applied to steel both before and after 15th February 2004.

741. CB applied ordinary paint to steelwork at their yard in Darlington, after fabrication and before transportation to site. Inevitably paint sustains some degree of damage during handling and transport. CB therefore maintained a team on site to carry out the necessary painting and “touch up” of paintwork at Wembley. Mr Rogers was the site manager employed by CB, in charge of that team.

742. Following CB’s repudiation, Hollandia became responsible for all necessary painting of steel on site. In about October 2004 Hollandia employed Tighe as subcontractors to carry out that work. Tighe engaged Mr Rogers as site manager, in charge of the painting team. In other words, Mr Rogers performed essentially the same functions both before and after repudiation, albeit within different contractual structures.

743. As between Multiplex and Hollandia, the application of paint to bowl steelwork after 2nd August 2004 fell within contract WP 2760. This was essentially a costs-plus contract.

744. Multiplex contend that part of the costs, which they incurred in relation to ordinary paintwork after 2nd August 2004, are attributable to breaches of contract by CB. Multiplex seek to recover these sums in Scott schedule 1B. I shall treat schedule 1B as a claim for damages rather than abatement, since (subject to the cap) that is Multiplex’s preferred basis of claim.

745. Schedule 1B comprises 380 separate claims, numbered JT1 to JT380. Claims JT1 – JT 376 fall into the same category and can conveniently be considered together. The other claims need to be considered separately.

746. It should be noted that claim JT 379 (in relation to which CB raised issues as to the propriety of Multiplex’s conduct) was abandoned on day 10 of the trial. Contrary to counsel’s observation at day 10, page 83 that claim had not been abandoned in the claimant’s opening note (see paragraphs 71 – 74 of the opening note).

747. I shall now address the individual claims in schedule 1B.

JT1 – JT376

748. These are claims for paintwork consequential upon the remedial works referred to in schedule 1D.

749. As set out in chapter 7 below and in appendix 1, I find proved a number of the claims contained in schedule 1D. The remedial work carried out in respect of those items would generate the need for further preparation and painting. Mr Williamson made the point in cross-examination that some of the daywork sheets in schedule 1B pre-date the site works instructions for the corresponding items in schedule 1D. As a matter of fact that is correct, but it does not affect the validity of Multiplex's claims. In some instances there may be errors in the recorded dates. In many instances, however, the explanation is that gritblasting and preparatory work were done before modifications to the steel were carried out.

750. In relation to quantum, I have considered the respective evidence of Dr Mastrandrea and Mr Hart. In my view, Dr Mastrandrea's approach is correct. I shall therefore adopt Mr Mastrandrea's valuation of those schedule 1B items which correspond to claims allowed in schedule 1D. The total value of these items is £19,154.39, as set out in appendix 1 to this judgment.

JT377

751. JT 377 is a claim for the cost of repairing damaged paintwork on erected steel. CB's alleged breach is failure to provide adequate protection to steelwork during storage, transport, erection "and subsequently during construction": see column 2. I construe the final phrase quoted as referring to damage caused to erected steel during the subsequent construction activities.

752. Claim JT 377 is supported by seven ring files containing daywork sheets (M1B-1 to M1B-7). These daywork sheets record painting carried out to erected steel in phases 11 to 18 and 24 to 26 between October 2004 and late 2005. The total value of this work is said to be £854,103.

753. Mr Rogers was called by Multiplex and gave evidence to the effect that the work described in the daywork sheets was carried out. However, he gave no evidence to link any of that work to breaches by CB.

754. During the 28 day handover period, when CB were being stood down as erectors, Multiplex made no complaint to CB about damaged paintwork. If it were really the case that CB had caused damage to paintwork on the scale alleged, I have no doubt that Multiplex would have picked this up, in the same way that other defects were picked up at the time of handover.

755. I am not persuaded by Mr Hewitt's evidence that CB were causing extensive damage to the ordinary paintwork on steel. In this regard, I accept Mr Patterson's evidence that the paintwork on steel, which CB delivered to site, was in a normal condition. "Handling damage was visible, but no more than one would expect from the transportation of pre-treated steel" (Patterson paragraph 33).

756. In my view, the cause of the damage to paintwork the subject of claim JT 377 was twofold. First, Multiplex handled steel badly and without taking proper precautions to protect the paintwork. This was especially the case after 2nd August. See paragraphs 34 – 38 of Mr Patterson’s statement. Secondly, erected steel was subjected to much damage at the hands of following trades: see the earlier section of this judgment dealing with schedule 1A, group 2.

757. Multiplex rely upon a large number of photographs in support of claim JT 377. I have examined a reasonable selection of these photographs. I have considered the comments on the photographs made by Mr Patterson (who took most of the photographs) and by Mr Green. I have also considered the cross-examination of Mr Rogers on the subject at day 10, pages 99 – 112. My conclusion is that Multiplex have failed to prove that any of the remedial paintwork, which is the subject of claim JT 377, arose from the alleged breaches of contract by CB.

JT 378

758. JT378 is a claim for “failure to paint the steelwork in accordance with the contractual specification, in that CBUK painted steelwork in CMHS (Coloured Modified High Solids) primer system which discoloured “yellow” on exposure to UV radiation and failed to meet the required RAL 9016 ...”. See schedule 1B, column 2. Multiplex claim £246,226 as the cost of remedial painting to the affected steelwork, namely phases 11 to 18 and 21 to 28.

759. In relation to this claim, it is necessary to review what paint CB were instructed to apply and what contractual obligations CB assumed in relation to the paintwork. The relevant correspondence is contained in bundle T50 and Mr Rogers was taken through that correspondence in cross-examination on day 10. It can be seen that on 29th August 2003 Multiplex issued site instruction 2750-005, requiring CB to paint all steel (not requiring fire protection) with Sigmacover CMHS 7712 in colour RAAL 9016. Before Multiplex issued that instruction, CB specifically warned them that this particular paint would be liable to chalking and would tend to yellow slightly with age.

760. CB applied the paint which they were required to apply. The discolouration which ensued was a consequence of the choice made by Multiplex and was in line with CB’s earlier warning: see Mr Rogers cross-examination at day 10, page 117.

761. In their closing written submissions Multiplex contend that the change in colour of the paint was a formulation problem and that the discolouration was more serious than Multiplex had been led to expect. Multiplex have called no expert evidence to support these assertions and I reject them.

762. It should also be noted that the remedial work comprised applying an additional coat of Sigmadur paint: see Mr Rogers cross-examination at day 10, pages 117 – 118. Multiplex had originally considered applying such an additional coat of Sigmadur, but had rejected that course, probably on grounds of cost.

763. The correct analysis here is that the original paint specification was insufficient. Multiplex put matters right after CB’s departure by instructing additional work.

764. I reject claim JT 378.

JT 380

765. This claim is related to the group 5 claims in schedule 1A. The basis of the claim is that a series of columns “across the whole bowl site” were painted with ordinary paint, when they required intumescent paint: see schedule 1B, columns 2 and 3.

766. I have set out the narrative history and background facts, when dealing with the group 5 claims in schedule 1A. That narrative history was confirmed by Mr Rogers at paragraphs 14 – 16 of his witness summary, and in his oral evidence-in-chief at day 10, pages 83 – 88.

767. Despite the lateness of Multiplex’s instructions, I am satisfied on the evidence that CB applied ordinary paint to a number of columns for which Multiplex had specified intumescent paint. This error on the part of CB is accepted by Mr Hall in his email dated 11th February 2004 (QC 4/158.5).

768. The application of ordinary paint to steel was part of CB’s works covered by the subcontract sum. Unlike intumescent painting, this was not the subject of a provisional sum. Accordingly, Multiplex make no claim for the cost of paintwork unnecessarily applied, since that cost was not charged to Multiplex as a separate or additional sum. Instead Multiplex claim in JT 380 (a) the costs of blasting off the ordinary paint which had been wrongly applied and (b) the costs of priming the steel in readiness for the application of intumescent paint. That remedial work was carried out by Tighe, working as subcontractors to Hollandia, during 2005.

769. In principle, Multiplex are entitled to recover the costs which they incurred in relation to that remedial work. I say “in principle”, because there is considerable dispute as to the extent of remedial work carried out under this head. This topic is addressed in the witness statement of Mr Hall and paragraph 16 of Mr Rogers’ witness summary. It was also explored in the cross-examination of Mr Rogers.

770. It is clear that a number of the daywork sheets relied upon by Multiplex in support of this claim (contained in bundle M1B-12) do not relate to the removal of incorrect coating or the preparation of steel for intumescent painting. Having considered the evidence on this issue, I am satisfied that defendants’ supplemental 12 correctly identifies those daywork sheets which do relate to this category of remedial work.

771. On the basis of supplemental 12 in conjunction with the evidence of Mr Ong, Mr Bicknell and the financial documents in bundle T7, I am satisfied (a) that Hollandia paid to Tighe £29,965 in respect of that remedial work and (b) that Multiplex reimbursed Hollandia for such payment. Although the rate charged by Tighe for scaffolding was too high in some of the daywork sheets contained in bundle M1B-12 (as to which see paragraphs 3.40 to 3.42 of Dr Mastrandrea’s schedule 1 report), that overcharge does not feature in any of the daywork sheets identified in supplemental 12. In the result, I conclude that the payment of £29,965 in respect of remedial work under item JT 380 was reasonable.

Conclusion

772. For the reasons set out above, I assess damages in respect of claims JT1 – JT376 in the sum of £19,154.39. I assess damages in respect of claim JT 380 in the sum of £29,965.

773. I dismiss claims JT377 and JT378. I note that, no doubt wisely, claim JT379 has been withdrawn.

774. Thus the total damages which I award in respect of schedule 1B amount to £49,119.39.

CHAPTER 7. SCHEDULE 1D

775. Scott schedule 1D is a claim for abatement, alternatively damages, in respect of defects in (a) steel erected by CB and (b) steel fabricated by CB and delivered to site, but not erected before the date when CB were removed as erectors.

776. Schedule 1D comprises 235 separate items, referred to in the schedule as “Hol 1” to “Hol 259”. The discrepancy in numbering arises because 24 items within the sequence have been withdrawn. The abbreviation “Hol” is used because the remedial work in respect of all 235 items was undertaken by Hollandia. The alleged defects fall into two categories: first, defects properly so called; secondly, incomplete work which Multiplex say that CB ought to have completed. I shall use the term “defect” in this extended sense when dealing with schedule 1D.

777. The total claim pleaded by Multiplex in respect of these 235 items amounts to £315,417. However, Dr Mastrandrea values those claims at £202,033 and Multiplex now limit their claim to those reduced sums: see paragraph E 4.1 of their closing submissions. Thus it can be seen that the average value of each item in schedule 1D is £860. Indeed many items have a value much lower than that.

778. The relatively modest value of the claims in schedule 1D has in no way dampened the parties’ ardour. Many pages of witness statements, reports, schedules and counter-schedules have been devoted to arguing out each one of these 235 items. Most of this material has simply been left for my private reading. Relatively little time was devoted during the trial to debate about individual items, although there was some relevant oral evidence in particular from Mr Watkins, Mr Stam, Mr Perkins, Mr Hutchinson and Mr O’Neill. In relation to many of the “Hol” items I am asked, in effect, to do my best with the vast mound of written material about schedule 1D.

779. The relevant written evidence comprises: paragraphs 39 – 42 of Mr Hewitt’s statement; paragraphs 121 – 122 of Mr Perkins’ first statement together with the schedule annexed to that statement, addressing individual items; paragraphs 32 – 97 of Mr Stam’s statement; paragraphs 211 – 379 of Mr O’Neill’s statement (which must be read together with 24 pages of spreadsheets); paragraphs 88 – 110 of Mr Green’s statement; paragraphs 89 – 149 of Mr Hall’s statement; pages 33 – 78 of Dr Mastrandrea’s schedule 1 report; pages 17 – 22 of Mr Hart’s report.

780. Turning to the pleadings, schedule 1D together with CB’s response and Multiplex’s reply span some 60 pages. For good measure the parties have also lodged six ring files of appendices in order to supplement those primary pleadings.

781. The costs which the parties have run up in relation to each item in schedule 1D must far exceed the sums in dispute. I propose to deal with schedule 1D in a proportionate manner, rather than embark upon a disquisition about each of the 235 items.

Issues of principle

782. The first issue of principle concerns the fact that 120 of the items in schedule 1D are shown as “client” changes in the tick box at the bottom of the site modification sheet. It is clear from the oral evidence of Mr Perkins and Mr Hutchinson that this simply denoted that Multiplex, as the client of Hollandia, required the work to be done. The term “client” did not indicate who was responsible for the fact that the work had to be done.

783. The second issue of principle concerns the various items in schedule 1D where the value is shown as estimated. No records have been produced to substantiate the costs of the alleged remedial works to these items. Furthermore, in respect of each of these items there is no corresponding claim made in the first part of schedule 1B (which one would expect to see if the alleged remedial work was in fact carried out). I have come to the conclusion that these claims are not substantiated and should not be allowed. Therefore I shall ascribe a nil value to those claims, in so far as they fall into categories of claim which are in principle upheld.

784. The third issue of principle concerns the welding of rakers on site (i.e. uniting sections of rakers, which had been transported to site separately). CB contend that in so far as rakers awaited welding on site, that was not a defect. It was simply site work which had not been completed before CB’s departure; furthermore if CB had undertaken that welding work, Multiplex would have had to pay for it under schedule 1 (c) of the Supplemental Agreement.

785. In support of this contention CB point to their method statement for the erection of upper tier rakers dated 4th March 2004 (V4/212 and following). Paragraph 8.1 of that method statement provides:

“The Upper Section of the upper tier rakers (from Level S6 to PPT) will be delivered to site in two sections classified as the Raker Upper Section and the Raker Top Tapered Section. These two sections are then to be site welded to form the Upper Section of the Upper Tier Raker. It is the intention of CBUK to weld these splice connections at ground level to reduce the amount of work required whilst the pieces are in the air and thus reducing the risks associated with working at height.”

786. I am not persuaded by CB’s argument. The welding of rakers should properly be regarded as part of fabrication, rather than part of erection. This is inherent in the scheme for interim valuations. See the pricing document at D2/289. The subcontract breakdown includes separate sums for assembly and pre-assembly in relation to the arch, but not in relation to the bowl. In my view, the welding of rakers formed part of the fabrication process, wherever CB chose to carry out that work. CB’s decision to carry out the welding on site made good sense and no doubt that was why Multiplex approved the method statement. However, that cannot change the legal character of the work undertaken.

787. The Court of Appeal's first judgment is relevant to this issue. At paragraph 76 May LJ said this in relation to schedule 1 to the Supplemental Agreement:

“In essence paragraph (b) was for fabrication work and paragraph (c) was for erection and site works. Fabrication work would not cease to be fabrication work only because fabrication work was transferred to and done on site.”

788. Accordingly, the welding of rakers forms part of the lump sum work, falling within schedule 1 (b) of the Supplemental Agreement. CB were paid in interim certificates for fabricating the rakers referred to in schedule 1D and no-one suggests that in the schedule 2 valuation (which I must undertake later in this judgment) CB should forego that payment. Accordingly, Multiplex are entitled to recover either as abatement or as damages the costs which they have incurred in welding together rakers which CB left on site unwelded.

Categorisation of Schedule 1D claims

789. In their opening note CB proposed that the claims in schedule 1D be categorised as follows:

Category 1: Hol 41 – 57, 61 – 143, 151.

Category 2: Hol 10 – 13, 34, 35, 146.

Category 3: Hol 37, 189.

Category 4: Hol 1.

Category 5: Hol 195, 237

Category 6: Hol 23, 209.

Category 7: Hol 213, 221, 223, 225 – 231.

Category 8: Hol 201.

Category 9: Hol 196 – 199, 208, 234, 241.

Category 10: Hol 2, 6, 8, 9, 16 – 18, 24, 25, 27 – 31, 36, 38 – 40, 144, 146 – 149, 152, 153, 157, 162, 163, 170, 180, 185, 186, 194, 212, 219, 224, 235, 236, 238, 239, 241 – 244, 248, 251, 253.

Category 11: Hol 160, 161, 165, 168, 203, 210, 220, 250.

Category 12: Hol 172 – 179.

Category 13: Hol 26, 150, 156, 164, 200, 202, 206.

Category 14: Hol 14, 15, 32, 33, 222, 254 – 259.

Category 15: Hol 211, 233, 245, 246.

790. It should be noted that Hol 195 and 237 have been transferred from category 10 to category 5: see counsel's various emails of 20th June 2008.

791. Multiplex have helpfully adopted the same categorisation of schedule 1D items in their closing written submissions. Multiplex have added a category 16 comprising Hol 3 – 5, 7, 154 – 155, 167, 169, 190 – 193, 247, 249.

792. I shall deal with the claims in schedule 1D, adopting the same categories and following the same sequence as the parties.

793. I have considered the voluminous evidence bearing upon all of these items. However, in the interests of proportionality, I shall not attempt to paraphrase that evidence. Instead I shall set out my conclusions in respect of each of the categories.

Category 1

794. These 101 items all relate to work to rakers. The allegations are that CB:

- i) Failed to complete the welding of rakers.
- ii) Failed to weld closure brackets.
- iii) Failed to weld stools.
- iv) Failed to weld louvres.

795. As to allegation (i), for the reasons set out above Hollandia are in principle entitled to recover the costs of this exercise. However, I accept the evidence of Mr Hall that in respect of Hol 41 – 51, 89 – 91, 94 – 99, 134 – 137, 138 – 143 the rakers had in fact been welded by CB. That evidence gains some support from the cross-examination of Mr Stam at day 10, pages 30 – 36.

796. On the basis of Mr Hutchinson's cross-examination on day 18, Multiplex now seek to put Hol 42 on a different basis from that pleaded: see paragraph E 4.36 of Multiplex's closing submissions. Although I am adopting a liberal approach to the pleadings (for the benefit of both parties, since the pleadings on neither side achieve perfection), this departure cannot be permitted. Nor is the proposed new case established on the evidence.

797. It should be noted that the reference to "Hol 148" in paragraph E 4.36 of Multiplex's closing submissions is a slip. Counsel are clearly talking about Hol 42, which corresponds to site works instruction 148.

798. As to allegation (ii), the welding of closure brackets was part of fabrication and could have been done in the factory: see Mr Stam, paragraphs 85, 88 and elsewhere. I do not regard this evidence as having been undermined by the cross-examination at day 10, pages 36 – 37. Therefore Multiplex are entitled to recover the costs of this work under schedule 1D.

799. As to allegation (iii), the welding of louvre supports falls into a different category. This work flowed from a post 15th February variation instruction, even though the original RFI was before 15th February (as to which see the cross-examination of Mr Watkins and Mr O'Neil). This was varied work, for which CB would be entitled to additional payment, if they had done it. In so far as the work was done by Hollandia rather than CB, it has not been shown that Multiplex incurred additional costs. Therefore I do not allow these claims. I do

not accept the contention that this particular detail ought to have been designed by CB, rather than Mott.

800. I turn finally to allegation (iv). The welding of stools was explored with Mr O'Neil in cross-examination on day 19. It is clear that Multiplex were aware before 15th February of the need for a design change to resolve the clash between certain stools and terrace units. However, no variation instruction was issued in this regard before 15th February. Therefore the welding of stools would be an extra cost borne by Multiplex whether that work was carried out by CB or Hollandia. Accordingly, I do not allow these claims.

801. In the result I uphold Multiplex's claims falling within allegations (i) and (ii) with the exception of those identified in paragraph 102 (i) – (ii) of Mr Hall's statement and those which are marked as "estimated" in schedule 1D.

802. I therefore uphold the following claims in whole or in part: 52-55, 61-65, 69, 73, 74, 78, 81, 82, 84-88, 92-93, 103, 106-107, 112, 115, 117, 120-126, 131-133 and 151.

Category 2

803. These seven items are claims for failure to weld fin plates to columns.

804. The drawings pleaded by Multiplex in column 2 of schedule 1D indicate that the fin plates should be welded on site. Indeed the fin plates had their own piece mark numbers. Having considered the evidence of Mr Hall and Mr Stam on this issue, I am satisfied that the welding of fin plates to columns constituted part of "erection and site works" within schedule 1 (c) of the Supplemental Agreement, rather than fabrication within schedule 1 (b). This work had not been accomplished by CB as at 28th July, when CB were relieved of their responsibilities as erectors. Furthermore Multiplex have never paid CB for carrying out this work.

805. Accordingly, the fact that those fin plates had not been welded to columns cannot be characterised as a defect. The category 2 claims are dismissed.

Category 3

806. Hol 37 relates to defects in welds, for which CB are liable.

807. I have had some difficulty with Hol 189, owing to the limited evidence. However, I conclude that this probably constitutes uncompleted site works, rather than fabrication for which CB have been paid. Therefore I reject Hol 189.

Category 4

808. Hol 1 relates to a number of pin holes which (after the necessary painting) were too small to accommodate the pins which had to fit into them.

809. I accept, as Mr Hall, points out that this is the kind of problem which arises from time to time in steelwork erection. It is by no means a heinous offence. Nevertheless, it constitutes a defect and, in law, a breach of contract. Multiplex are entitled to recover the cost of grinding out the pin holes.

Category 5

810. It can be seen from the site records that Hol 195 and Hol 237 both relate to phase 26, only part of which was fabricated by CB. I accept Mr Hall's evidence that CB did not fabricate the steel members which are the subject of these two claims. Indeed Multiplex claim damages in schedules 4A and 4F on the basis that CB failed to fabricate these two steel members. Accordingly the category 5 claims are dismissed.

811. An issue has arisen as to whether Multiplex should be permitted to move Hol 195 and 237 from category 10 to category 5 at a late stage. It is convenient to deal with those two claims here, but my decision would be the same, regardless of the category to which they are assigned. CB did not fabricate the members in question and cannot be liable for the alleged defects.

Category 6

812. These two allegations concern fabrication defects. There is a conflict of evidence as to whether the relevant steel pieces were fabricated by CB or were fabricated at least in part by ZNS.

813. Having considered the witness statements and the underlying documents in bundles M1D-1 and M1D-5, I conclude that Multiplex have not proved their case in respect of Hol 23 or Hol 209. Indeed in the case of Hol 209, it can be seen that Multiplex claim damages in schedule 4F on the basis that ZNS, rather than CB, fabricated the beam of which criticism is now made.

Category 7

814. These claims are linked to the issues surrounding CN 2086, which I shall address in relation to schedule 2.

815. These claims are dealt with in the statements of Mr Stam, Mr Perkins, Mr Green and Mr Hall. They were explored in cross-examination, in particular the cross-examination of Mr Green at day 21, pages 134 – 138.

816. My conclusion is that there is no fabrication error here. CB fabricated steel members in a form that could have been erected by CB's erection methodology. CB would have been able to install the cross beams, if they had remained as erectors. However, CB were relieved of responsibility for erection before that stage was reached.

817. The additional fabrication work undertaken by Hollandia arose from (a) Hollandia's erection methodology and (b) changes instructed by Multiplex after 15th February (for which CB would have been entitled to additional payment, if they had remained as fabricators).

818. Accordingly I dismiss the category 7 claims.

Category 8

819. There is only one item in category 8, namely Hol 201. This is a claim for a fabrication defect in the raker on grid line 103 within phase 15, erection group 2. The supporting documents in bundle M1D-4 show that in January 2005 the existing base plate was removed, the raker was trimmed and the base plate was re-welded. The cause of the problem identified in site modification sheet SW 514 is "fabrication" error.

820. Mr Hall points out that this raker was in an area which CB had completed and handed over to Multiplex. Both the steelwork and the concrete terrace units had been erected.

821. I accept that the raker concerned was in an area handed over by CB. Despite this however, I am satisfied on the contemporaneous evidence (including the sketch plan annexed to the site modification sheet) that this raker was defective, as alleged. I allow this head of claim.

Category 9

822. Hol 196, 197, 208, 234, 241 relate to diagonal raker tips, which were welded to gusset plates. Multiplex say that the need for this arose because of fabrication errors, in particular because the holes did not match up for the purpose of pinning.

823. This claim is unsound. The approved drawings show that the relevant joints were to be made by welding, rather than pins: see e.g. the flag symbols on drawing 430 1503961, revision 01. Furthermore the lower beams were designed in two pieces, so that the connection would be adjustable. This is denoted by the word “slot” just above the centre of the drawing, as explained by Mr O’Neil in cross-examination. I do not accept Multiplex’s contention (in closing submissions at paragraph E 4.76) that these features of the drawing were “gnomic”.

824. Hol 198 and 199 relate to rakers which were installed out of tolerance. The consequence was that shims needed to be inserted, before a TV gantry beam could be installed. Although the survey records in bundle T62 were not examined during the trial, I have now looked at the drawings listed in Multiplex’s closing submissions and am satisfied that the rakers in question were erected out of tolerance. The installation of shims was an appropriate remedy: see Mr Stam’s statement at paragraphs 67 – 68.

825. In relation to category 9, I allow claims Hol 198 and 199, but not the other claims.

Category 10

826. This is an assortment of forty nine lower value claims, which Mr Hall maintains are insufficiently described. Mr O’Neil has examined the relevant drawings prepared by CB and concludes that there were no drawing errors: see his statement at paragraphs 298 and following. Multiplex rely upon paragraphs 38 – 56 and 79 – 90 of Mr Stam’s statement in respect some of these items and also upon the appendix to Mr Perkins’ first statement (see paragraphs E 4.85 – 86 of Multiplex’s closing submissions).

827. Having considered the witness statements relied upon and the underlying documents, my conclusion is that the following claims are valid: Hol 6, 8 and 17. The remaining claims in category 10 have not been proved.

Category 11

828. Hol 160 and 161 are disallowed, because there are no records of what (if any) costs were incurred in dealing with these matters. They are described as “estimated” in schedule 1D.

829. Hol 165 relates to the removal of an end cap to correct a fabrication error. The relevant steel member went into fabrication on 12th November 2003. Mr Hall makes the

point that the Mott revised drawing detailing this piece might have been issued after 11th November. The evidence concerning Hol 165 is somewhat sparse on both sides. However, on balance of probabilities I conclude that the relevant information was provided to CB before 15th February 2004. By reference to that information Hol 165 was a fabrication error.

830. Hol 168 arises out of a variation instruction given on 4th May 2004, as explained by Mr Hall. If CB had done this work they would have received additional payment. It has not been demonstrated that Multiplex incurred any loss through employing Hollandia to do the work, rather than CB.

831. Hol 203 relates to the monorail. Mr Stam discusses Hol 203 at paragraph 53 of his statement. I accept Mr Hall's evidence that CB did not do the erection work which is criticised in Hol 203.

832. Hol 210 is not a defect. The steelwork design was varied on 10th March, which was after the steel had gone into fabrication.

833. Hol 220 relates to the installation of web stiffeners in January 2005. I can find no evidence that CB were instructed to provide these during the period that they were employed.

834. Hol 250 relates to works to the cleaning rail. Mr Hall asserts that the relevant drawing (1503904) was dated 14th March, whereas the steel went into fabrication on 10th March. Mr Hall is mistaken as to the drawing date, which was in fact 4th March. That was six days before the steel went into fabrication. I am satisfied that Hol 250 arises from a fabrication error on the part of CB.

835. In the result, out of category 11 I allow only Hol 165 and Hol 250.

Category 12

836. The eight claims in this category are Hol 172 – 179. These relate to modifications to base plates carried out by Hollandia in December 2004.

837. According to the site modification sheets, these works were carried out because of a new requirement of the client rather than any fabrication error or drawing error on the part of CB.

838. Mr Perkins in his schedule (as amended by email to the court dated 25th June 2008) maintains that the correspondence, instructions and drawings at QC 4/73.3 to 73.4UU provided details in respect of base plates to CB; and that CB failed to comply with those details. I have looked at these 47 pages of technical details with interest, but I am unable to deduce from this material that CB failed to comply with any particular details or that such non-compliance generated the need for the remedial works in December 2004. I am unable to find any correlation between (a) the drawings and details in bundle QC 4 and (b) the drawings attached to the eight site modification sheets issued in December 2004

839. Having considered the evidence of Mr Hall and Mr Perkins in relation to these items, I am satisfied that there was no fault on the part of CB. The work arose from post 15th February variation instructions. Despite the observations of Mr Perkins in his schedule, I have not been referred to any pre-15th February correspondence which constitutes an instruction to vary the base plates in question.

Category 13

840. These seven claims relate to modifications to steelwork, which were necessary to accommodate Bison's works.

841. I accept Mr Hall's evidence that none of these matters arose out of fabrication errors on the part of CB. Mr Perkins accepts in his schedule that Hol 26 arose out of an omission from Mott's drawings and that Hol 206 was the result of a variation instruction. I am satisfied by Mr Hall's evidence that there are similar explanations for the other five claims.

842. The category 13 claims are dismissed.

Category 14

843. These ten claims relate to the fact that Hollandia had to remove segments of flanges, in order to install tubular braces.

844. Four of the claims (hol 14, 15, 32 and 257) lack the necessary supporting documentation and are pleaded as "estimates". As to the others, I have considered the conflicting witness statements of Mr Stam and Mr Hall, as well as the cross-examination of Mr Stam at day 10, pages 39 – 41. I am satisfied that Mr Hall's account of events (before Mr Stam came to site) is correct. CB dealt with a design problem which was not of their making in a manner agreed with Multiplex. The on site modification work subsequently done by Hollandia was a consequence of this.

845. The category 14 claims are dismissed.

Category 15

846. These four claims are made in respect of steel members which somehow became lost.

847. I reject Hol 246, because it lacks supporting documents and is pleaded as estimated.

848. As for the other three claims, I have considered the conflicting evidence of Mr Petaccia, Mr Stam, Mr Green and Mr Patterson as to how Multiplex handled steel after 22nd June. I have also considered the evidence of Mr Hewitt, in particular paragraph 42 of his witness statement. On balance of probabilities I find that the three steel pieces were delivered to site but were lost by Multiplex.

Category 16

849. These are fifteen assorted items not specifically addressed in Cleveland Bridge's witness statements.

850. I reject Hol 3 because it lacks substantiating documentation and is pleaded as an estimate.

851. In relation to the remaining claims in this category, I have considered the evidence of Mr Stam and Mr Perkins and I find the following to be proved: Hol 158, 169, 184. Although Hol 184 is pleaded as 'estimate', in this instance I consider that the supporting documentation in bundle MID-4 is sufficient.

852. I reject all of the remaining claims in category 16. Some fall into categories of claim rejected above; some lack supporting evidence; some are supported only by formulaic entries in Mr Perkins' schedule.

853. In the result I allow Hol 158, 169 and 184. I reject all of the other claims in category 16.

Quantum

854. I accept Dr Mastrandrea's valuation of the claims in Schedule 1D.

855. Accordingly, in respect of the claims in schedule 1D I award to Multiplex damages of £42,109.50 as shown in Appendix 1 hereto.

856. The effect of my findings on the above items is that Multiplex also succeed on certain associated items in Schedule 1B. The relevant items, and their value, which is £19,154.39, are also shown in Appendix 1.

CHAPTER 8. SCHEDULE 1E

857. In Scott schedule 1E Multiplex claim damages, alternatively abatement, in respect of defects in Bridon cables. I shall treat this as a claim for damages, that being Multiplex's preferred basis.

858. It will be recalled from chapter 2 that Bridon supplied wire strand cables to CB for the purpose of attaching the arch to the north roof. The bottom ends of the cables were attached to ring cable node points on CT 17. The highest point of each cable was attached to the arch, as shown in the plan at defendants' supplemental 1A, slide 2. CB duly installed the cables, but unfortunately in respect of four cables they misaligned the ends attaching to the node points on CT17. As a result, when the arch was raised in June 2004 to its initial position, those four cables became twisted. The cables remained twisted when CB repudiated on 2nd August 2004. Hollandia subsequently engaged Bridon to carry out remedial works, in order to untwist the cables. Multiplex claim the remedial costs as damages.

859. The facts set out in the previous paragraph are not in dispute and CB have no defence on liability. This is the sort of claim which, in normal TCC litigation, the parties would resolve by agreement.

860. CB pleaded a variety of ingenious defences to this claim, including the proposition that there should be no liability because, if CB had not repudiated they would have done remedial works at no cost; alternatively, the proposition that Multiplex failed to mitigate their losses; and so forth. Most of these defences have been quietly dropped.

861. The first point pursued by Mr Williamson at trial was that Multiplex should not recover the costs claimed in the final three Bridon invoices, because they were disclosed late and are not specifically pleaded: see his submissions at day 26 page 187 and day 32 pages 87 – 89.

862. In relation to the pleading point, I accept that Multiplex's pleading falls short of perfection. In schedule 1E Multiplex plead the first four invoices (repeating one of them first with VAT and secondly without VAT, so that the list appears to comprise five invoices). Multiplex's pleading then continues "estimated further costs to completion £50,000". Multiplex subsequently disclosed three further invoices and one credit note, setting out those further costs.

863. Although Multiplex's pleading is not perfect, the nature of their claim is perfectly clear. There are imperfections in the pleadings on both sides, and in order to do justice to both parties I have adopted the approach set out in my ruling on day 3 at pages 96 to 99. Multiplex are entitled to rely upon the final three invoices.

864. As to late disclosure, the three invoices were included in Multiplex's supplemental disclosure statement dated 4th February and delivered to CB's solicitors on or about 8th February. I am satisfied that CB had sufficient opportunity to digest their import.

865. I shall therefore treat Multiplex's claim as being based upon the seven invoices and one credit note set out in paragraph 5.25 of Dr Mastrandrea's schedule 1 report. The total value of these invoices is £58,520.

866. Mr Williamson next makes a series of points about Bridon's invoices, derived from Dr Mastrandrea's report. It is correct that in some instances timesheets are missing. On the other hand, it is clear from the evidence of Mr Davies and Mr McGregor that Bridon undertook a substantial amount of work in order to rectify the twisted cables. It is also clear from the payment advice notices and Hollandia's invoices that (a) Hollandia paid Bridon's invoices and (b) Multiplex paid Hollandia for Bridon's work pursuant to contract WP2760. See in particular Hollandia's application for payment no. 46 at T7/401.068. Mr Ong states that his team validated the documentation before paying Hollandia in respect of Bridon's work. I accept that evidence.

867. There are two specific anomalies in Bridon's invoices, which are identified by Dr Mastrandrea and for which I must make allowance. First, Bridon provided one operative rather than two (as claimed) in the period 24th – 28th October 2005. Secondly, Bridon provided two operatives rather than four (as claimed) in the period 5 – 6th December 2005. A total sum of £3,905 must be deducted in respect of these matters.

868. Accordingly, I shall reduce the total value of Bridon's invoices to £54,615. I do not accept any of CB's further challenges to those invoices.

869. Multiplex in their pleading add a mark up of 26% to cover Hollandia's overheads and profit. Dr Mastrandrea reduces this to 20% in paragraph 5.25 of his report. I am satisfied on the evidence that Hollandia charged Multiplex a 10% mark up and that this was reasonable. See, for example, clauses 1 and 10 of the memorandum of understanding between Multiplex and Hollandia. I am not satisfied in respect of any further mark up, nor could Dr Mastrandrea substantiate any further mark up: see cross-examination at day 24, pages 148 – 149. I shall therefore add a mark up of 10% to Bridon's invoices, namely £5,461.50.

870. Accordingly, Multiplex succeed on their claim in schedule 1E and I assess damages in the sum of £60,076.50.

CHAPTER 9. CONCLUSION RE SCHEDULE 1

871. As set out in the four preceding chapters I award the following damages in respect of schedule 1:

Schedule 1A	Nil
Schedule 1B	£ 49,119.39
Schedule 1D	£ 42,109.50
Schedule 1E	<u>£60,076.50</u>
Total	<u>£151,305.39</u>

872. As will be set out below, Multiplex made a substantial gain from CB's repudiation of its obligation to fabricate outstanding bowl steel (the "repudiated steel"). This is because Hollandia fabricated the repudiated steel at a significantly lower cost than CB would have been entitled to charge under the Supplemental Agreement. Mr Williamson contended that the gains which Multiplex made in this regard should be set off against Multiplex's claims in schedule 1: see day 36, pages 105 – 106. This was a new argument, which had not been raised until the last day of closing speeches. I have come to the conclusion that the argument is unsound for two reasons.

873. First, Multiplex's schedule 1 claim for damages for defects is entirely separate from Multiplex's schedule 4 claim for damages for repudiation. The one flows from doing defective work pre-2nd August. The other flows from ceasing to work after 2nd August. It is fortunate indeed that CB's repudiation of the fabrication contract has enured so substantially to Multiplex's benefit. That, however, is a consequence of CB's deliberate conduct and Multiplex are entitled to keep the windfall. If CB had not done defective work, Multiplex would have kept the whole of that windfall. As it is, Multiplex have had to pay out £151,305.39 in order to put right CB's defective work. Multiplex are entitled to recover that sum as damages. There is no reason why Multiplex should pay those remedial costs out of their saving on post-repudiation fabrication costs.

874. Secondly, if I am wrong in the previous paragraph, Multiplex's claim for damages in schedule 1 could readily be re-formulated as a claim for abatement: see judgment 1, paragraphs 640 – 654 (which were not challenged on appeal). Multiplex's fortuitous gain on post-repudiation fabrication costs could not possibly be set off against Multiplex's abatement claim in respect of work done pre-repudiation.

875. I therefore hold that Multiplex are entitled to recover damages of £151,305.39 in respect of their claims in schedule 1.

876. Counsel have agreed interest on the above damages in the sum of £38,506.57.

PART 3. SCOTT SCHEDULE 2

CHAPTER 10. PRELIMINARIES UP TO 15th FEBRUARY 2004

877. CB claim £11,246,712 in respect of pre-15th February preliminaries. That claim is supported by Mr Hart at section 7.1 of his report. Multiplex's pleaded case is that only £7,857,810 is due. That figure is reduced to £7,339,143 by Dr Mastrandrea in his report.

878. The reason for this wide gulf between the parties is that CB assess preliminaries on a time elapsed basis, whereas Multiplex assess preliminaries by reference to the actual progress on site as at 15th February 2004.

Relevant contractual provisions

879. Clause 21 of the subcontract provisions provides:

“21.3 Applications for Payment

(1) “Within five (5) Business Days of a Progress Inspection having taken place pursuant to clause 21.2.2, the Sub-Contractor shall be entitled to make applications for payment (each an “Application for Payment”) in respect of the previous month (in this clause 21.3, and clause 21.4 the “Relevant Month”).”

(2) Each Application for Payment shall be submitted with 3 (three) hard copies (three) electronic copies, and shall specify the total amount claimed up to and including the Relevant Month by reference to:

- i) the value of the works properly completed;
- ii) the total value of work properly completed to which clauses 4.6 and 4.7A refer;
- iii) any amounts due pursuant to clause 45.2;
- iv) any additional payments to which the Sub-Contractor is entitled under the Sub-Contract during the Relevant Month;
- v) Less except where the Sub-Contractor has made the election pursuant to clause 39, the Retention referred to in clause 21.12 for all the amounts referred to above (except the payments referred to in clause 21.3.2.4); and
- vi) all previous payments made to the Sub-Contractor under the Sub-Contract.

(3) The Sub-Contractor shall submit with its Application for Payment any Off-Site Materials Bonds required to be procured pursuant to clause 45.2.

21.4 Valuation

(1) The Gross Valuation shall be lesser of;

- i) the amount specified for the relevant month in the Maximum Cumulative Monthly Amount column as shown in the Payment Profile;

And

- ii) the gross value of the works claimed in accordance with clause 21.3.2.

(2) For the purpose of paragraph 21.3.2.1 the value of the works properly completed shall be ascertained by allocating to each activity bar in the Payment Programme a monetary value equal to the same percentage of the total amount attributed to the whole of that activity bar in the Payment Programme as the percentage of the total work represented by the said bar as has been properly completed on Site and in accordance with the Sub-Contract prior to the end of the Relevant Month, and aggregating the said monetary values for all activity bars.

(3) For avoidance of doubt and notwithstanding any other provision of the Sub-Contract, the Sub-Contractor shall not be entitled to claim or request payment in respect of any Sub-Contract Works if the amount of such claim or request would on the date when payable result in the aggregate amount of Gross Valuation, then paid or payable to the Sub-Contractor exceeding the amount specified in the Cumulative Monthly Amount column as shown in the Payment Profile.

21.5 Supporting Data

Each application shall, to the extent relevant, be accompanied by;

- i) The Sub-Contractor's valuation of the work completed at the end of the Relevant Month, to be set out by allocations to activity bars in the Payment Programme in accordance with clause 21.4.2.
- ii) Reasonable substantiation of the amount claimed under clauses 21.3.2.3 and 21.3.2.4 in accordance with the requirements of the Sub-Contract.
- iii) Such other details justifying payment as the Contractor may reasonably require.

21.6 The Contractor and Sub-Contractor shall from time to time (but at least once every calendar month), carry out a detailed examination and review of the Payment Profile and the Payment Programme and an assessment of the extent to which the Execution of the works and/or the performance of the Design Obligations have been carried and the Sub-Contract Sum has been amended in accordance with the Sub-contract up to the date of such review and the Contractor shall, if he is of the opinion that revisions ought to be made, revise the Payment Profile and the Payment Programme. Such changes will take effect in the Valuation that becomes due three (3) months after the meeting, or earlier if mutually agreed.

21.7 Review of Sub-Contractor's Application for Interim Payment Certificate

The Contractor and the Sub-Contractor shall jointly review each Application for Payment and endeavour to agree the amount due to the Sub-Contractor. If no such agreement can be reached the Sub-Contractor shall issue its Application for Payment

as it sees fit pursuant to clause 21.3 and the Contractor shall issue a Certificate of Payment in accordance with clause 21.9 for such amount as the Contractor considers to be due. Any outstanding disagreement between the Contractor and the Sub-Contractor shall be determined in accordance with clauses 38A and/or 38C.

21.8 Amounts Due to the Contractor

In preparing each Application for Payment, the Sub-Contractor shall deduct all amounts due to the Contractor pursuant to the provisions of the Sub-Contract, except sums already so deducted in a previous Certificate of Payment or paid to the Contractor pursuant to clause 21.10.

21.9 Issue of Interim Payment Certificates

(1) Within twelve (12) Business Days after the receipt of the Application for Payment under clause 21.3, the Contractor shall issue a certificate (a "Certificate of Payment") certifying what amounts are due to the Sub-Contractor pursuant to this clause 21.9, less any amounts which are to be deducted pursuant to clause 21.10 or are the subject of a notice under clause 21.11.1.

(2) All Certificates of Payment shall specify the amount which the Contractor proposes to pay to the Sub-Contractor and basis on which that amount was calculated. Such amount shall become due on the date of issue of the Certificate for Payment and final date for payment shall arise ten (10) business days after the date of issue of the said Certificate for Payment.

21.10 Sums Due to Contractor

(1) Where by virtue of any provision in the Sub-Contract, the Sub-Contractor becomes liable to pay sums to the Contractor or the Contractor becomes entitled to abate amounts against sums due to the Sub-Contractor, the Contractor may:

- i) deduct such sums in computing the amount in any Certificate of Payment;
- ii) issue an invoice to the Sub-Contractor for such sum identifying the amount and the grounds for the Contractor's claim; or
- iii) do a combination of Clauses 21.10.1.1 and 21.10.1.2.

(2) The amounts specified in such Certificate of Payment and / or invoice shall become due and the final date for payment shall arise ten (10) Business Days after the date of issue of such Certificate of Payment and/or invoice as applicable."

880. Clause 1 of the Payment Programme (which forms part 1 of the Pricing Document at volume 3 of the contract documents) provides:

"1.0 PAYMENT PROGRAMME:

1.1 The purpose of the Payment Programme is to show the values of the various elements of the Works for the purpose of valuation and payment pursuant to Clause 21 of the Sub-Contract Conditions.

1.2 The amounts entered by the Sub-Contractor against each of the items shall be complete and are deemed to include for all associated work including labour, material, delivery, plant, tools, equipment, etc and based of the Agreed Pricing Schedule.

1.3 Not Used

1.4 The risk and responsibility for estimating the value of each item remains with the Sub-Contractor. All items are deemed to be included in the Contractor Sum whether or not any amount is shown against them unless otherwise noted as not included.

1.5 Where elements are provisional they are described as such in the Payment Programme and the provisional quantity or provisional sum given.

1.6 The Sub-Contractor shall include any additional items known or agreed it considers necessary to comply with the requirements of the Sub-Contract.

1.7 The total value of all items listed has been carried forward to the Sub-Contract Sum.

1.8 The sums included within the Payment Programme are to be dealt with in accordance with the Sub-Contract Conditions, refer Clause 21.6.”

881. The graph which follows clause 1 of the Payment Programme has three bars. The first bar, representing management and preliminaries, runs from month 1 to month 29. Schedules 1 to 5 of the Payment Programme are to be found immediately after that graph.

882. Schedule 1 of the payment programme shows how the original sub-contract sum of £60 million was made up. This sum includes the following preliminary items:

Project management	£6,035,207
Site management	£1,194,753
Design and engineering	£2,880,918
General site preliminaries	£6,939,977

883. Schedule 1 shows that 16% of the project management sum is variable and 84% is fixed; all of the site management sum is fixed; 32% of the design and engineering sum is variable and 68% is fixed; 21% of the general site preliminaries sum is variable and 79% is fixed.

884. The Payment Programme assumes that CB’s work will be accomplished over a period of 29 months. On that basis, schedules 2 to 5 of the Payment Programme show what instalments of each preliminary item were to be paid in each month. Essentially, the variable elements of the preliminaries were to be earned by reference to work done, whereas the fixed elements were to be payable on a time elapsed basis. A helpful one-page summary of schedules 2 to 5 appears immediately after schedule 5.

885. The monthly totals from that summary sheet are carried across to the Payment Profile, which constitutes section 5 of the Pricing Document (subject to certain anomalies, which it is

not necessary to resolve: see Mr Williamson's submissions at day 34, page 25). The Payment Profile shows monthly instalments payable to CB totalling £60 million at the end of month 29. This idealised profile assumes no variations (either by way of addition or omission) and no delay.

886. CB contend that in valuing their work up to 15th February 2004 the fixed elements of the preliminaries should be paid for on a time elapsed basis, whereas the variable elements should be paid for by reference to what "deliverables" (as shown in schedules 2 to 5) had been delivered. CB point out that this is how preliminaries were assessed during the course of the project. CB maintain that this is what the subcontract required. Accordingly, CB refer to the summary of schedules 2 to 5 and point out that 15th February 2004 fell in the middle of month 17. CB claim all the fixed preliminaries shown in that summary up to month 16 plus half of the fixed preliminaries shown for month 17 plus such of the variable preliminaries as had been delivered by 15th February 2004.

887. Multiplex contend that no part of the preliminaries should be assessed on a time elapsed basis. Preliminaries due to CB in respect of work done up to 15th February should be assessed by reference to the stage which steelwork had reached on that date. Multiplex accept that the summary of schedules 2 to 5 is a useful tool, but contend that one should not focus upon the mid point of month 17, because time elapsed is irrelevant. Instead one should look at the stage which the steelwork had *actually* reached on 15th February 2004 and identify where on the summary sheet that degree of completion is to be found. Because of the delays that occurred, that point lies towards the end of month 13. Multiplex have produced a graph (claimant's supplemental 1, referred to by counsel as the "Everest" graph, because of its shape) showing the originally predicted project spend, in order to illustrate their point. Chart 2 of supplemental 1 illustrates the effect of a 4 month delay.

888. In choosing between these rival submissions, I start with paragraph (a) of schedule 1 to the Supplemental Agreement. The court has to determine "the gross valuation as at 15th February 2004 of work properly completed on site and goods and materials brought onto site by the contractor and off-site materials in accordance with the provisions of the subcontract". Each of those three activities (completing work on site, bringing materials onto site and procuring materials off-site) generate preliminary costs. The whole thrust of paragraph (a) is directed towards work actually done and materials actually provided. As the Court of Appeal pointed out in CA judgment 1, paragraph (a) of schedule 1 to the Supplemental Agreement is closely linked to clause 21 of the sub-contract conditions; and within clause 21 the "core provision" is clause 21.3.2: see paragraphs 100-101 of May LJ's judgment. Clause 21.3.2 (1) requires interim applications for payment to be based upon "the value of the works properly completed".

889. Clause 21.4 (2) states that "the value of the works properly completed" shall be ascertained by reference to the value of work "properly completed on site and in accordance with the subcontract". At first sight, this may suggest that work off site (such as procurement) is to be disregarded. However, such an approach to valuation would be odd and would be inconsistent with the Payment Programme. Clause 1.1 of the Payment Programme provides "The purpose of the Payment Programme is to show the values of the various elements of the Works for the purpose of valuations and payment". Furthermore, clause 21.4 (2) expressly refers the reader to the three activity bars in the Payment Programme and these comprise: (i) management and preliminaries, (ii) procurement and fabrication and (iii) construction activities. When one reads clause 21.4 (2) in conjunction with the graph in the Payment Programme, it is clear that valuations must have regard to

work done by CB both on and off site. Any more restrictive reading of clause 21.4 (2) would (a) be unduly harsh upon CB and (b) would conflict with the Payment Programme.

890. Clause 21.4 (1) of the sub-contract conditions provides that the gross valuation shall be the lesser of (1) the amount specified in the Payment Profile and (2) the gross value of the works in accordance with clause 21.3.2. This provision indicates to me that (absent the Supplemental Agreement) both the Payment Profile and schedules 2 to 5 (which feed into the Payment Profile) were intended to operate as a cashflow cap, rather than as provisions which conferred automatic entitlement to payment on a time elapsed basis.

891. The cashflow cap was removed by the Supplemental Agreement. Nevertheless, it remained the case under the sub-contract, both before and after the Supplemental Agreement, that valuations up to February 2004 were to be assessed by reference to work done and materials supplied or procured. If CB's interpretation of the sub-contract were correct, it would mean that CB became entitled to substantial monthly payments of the fixed elements of preliminaries, even if CB did no work and procured no steel. In the present case, it would mean that CB became entitled to reimbursement of preliminary costs which CB had not begun to incur. For example, in the valuation up to 15th February CB would be entitled to recover £638,000 in respect of strand jacking, even though CB had not incurred those costs: see Dr Mastrandrea's report re schedule 2 at paragraph 3.98. That interpretation does not make commercial sense. Nor does it accord with the express terms of the sub-contract.

892. The Neutral Cashflow Procedure (upon which CB rely) does not displace this conclusion. Clause 6.1 of the Neutral Cashflow Procedure makes it clear that the provisions of that procedure are subordinate to the provisions of clause 21. I do not accept Mr Williamson's submission that the existence of clause 21.6 provides a ready escape route for Multiplex ("clause 21.6 rides to the rescue of Multiplex": day 34, page 34) such that CB's interpretation of clause 21 should be preferred.

893. Mr Williamson has an alternative argument to the effect that Multiplex's interpretation of clause 21 results in Multiplex obtaining a form of compensation for CB's delay; however, Multiplex's entitlement to such redress is excluded by clause 2.1 of the Supplemental Agreement. See paragraph 173 of Mr Williamson's opening note and his closing submissions at day 34 page 30. I do not accept this argument. Multiplex's approach simply involves compensating CB for their preliminary costs incurred in accordance with the provisions of the subcontract.

894. Let me now draw the threads together. For the reasons set out above, I conclude that Multiplex's approach to calculating preliminaries up to 15th February 2004 is in accordance with the subcontract and the Supplemental Agreement. I reject CB's approach to calculating preliminaries.

895. Turning to quantum, I consider that Dr Mastrandrea's approach is correct subject to one qualification. In relation to design and engineering, at his appendix 2 tabs 15 and 26 Dr Mastrandrea has used approximate figures for percentages complete, rather than the actual percentages derived from CB's progress report dated 13th February 2004. I accept Mr Williamson's submission that if one starts from CB's February progress report, one should take the actual figures, rather than approximations of those figures. Indeed Dr Mastrandrea accepted this in cross-examination at day 26, pages 53 – 55. Subject to that qualification, I accept the claimant's methodology.

896. In claimant's supplemental 11, Multiplex accept CB's substitution of actual figures for approximate figures, but then make a further adjustment to allow for the fact that drafting lags behind design. It should be noted that Mr Hart substantially accepted the claimant's methodology at day 28, pages 117 – 122 (where Mr Stewart put to Mr Hart defendants' supplemental 21.5 and claimant's supplemental 11). Although I have reservations about some individual constituents of claimant's supplemental 11, the overall percentage completion resulting from that supplemental is very close to the overall figure which I arrive at by a different method in chapter 24 below (when comparing the state of design and drafting as at 15th February with the state of design and drafting as at 2nd August 2004). Doing the best I can on the totality of the evidence, I propose to adopt the final figure resulting from claimant's supplemental 11.

897. In the result I assess preliminaries up to 15th February 2004 in the following sums:

Project management	£2,601,713
Site management	£ 245,112
Design and engineering	£1,729,871
General site preliminaries	£2,623,620
Total	£7,200,316

CHAPTER 11. GO DATA

898. Go Data is a software system, created by AceCad Software Ltd ("AceCad"), for recording steel as it passes through the various phases of its life from initial purchase as black steel through fabrication and painting to ultimate erection. CB used Go Data to record the steel which they purchased and processed. CB's witnesses describe the operation of Go Data in considerable detail. For present purposes a brief outline will suffice.

899. Provided that appropriate information is input into Go Data, the system will produce printouts showing the quantities of steel at each stage of the process. Stock in reports record black steel which is purchased. The piece monitoring system ("PMS") records details of individual steel members as they progress through planning, fabrication, treatment (i.e. painting), loading, delivery and erection. PMS also records if a piece of steel is scrapped. CB used stock in and PMS printouts to support all their applications for payment.

900. In the present litigation both sides have based their calculations and assessments upon print outs from Go Data. Multiplex contend, however, that there were serious flaws in Go Data, at least in so far as that system was used for the Wembley project; that the errors made were generally in favour of CB; and that accordingly, in assessing sums due to CB, the court should reduce by 10% all quantities generated by Go Data: see paragraphs 4.1 to 4.36 of Multiplex's closing submissions.

901. CB were handling several thousand pieces of steel. I accept that on occasions mistakes were made and inaccuracies appeared in Go Data. Four examples of such

inaccuracies are set out in claimant's supplemental 4. The first and fourth of these examples were put to Mr Hall in cross-examination and accepted by him: see day 21, pages 10 – 19. Mr Hall accepted a number of further inaccuracies in Go Data, which were explored in cross-examination on day 21. Further inaccuracies were put to Mr Osborne in cross-examination. Mr Osborne also explained that erected steel was not originally recorded on Go Data, but a decision was made in February or March 2004 to add this information in. There were problems with this exercise and a great deal of catching up to do.

902. Mr O'Neil was strongly critical of the Go Data records in internal documents and he was cross-examined in some detail about the shortcomings of the system. Mr Underwood also accepted in cross-examination that there were anomalies in the Go Data records.

903. Despite the fact that there were mistakes in Go Data which arose in a number of ways, the Go Data printouts remain as important evidence. Indeed they are the best evidence available to the court as to (a) what quantities of black steel were bought by CB and (b) what stages in the process individual pieces of steel had reached at the critical dates (in particular 15th February, 30th June and 2nd August 2004).

904. The crucial question for the court is whether the demonstrated errors and inaccuracies in Go Data require some adjustment to be made to the various steel quantities derived from Go Data. If so, what should that adjustment be?

905. Mr Williamson submits that Go Data is generally reliable and that the errors in Multiplex's favour, at the very least, cancel out the errors in CB's favour. See CB's written closing submissions at paragraphs 689 – 690 and oral closing submissions at day 36, pages 83 – 86. Mr Stewart submits that the extent of the errors is far greater, that they are generally in CB's favour and that they warrant a 10% adjustment. See section F4 of Multiplex's written closing submissions and oral closing submissions at day 36, pages 137 – 140, together with claimant's supplemental 18.

906. Dr Mastrandrea set out his concerns about Go Data in section 2 of his schedule 2 report, and developed these concerns in his supplemental report, following a visit to Darlington. Dr Mastrandrea was cross-examined about the reliability of Go Data on day 26 at pages 89 to 100 by reference to Multiplex's pleaded criticisms of the system. (Multiplex's pleaded criticisms of Go Data are set out in Multiplex's Further Information dated 14th December 2006.) That cross-examination included the following passages:

PAGES 91-93

“Q. You have had some communications with AceCad, who are effectively the inventors of GO Data -- A. Yes, I have.

Q. -- and you have no reason, have you, to suppose that GO Data, as a software package, is in any way deficient? A. No, not at all.

Q. So if we then look at the criticisms, for example (i), (iii), (iv) and (v), that is essentially making the point, isn't it, that GO Data can only be as good as the information put into it? A. Yes.

Q. That is not a criticism of GO Data as a system; that is a function of any computer or database system? A. That is correct.

Q. Now a point is made at (iv) and (v) effectively that there could be mistakes made in inputting the data. A. Yes

Q. I wonder if we could just turn up what Mr O'Neil says about that. That is bundle B4/2 at page 297. While I find the bundle, the relevant passage is paragraphs 390-392, if you would just like to refresh your memory of those. (Pause) A. Yes.

Q. So what Mr O'Neil says is that effectively you would only have an error of any significance at the last stage of the process, ie the erection stage. A. Through the manufacturing process, yes. There are checks within the system which sort of relate back to the earlier stage as a cross-check against the next stage.

Q. Yes. Your answer effectively is summarising what Mr O'Neil says in that passage in his witness statement? A. Yes, subject to what it is that goes into the process, ie the manufacturing process, the quantities of material, the nature of the materials, that is correct

Q. Now if you want to put away Mr O'Neil's statement for the time being, can you then go back to the further information at page 457? A. Yes.

Q. At (iii) there is reference to late updating of the database prior to valuations being prepared. Yes? A. Yes.

Q. Now what one imagines might happen there is this, isn't it, that a piece of steel has, for example, reached a particular stage in the process, but the person who is inputting the data has not yet caught up with the steel? A. Yes.

Q. That could happen? A. Yes.

Q. The effect of that, in relation to valuation, would be that CBUK would be underpaid, wouldn't they? A. I believe that is right, yes.

Q. Then so far as -- A. You would have inaccuracy, but it would lead to that result, yes."

PAGES 95-98

"Q. So far as (ii) is concerned, on the Multiplex list there is reference to manipulation of the information within the database. It is right, isn't it, Dr Mastrandrea, that as part of the interim payment application process, CBUK provided to Multiplex printouts both of the stock-in reports and the PMS reports on a monthly basis? A. I believe that is so, yes, although I've only, I think, seen a limited number of those. But I believe that is so.

Q. Let's just see what is in the documents that we have got. Could you be given file E9? Now, Dr Mastrandrea, we are dealing here with the application for the payment, as it happens, to February 2004. Do you follow? So this is pre-15 February. A. Yes.

Q. Could you go to E9/62? A. Yes.

Q. There we have a section which is headed "UK and China materials offsite". Do you have that? A. Yes, I do.

Q. Then go forward to page 67. There we have the stock-in phase breakdown printed on 15 February 2004. That is the arch and then the bowl is at page 68. Yes? A. Yes, that is right.

Q. Then if you go behind the next tab at page 221, we have "measured works on-site". A. Yes.

Q. If you go by way of example to page 235 -- A. Yes.

Q. -- this is now the material in the PMS system here at planning and then going forward to fabrication and so on. A. Yes, that is right, yes.

Q. So just pausing there, first of all it would be possible, wouldn't it, for Multiplex, as the paying party, to check this information as to whether they were, so to speak, getting what they were paying for? A. Yes.

Q. Secondly, there would be no way, would there, of manipulating these hard copy records, hard copy reports? A. Manipulating them?

Q. Manipulating them. A. No, but I don't think that removes the problem of between documents. It doesn't follow that there are no errors or inconsistencies in these documents. That is the problem, I think. Whether or not you are able to satisfy yourself about the adequacy of these documents depends on how much of an expert you are with this sort of system. You know, if you are not, then you are very likely to take it at face value, I suggest. That is perhaps not a good thing. If I could just give you an example of what I think are inconsistencies within this bundle. If we look for example at E9/68, which is the stock-in phase breakdown for the bowl we were looking at, and we compare it with page 192, what we see in relation to the list at 192 is that phases 51-54 are not represented in that listing. You see 55, 56, 57, but 51-54 is not represented in that system.

MR

JUSTICE JACKSON: Are they phases 51-54? A. It is phases, my Lord, yes. I beg your pardon. It is 61-64. 61-64 is -- MR JUSTICE JACKSON: That is the south roof, isn't it? A. Yes, these are the roofs. MR WILLIAMSON: No, this is the bowl we are looking at. Page 68 is the bowl, Dr Mastrandrea. A. I beg your pardon. 69, I mean.

Q. Just take it in stages. The particular allegation that is made by Multiplex is manipulation of the information within the database. A. Yes.

Q. I'm suggesting to you that it is not possible to manipulate -- that is the word which is used -- information within these hard copy documents which are supplied as part of the payment applications. A. Not when you are within the fabrication process. I agree with that."

“Dr Mastrandrea, after that false start, the question I was asking you was whether you were familiar with this documentation which, on my instructions, was used to support the post 15 February application. A. Yes, I am.

Q. Just to see what we get out of it, if we go to tab 2 -- A. Yes.

Q. -- that supplies the stock-in reports and we can see, at page 12, it identifies the contract numbers; yes? A. Yes.

Q. Then, at page 16, for example, one can see when this information is printed out; on this occasion on 23 August 2004. A. Yes.

Q. Then, at tab 3, this is now the fabrication part of the process, with the GO Data reports. If you look, for example, at page 154, one has a list of material at planning and so on. A. Yes.

Q. Dr Mastrandrea, again so far as this information is concerned, the hard copy information, it was capable of being checked by Multiplex? A. Yes.

Q. It is not capable of manipulation? A. In relation to the fabrication process, I agree.”

907. I have considered the whole of Dr Mastrandrea’s evidence, of which the above passages just form part. I have also considered the various examples of errors and inaccuracies which were traversed in evidence. My conclusion is that quite often the errors worked against CB, in that work done was not always keyed into the system. Overall, I consider that mistakes in CB’s favour were certainly no greater than mistakes in Multiplex’s favour.

908. In the result, like both parties, I shall use the Go Data print outs as the best evidence available of steel quantities. I decline to make a deduction of 10% (as proposed by Multiplex) or any deduction from the Go Data figures.

CHAPTER 12. THE VARIATIONS COMPRISED IN VARIATION NOTICE SV399

909. CB contend that as at 15th February 2004 they were entitled to be paid £2,370,328 in respect of the variations comprised in SV 399: see paragraphs 484 – 494 of CB’s closing submissions. Multiplex contend that the correct figure is £1,007,490 for the reasons set out in paragraphs F 3.3 to 3.13 of Multiplex’s closing submissions.

910. Before tackling the parties’ respective submissions, it is first helpful to set out the salient facts.

911. On 31st December 2003 CB submitted application for payment no. 16. This was accompanied by a 12 page schedule of change notices, namely CNs 1 – 694. In this schedule CB estimated that the total value of the variations (when carried out) would be £20,124,213. CB also asserted that work to the value of £8,504,830 had already been carried out in respect of those variations: see E2/23. Accordingly CB claimed the latter sum in application 16.

912. Examination of the individual change notices reveals that CB were asserting that the changes involved a total additional quantity of steel of 1,912.3 tonnes: see claimant's supplemental 10, which reviews the change notices. Multiplex did not agree with this assessment.

913. Examination of CB's progress reports and related documents indicates that by February CB had purchased all the steel required for the variations and that this steel was spread across the various work stages from raw steel to erected. The claimant's supplemental 13, which was lodged during closing speeches (amidst some protest – see day 36 page 191), examines the progress made by steel the subject of three major change notices, namely CNs 102, 249 and 285. Supplemental 13 was sufficiently foreshadowed by paragraph F 3.11 of Multiplex's closing submissions and I consider that Multiplex are entitled to rely upon it. This supplemental shows that approximately half of the steel the subject of CNs 102, 249 and 285 had been fabricated and about a quarter of that steel had been erected.

914. Multiplex assessed the total quantity of steel involved in change notices 1 – 720 as 1,200 tonnes, rather than 1,912.3 tonnes as claimed by CB.

915. On 4th February 2004 Multiplex sent variation notice SV 399 to CB. This variation notice “approved” an adjustment (by increase) to the subcontract sum of £2,884,712 in respect of change notices 1 to 720. A build up of the sum of £2,884,712 was attached, showing CB's claim on the left hand side and Multiplex's valuation on the right hand side. It can be seen from this table that Multiplex are comparing CB's figures for the value of variation work actually done (totalling £8,504,830) with Multiplex's figures for variation work (totalling £2,884,712).

916. Variation notice SV 399 is not at all an easy document to construe. There are some indications that the document is setting out Multiplex's valuation of the work done to date in respect of the variations. There are also indications that Multiplex is valuing what the total value of those variations will be when the work has been fully performed.

917. CB regarded Multiplex's valuation of the variation work carried out as ungenerous. Nevertheless (on the basis of the evidence adduced at the trial of preliminary issues 1 to 10 and concessions made at that trial) CB must be treated as having only disputed two items within that valuation, namely arch lighting bracketry (£170,304) and drawing rework (£343,680). The valuation of the remaining variations within that batch (amounting to £2,370,728) was undisputed. See judgment 1, paragraph 553 and CA judgment 1, paragraphs 26-27.

918. It is a consequence of this court's decision on issue 4 that the valuation of disputed variations was resolved by the Supplemental Agreement. Thus both arch lighting bracketry and drawing rework were paid for by the sums specified in that agreement. However, CB's pre-existing entitlement to payment in respect of undisputed variations was not affected by the Supplemental Agreement.

919. This court held at the trial of preliminary issue 4 that, as at 15th February 2004, CB was entitled to be paid “some £2.37 million” in respect of the undisputed variations comprised in SV 399: see paragraph 561 (vi) of judgment 1. The phrase “some £2.37 million” in that paragraph was a reference to £2,370,728, as calculated above. Paragraph 561

(vi) of this court's judgment was approved by the Court of Appeal. See CA judgment 1, paragraphs 72 (vi) and 76.

920. Thus it can be seen that, when dealing with preliminary issue 4, both this court and the Court of Appeal treated SV 399 as valuing variation work done to date, not all the variation work comprised in CNs 1 – 720.

921. Multiplex now contend that CB are not entitled to the full sum of £2,370,728 in respect of variation notice SV 399, on the basis that only 42% of the bowl steel variation work was complete as at 15th February. Accordingly CB's entitlement in respect of SV 399 is reduced to £1,007,490. In my judgment this argument is unsound for two independent reasons. First and foremost, it is inconsistent with the earlier decisions of both this court and the Court of Appeal on issue 4. Secondly the sum of £2,370,728 has already been discounted to reflect the fact that the variation work had only been partially carried out before 15th February.

922. I therefore hold that in the valuation of work done up to 15th February 2004 CB are entitled to recover £2,370,728 in respect of variation notice SV 399.

CHAPTER 13. THE SIDE LETTER

923. CB contend that there was a pre-contract agreement between the parties to the effect that, because additional quantities of steel were added in at a late stage of the tender process, CB's remuneration for constructing the bowl should be increased by £400,000. This additional remuneration was to be paid by the mechanism of adding £400,000 to the valuation of one identified variation, which has been referred to during the trial as "the hotel variation". That variation was referred to at the time as "1B (1) (a) changes" relating to the construction of conference and banqueting facilities in lieu of hotel/office accommodation.

924. CB's evidence, as originally served, did not recount the somewhat curious story upon which this part of CB's case is based. That story was first told in Mr Underwood's sixth witness statement, dated 27th March (i.e. two and a half weeks after the trial had started).

925. Mr Underwood was not personally involved in the pre-contract negotiations and those CB witnesses who were involved in those negotiations have neither given oral evidence nor provided witness statements for the purpose of this trial. Mr Underwood's account, based upon hearsay and reconstruction from documents, is as follows. After CB had arrived at their tender figure of £60 million, Multiplex provided twelve revised drawings which indicated the need for additional steel in the bowl. CB agreed that those drawings would be included in the list of contract drawings; that the contract sum would remain at £60 million; CB would be paid for doing the additional work identified in those drawings by means of £400,000 being added to whatever may be the assessed valuation of the hotel variation (whether that valuation was a negative or a positive sum). This agreement was recorded in Multiplex's letter to CB dated 20th August 2002. This letter has been referred to during the trial as "the side letter".

926. In their application for payment dated 16th December 2003 CB applied for £220,000 of the £400,000 sum referred to in the side letter, on the basis that the work involved in the hotel variation was partially complete: see E2/007. Although Multiplex had previously allowed £20,000 in respect of this item, in their certificate dated 11th February 2004 (relating to the period up to 31st December 2003) Multiplex allowed nothing in respect of this item: see E1/ 57 and 66.

927. CB's case is that they were entitled to be paid in respect of bowl steelwork £400,000 more than appears in the subcontract breakdown (D2/289); furthermore in calculating the lump sum risk factor the quantities of bowl steel shown in the subcontract breakdown (viz 13,586 tonnes) should be increased by the quantity steel to which the £400,000 relates. CB plead that quantity as being 347.59 tonnes. In his sixth witness statement Mr Underwood states that the quantity is 434.005 tonnes.

928. Multiplex's case is as follows. First, they do not accept that there was a side agreement as asserted by Mr Underwood. However, given the late stage at which Mr Underwood's sixth witness statement appeared and the time constraints of the trial, it was not feasible to investigate and cross-examine Mr Underwood upon those matters. Secondly, even if there was such a side agreement made or recorded in August 2002, that was subsequently overtaken by the subcontract. The subcontract was made on 26th September 2002. It specified a subcontract sum of £60 million, not £60.4 million. Furthermore, it included an "entire agreement" clause in the following terms:

"1.8.1 The Sub-Contract constitutes the entire agreement between the Parties and supersedes all prior negotiations, commitments, representations, communications and agreements relating to the Sub-Contract either oral or in writing except to the extent they are expressly incorporated herein. The Sub-Contractor confirms that it has not relied upon any representation inducing it to enter into the Sub-Contract (whether or not such representation has been incorporated as a term of the Sub-Contract) and agrees to waive any right which it might otherwise have to bring any action in respect of such representation. The Sub-Contractor further confirms that there is not in existence at the date of the Sub-Contract any collateral contract or warranty of which the Sub-Contractor is the beneficiary which might impose upon the Contractor obligations which are in addition to or vary the obligations expressly contained in the Sub-Contract and which relate in any way to the subject matter of the Sub-Contract. The Sub-Contractor's only rights arising out of, or in connection with, any act, matter or thing said, written or done or omitted to be said, written or done, by or on behalf of the Contractor (or any agent, employee or sub-contractor of the Contractor) in negotiations leading up to the Sub-Contract or in the performance or purported performance of the Sub-Contract or otherwise in relation to the Sub-Contract are the rights to enforce the express obligations of the Contractor contained in the Sub-Contract and to bring an action for breach thereof. Nothing in this clause 1.8 is intended to exclude liability of the Contractor for fraud or fraudulent misrepresentation."

929. Thirdly, Multiplex contend that if CB otherwise had any entitlement in respect of monies due under the side letter, then that claim has been compromised by clause 2.1 of the Supplemental Agreement.

930. On this issue, I have come to the conclusion that Multiplex's second contention is correct. The whole purpose of clause 1.8.1 of the subcontract was to shut out argument about what had or had not been agreed at the date of the subcontract, but was not recorded in the subcontract. Furthermore, the reasoning of the Court of Appeal at paragraph 109 of CA judgment 1 would seem to be consistent with this conclusion. If clause 1.8.1 precludes reliance on a subsequent agreement between the parties, *a fortiori* it precludes reliance on a previous agreement.

931. Mr Williamson sought to evade the effect of clause 1.8.1 by submitting that the side letter was an entirely separate agreement and therefore outside the ambit of the clause. That submission cannot succeed in the face of the clear words of clause 1.8.1. The subcontract is stated to supersede all "agreements relating to the subcontract either oral or in writing". Furthermore the subcontractor expressly confirms that it is not the beneficiary of any pre-existing collateral agreement, which adds to or varies the contractor's obligations under the subcontract.

932. In those circumstances, Multiplex's third submission based upon the Supplemental Agreement does not arise. I should add, however, that if Multiplex had failed on their second submission, I would have accepted their third submission.

933. In those circumstances, it is neither necessary nor appropriate for the court to investigate the facts surrounding the side letter, based as they are upon unsatisfactory hearsay evidence.

934. In the result I come to the following three conclusions:

- i) In the valuation of work done up to 15th February 2004, CB is not entitled to additional payment in respect of the side letter.
- ii) In considering what sum Multiplex had agreed to pay in respect of bowl steel, I must take the figure of £16,634,657 as set out in the subcontract breakdown, rather than that figure plus £400,000.
- iii) In considering how much steel CB had agreed to erect for the sum of £16,634,657, I must take the quantity of 13,586 tonnes as set out in the subcontract breakdown. I should not add to that quantity either 347.59 tonnes or 434.005 tonnes in respect of the side letter.

CHAPTER 14. HOW MUCH BLACK STEEL WAS REQUIRED IN ORDER TO CONSTRUCT THE BOWL AS ORIGINALLY SPECIFIED?

935. This topic is addressed at length in the expert reports, as well as the factual witness statements of Mr Underwood and Mr Osborne. It was addressed in the cross-examination of Dr Mastrandrea at day 25 pages 38 – 76 and in the cross-examination of Mr Hart at day 28,

pages 109 - 116. I regard the evidence of these witnesses as providing a more reliable guide than estimates which were made by CB during the 2004 negotiations.

936. In order to answer this question, it is necessary to look at the amount of black steel which was actually purchased for the purpose of constructing the bowl and then to make a number of adjustments. The adjustments for which Dr Mastrandrea contends are set out on page 3 of his supplemental note dated 3rd March 2008 (B7-3/2/173).

937. All parties start this exercise by taking the quantity of steel which CB in fact purchased for the purpose of fabricating bowl steelwork, as recorded in the Stock In section of Go Data. That is 18,951 tonnes. It is noteworthy that the errors in Go Data which were identified in cross-examination for the most part related to the Piece Monitoring System, rather than the Stock In reports.

938. I shall now consider the potential adjustments in the order set out by Dr Mastrandrea in his supplemental note.

(b) Variations (compromised)

939. The argument here is that, although Multiplex paid CB for 1,200 tonnes of steel under SV 399, CB in fact had to purchase 1,900 tonnes in order to carry out those variations. Therefore 700 tonnes should be added, in addition to the agreed allowance for SV 399. I see no evidence to support this contention. When cross-examined on the issue at pages 71 to 76, Dr Mastrandrea did not provide any substantiation for this contention. See in particular day 25, page 76, lines 11 to 12. I make no addition under this head.

940. In any event, for the reasons given by Mr Underwood in paragraph 79 of his fifth witness statement, the steel purchased by CB for variations will be included within the Go Data figure of 18,951 tonnes. Dr Mastrandrea came close to accepting this: see cross-examination at day 25, pages 47 to 49.

(c) Ledger angles

941. Multiplex contend that 149 tonnes must be added for ledger angles purchased by CB from site, but not recorded in Go Data. Although Mr Osborne gave the figure of 149 tonnes in his first witness statement, it is clear to me that that was a mistake. The correct figure is 6 tonnes, for the reasons explained in Mr Underwood's fifth statement and Mr Osborne's second statement. Mr Hart accepts that figure: see day 28, pages 111 – 112. I therefore make an addition of 6 tonnes in respect of ledger angles.

942. Dr Mastrandrea suggested in cross-examination at day 25, page 61 that an additional 50 tonnes should be added for ledger angles, which had been overlooked in his supplemental note. I see no basis for this assertion.

943. Further ledger angles would have been bought by Hollandia between 2nd August and completing the bowl. CB estimates this at 6 tonnes. Multiplex estimates it at 10 tonnes. Neither figure can be certain. I consider that 8 tonnes would be a reasonable figure to take.

(d) Floor steel in unlisted fittings

944. It is clear from Mr Underwood's evidence, and I accept, that black steel purchased for fittings was entered into the Stock In section of Go Data. No figure should be added under this head.

(e) Steel provided by ZNS

945. Mr Van Gils has asserted, and I accept, that ZNS purchased 686 tonnes of black steel in order to complete fabrication of the bowl steelwork. For the reasons set out in chapter 29 below (re Scott schedule 4A), 377 tonnes of that steel would not have been required for the purpose of constructing the bowl as originally specified.

946. Accordingly, I shall only take into account the purchase of 309 tonnes of black steel in the present exercise.

(f) Material sent to site by sub-contractors

947. This item was abandoned by Dr Mastrandrea in his evidence in chief: see day 24/119 – 120. That effectively remained the position in cross-examination.

(g) Materials ordered but not delivered

948. It is clear from Mr Underwood's evidence that the input into Go Data comprised steel delivered to CB, rather than steel purchased. No addition should be made under this head.

(h) Materials transferred to contracts other than Wembley

949. In cross-examination at day 25, page 59, Dr Mastrandrea accepted Mr Underwood's analysis of this issue at paragraphs 100 to 108 of his fifth witness statement. The quantity involved is 6 tonnes. This quantity should be deducted from the total, not added to it.

(i) The 20 change notices post 15th February 2004

950. For the reasons mentioned above the steel purchased by CB to effect these variations will be included in the Go Data figure of 18,951 tonnes. These variations are analysed in chapter 25 below. In so far as they are held to be valid variations (whether instructed before or after 15th February), the additional steel involved must be deducted for the purpose of the present exercise. The parties (having been given chapter 25 in draft) have agreed that this amounts to 32.5 tonnes.

(j) Replacement steel left in China

951. It is common ground that some of the steel purchased by CB for the bowl and sent to SGT for fabrication never in fact came back to the UK either fabricated or unfabricated. Therefore this quantity must be deducted. Multiplex plead in Scott schedule 2 that the quantity is 1,656 tonnes. Dr Mastrandrea asserts that the correct figure is 818 tonnes, to be derived from a Go Data print out, which he exhibits as part of tab 26 of the appendices to his schedule 2 report.

952. I do not accept Dr Mastrandrea's figure of 818 tonnes, because the Go Data print out, upon which he relies, does not purport to show steel left in China. In my view, the most reliable evidence of what steel was left in China appears from the settlement agreement between CB and SGT. This shows that CB provided 1,300 tonnes of steel to SGT as part

payment for the fabrication work undertaken by SGT: see QC 66/227.10 – 227.11. Out of that 1,300 tonnes, 297 tonnes related to the roof: see CB's reconciliation document of 2nd September at P1/ 5 and 7.

953. Accordingly 1,003 tonnes should be deducted from the total in respect of steel left in China.

(k) Wastage

954. Dr Mastrandrea deducts 5% for wastage. Mr Underwood has given evidence that the wastage rate on the Wembley bowl was 7.05% (see paragraph 171 of his fourth witness statement). Dr Mastrandrea very fairly conceded in cross-examination that this was an exceptional project and that he had no experience of steel wastage on a project such as this.

955. I am satisfied that Mr Underwood's figure of 7.05% is soundly based. That is the figure which I shall take.

New item suggested by Dr Mastrandrea on day 25

956. In the coloured chart which Dr Mastrandrea introduced on day 25, he suggested that 143 tonnes should be added for "AceCad total ordered/delivered". I have examined the correspondence with AceCad produced by Dr Mastrandrea and exhibited to his report. I see no proper basis for making this addition.

957. In addition to the above, 1200 tonnes must be deducted in respect of SV 399. No adjustment must be made in respect of the side letter. See chapters 12 and 13 dealing with those two issues.

958. On the basis of the above analysis, I conclude that the total quantity of black steel which has been purchased in order to construct the bowl of Wembley Stadium, as it now is, amounts to 16,978 tonnes. However, the bowl in its present state includes variations which necessitated the purchase of additional steel. On the basis of my findings in relation to the variations issues, I hold that the additional steel attributable to variations was 1,232.5 tonnes.

959. Accordingly, I conclude that the total quantity of black steel which CB needed to purchase in order to construct the bowl as originally specified in the subcontract was 15,745.5 tonnes. This quantity exceeded CB's allowance of 13,586 tonnes contained in the Backup to Overall Subcontract Breakdown (D2/289) by 2,159.5 tonnes.

960. On the basis of these figures, the lump sum risk factor is 86.28%. This lump sum risk factor will be applied in the valuation exercise set out in chapter 28 below.

CHAPTER 15. HOW SHOULD WORK IN PROGRESS BE VALUED?

The parties' contentions

961. CB contend that in the various valuation exercises which the court must undertake, allowance should be made (a) for steel which was partly fabricated and (b) for fabricated

steel which was partly painted. CB contend that if they do not receive payment for partial fabrication and for partial painting, they will not be properly remunerated for the work which they have performed. Furthermore CB contend that this approach accords with the proper interpretation of the Supplemental Agreement and the purchase order. See paragraphs 577 – 581 of CB’s closing submissions and Mr Williamson’s brief oral submissions at day 36, page 82.

962. Multiplex contend that there is no contractual basis for these claims. CB are entitled to payment for fabrication when fabrication is complete and not before. CB are entitled to payment for painting when painting is complete and not before. See paragraphs F 4.60 to 4.65 of Multiplex’s closing submissions and Mr Stewart’s oral submissions at day 34 pages 138 – 142.

963. I shall address these issues by reference to the three separate valuations which I am required to carry out, namely (i) valuation of steel fabricated up to 15th February, (ii) valuation of steel fabricated pursuant to clause (b) of schedule 1 to the Supplemental Agreement (“schedule 1 (b)”) and (iii) valuation of steel fabricated pursuant to the purchase order.

(i) Valuation as at 15th February

964. The issue to be addressed here is how bowl steel which was undergoing fabrication or painting on 15th February should be treated in the valuation.

965. CB contend that steel undergoing fabrication should be paid for at 50% of the fabrication rate, whereas Multiplex contend that such steel should be treated as black steel. CB contend that fabricated steel undergoing painting should be paid for at 50% of the painting rate, whereas Multiplex contend that such steel should be treated as unpainted steel.

966. My starting point is schedule 1 to the Supplemental Agreement. That sets out the valuation exercise which must be undertaken:

“(a) the gross valuation as at 15th February 2004 of work properly completed on Site and goods and materials brought onto Site by the Subcontractor and Off-Site Materials in accordance with the provisions of the Subcontract ...”.

I shall refer to this provision as “schedule 1 (a)”.

967. The valuation process required by schedule 1 (a) must be carried out in accordance with clause 21 of the subcontract (set out in chapter 10 above) and in accordance with the provisions of the Pricing Document, which comprises volume 3 of the contract documents. This follows from the language of schedule 1 and from the reasoning of the Court of Appeal in CA judgment 1.

968. Clause 1.1 of the Payment Programme (on page 3 of the Pricing Document) provides:

“The purpose of the Payment Programme is to show the values of the various elements of the Works for the purpose of valuations and payment pursuant to Clause 21 of the Subcontract Conditions.”

969. The “Backup to Overall Subcontract Breakdown” constitutes the last four pages of the Payment Programme within the Pricing Document. I shall refer to this as “the

subcontract breakdown”. Although the words “for information only” appear at the top of the page, it is agreed that this constitutes a contract document: see e.g. day 27, page 191.

970. The subcontract breakdown allocates £15,634,657 of the subcontract sum to bowl steelwork on the assumption that the bowl comprises 13,586 tonnes of steel. In the event that the bowl (ignoring variations) comprises more or less than 13,586 tonnes, then the subcontractor bears the risk of loss or the chance of gain. This is referred to as “the lump sum risk”. For present purposes, I shall ignore the lump sum risk. The subcontract breakdown apportions the sum allowed for bowl steelwork into the following five categories:

- i) Materials procurement
- ii) Fabrication
- iii) Painting
- iv) Materials on site unfixed
- v) Erection.

971. Accordingly the amount of the subcontract sum which should be paid on interim valuations for steel which has reached any one of those five stages can readily be deduced. To take a simple example, if 3,091 tonnes of steel have been procured and fabricated for phase 11 North, it can be seen from the subcontract breakdown that CB receive £1,574,588 for procuring that steel and £1,276,155 for fabricating that steel. The Payment Programme says nothing about payment for steel which is partly fabricated; it says nothing about payment for fabricated steel which is partly painted. The scheme of the subcontract is that CB receive payment for completed stages of work.

972. In my view, this is precisely the scheme which should operate in carrying out a valuation for the purpose of schedule 1 (a). If the parties had intended to provide for payment in respect of part fabrication or part painting, they could and would have specified that. They chose not to do so, no doubt for a number of good reasons. One obvious reason for not specifying part payments is that Go Data does not reveal how much fabrication has been carried out to steel which has entered that process. Nor does it reveal how much painting has been carried out to fabricated steel, which has gone off for painting. There simply was no practicable way of valuing part fabrication or part painting (as CB concede in paragraph 219 of their opening note).

973. This interpretation does not mean that work in progress would go unremunerated. CB would get the benefit of any partial fabrication or partial painting completed as at 15th February, because there would be correspondingly less painting and fabrication to do, in order to earn the lump sum under schedule 1 (b).

974. I therefore conclude that, in relation to the valuation of bowl steel as at 15th February, Multiplex’s approach to work in progress is correct and CB’s approach is incorrect. CB are not entitled to payment for partial fabrication or partial painting.

(ii) Valuation of Steel Fabricated pursuant to Schedule 1 (b) of the Supplemental Agreement

975. There is an issue as to whether the relevant date for valuing CB's fabrication work pursuant to schedule 1 (b) is 30th June, 2nd August or some intermediate date. For the reasons set out in chapter 19, I have concluded that the relevant date is 30th June.

976. The valuation exercise which must be carried out as at 30th June is an interim valuation in accordance with clause 21 of the subcontract conditions. That clause was preserved by the Supplemental Agreement and was applicable to the valuation of the lump sum works. See the final, unnumbered paragraph of schedule 1 to the Supplemental Agreement.

977. In relation to the work in progress issue, the same considerations apply as were discussed in relation to the 15th February valuation.

978. The mere fact that CB repudiated the subcontract before another interim payment fell due does not entitle CB to additional remuneration in respect of work in progress as at 30th June.

979. This conclusion does not cause unfairness, as CB have suggested. The part fabricated steel which CB sent to Holland required less work to be done to it. Accordingly, Hollandia reduced their charges for fabricating such steel: see the spreadsheets in bundle M4A (which set out Hollandia's charges for fabricating each individual piece of steel). Thus it can be seen that CB receive credit for work in progress as at repudiation in two ways. First, Multiplex's claim for damages in schedule 4A is reduced because there was less work to do in respect of part fabricated steel. Secondly, the amount of credit (i.e. the unused part of the £12 million lump sum) which Multiplex must give against their damages claim is increased.

980. I conclude that in valuing work carried out pursuant to schedule I (b), CB are entitled to payment for steel which was fully fabricated and for fabricated steel which was fully painted. CB are not entitled to payment for steel which was partly fabricated or partly painted.

(iii) Valuation of steel fabricated pursuant to the Purchase Order

981. This exercise turns upon the proper interpretation of the purchase order, which is addressed in chapter 18. For the reasons there set out, I hold that the relevant valuation date under the purchase order is 2nd August and that CB are not entitled to payment for partial fabrication.

982. This decision does not cause unfairness to CB for the same reasons as discussed above. Multiplex's claim for damages at Scott schedule 4F is correspondingly reduced by reason of Multiplex's success on the "work in progress" issue under Scott schedule 2.

Overall Conclusion

983. At each valuation date CB are entitled to payment for completed work stages. They are not entitled to additional payment for work in progress (i.e. steel which according to the Go Data piece monitoring system was at planning, in fabrication or in painting).

984. This topic is addressed in the defendants' supplemental 21.25. Supplemental 21.25 is an extremely helpful, agreed document which sets out both parties' contentions in separate columns. The document has come in two versions, namely version A which applies if CB's method of valuing work in progress as at 15th February prevails, and version B which applies if Multiplex's method of valuing that work in progress prevails.

985. For the reasons set out above, Multiplex's method of valuing work in progress as at 15th February is the correct one. Accordingly, I must adopt version B of supplemental 21.25 (which will be referred to in this section of judgment as "the supplemental").

986. At E9/68 there is an Excel spreadsheet derived from the Go Data stock in report dated 15th February 2004. This shows that as at 15th February 2004 CB had purchased 15,952.9 tonnes of steel for the bowl. This figure is adopted by both parties as the starting point for their respective valuations, as pleaded in Scott schedule 2 and as set out more intelligibly in the supplemental. The starting figure of 15,952.9 tonnes appears at row 2 of the supplemental in columns F and G (CB's case) and columns H and I (Multiplex's case).

987. At this point the parties' cases diverge. CB contend that I should value the net weight of unfabricated black steel at contract rates. Multiplex contend that I should value the gross weight of unfabricated black steel at cost.

988. As previously set out, in my view the 15th February valuation should be conducted in accordance with the original valuation provisions of the subcontract, save in so far as those provisions are expressly overridden by the terms of the Supplemental Agreement. That approach inured to the advantage of Multiplex in relation the method of valuing work in progress. In relation to the present issue, however, it inures to the benefit of CB.

989. Clause (f) of schedule 1 to the Supplemental Agreement provides that steel procured post 15th February should be valued at cost. However, clause (f) does not affect the method of valuing materials procured for the purpose of the valuation of work and materials up to 15th February. I therefore hold that the original subcontract provisions govern that process. Steel procured by CB for the bowl must be valued on a net basis at rates to be derived from the subcontract breakdown. I say "to be derived from", because the process of derivation is a complex one which will have to be addressed subsequently. My present concern is simply to calculate the quantities of steel to be valued.

990. The bowl steel must be valued by reference to the following work stages, as set out in the subcontract breakdown (D2/289):

- i) Materials procurement
- ii) Fabrication
- iii) Painting
- iv) Materials on site unfixed
- v) Erection.

991. It is common ground that steel in work stages (ii) to (v) must be valued net of wastage. It follows from my decision in the previous paragraph that steel in work stage (i) must also be valued on a net basis.

992. I therefore arrive at the position that all of the bowl steel in the 15th February valuation must be valued on a net basis. Accordingly, my next task is to determine the appropriate deduction for wastage. Multiplex contend that the deduction should be 5% and that figure is supported by Dr Mastrandrea. It can also be seen that this was the figure allowed in CB's tender.

993. CB contend that the deduction should be 7.05%. That figure is explained by Mr Underwood at paragraphs 171 to 174 of his fourth witness statement. Essentially, 7.05% is higher than usual. However, analysis shows that approximately 7.05% is the actual level of wastage in this case. Furthermore, the higher than usual wastage is explicable because of the unusually large number of design changes.

994. Dr Mastrandrea was cross-examined on this issue at day 25, pages 62 – 64. He said that he had experience of steel wastage on structural steelwork jobs, but not on an exceptional project like Wembley. Wembley was exceptional because of the high level of design changes. Mr Hart was cross-examined on the wastage issue at day 28, pages 108 – 109. He admitted that he had previously overlooked the tender allowance of 5%, but nevertheless he maintained that the figure of 7.05% based on actual experience was appropriate.

995. On the basis of the factual evidence, I find that 7.05% is the best estimate that can now be made of the wastage which occurred on steel for the Wembley bowl. Having considered the expert evidence and counsel's submissions, I am satisfied that the wastage level which actually occurred (rather than the tender allowance for wastage) is the figure which should be used in the present valuation exercise.

996. I shall therefore take 7.05% of 15,952.9 tonnes as the quantity of bowl steel wasted. That amounts to 1,124.68 tonnes of wastage, leaving the net total purchased as 14,828.22 tonnes.

997. It is next necessary to identify how much of that net steel had been fabricated, how much had been painted, how much was on-site unfixed and how much had been erected as at 15th February. These quantities can be derived from (a) the PMS print outs dated 15th February and (b) Mr Osborne's spreadsheets recording steel on site and steel erected. All of this information is summarised on the excel spreadsheet at E9/34. An adjustment must then be made for 359.5 tonnes of steel, which had been painted and was in transit to site. Also 24.5 tonnes must be added to the unfixed materials on site, in order to correct the misallocation explained in paragraph 83 of Mr Underwood's fifth witness statement (accepted by Dr Mastrandrea in cross-examination at day 26, pages 110 – 111).

998. Although Go Data does not record the amount of steel which remained as black steel on 15th February, that figure can be readily deduced. It is the difference between the total amount of steel purchased and the total amount of steel which had entered the piece monitoring system.

999. When the above calculations are done, it can be seen that the quantities of steel to be valued as at 15th February 2004 are as follows:

Steel procured	7,394.96 tonnes
Steel fabricated	2,890.94 tonnes
Steel painted	1,489.82 tonnes
Steel on site unfixed	561.50 tonnes
Steel erected	<u>2,485.05 tonnes</u>
Total	14,822.27 tonnes

1000. This total comprises (a) 7,427.31 tonnes of fabricated steel and (b) 7,394.96 tonnes (net) of unfabricated steel.

1001. The slight difference between the total in the previous paragraph and the quantity of net steel purchased (set out earlier) is, I believe, due to the fact that some 6 tonnes of ledger angles were purchased from site and were not properly accounted for in the Go Data system.

1002. The final issue which arises concerns the 1,200 tonnes of variation steel. Should that be treated as all falling within the erected category (as Multiplex contend) or should it be spread evenly across all categories (as CB contend)? In my judgment that quantity of steel should be spread evenly across all categories. CB's application for payment in respect of variation work (in the sum of £8,504,830) was advanced on the basis that such work was only partially complete. Multiplex's valuation of that work was in a substantially lower sum than claimed by CB. I see no basis for treating Multiplex's valuation as attributable entirely to steel which was fully erected. An even distribution of variation work across all categories represents the best and fairest estimate that can now be achieved.

CHAPTER 17. OTHER PRE-15th FEBRUARY VALUATION ISSUES

1003. In this chapter I shall address all issues concerning the valuation up to 15th February, which have not been dealt with in previous chapters.

Metal decking

1004. The locations of metal decking were explained by Mr Stewart, on instructions, on day 29. Essentially Bison planks were laid on levels S2, S3, S4 and S5. Metal decking was used in parts of phases 11, 12 and 17, where the configuration made it impracticable to lay Bison planks. The areas where Bison planks or metal decking were laid have been coloured green on the plan at T 17/1.

1005. It can be seen from the subcontract breakdown at D2/280 that out of the subcontract sum of £60 million, £320,400 is allocated to metal decking (£57,200 + £125,800 + £137,400).

1006. CB have recently abandoned their pleaded case that metal decking was 60% complete on 15th February and now contend for 52% completion: see paragraph 809 of CB's closing submissions.

1007. It can be seen from CB's February progress report at F3/ 63 that only 41% of steel erection was complete on phase 11 and only 8% of steel erection was complete on phases 12 and 18. As Mr Stewart pointed out to Mr Underwood in cross-examination, at first sight this makes it unlikely that 52% of the metal decking had been completed in those areas. Mr Underwood explained (and Multiplex now accept at paragraph F 8.25 of their closing submissions) that the explanation is as follows: as a consequence of the hotel variation, less metal decking was required in phases 11, 12 and 18 than before. By 15th February MSW (UK) Ltd, CB's subcontractor, had indeed laid 52% of the metal decking which was required.

1008. The issue which then arises is whether as at 15th February CB were entitled to be paid (a) 52% of the original £320,400 or (b) 52% of some lesser sum. I have come to the conclusion that Multiplex's otherwise valid claim to reduce the valuation of metal decking is one of the many variation claims which have been compromised by clause 2.1 of the Supplemental Agreement. There are many instances where clause 2.1 operates in favour of Multiplex. On this occasion, however, as Mr Underwood observed (day 22, page 139), the clause operates in favour of CB.

1009. I assess CB's claim for metal decking up to 15th February at £166,608.

Provisional sums

1010. CB claim £1,207,452 in respect of provisional sum items: see paragraphs 71 – 79 of CB's re-re-re-amended Scott schedule 2.

1011. Multiplex contend that reductions should be made in respect of (i) Enob and Babbie costs referable to pre-15th February variations and (ii) CB's over recovery in respect of treating steel. Multiplex also dispute CB's addition of 15% for overheads and profit.

1012. Enob and Babbie costs referable to pre-15th February variations. The final paragraph of schedule 1 to the Supplemental Agreement provides:

“(All costs associated with the painting for which a provisional sum was included in the Sub-Contract are deemed to be included in the lump sum referred to at paragraph (b) above. For the avoidance of doubt all costs associated with the expenditure of the Provisional Sum for Fire Protection is not included in the lump sum referred to at paragraph (b) above. Such expenditure will be recovered by the Sub-Contractor monthly and in addition to the draw down on the lump sum at paragraph (b))”.

1013. It is implicit in this paragraph that CB recover the sums which they pay to Enob for intumescent painting, quite separately from and in addition to the sums due under the Supplemental Agreement. Intumescent painting was work which was carried out by Enob (as subcontractor to CB) to the extent instructed by Multiplex and at Multiplex's cost. CB were entitled to be paid for intumescent painting consequential upon pre-15th February variations.

1014. Schedule 1 to the Supplemental Agreement is silent in respect of Babbie. In those circumstances clause 2.1 of the Supplemental Agreement applies without modification. CB are not entitled to recover sums which they have paid to Babbie (the third party checking engineer) in respect of work consequential upon pre-15th February variations.

1015. Over-recovery in respect of treating steel. Multiplex contend that the subcontract breakdown pre-supposes that CB will paint all steel members with ordinary paint. In so far as Enob subsequently applied intumescent paint to steel members and Multiplex paid for such intumescent painting by way of adjustment of the provisional sum, CB have saved the cost of applying ordinary paint and must give credit for that saving.

1016. I agree with the view of Dr Mastrandrea (at paragraph 3.146 of his schedule 2 report) that in principle this argument is sound.

1017. Mr Hart argues, in effect, that CB made allowance in their rate for the fact that some steel was destined for intumescent painting even though the quantity of that steel was not known (my paraphrase of Mr Hart's report paragraphs 465 – 467). I do not accept Mr Hart's argument. The subcontractor has no way of knowing what use the main contractor will make of provisional sums and he does not price his tender on the assumption that any particular use will be made of provisional sums. See *Midland Expressway Ltd v Carillion Construction Ltd* [2006] EWCA Civ 936.

1018. Mr Hart makes the separate point that CB would have had to blast and prime steel which required intumescent painting. I accept that, in so far as CB carried out preparation work upon steel sent to Enob but did not recover the cost of that preparation work under the provisional sum mechanism, this cost must be brought into account.

1019. Accordingly, the credit to which Multiplex are entitled is the notional cost of applying ordinary paint to the relevant steel minus the actual cost of preparing that steel to receive intumescent paint.

1020. However, there was no evidence before me as to whether CB did in fact prepare such steel or what such preparation cost. Following a hearing on 30 July 2008 (at which I sought counsel's assistance on the point), CB did not pursue this issue.

1021. The result therefore is that CB must give credit for this saving both in respect of the period before 15th February and the period after 15th February. I accept the figures for this saving set out in Dr Mastrandrea's report. Owing to a clerical error, one of those figures was not correctly incorporated into Multiplex's pleadings when amendments were made, but I am satisfied that this slip has not prejudiced CB.

1022. I therefore deduct £228,641.88 pre-15th February and £181,530.15 post-15th February 2008.

1023. Overheads and profit. It is normal practice for a contractor to add a margin for overheads and profit to the cost of provisional sum work. This is reflected in rule 10 of SMM 7. Although the Standard Method of Measurement is not incorporated into the present subcontract, it must have been the intention of the parties that CB would add to the base cost of provisional sum works a reasonable mark up in respect of overheads and profit. Dr Mastrandrea contends that 11% is the appropriate mark up. Mr Hart supports a mark up of 15%.

1024. There is little by way of evidence or argument to assist me in assessing an appropriate mark up for overheads and profit in respect of provisional sum items. In those circumstances, I propose to take a figure half way between Dr Mastrandrea and Mr Hart. I allow 13%.

1025. Further issue post trial. During the post trial hearings counsel identified an issue which had not been debated during the trial, namely whether Enob's total costs should be those invoiced by Enob up to 30th June (£1,122,753.22) or those claimed by CB in application 23 (£1,075,120.64). Miss Garrett submitted at the post trial hearing on 30th July that I should take the former figure. Mr Buckingham submitted that I should take the latter figure.

1026. I have come to the conclusion that I should take the invoiced figure, namely £1,122,753.22. I reach this conclusion for three reasons:

- i) It was Multiplex's duty to value "works properly completed" during the relevant month: see clauses 21.3 (2) (4) and 21.4 (2).
- ii) It appears from Enob's invoice dated 30th June and (received by CB on 30th June) that work to the value of £1,122,753.22 had been completed by Enob by the end of June.
- iii) In paragraph 4.59 of his schedule 2 report Dr Mastrandrea notes that the starting point for calculation of fire protection costs is £1,122,753.22.

1027. Miss Garrett and Mr Buckingham have agreed (and have demonstrated with the aid of a supplementary bundle lodged on 30th July) that this issue affects the quantification of provisional sums both before and after 15th February. Therefore I shall take this conclusion into account both in the present chapter and also in chapter 27, but I shall not repeat the above two paragraphs in chapter 27.

1028. Conclusion. On the basis of the decisions set out above, I assess that £273,969.02 (i.e. £502,610.90 less a deduction of £228,641.88 for over-recovery re treating steel) is due to CB in respect of Enob's provisional sum item up to 15th February 2004.

Black steel for the Roof

1029. The issues arising under this item are exactly the same as those which arise in the valuation of black steel for the bowl, except that CB press for a substantially lower wastage factor.

1030. For the reasons given in chapter 14, I accept CB's argument that black steel for the roof should be valued at subcontract, not cost, rates and that it should therefore be valued on a net basis.

1031. I do not accept the argument in paragraphs 293 and 294 of Mr Underwood's fourth witness statement that wastage for the roof should be reduced to 2%. The scepticism expressed by Multiplex in paragraph F 4.51 of their closing submissions is justified. Having accepted CB's argument in relation to the bowl that a wastage factor of 7.05% has been established empirically, I am not prepared to take a different rate for the roof on the basis of

speculation. The roof, like the bowl, was a complex structure and subject to extensive change. The appropriate wastage factor is 7.05%.

1032. Accordingly the value of black steel for the Roof is £1,606,713.05.

CHAPTER 18. THE SAGA OF CHINA STEEL AND THE PURCHASE ORDER

1033. The sequence of events surrounding steel sent to China and the purchase order has been the subject of extensive debate in this litigation for over two years. Despite the passage of time, the facts do not become any easier to unravel.

1034. It will be recalled from paragraphs 72, 127, 232, 241, 410, 481 of judgment 1 and paragraph 33 of judgment 2, that CB sent a quantity of black steel to China for fabrication by SGT. Some of that steel came back to the UK fabricated; some came back part fabricated; some came back to the UK in its original state, after a not inexpensive round trip; some was left in China (and was used, I am told, for the Beijing Olympics). The problem of China steel was overlooked in the Heads of Agreement but addressed in the Supplemental Agreement.

Purchase Order

1035. On 26th May 2004 Multiplex sent purchase order 74010 to CB (QC 27/86). This was the “side order” referred to by Mr Grant in his evidence during the trial of preliminary issues 1 – 10 (April to May 2006). It is generally referred to as “the purchase order” and I shall follow that convention.

1036. Item 1 of the purchase order required CB to fabricate and deliver to site “China steel returned unmade” as defined in schedule 3, part A of the (then draft) Supplemental Agreement. The rate specified for this work was £1,067.24 per tonne. Item 2 of the purchase order required CB to fabricate 666.71 tonnes of steel for Multiplex in accordance with schedule 3, part A of the (then draft) Supplemental Agreement. Item 3 of the purchase order required CB to supply paint material to Holland. Item 4 required CB to transport black steel to Holland.

1037. Item 1 of the purchase order was subject to Multiplex’s standard conditions for purchase orders, which appear at QC 27/87. Clause 14 of those conditions required CB to submit a VAT invoice for goods properly supplied and delivered.

1038. Item 2 of the purchase order was not only subject to Multiplex’s standard conditions, but also provided “the materials shall be valued under clause 4.7 of the subcontract”. Clause 4.7 of the subcontract required variations to be valued on a fair and reasonable basis consistent with the values included in the build up of the subcontract sum.

1039. Items 3 and 4 appeared in the purchase order because, under the Heads of Agreement, some of CB’s fabrication responsibility had been carved out and was being re-let by Multiplex to Hollandia. Items 3 and 4 do not give rise to any issues of principle between the parties.

1040. Two issues of interpretation arise in respect of the purchase order, which it is convenient to deal with now. The first issue (upon which I am not sure that any money turns) concerns dates. Multiplex concede that in relation to item 1 of the purchase order CB are entitled to payment for fabrication work completed up to the date of repudiation. That is because there is no payment mechanism linked to interim applications and certificates. In relation to item 2, however, Multiplex point to the reference to clause 4.7. They submit that this brings in the payment mechanism of the subcontract. Accordingly, CB are only entitled to payment for fabrication work done under item 2 up to 30th June 2004 (the date up to which certificate 37 runs).

1041. I do not accept this argument. Item 2 expressly incorporates clause 4.7 of the subcontract, namely the yardstick for valuing variations. It does not, however, either expressly or impliedly incorporate any other provisions of the subcontract. In particular, it does not incorporate the payment mechanisms of the subcontract (interim applications and certificates). Accordingly, I hold that CB are entitled to payment for fabrication work carried out under item 2 up to the date of repudiation.

1042. The second issue of interpretation concerns rates. CB contend that they are entitled to be paid for steel fabricated under item 2 of the purchase order at £1,067.24 per tonne. Multiplex contend that CB should be paid at subcontract rates for steel fabricated under item 2.

1043. On this issue I accept the submissions of Multiplex. If the parties had intended the rate of £1,067.24 to apply to steel fabrication under item 2 (as well as to steel fabrication under item 1) they would have shown that in the “rate” column of the purchase order. They did not do so. Instead they provided that steel fabricated under item should be “valued under clause 4.7 of the subcontract”.

Supplemental Agreement

1044. Clause 3.1 of the Supplemental Agreement provided that the subcontract works should be varied post 15th February by the omission of the fabrication and delivery of the items specified in schedule 3, part A.

1045. Schedule 3, part A provided that Multiplex would carry out the works listed in the two attached schedules. The second schedule attached was called “document 2”. The first schedule attached was nameless. For the sake of consistency, I shall call it “document 1”.

1046. Document 1 identified the steel fabrication, which formerly formed part of the subcontract, but which was now being carved out and becoming the responsibility of Multiplex. Document 1 comprised seven columns, which I have numbered from the left and will refer to as “column 1”, “column 2” and so forth. Document 1 was divided into four sections, which I will refer to as “section 1”, “section 2” and so forth.

1047. Section 1 of document 1 dealt with bowl steel. It identifies 3,564.11 tonnes of bowl steel fabrication, for which Multiplex was assuming responsibility. Section 1 also sets out the arrangements which Multiplex was making for the fabrication of that bowl steel. Column 3 of section 1 identifies 1,023.4 tonnes of bowl steel which Multiplex was employing ZNS to fabricate. This steel formed part of phases 11, 12, 14, 16, 18, 21 and 25. Column 4 of section 1 identifies 1,874 tonnes of “China steel returned unmade”, which Multiplex was employing CB to fabricate. This steel formed part of phases 13, 17, 21, 22, 23, 24, 25, 26,

27, 28 and 34. Column 5 of section 1 identifies 666.71 tonnes of bowl steel which Multiplex was employing CB to fabricate. This steel formed part of phases 11, 12, 15 and 18.

1048. It can readily be seen from the previous paragraph that column 4 of section 1 of document 1 marries up with item 1 of the purchase order. Column 5 of section 1 of document 1 marries up with item 2 of the purchase order. Indeed document 1 of schedule 3 may well be identical to the draft of schedule 3 which was attached to the purchase order. I say “may well be”, because all surviving copies of schedule 3 attached to the purchase order are partially illegible.

Mr Underwood’s evidence

1049. In his fourth and fifth witness statements Mr Underwood recounts the story of China steel. The general code which CB used for Wembley was 430. However, black steel sent to China for fabrication was recorded in the stock in reports under the code 430A: see paragraph 57 of statement 5 (confirmed in cross-examination at day 22, page 97).

1050. Up until 15th February 2004 the progress of steel being fabricated in China was not tracked on the Go Data piece monitoring system. It was simply recorded on spreadsheets sent by SGT to CB. After 15th February, however, CB knew that they would be paid separately for fabricating “unmade” steel returned from China. So they recorded this steel under a separate code, namely “430 China”.

1051. CB sent a total gross quantity of 5,352 tonnes of steel to China. Of that SGT sent back 3,695.6 tonnes. 1,300 tonnes of steel were left in China in part payment for SGT’s services. Wastage amounted to 356.4 tonnes. (See Mr Underwood’s fourth statement, paragraphs 191 – 194, commenting on figures used by Multiplex.)

1052. Mr Underwood’s evidence as to the amount of steel left in China was originally disputed. However, the figure of 1,300 tonnes is evidenced by the settlement agreement between CB and SGT. That figure became agreed on day 30 of the trial, although Multiplex contend that part of the 1,300 tonnes was roof steel (an issue which is addressed separately in this judgment).

1053. It became clear during cross-examination on day 22 (pages 100 to 133) that Mr Underwood was confused in his recollection of the codes under which China steel was recorded. Accordingly, it has become necessary to reconstruct the true position, so far as possible, from the documents.

The Parties’ cases as to what is due under item 1 of the purchase order

1054. Multiplex’s case in this regard is set out in claimant’s supplemental 6. CB’s case in this regard is set out in defendants’ supplemental 25. Ms Garrett has helpfully set out the rival figures in tabular form in defendants’ supplementals 27.6 and 27.7. Mr Buckingham and Ms Garrett gave a helpful explanation of these supplementals on day 30.

1055. The parties’ cases are elaborated, to some degree, in their respective closing submissions: see claimant’s closing submissions at section F 8.55 to 8.57 and defendants’ closing submissions at paragraphs 886 to 894.

Decision re Item 1 of Purchase Order

1056. I have considered the underlying documents, the oral and written evidence of Mr Underwood, the views of Dr Mastrandrea and Mr Hart, the various supplementals and the submissions of counsel.

1057. I shall first set out how, as a matter of fact, China steel was dealt with. I shall then assess what sum is due to CB under item 1 of the purchase order.

How China steel was dealt with

1058. It is clear from analysis of the documents that CB used code 430A in the stock in reports to record black steel which they purchased and sent to China before 15th February 2004. After 15th February CB used code 430A in the PMS reports to record the fabrication and other work which they carried out on black steel returned from China.

1059. CB used the code “430 China” for two purposes. First, it denoted steel which SGT had fabricated in China. Secondly, it denoted steel which SGT had partly fabricated in China and the fabrication of which CB completed in the UK.

1060. The steel which SGT fabricated or partly fabricated in China up to 15th February is identified by quantities and phase numbers in the spreadsheet provided by SGT, dated 16th February (E9/37). The same information is set out in a more convenient format on CB’s spreadsheet at E9/36. This shows that SGT fabricated 1,703 tonnes and partly fabricated 219 tonnes (making a total of 1,922 tonnes). The record of shipments at T21/190 shows that the fabricated and partly fabricated steel was shipped back to England on various dates between January and March 2004. The discrepancy between 1,922 tonnes on shown on SGT’s spreadsheet and the total of 1,897.5 tonnes derived from the shipping invoices is not one which the parties or I can explain. It is clear, however, that the two tonnages relate to the same subject matter. Possibly the discrepancy is due to an accumulation of small errors in the shipping invoices. I shall take the figure of 1,922 tonnes provided by SGT as being correct.

1061. The PMS reports under code 430 China reveal that CB completed the fabrication of the 219 tonnes of partly fabricated steel sent back by SGT. Indeed an additional 51 tonnes of steel fabrication also somehow became recorded under code 430 China. See the PMS report at P1/145. This shows that a total quantity of 1,973.96 tonnes was fabricated under code 430 China by the date of repudiation.

1062. The shipping invoices record that a total of 1,798.1 tonnes of black steel was shipped back to the UK on dates between 30th March and 6th June. The PMS reports for 2nd September (which I regard as the most reliable record of work done up to repudiation) show that CB fabricated 237 tonnes of the black steel returned from China. As at the date of repudiation 394.24 tonnes of the black steel returned from China were in planning, and 53.68 tonnes of that steel were in fabrication.

Assessment of what is due to CB under item 1 of the purchase order

1063. The first issue is whether CB are entitled to be paid under the purchase order for completing the fabrication of partly fabricated steel sent back from China. In my view such steel falls within the meaning of “China steel returned unmade”. It can be seen from the spreadsheet at E9/36 that of that 219 tonnes (a) 137 tonnes related to phases 13 and 17, (b) 82 tonnes related to phases 14 and 16. The purchase order applied to steel for phases 13 and 17,

but not to steel for phases 14 and 16. I therefore conclude that CB are entitled to be paid under the purchase order for completing the fabrication of 137 tonnes of partly fabricated steel relating to phases 13 and 17. CB are not entitled to be paid under the purchase order for completing the fabrication of the other 82 tonnes. Nor are CB entitled to be paid for fabricating the additional 51 tonnes, which have somehow found their way into the PMS reports under code 430 China. There is no evidence that that steel was “returned unmade from China”. Therefore the latter quantities of steel fabrication (the 82 tonnes and the 51 tonnes) fall under the schedule 1 (b) lump sum.

1064. In my view CB are entitled to be paid for completing the fabrication of the 137 tonnes at half the contractual rate under the purchase order. The simplest way to deal with this entitlement is to treat CB as being entitled to payment at full rate for fabricating 68.5 tonnes of steel under code 430 China.

1065. I now turn to steel fabrication recorded under code 430A. CB were entitled under the purchase order to be paid at the agreed rate for steel which they fabricated up to the date of repudiation. They had no contractual right to be paid for steel which was in planning or in fabrication on that date. The purchase order neither expressly nor impliedly entitled CB to be paid in respect of steel which was not fully fabricated. Accordingly CB are entitled to be paid under the purchase order for fabricating 237 tonnes of black steel returned from China. CB are not entitled to be paid for the 394.24 tonnes in planning or the 53.68 tonnes in fabrication.

1066. Let me now draw the threads together. CB are entitled to be paid under item 1 of the purchase order for fabricating 68.5 tonnes recorded under code 430 China and for fabricating 237 tonnes recorded under code 430A. That makes a total of 305.5 tonnes. The rate specified in item 1 of the purchase order was £1,067.24 per tonne. Therefore CB are entitled to be paid £326,042 for steel fabrication pursuant to item 1 of the purchase order.

Decision re Item 2 of Purchase Order

1067. For the reasons set out above CB are entitled to be paid for all steel fabricated pursuant to item 2 of the purchase order up to the date of repudiation. CB are entitled to be paid for that fabrication not at a fixed rate, but in accordance with clause 4.7 of the subcontract conditions.

1068. The quantity of steel fabricated by CB pursuant to item 2 of the purchase order has been agreed between the parties. CB say the agreed figure is 672.92 tonnes (paragraph 897 of their closing submissions). Multiplex say the agreed figure is 672.37 tonnes. I shall take the agreed figure to be 672.5 tonnes.

1069. I must value that quantity of steel fabrication in accordance with clause 4.7 of the subcontract. In carrying out this exercise it is not appropriate to apply a lump sum risk factor, as suggested by Multiplex. Steel fabricated pursuant to the purchase order (unlike the original subcontract steel) was not subject to any lump sum risk. Multiplex agreed under the purchase order to pay for the actual quantities fabricated.

1070. The next question is how clause 4.7 of the subcontract should be applied in the context of item 2 of the purchase order. On the date of the purchase order, namely 26th May 2004, the parties were in the interregnum. They were proceeding under the subcontract, as

varied by the Heads of Agreement, in the knowledge that a Supplemental Agreement would be executed in due course and would supersede the Heads of Agreement.

1071. On this issue I consider that Dr Mastrandrea's approach to determining the rate is correct. I shall therefore take Dr Mastrandrea's rate of £509.71 per tonne. However, I shall not make a 25% deduction for lump sum risk, as Dr Mastrandrea does.

1072. In the result CB are entitled to be paid £342,780 in respect of steel fabrication pursuant to item 2 of the purchase order.

Sums due to CB under Items 3 and 4 of the Purchase Order

1073. Item 3 of the purchase order relates to the supply of paint to Holland. CB's original claim for this item, namely £55,350, was agreed between the parties. CB subsequently amended schedule 2 to claim a further sum of £44,827.83 in respect of additional paint supplied, as identified in five invoices: see paragraph 147A of CB's schedule 2.

1074. This matter is dealt with in paragraph 505 of Mr Underwood's fourth witness statement, paragraphs 742 to 744 of Mr Hart's expert report and paragraph 4.88 (c) of Dr Mastrandrea's report. There is no dispute about the rate of £4.10 per litre.

1075. I am satisfied on the evidence that CB have supplied the quantities of paint alleged. CB are entitled to £100,177.83 in respect of paint supplied pursuant to item 3 of the purchase order.

1076. It is agreed between the parties that £511,700 is due to CB for shipping black steel to Holland pursuant to item 4 of the purchase order.

CHAPTER 19. CERTIFICATION DATE

1077. In this chapter I shall address the following question, namely up to what date or dates are CB entitled to be paid for work carried out pursuant to the subcontract, as amended by the Supplemental Agreement?

Lump sum work

1078. Under clause (b) of schedule 1 to the Supplemental Agreement Multiplex agreed to pay £12 million to CB for carrying out certain specified fabrication and related work (referred to in this chapter as "lump sum work").

1079. The final paragraph of schedule 1 to the Supplemental Agreement provided that payment of the £12 million lump sum "shall be made, monthly, in accordance with the payment provisions of the sub-contract". Thus the provisions of clause 21 of the subcontract conditions concerning application, certification and payment all applied to the lump sum work. Those provisions have been set out in chapter 10 above, concerning preliminaries.

1080. The last certificate issued by Multiplex in respect of CB's lump sum work was certificate no. 37, dated 16th July 2004 (E1/527 – 539). That certificate related to work done

by CB up to and including Wednesday 30th June. I am told by counsel that, for present purposes, certificate 38 can be ignored. That certificate was issued on 16th July, but only for the purpose of facilitating payment of reimbursable costs under clause (c) of schedule 1 to the Supplemental Agreement. Certificate 38 did not generate any entitlement to an additional instalment of lump sum costs.

1081. The next application for payment made by CB in respect of lump sum work was application no. 24, dated 29th July. That application related to lump sum work done by CB up to 27th July.

1082. Under clause 21.9 Multiplex came under a duty to issue a certificate for payment within twelve days after receipt of application no. 24, i.e. by 10th August. On 2nd August 2004, when CB repudiated the subcontract, Multiplex was not yet obliged to issue a certificate for payment in respect of application no. 24, nor had it done so.

1083. Multiplex subsequently issued a certificate in response to application no. 24 on 10th August. That certificate (which was in a negative sum) cannot have conferred any contractual rights upon CB, since by 10th August the subcontract and the Supplemental Agreement had come to an end as a result of CB's repudiation.

1084. Multiplex contend that their contract with CB was an entire contract, subject to instalment payments. Each instalment had to be fully earned before payment fell due: see *Sumpter v Hedges* [1898] 1 QB 673; Keating on Building Contracts, eighth edition, paragraph 4-004. CB's right to payment only arises when a certificate either is or ought to be issued, not any earlier: see *Lubenham Fidelities v South Pembrokeshire District Council* (1986) 33 BLR 39 at 55; *Henry Boot Construction Ltd v Alstom Combined Cycles Ltd* [2005] EWCA Civ 814, [2005] 1 WLR 3850 at paragraph 23.

1085. In my judgment, Multiplex's argument is sound in principle. As a result of their repudiation, CB have forfeited any contractual right to payment for lump sum work carried out between the date of certificate 37 and the date of repudiation.

1086. Mr Williamson submits that even if Multiplex succeed in principle on this point, nevertheless CB are entitled to payment for materials which they supplied to Multiplex after 30th June. Mr Williamson points out that in *Sumpter v Hedges*, although the builder did not recover payment for the part completed building works, nevertheless he recovered the value of the materials left on site, of which the defendant made use. That part of the judgment was not appealed, but it was clearly approved: see the judgment of A.L. Smith LJ in *Sumpter v Hedges* at 674 and the judgment of Collins LJ at 676.

1087. Mr Williamson's argument applies to black steel, part fabricated steel and fabricated steel which CB either left on site at Wembley or sent across to Holland. See paragraphs 161 – 162 of CB's written closing submissions. Mr Williamson submits that Multiplex had a choice whether (a) to keep the steel materials or (b) to return those steel materials to CB: see day 34, pages 49 – 50.

1088. In my view, this argument has some force in relation to clause (f) of schedule 1 (which I shall address below) but not in relation to clause (c). Once Multiplex have reimbursed CB (or become obliged to reimburse CB) for the purchase of black steel, it cannot sensibly be suggested that Multiplex should return such steel to CB merely because CB have stored or fabricated or painted that steel but have forfeited the right to payment for

such services by reason of repudiation. Steel which Multiplex have paid for but which CB have worked upon is not analogous to the builder's materials in *Sumpter v Hedges*. Furthermore, given the time and the circumstances of CB's repudiation, Multiplex had no real option but to retain that steel. Nor is there any evidence that CB would have welcomed the return of steel members fabricated or partly fabricated to fit the bowl of Wembley Stadium. CB never suggested that they would like to receive the Wembley steel back.

1089. I therefore conclude that in relation to lump sum work under clause (c) of schedule 1 to the Supplemental Agreement, CB's contractual right to payment only runs up to 30th June.

Reimbursable costs

1090. Under clause (c) of schedule 1 to the Supplemental Agreement Multiplex agreed, subject to qualifications which I shall discuss later, to reimburse CB's costs in connection with erection and site works. I shall refer to these costs as "reimbursable costs".

1091. The final paragraph of schedule 1 provided that CB's reimbursable costs should be paid at two week intervals. That paragraph continued:

"An Application for Payment in respect of the items referred to at paragraph (c) above may be made in accordance with clause 21.3 of the Sub-Contract at two week intervals and clause 21 of the Sub-Contract shall be construed accordingly with the necessary changes made."

1092. CB duly made fortnightly applications for reimbursable costs, and Multiplex duly issued certificates for reimbursable costs in respect of each two week period. The last such certificate issued by Multiplex before the repudiation was certificate 39, dated 30th July. This certificate related to CB's costs incurred in weeks 93 and 94, namely the weeks ending 9th July and 16th July.

1093. CB's pleaded case is that they are entitled to recover reimbursable costs up to 27th July, the date when CB ceased to be erectors. Multiplex's pleaded case is that CB are only entitled to reimbursable costs up to 30th June. I do not accept either of those extreme submissions. In my view, CB have a contractual entitlement to recover their reimbursable costs up to 16th July (the end date of certificate 39). CB have no contractual right to recover reimbursable costs in the period between 16th July and repudiation, because no further certificate was issued by Multiplex during that period: see defendants' supplemental 29. Indeed I sensed that during closing speeches both counsel were edging towards an acceptance that mid-July may be the appropriate cut-off point: see Mr Williamson's submissions at day 34, pages 50 – 55 and Mr Stewart's submissions at day 34, pages 143 – 144.

Costs of purchasing steel

1094. Under clause (f) of schedule 1 to the Supplemental Agreement Multiplex agreed to reimburse CB's costs reasonably incurred in purchasing steel. CB contend that they are entitled these costs up to 2nd August. Multiplex contend that CB's entitlement ceases on 30th June, the date to which certificate 37 relates.

1095. In my judgment, in relation to clause (f) Mr Williamson's argument based upon the judgments of AJ Smith LJ and Collins LJ in *Sumpter v Hedges* has force. None of the black steel purchased after 30th June would have passed through all stages of planning, fabrication, painting and erection by 2nd August. All of that steel would have remained as steel materials, even if fabricated or partly fabricated. Multiplex cannot keep that steel without at least reimbursing CB for the purchase costs. Indeed Multiplex's success on the certification date issue in relation to lump sum works is based in large part upon the fact that Multiplex has paid (or has incurred a liability to pay) for the black steel.

Conclusion

1096. For the reasons set out above, CB's contractual entitlement to payment under schedule 1 to the Supplemental Agreement is as follows: CB are entitled to payment for lump sum work under clause (b) up to 30th June. CB are entitled to payment of reimbursable costs under clause (c) up to 16th July. CB are entitled to payment for the costs of purchasing steel under clause (f) up to 2nd August.

CHAPTER 20. HOW MUCH BOWL STEEL WAS CB REQUIRED TO FABRICATE UNDER THE LUMP SUM PROVISION OF THE SUPPLEMENTAL AGREEMENT?

1097. Clause (b) of schedule 1 to the Supplemental Agreement ("clause (b)") required CB to complete certain specified works for the lump sum of £12 million. The principal operation within clause (b) was fabrication of bowl steel. It is common ground that £7.19 million out of the total sum £12 million was referable to bowl steel fabrication.

1098. In order to ascertain how much steel CB had contracted to fabricate for £7.19 million it is necessary to do the following: (i) Ascertain how much steel is contained in the bowl as finally constructed (and as it now is at Wembley). (ii) Deduct the amount of steel which had been fabricated as at 15th February. (iii) Deduct bowl steel fabrication, which fell outside the ambit of clause (b). I shall refer to these three exercises as "step 1", "step 2" and "step 3".

Step 1

1099. I take as my starting point the total quantity of black steel which CB purchased for the bowl. This must be derived from the Go Data stock in reports. Multiplex base their calculations on the figures in the stock in reports dated 27th July 2004, because they distrust the later version dated 2nd September. CB, on the other hand, take the stock in reports of 2nd September as their basis.

1100. There is not a huge difference in figures between the two dates. I do not find any evidence of inappropriate tampering with Go Data by CB in the intervening period. In my view, such changes as were made between 27th July and 2nd September probably removed errors and updated Go Data. I shall therefore take the 2nd September stock in reports as the most accurate record that exists of the total quantity of bowl steel purchased by CB. That produces a gross figure of 18,951 tonnes: see P1/13.

1101. Next I must add the additional quantity of steel which ZNS purchased for the bowl (omitting duplications etc). Multiplex contend that figure is 686 tonnes. CB contend that it is nil. For the reasons set out earlier, I hold that the correct figure is 309 tonnes. It is also necessary to add 6 tonnes in respect of ledger angles which CB purchased on site and did not record in Go Data.

1102. This produces a total figure of 19,260 tonnes. Because of the uncertainties surrounding the above figures, I have rounded each one to the nearest whole number. From this total must be deducted the black steel for the bowl which CB left in China, as part of its overall settlement with SGT. For the reasons set out in chapter 18 I assess this as 1,003 tonnes. It is agreed between the parties that a further 6 tonnes must be deducted in respect of steel transferred from Wembley to other contracts. This reduces the total to 18,251 tonnes.

1103. It is then necessary to deduct 7.05 % for wastage. This reduces the total quantity of bowl steel to 16,964 tonnes net.

1104. It is then necessary to add a total of 14 tonnes in respect of ledger angles which CB purchased on site and did not record in Go Data (see chapter 14).

1105. Accordingly, the best estimate which I can make of the weight of steel now constituting the bowl of Wembley Stadium is 16,978 tonnes.

Step 2

1106. The total quantity of bowl steel which had already been fabricated by 15th February 2004 is set out in chapter 16 above. For this purpose, I must add together the quantities of steel fabricated, steel painted, steel on site unfixed and steel erected. The total amount of steel within those categories amounts to 7,427 tonnes. I must therefore subtract this quantity of steel from the figure arrived at in step 1 (viz 16,978 tonnes). The difference is 9,551 tonnes.

1107. CB contend that even if they lose the work in progress issue in relation to the 15th February valuation (as they have done), nevertheless this becomes a live issue once more for the purpose of the present exercise. In essence, CB's argument is that within the 7,395 tonnes of "steel procured" as at 15th February, there was a quantity of steel which was partly fabricated. CB had less fabrication work to do in respect of that steel, for the purpose of earning the £7.19 million lump sum. In principle, that argument is sound. At this stage of the exercise, I am not carrying out a valuation under the terms of the subcontract. I am trying to ascertain, as a matter of fact, what quantity of fabrication work had to be carried out pursuant to clause (b).

1108. In order to ascertain the quantity of steel which was undergoing fabrication on 15th February, I turn to the PMS print out of that date. This shows that 1,712 tonnes of steel were in planning and 704 tonnes of steel were in fabrication. The term "in planning" means that the steel was in the preparation bay for the purpose of cutting holes, drilling and so forth: see paragraph 243 of Mr Underwood's fourth witness statement and paragraph 27 of Mr Underwood's fifth witness statement. The term "in fabrication" means what it says. CB contend that the figures for steel in planning and steel in fabrication should be added together (producing 2,415.95 tonnes) and that the total should be halved in order to reach an amount of assumed fabricated steel for the purpose of this exercise. I regard that approach as unduly generous to CB. It is reasonable to assume that, on average, the steel in planning was half

way through the cutting and drilling process; the steel in fabrication was half way through the fabrication process. I must therefore assume that 856 tonnes of steel had been cut and drilled, and that 352 tonnes had been cut, drilled and fabricated. In other words 856 tonnes are assumed to be less than half way through the whole process and 352 tonnes are assumed to be more than half way through the whole process. These figures are all approximations, because no record survives of how far any particular piece of steel had actually progressed through the fabrication process on the critical date. Doing the best I can on the basis of Mr Underwood's factual evidence, I find that the total quantity of steel in planning and steel in fabrication represented the equivalent of 805 tonnes having been fabricated (i.e. one third of 2,415 tonnes). I shall therefore subtract 805 tonnes from the figure of 9,551 tonnes calculated above.

1109. Let me now draw the threads together. For the reasons set out above, I conclude that as at 15th February the equivalent of 8,746 tonnes of steel remained to be fabricated for the Wembley bowl.

Step 3

1110. Multiplex assumed responsibility for the fabrication of the bowl steel identified in schedule 3 to the Supplemental Agreement. Accordingly that steel falls to be deducted at step 3 of the assessment.

1111. There is an issue between the parties as to whether, for the purpose of step 3, I should take the nominal amounts stated in schedule 3 or the actual amounts which Multiplex caused to be fabricated under the Hollandia and CB sublets. CB contend for the nominal amounts in schedule 3. Multiplex contend for the actual amounts.

1112. Since the purpose of the present exercise is to establish how much bowl steel CB would in fact have fabricated under clause (b) if they had not repudiated, the correct approach is to take actual amounts rather than the schedule 3 figures. This approach is reinforced by paragraph 494 of Mr Underwood's fourth witness statement, in which he points out that the figures for China steel included in the purchase order (subsequently incorporated into the Supplemental Agreement) were an estimate.

1113. As set out in chapter 18, CB fabricated 305.5 tonnes of China steel "returned unmade" under item 1 of the purchase order. Hollandia subsequently fabricated 1,243 tonnes of steel in that category (that is the total weight of the steel pieces listed in appendix 4 to Scott schedule 4A). That makes a total of 1,548.5 tonnes falling within column 4 of purchase order, schedule 3, document 1.

1114. It can be seen from CB's application for payment no. 22 (at E40/14, column 18) that Hollandia fabricated 1,062.96 tonnes of steel pursuant to contract WP 2755 (referred to as "MPX sublet" in column 3 of purchase order, schedule 3, document 1).

1115. It can be seen from CB's application no. 22 (at E40/14, column 18) that CB fabricated 672.74 tonnes pursuant to item 2 of the purchase order (referred to as "CBUK sublet" in column 5 of purchase order, schedule 3, document 1).

1116. The total of the figures arrived at in the preceding three paragraphs is 3,284.2 tonnes. Accordingly, I deduct 3,284 tonnes from 8,746 tonnes. The resultant figure is 5,462 tonnes.

I therefore conclude that under clause (b) of schedule 1 to the Supplemental Agreement CB were obliged to fabricate 5,462 tonnes of bowl steel for the lump sum of £7.19 million.

1117. It follows from this conclusion that the rate for fabricating bowl steel under clause (b) of schedule 1 to the Supplemental Agreement was £1,316.37 per tonne.

CHAPTER 21. HOW MUCH BOWL STEEL DID CB IN FACT FABRICATE UNDER THE LUMP SUM PROVISION OF THE SUPPLEMENTAL AGREEMENT?

1118. For reasons previously set out, I take the valuation date of 30th June, for which Multiplex contend, rather than 2nd August, for which CB contend. I exclude steel which was in planning or in fabrication, because under the valuation provisions of the subcontract (which survived under the Supplemental Agreement) CB had no contractual right to payment in respect of partial fabrication.

1119. The stage which fabrication had reached as at 30th June can best be seen from the spreadsheet at E40/14. This spreadsheet is compiled from PMS reports in respect of fabricated, treated and loaded steel. The spreadsheet is compiled from Mr Osborne's on-site reports in respect of steel erected and steel unfixed on site.

1120. It can be seen from the spreadsheet at E40/14 that CB and Hollandia had fabricated a total quantity of 12,524.21 tonnes of bowl steel as at 30th June. This figure is arrived at by the following process. One starts with the total of 14,447.07 tonnes (shown at E40/14) and then deducts the amount of steel in planning (1,357.08 tonnes) and the amount of steel in fabrication (566.117 tonnes). That produces 12,524.21 tonnes, the figure pleaded by Multiplex in appendix 1 to Scott schedule 2.

1121. If the court takes a valuation date of 30th June, then (a) 672.73 tonnes should be deducted in respect of steel fabricated by CB pursuant to item 2 of the purchase order and (b) 757.67 tonnes should be deducted in respect of steel fabricated by Hollandia pursuant to contract WP 2755. These figures are derived from E40/14 and were agreed between counsel on day 31. Thus the total of 12,524.21 tonnes is reduced to 11,093.81 tonnes.

1122. The next step is to deduct the amount of bowl steel which was fabricated up to 15th February. That amounts to 7,427.31 tonnes: see chapter 16 above. The resultant figure is 3,666.5 tonnes.

1123. Finally, I must deduct the amount of "China steel returned unmade", which CB fabricated pursuant to item 1 of the purchase order. As set out in chapter 18 above, that amounts to 305.5 tonnes. After making this deduction, the resultant figure is 3,361 tonnes.

1124. I therefore conclude that by 30th June 2004 (the valuation date) CB had fabricated 3,361 tonnes of bowl steel pursuant to clause (b) of schedule 1 to the Supplemental Agreement.

1125. If that quantity of steel is valued at the rate of £1,316.37 per tonne (as previously calculated) CB are entitled to payment of £4,424,319.57 for bowl steel fabrication pursuant clause (b) of schedule 1 to the Supplemental Agreement.

CHAPTER 22. REIMBURSABLE COSTS

1126. In this chapter I shall refer to clauses (b) and (c) of schedule 1 to the Supplemental Agreement as “clause (b)” and “clause (c)” respectively.

1127. CB, basing their claim upon a period of 23.4 weeks (i.e. up to 27th July 2004), claim £11,222,390 under clause (c): see paragraph 134 of CB’s re-re-re-amended case on valuation schedule 2. Multiplex, basing their assessment on a period of 19.5 weeks (i.e. up to 30th June), assert that £5,913,115 is due under this head: see appendices 4 and 5 to the re-amended particulars and explanations of Multiplex’s valuation schedule 2. Numerous variants of those figures are to be found in the expert reports, counsel’s supplementals and counsel’s written submissions.

1128. The reimbursable costs comprise twenty seven heads of claim. By far the largest of these is the claim for labour costs. I shall therefore address labour costs first, before turning to the other twenty six items in dispute.

1129. For the reasons set out in chapter 19 above, I hold that CB are entitled to recover their reimbursable costs for a period of 22 weeks. That 22 week period runs from 16th February to 16th July 2004, i.e. contract weeks 73 – 94 inclusive. The twenty sixth head of claim (namely variation materials) must be treated differently, as explained below.

Adequacy of the records submitted by CB

1130. Clause (c) entitles CB to recover “all costs reasonably and properly incurred by the Sub-Contractor ... in connection with the erection and site works (being site staff, direct labour, cranes and other site related staff) ...”.

1131. Multiplex contend that CB have failed to provide such records as are necessary to establish what their entitlement is. In particular, although the numbers of hours worked are recorded (subject to Multiplex’s point about over-claiming discussed below), there is no contemporaneous record of what work the men were doing during those hours. In those circumstances, CB’s claim based upon their total actual costs incurred must be rejected; instead CB’s entitlement should be assessed by reference to Multiplex’s “bottom up” calculation.

1132. In advancing this contention, Multiplex rely upon the terms of clause (c); clause 21.5 of the sub-contract conditions; the decision of Debelle J in *OneSteel Manufacturing P/L v United KG P/L* [2006] SASC 119; the cross-examination of Mr Hart on day 26 as to what information he would expect to see submitted and Dr Mastrandrea’s report on this topic (in particular paragraphs 4.73 – 4.74 of his schedule 2 report).

1133. In *OneSteel* a contractor was claiming payment for relining and upgrading a blast furnace. The Target Estimate Contract, under which the works were carried out, included a provision for reimbursable costs. Debelle J held on the trial of preliminary issues that the contractor was “obliged to support its claim ... with evidence and with such information as OneSteel’s representative may reasonably require”. I have studied Debelle J’s judgment with

interest and I can well see how he arrived at that decision on the basis of the contract in that case. Nevertheless, although the judgment is interesting by way of background, I do not find it directly relevant to the issues before this court. I am construing a Supplemental Agreement made in unusual circumstances, containing a complex web of terms very different from the Target Estimate Contract in *OneSteel*.

1134. It is of significance that the Supplemental Agreement in the present case was entered into some four months after the Heads of Agreement, which had first introduced the reimbursable costs regime: see clause 8 of the Heads of Agreement. During those four months (a) CB submitted fortnightly applications for payment, detailing the costs incurred but not itemising the work which was being performed; (b) Multiplex made interim payments on the basis of those applications. The Supplemental Agreement was silent as to what supporting material CB was required to submit in respect of reimbursable costs.

1135. In those circumstances, I do not accept that the Supplemental Agreement either expressly or impliedly imposed as a threshold condition for payment that CB should provide the detailed back-up now sought by Multiplex. In my view, the correct approach is that the court should do its best to assess what sums are due to CB on the basis of (i) the supporting material submitted by CB with their fortnightly applications, (ii) the further material disclosed in this action, (iii) the factual evidence of witnesses who were on site between 16th February and 16th July 2004 and (iv) the expert evidence.

1136. I am comforted in reaching this conclusion by the report which Multiplex produced in July 2004. Mr Goulding, a representative of Multiplex, visited Darlington in order to verify CB's weekly costs. His report includes the following paragraph (at QC 40/89):

“CBUK Darlington Office was visited 1 – 2 July 2004 and CBUK payroll, timekeeping, bookkeeping and personal staff were interviewed. CBUK staff had no difficulty in producing any paperwork, justification, or explanation for any verification query posed. The staff responded efficiently and in an open manner despite the circumstances.”

1137. The phrase “despite the circumstances” was a reference to the fact that Multiplex had recently given 28 days notice terminating CB's role as erectors. Although Mr Goulding has not been called as witness by Multiplex, the conclusion which I draw from his report is that CB opened their books to Mr Goulding and showed him whatever he wished to see in connection with the claims for weekly costs.

1138. Difficulties now arise in this litigation because neither Multiplex nor CB realised in 2004 that detailed evidence would be required in the future for the purpose of re-assessing what sums were due to CB under clause (c). The court must do the best that it can on the evidence available.

Multiplex's bottom-up calculation

1139. Multiplex reject CB's starting point of the costs actually incurred and instead undertake a “bottom up” calculation of what costs CB ought to have incurred in order to erect the steel which was in fact erected between 16th February and 30th June. This calculation is set out in Multiplex's Scott schedule 2 at paragraphs 30 to 32 and in appendix 5. Multiplex

assess that reasonable labour costs for the quantity of bowl steel erection achieved during the costs reimbursable period amount to £1,649,392.

1140. I accept Mr Williamson's submission that Multiplex's bottom up calculation is flawed: see paragraphs 731 – 732 of CB's closing submissions. I reach this conclusion principally for four reasons:

(i) Multiplex's calculation takes no account of the other erection undertaken by CB, in particular pre-cast planks. Erection of pre-cast planks was a substantial operation.

(ii) Multiplex's calculation takes no account of delays caused by lack of crane availability and bad weather.

(iii) Multiplex's calculation takes no account of work undertaken by CB other than erection, in particular raising the arch, removing the turning struts, assembling and erecting the PPT.

(iv) Hollandia subsequently used similar resources to CB and achieved broadly similar outputs: see defendants' supplemental 6.

1141. These matters were explored in the cross-examination of Mr Watkins, which is summarised in chapter 2 above.

1142. Having considered the evidence of all the contemporaneous witnesses, in particular the cross-examination of Mr Watkins, I am satisfied that Multiplex's bottom up calculation must be rejected. The shortcomings in that calculation are so serious that it is not sensible to take that calculation as a starting point and then make adjustments.

CB's claim for labour costs

1143. CB claim the labour costs which they actually incurred in the period 16th February to 27th July (the last date upon which CB were employed as erectors). These labour costs amount to £4,759,435. Mr Hart in his appendix 2/19 identifies arithmetical errors which reduce this figure to £4,685,813.

1144. Mr Hart concedes that a modest deduction may be made from the above figure to reflect variation work which was instructed before 15th February, but carried out on site after 15th February. See paragraphs 708 – 715 of his report and paragraphs 1.9 – 1.16 of his supplemental report.

1145. Multiplex attack CB's claim on the basis that it is grossly inflated. CB claim all their costs incurred, without making any deduction for: fabrication work done on site; retrofit work to remedy CB's own defects; retrofit work to deal with pre-15th February variations; time spent repairing damage to paintwork beyond mere "touch up"; inefficiencies on site; delays and disruptions caused by wrong deliveries. In addition Multiplex point out that CB's fortnightly applications included claims for men who were not actually working. I shall examine these matters in turn.

Fabrication work done on site

1146. As discussed in chapter 7 above, CB welded a number of rakers on site, because it was only practicable to transport them to Wembley in sections. This procedure was set out in

CB's method statement and approved by Multiplex. Nevertheless, as explained in chapter 7, the fact that this work was done on site did not change the character of the work. It remained fabrication work, falling within clause (b). The costs of that work cannot be claimed under clause (c).

Retrofit work on site

1147. It is clear from the evidence of the factual witnesses, summarised in chapters 2 and 3 above, that both pre-15th February variations and post-15th February variations were impacting upon work on site during this period. See paragraph 638 of Multiplex's claim letter against Mott and the cross-examination of Mr Hall on day 21. CB's retrofit team on site (comprising approximately 20 men) was dealing with the consequences of both categories of variations. It is also clear that mistakes were sometimes made in fabrication and that CB's retrofit team had to correct these mistakes on site. CB have not made any allowance in their claim for time spent correcting defects, save in respect of the arch chords (see defendants' supplemental 21.6).

Damage to paintwork

1148. I have discussed damage to paintwork in chapters 5 and 6 above (relating to schedules 1 A and B). For the reasons there set out, I am not satisfied that there was any significant amount of paintwork damage, which was CB's responsibility.

Inefficiencies on site and wrong deliveries

1149. On the basis of the factual evidence, I do not accept that CB was managing its workforce inefficiently. However, it is clear from the factual evidence that on occasions steel was delivered in the wrong sequence and that this caused significant delay and disruption to CB's work. These problems were graphically recorded in the diary of Mr Green, CB's construction superintendent. Mr Buckingham took Mr Green through those diaries in some detail in cross-examination on the afternoon of day 21. I was not persuaded by Mr Green's assertion that all of the problems for which he blamed "Darlington" in his diary were really attributable to design changes by Mott. Mr Osborne accepted in cross-examination (as summarised in chapter 3 above) that some of the blame for these matters rested with CB. Having considered Multiplex's recent letter of claim against Mott, Mr Green's diary and the oral evidence, I consider that there were two causes for the mishaps which Mr Green recorded so eloquently in his diary: mistakes by CB at Darlington or Scunthorpe in assembling loads and design changes by Mott both before and after 15th February.

Claims for men who were not working

1150. In relation to this issue, week 91 was taken as a specimen week and both parties focussed upon that in some detail. The records for that week were explored in the cross-examination of Mr Hart at day 28, pages 137 – 139. It was subsequently agreed between counsel that of the 182 men claimed for, 8 were in fact absent. Those 8 men were paid small sums of money, probably sick pay. CB now concedes that it was not entitled to claim this: see counsel's Agreed Note 3. It seems to me reasonable to assume that similar mistakes were made in respect of other weeks, although there is not time and it would not be proportionate to undertake a detailed audit of every individual week.

Assessment

1151. In my view, the correct approach to the issue of labour costs is for the court to take the actual costs incurred as its starting point. The court must then make a deduction for the period 17th to 27th July, which has been wrongly claimed by CB. The court must then make deductions for (i) costs which were not incurred, (ii) costs which were incurred unreasonably and (iii) costs which fell within clause (b). The adjudicator made an allowance of 15% to cover such matters: see paragraph 92 (iii) of judgment 1. Having heard much fuller evidence than the adjudicator, I am satisfied that that allowance was insufficient.

1152. It is not possible precisely to quantify each head of deduction, because the records kept by CB do not enable this to be done. However, CB's look-ahead plan dated 22nd March shows how it was planned to allocate labour resources. CB's site organisation chart for June (QC30/111, wrongly dated 2nd May) shows how the labour force and site management were organised during June 2004. Mr Hall was cross-examined about these documents at day 21, pages 29 – 49. Mr Osborne's productivity analysis gives a picture, after the event, of how the CB workforce were occupied.

1153. Having considered contemporaneous documents and the oral evidence, doing the best that I can on the evidence before me I make the following assessment. Out of the £4,685,813 claimed for labour costs up to 27th July, £3 million represents costs reasonably and properly incurred by CB up to 16th July in connection with erection and site works falling within clause (c).

Other heads of reimbursable costs claimed

1154. In the interests of proportionality, I shall deal with the other twenty six heads of claim relatively briefly and without extensive recitation of the evidence.

1155. Staff. Clause (c) permits CB to recover the costs of site staff, reasonably and properly incurred. CB claim £1,490,937 for site staff up to 27th July and that claim is supported in full by Mr Hart: see appendix 2/19 to his report.

1156. Dr Mastrandrea assesses this claim at £1,458,777 for a period of 24 weeks or £1,175,977 for a period of 19 weeks. Dr Mastrandrea's reasoning is set out in paragraph 4.80 (a) of his report. I consider that Dr Mastrandrea's reductions are well justified. It can be seen from the exercise on week 91 that staff costs were over-claimed in that week.

1157. I take the mid-point between Dr Mastrandrea's two figures and assess staff costs up to 16th July as £1,317,377.

1158. Computers and printers. CB include £10,800 for computers in their claim for staff costs. Dr Mastrandrea regards this as reasonable, subject to adjusting the cut-off date. I agree that this claim is reasonable. After deducting an allowance for the eleven day period 17th – 27th July, I allow £10,071.

1159. Staff overtime. CB claim £94,067, supported in full by Mr Hart. Dr Mastrandrea allows nothing, because he considers the claim to be unsubstantiated. I cannot find any proper substantiation of the overtime claim in CB's evidence.

1160. CB rely upon Mr Goulding's audit report: see paragraph 756 of CB's closing submissions. Although Mr Goulding notes the overtime claim (e.g. at QC 40/105A) I do not regard his report as substantiating the overtime claim. This claim is not allowed.

1161. Redundancy. CB claim £249,505 for redundancy monies paid to their workforce following the termination of CB's role as erectors. Mr Williamson submits that these costs fall within clause (c). Mr Stewart submits that they do not.

1162. On this issue, I am satisfied that Mr Stewart is correct. The liability which CB incurred to make redundancy payments following termination of CB's role as erector on 27th July cannot be classified as "costs ... incurred ... in connection with the erection and site works". The words which follow in brackets, namely "being site staff, direct labour, cranes and other site related costs", do not have the effect of widening the concept so as to include redundancy payments.

1163. Staff expenses. CB claim £20,398 up to 27th July. Mr Hart reduces that figure to £19,696. Dr Mastrandrea allows £18,853 for a period of 24 weeks or £14,926 for a period of 19 weeks. The reason for Dr Mastrandrea's deductions is that he disallows professional fees, VAT charges and costs which relate to the period prior to 15th February. I agree the principle of Dr Mastrandrea's deductions. I take the mid point between Dr Mastrandrea's two figures and assess staff expenses to 16th July as £16,890.

1164. Staff travel. CB claim £4,043. Dr Mastrandrea agrees that figure, subject to the issue of cut-off date. I make a pro rata deduction for the 11 day period 17th – 27th July and allow £3,790.

1165. Subcontract staff. CB claim £149,764, reduced by Mr Hart to £149,670. Dr Mastrandrea has checked the back up and agrees the figures, subject to the issue of cut-off date. I make a pro rata reduction for 11 days and allow £139,570.

1166. There is an issue (no doubt fascinating to the experts) as to whether the costs of Hyder Engineering should be included within "subcontract staff" or "subcontractors". This point is academic, since no money turns upon it. I shall include Hyder Engineering within "subcontractors".

1167. Subcontractors. CB claim £278,376, reduced by Mr Hart to £278,414. The only issue here is whether CB should recover the costs of non-destructive testing, which amount to £115,475. It is clear that some of the welding done on site by CB formed part of erection and site works, pre-eminently the welding of the PPT. This falls within clause (c). Some of the welding done on site by CB formed part of fabrication, pre-eminently the welding of rakers (as discussed in chapter 7 above). This falls within clause (b). Thus it is necessary to apportion non-destructive testing costs between those welds which are to be characterised as fabrication and those welds which are to be characterised as erection and site works.

1168. This issue was touched upon in the cross-examination of Dr Mastrandrea at day 25 pages 19 – 20, but not explored during trial. Following the trial I have received written submissions on this issue, which (although unwelcome) I have carefully studied. Each side contends that the apportionment should be at least 90% in its own favour. The documents relied upon by each party were not referred to during oral evidence and argument. The picture which emerges is far from clear. Doing the best that I can on this material, I shall apportion non-destructive testing costs equally between clause (b) and clause (c).

1169. I then reduce the total figure pro rata, to reflect the 11 day period 17th – 27th July. On this basis I assess the figure for subcontractors at £205,749.

1170. In his report Dr Mastrandrea suggested that drilling and grouting costs might have been compromised by clause 2.1 of the Supplemental Agreement. It should be noted that Multiplex have now abandoned this suggestion.

1171. Office costs. CB claim £44,714, reduced by Mr Hart to £37,503. Dr Mastrandrea assesses this claim at £40,635 for 24 weeks or £32,169 for 19 weeks. I reduce Mr Hart's figure pro rata for 11 days and assess office costs as £34,972.

1172. Running costs (telephone). CB claim £14,119, reduced by Mr Hart to £13,857. Dr Mastrandrea asserts that some of the telephone costs relate to the period before 15th February. Dr Mastrandrea allows £11,807 for 24 weeks or £9,348 for 19 weeks. Dr Mastrandrea appears to be the only expert who has specifically gone through the telephone bills to weed out charges pre-15th February, and I have no reason to doubt his calculations. I shall allow £10,577 in respect of telephone costs up to 16th July.

1173. Cranes. CB claim £1,466,963, of which Mr Hart allows £1,465,107. Dr Mastrandrea agrees the figures subject to the cut-off date. I shall make a pro rata reduction for 11 days and allow £1,366,235.

1174. Mechanical elevated working platforms. CB claim £255,551, of which Mr Hart allows £255,255. Dr Mastrandrea comes to a similar total in respect of the full period (in fact £19 higher). I make a reduction for the 11 days and allow £238,029.

1175. Hired plant. CB claim £240,235, of which Mr Hart allows £238,564. Dr Mastrandrea comes to a slightly higher figure in respect of the full period. I take Mr Hart's figure and reduce for 11 days, thus arriving at £222,465.

1176. Air bags. The total cost of £90,680 is agreed between the experts, subject to cut-off date. I make a pro rata reduction for 11 days and assess this item as £84,560.

1177. Scaffolding. CB claim £321,938, of which Mr Hart allows £281,719. Dr Mastrandrea assesses this claim at £215,978 for the full period or £164,733 for 19 weeks. On the basis of Dr Mastrandrea's report, paragraph 480 (p), I am satisfied that Mr Hart has made insufficient deductions from CB's top line claim. The deductions should be:

Scaffolding for work completed before 15 th February	£60,860
Credit notes	£ 8,398
Scaffolding re arch repairs	<u>£30,000</u>
Total	£99,258

1178. For the reasons explained in judgment 1, CB are responsible for the arch remedial works. After making the above deductions and a further pro rata reduction for the 11 days, I assess scaffolding costs at £207,653.

1179. Company owned plant. CB claim £52,567, of which Mr Hart allows £29,990. Dr Mastrandrea has checked the figures and confirmed that they are arithmetically correct. The issue here is one of principle, namely whether CB are entitled to recover for depreciation after 15th February in respect of plant purchased before 15th February. It should be noted that Mr Goulding in his audit report regarded this claim as reasonable and he approved the write-

down periods used: see QC 40/98, first paragraph. I am satisfied that plant depreciation is a cost falling within clause (c). After reducing Mr Hart's figure pro rata for the 11 days, I allow £27,966.

1180. Monks and crane miscellaneous. CB claim £43,990, which is supported by Mr Hart. Dr Mastrandrea has spotted a credit note for £144 which had been overlooked, but otherwise agrees the figures. After making reductions for the credit note and for the irrecoverable 11 day period, I assess this head of claim at £40,887.

1181. Gas and fuel. CB claim £36,576, supported by Mr Hart. Dr Mastrandrea maintains that the cost of replacement canisters (£4,791) should be deducted. I do not agree. Canisters are not eternal. These canisters were presumably purchased for the purpose of refuelling plant on site. This cost falls within clause (c). Dr Mastrandrea makes a further deduction of £1,775 in respect of invoices relating to other projects or the period before 15th February. I accept this latter deduction. After discounting for 11 days, I assess the recoverable costs of gas and fuel at £32,452.

1182. Slings and shackles. CB claim £54,922, which is supported by Mr Hart. Dr Masrtrandrea has identified five duplicated invoices, which total £1,610. After making deductions for the duplicate invoices and the irrecoverable 11 days, I assess this claim at £49,714.

1183. Skips. Subject to cut-off date, this claim is agreed at £3,370. After allowing for the irrecoverable 11 days, I assess skip hire at £3,143.

1184. Consumables. CB claim £12,580, which is supported by Mr Hart. I accept Dr Mastrandrea's evidence that the followings deductions should be made:

Duplicated invoice	£ 750
Credit note	£ 325
Consumables for arch repairs	<u>£2,000</u>
Total	£3,075

1185. After making the above deductions and discounting for the 11 days, I assess consumables at £8,864.

1186. Sundries. CB claim £81,598, which is supported by Mr Hart. Dr Mastrandrea deducts £21,334 in respect of grit blasting and painting: see paragraph 480 (v) of his report and cross-examination at day 25, page 20. On the basis of my earlier findings, I consider that some of this work related to site touch up, some related to steel modifications which were the responsibility of CB and some related to steel modifications which were the responsibility of Multiplex. I shall make a deduction of £7,000 in respect of painting and grit blasting. I shall also deduct £870 in respect of duplications and minor errors spotted by Dr Mastrandrea. After making deductions in respect of those matters and the irrecoverable 11 days, I assess sundries at £68,752.

1187. Holding yard. CB claim £119,173, of which Mr Hart allows £115,795. These costs relate to the renting of a "shunter holding yard to site". I am satisfied that these costs in principle fall within clause (c). I accept Dr Mastrandrea's deductions which bring the figure

for the full period down to £100,805. After discounting for the irrecoverable 11 days, I assess these costs at £94,002.

1188. DLT strand jacks. CB claim £688,109, which is supported by Mr Hart. It will be recalled from chapter 10 above that I have excluded the costs of strand jacks from the claim for preliminaries up to 15th February, on the basis that such costs were incurred after that date. Accordingly CB are entitled to recover the costs of strand jacks under clause (c). I accept Dr Mastrandrea's evidence that the total costs attributable to strand jacks amount to £734,250. After discounting for the irrecoverable 11 days, I assess this head of claim at £684,699.

1189. Variation materials. CB claim £269,597, which is supported by Mr Hart. Dr Mastrandrea allows £83,300. Dr Mastrandrea explains his deductions on pages 1 – 2 of his typed "Responses" lodged on day 26. This passage must be read in conjunction with B7-3/2/170. I accept Dr Mastrandrea's deduction of £27 in respect of a duplicate invoice and his deduction of £7,852 in respect of catenary nodes. I approach the individual variations challenged by Dr Mastrandrea on the same basis as I have dealt with variations in chapter 25. I therefore deduct £181,505 in respect of the variations challenged by Dr Mastrandrea.

1190. It is reasonable to suppose that any variation materials purchased between 17th and 27th July either (a) remained as materials on site or (b) were delivered to Hollandia. Accordingly, for the reasons set out in chapter 19 above, I do not make any deduction for the period 17th – 27th July in respect of this head of claim.

1191. In the result, I assess the claim for variation materials at £88,092.00.

1192. Off-site administration and overheads. Under clause (c) Multiplex agreed to pay £80,000 per month in respect of off-site administration and overheads. CB claim £432,332 up to 27th July. Dr Mastrandrea agrees that that figure is arithmetically correct. However, I must make a pro rata reduction for the irrecoverable 11 days. I therefore assess off-site administration and overheads at £403,156.

Overall total

1193. The total of the items set out above is £8,359,665. I therefore award that sum as the reimbursable costs due to CB under clause (c).

CHAPTER 23. STEEL PURCHASE COSTS UNDER SCHEDULE 1 (f)

1194. Under clause (f) of schedule 1 to the Supplemental Agreement Multiplex agreed to pay to CB "the costs reasonably incurred by the Sub-Contractor in purchasing steel (as directed by the contractor) that are not included in the gross valuation as at 15th February 2004".

1195. Subject to two issues, which I must now address, the quantities involved and CB's entitlement either flow from my earlier findings or have been agreed between the parties in the light of those earlier findings. The two outstanding issues are:

- i) Whether the rate allowed should include (a) fabrication shop handling charges and (b) overheads and profit.
- ii) Whether CB are entitled to recover the cost of 96.11 tonnes of steel purchased for the arch.

1196. As to issue (i), I accept Mr Underwood’s evidence at paragraphs 339 – 340 of his fourth statement to the effect that fabrication shop handling charges represent a genuine cost to CB incidental on the purchase of steel. I also regard that head of costs as, in principle, reasonable. Thus these costs fall within paragraph (f) of schedule 1.

1197. I reject the claim for overheads and profit. These do not fall within the term “the costs reasonably incurred by the Sub-Contractor in purchasing steel”. Where the parties intended overhead costs to be added to the recovery of costs incurred, they specifically provided for that. They did so provide in clause (c) of schedule 1, but they did not so provide in clause (f).

1198. As to issue (ii), I note that in their application for payment up to 15th February 2004, CB claimed on the basis that the fabricated steelwork for the arch was 100% complete (see E9/017). It appears from Go Data that CB subsequently purchased 96.11 tonnes of steel for the arch. It is not at all clear why this steel was purchased. Dr Mastrandrea might be correct in his speculation that this steel was obtained for the purpose of rectifying defects. CB have failed to prove on balance of probabilities that this steel falls within clause (f) of schedule 1. This head of claim is dismissed.

1199. Those two issues having been decided, it follows from the above that CB’s entitlement under clause (f) of schedule 1 is as follows:

Gross tonnes	16-Feb	02-Sep	Balance
Bowl	15,952.90	18,951.27	2,998.37
Arch	1,825.01	1,949.76	124.75
Roof	2,413.29	5,171.46	2,758.17
Less: China steel			-1,300.00
Less: Internal transfer			-6.00
Less: adjustment for arch steel			-124.75
Total			4,450.54

Cost	£ per tonne	Quantity	Value
Agreed rate per tonne	495.08	4,450.54	£2,203,373.34
Fabrication shop rate	22.96	4,450.54	£102,184.40
Total			£2,305,557.74

CHAPTER 24. DESIGN AND DRAFTING AFTER 15th FEBRUARY

1200. The “remaining works, services and other obligations” referred to in clause (b) of schedule 1 to the Supplemental Agreement included the completion of all outstanding steelwork design and drafting.

1201. The design work for which CB were responsible consisted principally of designing permanent works connections. In other words CB had to determine how the steel members (designed by Mott) would be connected to one another, so as to transfer loads appropriately.

1202. The drafting work for which CB were responsible consisted principally of preparing drawings of each individual steel member in accordance with Mott’s general design and CB’s connections design. Drafting work was undertaken by Oakwood, as subcontractors to CB.

1203. It is common ground that out of the lump sum of £12 million stipulated in clause (b) of schedule 1, £1,138,000 was allocated to design and £541,000 was allocated to drafting. In other words a total sum of £1,679,100 was attributed to design and drafting. See paragraph 4.17 of Dr Mastrandrea’s schedule 2 report, which is agreed between the parties.

The issues between the parties

1204. CB’s pleaded case is that overall they completed 90% of the remaining design and drafting between 15th February and 2nd August. Accordingly CB claim 90% of £1,679,000, namely £1,511,100: see paragraphs 103 – 104 of CB’s re-re-re-amended Scott schedule 2. In their closing submissions CB are somewhat less ambitious. They now contend that they completed 80% of the remaining design and drafting. On this basis CB claim £1,343,200. See paragraphs 833 – 844 of CB’s closing submissions.

1205. Multiplex’s pleaded case on this issue was totally re-cast on day 5 of the trial. Multiplex now plead that between 15th February and 2nd August CB (a) performed no drafting work and (b) carried out only 14.7% of the remaining design work. Accordingly, CB have only earned £167,286 in respect of this element of the lump sum. Multiplex maintain that position in their closing submissions (paragraphs F 8.58 – 8.62).

1206. Thus the parties are £1,175,914 apart in relation to this issue.

1207. There is no dispute about the certification date in relation to design and drafting. Both parties take 16th February to 2nd August 2004 as the relevant period. See paragraphs 22A – 22C of Multiplex’s re-re-amended additional particulars and explanations of Scott schedule 2.

Assessment

1208. In chapters 2 and 3 above, I have briefly summarised the evidence bearing on this issue given by Messrs Boks, McGregor, Montijn, Hudson, Mann, O’Neil, Taylor and Wilkinson. On the basis of the evidence given by those witnesses and the contemporaneous documents, I make the following findings of fact:

- (i) The design and drafting of bowl steelwork were 90% complete on 15th February and 95% complete by 2nd August 2004.

(ii) The design and drafting of erection engineering and temporary works for the bowl steelwork were 90% complete on 15th February and 95% complete by 2nd August 2004.

(iii) The design and drafting of PPT steelwork were 87% complete on 15th February and 95% complete by 2nd August 2004.

(iv) The design and drafting of erection engineering and temporary works for the PPT steelwork were 87% complete on 15th February and 95% complete by 2nd August 2004.

(v) The design of the fixed roof permanent works was 55% complete on 15th February and 90% complete on 2nd August 2004.

(vi) The drafting of the fixed roof permanent works was 25% complete on 15th February and 90% complete on 2nd August.

(vii) The design and drafting of erection engineering and temporary works for the fixed roof were 25% complete on 15th February and 85% complete on 2nd August.

(viii) The design and drafting of permanent works for the moving roof had not started on 15th February. By 2nd August this work was 5% complete, in that some work had been done in relation to the buffers.

(ix) The design and drafting of erection engineering and temporary works for the moving roof had not been started on 15th February. By 2nd August this work was 5% complete.

1209. Where I state the same percentage for design and drafting, that percentage is an average. In practice drafting lags behind design, so that the percentage for design will be slightly above than the stated figure and the percentage for drafting will be slightly below the stated figure. In making these assessments, I have taken as my starting point Mott's design of the bowl, PPT and roof as at 15th February. Any design and drafting which became necessary as a result of subsequent changes made by Mott or Multiplex cannot increase the quantity of work which CB were required to perform in order to earn the lump sum specified in the Supplemental Agreement.

1210. In relation to the design and drafting of bowl steelwork, there are many inconsistencies within the pleadings, the witness evidence and the contemporaneous documents as to what degree of completion was achieved by 2nd August. I refer to some of these inconsistencies in chapter 30 below, when assessing Multiplex's claim for the cost of completing the design and drafting of bowl steelwork. My conclusion in this chapter that as at 2nd August the design and drafting of the bowl were 95% complete is the best assessment that I can make on the totality of the evidence.

1211. In relation to the fixed roof, I have gained assistance from a number of contemporaneous documents. One such document is DLT's assessment of July 2004. This showed that in relation to the north roof, the design of phases 51, 52, 57, 58 and 59 were 100% complete; the design of phases 53 and 54 was 98% complete; the design of phases 55 and 56 was 99% complete. In relation to the south roof, DLT's assessment showed that the design of phases 65, 66 and 69 was 100% complete; the design of phases 61 and 62 was 98% complete; the design of phases 63, 64, 67, 68, 81 and 82 was 97% complete. Mr Hargreaves

put this document in cross-examination to Mr Boks, who had no reason to doubt its accuracy: see day 11 page 135. Another relevant contemporaneous document is Mott's email to Multiplex dated 13th July 2004 (QC 41/ 82). That email reviews the north roof and the south roof in some detail and makes it clear that the overwhelming majority of the permanent works design and drafting had been carried out by CB.

1212. On the other hand, at the time of repudiation a substantial number of approvals were awaited from Mott: see the design status documents produced by Mr Gettins in August 2004 (QC 58/86 – 129) and the evidence of Mr Hudson. In so far as connection designs and calculations were not subsequently approved by Mott, these would have required further work on the part of CB (absent repudiation). Furthermore Oakwood's roof status report as at 3rd August (QC 50/81 – 91) identifies a number of detailed aspects of the design which required completion.

1213. I have considered all of the contemporaneous documents, including those mentioned above, together with the oral evidence. My conclusion that the design and drafting of the fixed roof were 90% complete as at 2nd August is the best assessment that I can make on the totality of the evidence.

1214. As set out more fully in chapter 30 below, I find that CB's proposed methodology for erecting the roof was feasible and in accordance with Mott's design as at 15th February. The fact that post 27th July Hollandia reasonably decided to adopt a different methodology is irrelevant to the present exercise. The extent of CB's progress on the design and drafting of erection engineering and temporary works for the roof must be assessed by reference to CB's intended methodology.

1215. In relation to the apportionment of design and drafting between different elements of the structure, I accept Mr Stewart's submission that the weightings derived from Mr Baron's spreadsheet at QC 70/244 should be adopted. I note the reservations expressed by Mr Wilkinson in cross-examination on day 18. In particular, the spreadsheet was prepared for an adjudication and was based upon CB's June 2002 budget. Nevertheless, QC 70/244 provides better evidence of the weighting than any of the other 200,000 pages of evidence which have been bestowed upon me. I am satisfied that that this spreadsheet provides a reasonable approximation.

1216. On the basis of the above findings, I hold that between 16th February and 2nd August CB carried out 61.79% of the remaining design work and 64.195% of the remaining drafting work. Accordingly CB have earned £703,170.20 and £347,294.95 of the Supplemental Agreement lump sum for design and drafting respectively. This is a total of £1,050,465.15.

CHAPTER 25. CB's CLAIM FOR VARIATION INSTRUCTIONS AFTER 15th FEBRUARY 2004

1217. In paragraphs 128A to 128H of re-re-re-amended Scott schedule 2 CB claim £305,753 in respect of bowl steel variations after 15th February. This claim comprises (i) additional design costs of £204,000 and (ii) increased costs relating to temporary works materials of £101,753. The latter claim is contained in paragraph 128G of schedule 2, which

was amended during closing speeches and then subsequently abandoned: see day 34, pages 179 – 184. Therefore in respect of this matter I am now only concerned with the claim for additional design costs.

1218. This claim is based upon twenty change notices listed in CB's appendix 2, which CB contend constitute variation instructions issued after 15th February 2004.

1219. CB's evidence in relation to these twenty change notices is general, rather than specific: see Mr Underwood's fourth witness statement paragraphs 470 – 474 and Mr Hutchinson's statement. Nevertheless Mr Hutchinson gives helpful evidence as to the amount of drafting work which he and his colleagues at CB were required to undertake, each time Mott revised their drawings. I have summarised this evidence in chapter 3 above.

1220. The individual change notices are discussed in the witness statements of Mr Perkins and Mr Watkins. Some of the change notices were debated with Mr Perkins and Mr Watkins in cross-examination. There is a helpful categorisation of the change notices in defendants' supplemental 18. Mr Perkins has provided his comments on supplemental 18 in the form of manuscript annotations.

1221. Having considered the evidence and the parties' submissions, my decisions in respect of the 20 change notices are as follows.

CN 2020

1222. This claim is not allowed. It arises from an error by CB, as explained by Mr Perkins at paragraphs 46 – 48. Mr Hall was cautious when cross-examined on this topic at day 21, pages 61 – 62.

CN 2033

1223. This CN relates to the provision of reinforcement tangs. This was variation work instructed by Multiplex after 15th February. CB are entitled to additional payment. This claim is allowed.

CN 2046

1224. This CN relates to the incorporation of holes and plates in steelwork, so as to enable Permasteelisa to connect cladding brackets. The details of the holes and plates were provided to CB before 15th February. See Mr Perkins statement at paragraphs 53 – 54 and the cross-examination of Mr Hall at day 21, pages 63 – 64.

1225. This claim is not allowed.

CN 2081

1226. CN 2081 is dealt with in paragraphs 21 – 23 of Mr Watkins' statement. The history of events was explored in the cross-examination of Mr Watkins (with the aid of a cardboard model), as summarised in chapter 2 above. On the basis of that sequence of events, I am satisfied that CN 2081 is a post 15th February variation. Although CB knew that a variation instruction would be issued detailing louvre supports and waterproofing at the tops of rakers, as at 15th February they did not know what form these details would take. Multiplex issued specific instructions in respect of these matters after 15th February.

1227. CB are entitled to payment in respect of this CN.

CN 2086

1228. This CN relates to revised details of diagonal bracings on lower tier raker beams (the subject of claims Hol 213, 221,223, 225-231, discussed in chapter 7 above). CB requested information on 6th February, but did not receive the information until after 15th February.

1229. Mr Perkins asserts in his witness statement that he is “certain” CB did not carry out these works. In cross-examination Mr Perkins conceded that CB did at least part of the drafting work relating to CN 2086. I am satisfied that CB did all of the drafting work for which they claim.

1230. This claim is allowed.

CN 2098

1231. This is conceded by Mr Perkins to be a post 15th February variation. I allow the claim.

CN 2121

1232. This is conceded by Mr Perkins to be a post 15th February variation. I allow the claim.

CN 2157

1233. This CN relates to the installation of three additional universal beams. I am satisfied that this is a post-15th February variation. The details of the drafting work involved were explored in cross-examination of Mr Perkins on day 16 at pages 94 – 99. It became clear that Mr Perkins has not examined the relevant drawings and has not gone into the matter in any detail.

1234. Mr Perkins in his witness statement accepts that this was a post-15th February variation, but disputes that 20 fabrication drawings needed to be changed. He maintains that only 16 drawings were affected. I am satisfied that all 20 fabrication drawings listed in the CN were affected.

1235. I allow this claim.

CN 2161

1236. This was a design co-ordination issue, rather than a variation. Design co-ordination was the responsibility of CB: see clause 23 of the subcontract conditions and clause 6.02 of the special conditions (D1/166-167). This co-ordination issue was apparent before 15th February. This claim is not allowed.

CN2163

1237. This is conceded by Mr Perkins to be a post 15th February variation. The fact that before 15th February an error was apparent in Mott’s drawing is not relevant. I allow the claim.

CN 2169

1238. This CN relates to strengthening connections due to increased loads. It is conceded to be a post 15th February variation. In his witness statement Mr Perkins disputed that CB did the consequential drafting work. Mr Perkins retreated somewhat from this position in cross-examination: see day 16, page 90.

1239. I am satisfied that CB did all the drafting work alleged. This claim is allowed.

CN 2179

1240. I am satisfied on Mr Hall's evidence that this work was within the scope of CB's original subcontract. The subject matter of CN 2179 was not a variation.

1241. This claim is not allowed.

CN 2187

1242. Mr Perkins in his witness statement accepts that this was a post-15th February variation, but disputes the number of drawings that needed to be changed. He maintains that only 16 drawings were affected. I am satisfied that all 28 fabrication drawings listed in the CN were affected.

1243. I allow this claim.

CN 2194

1244. I accept Mr Hall's evidence that this change was made at CB's request, to accommodate CB's works. It was not a variation.

1245. This claim is not allowed.

CN 2211

1246. This was a design co-ordination issue, rather than a variation. See paragraph 23 of Mr Watkins' statement. This claim is not allowed.

CN 2213

1247. This CN relates to steelwork modifications for the purpose of providing a connection to Permasteelisa's cladding brackets. Multiplex instructed this work before 15th February: see e.g. the minutes of the meeting between Multiplex, CB, Permasteelisa and Mott on 3rd February.

1248. This claim is not allowed.

CN 2217

1249. Mr Perkins concedes that this was a post 15th February variation, but contends that only 20 drawings were revised by CB. He "believes" that CB were told not to proceed any further.

1250. It must be said that the evidence on this matter from both sides is fairly scanty and it was not explored during the trial. However, the contemporaneous records in bundle J1 appear to support Mr Perkins' contention. I allow this claim, but only in respect of 20 fabrication drawings, not 59 drawings as claimed.

CN 2229

1251. I am satisfied on Mr Hall's evidence that this matter arose out of an error on the part of CB. This claim is not allowed.

CN 2243

1252. This was a design co-ordination issue, rather than a variation. This claim is not allowed.

CN 2263

1253. This was a variation instruction in relation to precast floor support, issued after 15th February. There is an issue as to whether CB amended 5 fabrication drawings, as alleged, in respect of this matter. On balance of probabilities, I am satisfied that CB did do this work.

1254. This claim is allowed.

Quantum

1255. Having considered the evidence of Mr Hutchinson and Dr Mastrandrea, I am satisfied that CB's approach to quantum is correct. It took ten hours on average to complete each revised drawing. The rate claimed of £30 per hour is reasonable. Indeed that rate appears to be accepted by Dr Mastrandrea.

1256. Accordingly I award £101,700 in respect of the drafting work the subject of this head of claim.

CHAPTER 26. CB's CLAIM FOR TEMPORARY STEEL NOT RETURNED BY MULTIPLEX

1257. CB claim between £3.35 million and £3.7 million in respect of temporary steelwork which they left on site in August 2004 and which Multiplex failed to return.

1258. Clause 9 of the Supplemental Agreement provided:

“9. In the event that the unperformed reimbursable costs items (referred to in schedule 1, paragraph (c)) are removed from the subcontract works in accordance with clause 8, it is agreed that:

“9.1 the parties will liaise during the 28 day notice period with a view to securing alternative employment for as many of the Sub-Contractor's

Site employees as possible and ensuring an orderly handover of the works with due respect for consultation and notice requirements.”

“9.3 the Contractor and/or his sub-contractors and/or his or their agents may enter upon the Sub-Contract Works and use for a consideration of £500,000 all temporary buildings, plant, tools, equipment and temporary works necessary for the carrying out and completion of the unperformed reimbursable cost items provided that where the aforesaid temporary buildings, plant, tools, equipment and temporary works are not owned by the Sub-Contractor, the Sub-Contractor shall use all reasonable endeavours to ensure that the benefits of all hire agreements and the like in respect of such temporary buildings, plant, tools, equipment and temporary works are fully assigned to the Contractor for the completion of the unperformed reimbursable cost items. The aforesaid consideration will be paid within 14 days of the Sub-Contractor complying with the Clause 9 and leaving the Site.”

1259. There is no dispute that under clause 9.3 of the Supplemental Agreement Multiplex must pay to CB the sum of £500,000 for use of such temporary buildings, plant, tools, equipment and temporary works as CB left behind on site in August 2004. The present claim by CB is for temporary steel and equipment which CB left on site, but Multiplex failed to return. This is a claim for conversion or breach of clause 9.3 of the Supplemental Agreement.

What steel did CB leave on site?

1260. The temporary steel allegedly retained by Multiplex is described as follows in CB’s Scott schedule 2:

<u>Items</u>	<u>Value</u>
Equipment as asset register	£ 585,732
Cable reeler/unreeler	£ 24,000
2,000 tonnes of steel valued at £1,500 per tonne	£3,000,000
Or	
Temporary works as asset register	£2,307,187

1261. Thus CB’s total pleaded claim, excluding the related claim for overheads and profits, amounts to £3,609,732, alternatively £2,916,919. In their closing submissions CB limit this claim to a total of 2,000 tonnes of steel: see paragraphs 780 – 781.

CB evidence

1262. Mr Underwood asserts that the steelwork not returned comprised 580 tonnes of “toblerone” steelwork and a further 1,521 tonnes of steelwork as listed in CB’s asset register at T21/264 – 279: see paragraphs 513 – 514 of his fourth statement. Mr Underwood was challenged in cross-examination about these paragraphs. He was somewhat vague about the details, but maintained that his statement was correct.

1263. Mr Hall in his witness statement confirmed that CB left temporary steelwork on site in August 2004. This included the arch turning struts, stillages for the PPT trusses and raker assembly, steel anchoring at ground level the temporary restraint cables for the arch. In

cross-examination he was unable to give an estimate of the total weight of temporary steel left on site. He was unfamiliar with the asset register.

1264. Mr Forrest confirmed in his witness statement that the pleaded items of temporary steelwork had been left on site by CB in August 2004, but these matters were not within his direct knowledge: see cross-examination at day 24, page 15.

Multiplex evidence

1265. Mr Watkins accepted that CB left behind the toblerone sections and that Multiplex retained these. He maintained that CB retrieved the black steel forming part of the temporary works. CB also retrieved the stillages supporting the arch.

1266. Mr Montijn referred in cross-examination to some stillages of modest size, which may have been left behind by CB. He could not point them out on the aerial photographs, because they would have been inside the sheds (day 13/ pages 122 – 123).

1267. Mr McGregor asserted that Hollandia removed a quantity of temporary steelwork from site between August and October 2004.

1268. Mr Bicknell stated that at the end of the project Multiplex disposed of about 3,000 tonnes of temporary steel as scrap. He does not know what part of that temporary steel belonged to CB. That steel only had a scrap value.

Toblerones

1269. It will be recalled from paragraphs 6 – 8 of judgment 2 that CB used five turning struts to raise the arch. The middle sections of the turning struts were triangular trusses. These were referred to as “toblerones”, because they resembled in shape a well known confectionery product. CB planned that after raising the arch they would modify the toblerones so as to re-use them in the temporary towers, which would support the roof during construction.

1270. CB duly left the toblerones on site when they departed. Neither Multiplex nor Hollandia ever returned the toblerones to CB.

1271. A large measure of agreement has now been reached in respect of the toblerone steelwork. An agreed description of the turning struts used for the arch is set out in Agreed Note 3. As set out in that note, there were five turning struts, made up of 116 toblerones. CB now contend that those toblerones weighed 605 tonnes, whereas Multiplex contend that the weight was 580 tonnes. Multiplex’s contention accords precisely with the evidence of Mr Underwood. I shall therefore take the weight of the toblerones as 580 tonnes.

1272. I have not been told the weight of the headers and footers of the turning struts. However, Mr Taylor said that these would be more difficult to re-use. Mr Watkins said that the headers and footers would be scrapped (day 7, page 147). In the circumstances, I ascribe a nil value to the headers and footers.

Other steel

1273. Four assembly sheds, standing in the centre of the football pitch, can be seen in the aerial photographs. They remained on site after CB’s departure. Mr Underwood stated that

these assembly sheds were the property of CB. This point was conceded by Mr Muldoon on day 27 (pages 167 – 168), somewhat to the dismay of counsel. The parties indicated that they would endeavour to agree the weight of the four sheds. Subsequently, following the hearing on 30th July, the parties agreed that the value of the four sheds was £60,000.

1274. There is a fair amount of contemporaneous evidence to the effect that (apart from the toblerones and assembly sheds) most temporary steel of any value was removed by CB in the summer of 2004. CB's work plans for July 2004 included items for the removal of temporary steel and for scrapping those parts which were not suitable for re-use: see G6/144.42 and following. This was a perfectly sensible approach for CB to adopt, having by then been given 28 days notice. CB would only leave on site such temporary steelwork as Multiplex specifically required, pursuant to clause 9.3 of the Supplemental Agreement.

1275. In an email dated 8th July 2004 Mr Thomas (CB's project director) referred to certain plant and temporary works belonging to CB, which would be left on site after CB ceased to be erectors. He stated that the scrap value of this steel "could be as much as £40,000 to £60,000". Mr Thomas gave evidence during the first trial and I recall that he had a fairly detailed knowledge of what was happening on site.

1276. In an adjudication witness statement dated 26th October 2004 Mr Allison stated that CB removed about 1,200 tonnes temporary steel from site following the raising of the arch: see paragraph 4.22. It will be recalled from the first trial that Mr Allison was CB's construction manager, who was initially responsible for the arch but became responsible for the whole site after 15th February.

1277. There are several entries in Mr Allison's diary for June and July 2004 referring to the removal of temporary steel from site. Quite often this steel appears to have been scrapped, but some was transported to a holding yard for future use: see S10/216.

1278. Having reviewed all of the factual evidence, I conclude that (apart from the toblerones and the four assembly sheds) CB left on site a modest quantity of temporary steel, which would only have a scrap value after use at Wembley. Some of that was removed by Hollandia in the latter half of 2004 and some was removed by CB at the end of the project in 2006.

Valuation of temporary steel

1279. Mr Forrest has given evidence to the effect that the Wembley toblerones, if returned to CB, could have been re-used for the Antwerp Ring Road project.

1280. I have come to the conclusion that CB cannot rely upon any notional benefit from using the toblerones on the Antwerp Ring Road project for two separate reasons. First, on the evidence, CB have not yet been awarded the Antwerp project; although I wish CB well in relation to their tender, my overall assessment of the Antwerp evidence is that CB's chances of success are less than 50%. There has been an ominous silence from the main contractor (a Belgian/ Italian consortium) since the time when CB were shortlisted: see day 24, page 7. Secondly, the Antwerp project and its specific requirements are special circumstances which were not in Multiplex's (or indeed CB's) contemplation at the time when the Wembley subcontract was executed. Thus any loss referable to the Antwerp project falls outside the second limb of *Hadley v Baxendale* (1854) 9 Exch 341: see the judgment of Alderson B at 354 – 355.

1281. On the other hand, Mr Forrest's evidence, which chimes with that given by Mr Taylor, does satisfy me that the tobleroness could have readily been adapted for re-use by CB on other projects generally. Furthermore, this is a matter which would have been appreciated by Multiplex, CB and the industry generally. Indeed both Multiplex and CB appreciated that the tobleroness could be re-used at Wembley.

1282. In valuing the tobleroness, I must take into account that, before re-use, CB would have to transport the tobleroness from Wembley to Darlington, store them, adapt them for the next project and then transport the tobleroness to the site of the next project.

1283. Having considered the factual evidence of Mr Forrest, the expert reports of Dr Mastrandrea and Mr Hart and the cross-examination on days 25 and 28, I conclude that the steel comprising the Wembley tobleroness had a value to CB or any similar steelwork contractor of some £800 per tonne. I therefore assess damages for non-return of the tobleroness at £464,000.

1284. I assess damages for the non-return of the four assembly sheds in the agreed sum of £60,000.

1285. I value all other temporary steel left on site by CB at nil. There is no evidence to establish that the scrap value of that steel would exceed the removal costs.

Equipment

1286. CB's asset register, dated 26th July 2004, lists numerous pieces of equipment on site at Wembley which, according to CB's pleading, had a total value of £585,731. The evidence as to precisely what equipment remained on site after July and as to the value of that equipment is somewhat confused. Nevertheless it is clear that, in general terms, Multiplex needed to retain on site the equipment which was being used to erect the steelwork. Furthermore, there is no evidence of general removal of equipment by CB, although CB may have removed some stillages.

1287. Subject to certain qualifications Dr Mastrandrea values the equipment claim at £253,694: see paragraph 4.159 of his schedule 2 report. Mr Hart values the equipment claim at £178,513. This is the total book cost of assets for which Mr Hart has seen purchase orders: see paragraph 756 of his supplementary report. Thus, unusually, on this aspect of the case Mr Hart's figure is more favourable to Multiplex than Dr Mastrandrea's figure.

1288. In paragraph 246 of their opening note Multiplex indicated that agreement was likely to be reached on the value of equipment retained by Multiplex. Nevertheless that obviously sensible course did not commend itself to the parties.

1289. Doing the best I can on the evidence, I assess the equipment claim at £216,103.

1290. I reject CB's claim for the cable reeler/unreeler. This has not been established on the evidence.

Conclusion

1291. There is no justification for adding a percentage for overheads and profit to the above sums, as claimed by CB.

1292. Let me now draw the threads together. For the reasons set out above, I assess Multiplex's liability to CB in respect of items left on site by CB and not returned by Multiplex in the total sum of £740,103.

CHAPTER 27. OTHER POST 15th FEBRUARY VALUATION ISSUES

1293. In this chapter I shall address all issues concerning the valuation of work done after 15th February, which have not been dealt with in previous chapters.

Category 1 buyouts

1294. The term "buyouts" was used by the parties to denote materials, items or services which CB would purchase from third parties. In the negotiations leading up to the Heads of Agreement in February 2004, the buyouts were listed in two schedules, namely the "category 1 schedule" and the "category 2 schedule". Those buyouts listed in the category 1 schedule were destined to fall within the £12 million lump sum price, whereas those listed in the category 2 schedule were destined to fall outside the £12 million lump sum price.

1295. I have recounted the story of the category 1 buyouts and the category 2 buyouts at some length in judgment 2, because those matters played a prominent role in preliminary issue 11. Anyone who wishes to peruse a detailed history of the buyouts and their place in the contractual scheme is referred to paragraphs 10 to 149 of judgment 2.

1296. It is common ground that out of the £12 million lump sum referred to in clause (b) of schedule 1 to the Supplemental Agreement, £2,421,000 was allocated to category 1 buyouts.

1297. For the reasons set out in chapter 19 above, CB are entitled to payment in respect of category 1 buyouts up to 30th June 2004. The sums claimed by CB as due in respect of category 1 buyouts up to 30th June are set out on page 12/19 of CB's interim payment application number 23 (E1/557). They total £1,250,150.

1298. Multiplex challenge three items in the list on page 12/19, namely:

- E. Roof castings (£261,100).
- F. PPT truss and roof pins (£45,000).
- S. Cable and strand handling temporary works (£70,000).

These three items are identified in paragraph 23 of Multiplex's re-re-amended additional particulars and explanations of Scott schedule 2. Dr Mastrandrea deals with these items at paragraphs 4.43 to 4.45 of his schedule 2 report. Mr Hart reviews them at paragraphs 645 to 650 of his report. The essential issue is one of fact, namely whether CB had supplied the items in question by 30th June. That factual question is addressed by Mr Underwood on behalf of CB and Mr Muldoon on behalf of Multiplex.

1299. In paragraph F 8.65 of their closing submissions Multiplex raise issues concerning items I, K and U in the list on page 12/19. No challenge to those three category 1 buyouts

has been pleaded. Nor has any such challenge been investigated during trial, except that Mr Underwood justified item I *en passant* at day 22, pages 140 – 141. In the circumstances, I shall treat paragraph F 8.65 as general comment rather than as a head on challenge to items I, K and U. Indeed, in fairness to Multiplex, it may well be that this is how Multiplex intend paragraph F 8.65 to be construed.

1300. I shall now turn to the pleaded issues.

1301. E. Roof castings. Mr Underwood asserts at paragraphs 434 – 435 of his fourth witness statement that CB procured heavy nodes, which they attached to the tops of the pyramid struts where they adjoin catenary cable CT 17. These are the roof castings referred to at item E of the list of category 1 buyouts. They were installed before the arch was rotated. He refers to the photographs at T21/ 223 – 226 as showing the roof castings in question.

1302. In paragraph 14.1 of his fourth witness statement Mr Muldoon denies that CB supplied any roof castings. In cross-examination Mr Muldoon asserted that the items shown in the photographs are part of the arch, rather than roof castings: see day 20 pages 99 – 101.

1303. I have studied the roof plans, the photographs and the evidence of Messrs Underwood and Muldoon. Having regard to the location of these items (at the top of the pyramid struts) and their function (transmitting load between the leading edge beam and catenary cable CT 17), I am satisfied that these items should be characterised as roof castings. I am also satisfied that they were duly supplied and installed by CB to the extent set out in application 23. I allow £261,100 in respect of roof castings

1304. F. PPT truss and roof pins Mr Underwood asserts that CB purchased and supplied pin assemblies for the PPT and roof. Mr Underwood produces 23 pages of invoices for the pin assemblies. Details of the pins were given to Multiplex as part of the handover process following CB's dismissal as erectors: see hand over file R20.

1305. In paragraph 14.2 of his fourth witness statement Mr Muldoon denies that CB provided any pins for the PPT or roof. In cross-examination he made the point that the pins in question were part of the arch: see day 20, page 101, lines 15 – 16.

1306. The evidence about the use to which the pins were put is sparse. I infer that some pins linked the arch to the PPT and some pins linked the arch to the roof. Doing the best I can on the evidence I hold that half the pins related to the arch and half related to the roof and PPT. I therefore allow £22,500 in respect of this item.

1307. S. Cable and strand handling temporary works. Mr Underwood asserts that CB provided and installed this equipment. This item is shown as 100% complete in CB's application number 23.

1308. In paragraph 14.2 of his fourth witness statement Mr Muldoon denies that CB had "carried out" these temporary works. In cross-examination Mr Muldoon made the point that these temporary works related to the arch.

1309. It is clear from the photographs at T21/ 220 – 222 that these temporary works were provided. Item S (unlike items E and F) is not specifically related to the roof. The fact that the cable and strand handling equipment was used for the arch does not specifically take it

outside item S of the category 1 buyouts. I therefore conclude that CB are entitled to payment.

1310. Conclusion. CB are entitled to payment in respect of category 1 buyouts up to 30th June, as set out on sheet 12/19 of application 23, less £22,500 in respect of PPT truss and roof pins. I therefore award £1,228,650 in respect of category 1 buyouts.

On-costs, bonds and insurance

1311. It is common ground that out of the £12 million lump sum referred to in clause (b) of schedule 1 to the Supplemental Agreement, £710,000 was allocated to on-costs, bonds and insurance.

1312. CB claim that they are entitled to the whole sum of £710,000. Multiplex contend that only £182,541 was due. This is calculated by taking £710,000 as referable to a total period of 70 weeks, and then allowing an appropriate proportion for 18 weeks. See item G on page 2 of Multiplex's re-amended Scott schedule 2 (which is not elaborated in the re-re-amended additional particulars and explanations). Dr Mastrandrea slightly increases Multiplex's pleaded figure on the basis that the relevant period was 19 weeks, not 18 weeks.

1313. Mr Underwood sets out the bonds and insurances which CB provided at paragraphs 444 to 460 of his fourth witness statement. These ran on for some considerable time after CB's repudiation.

1314. The actual costs which CB incurred (whether more or less than the allowance within the £12 million lump sum) are irrelevant to this issue. In my view CB are only entitled to an appropriate proportion of their on-costs, bond and insurance costs. CB are not entitled to recover those costs which are attributable to the period after repudiation. Multiplex only received the benefit of CB's on-costs, bonds and insurance in respect of work done prior to repudiation. If CB had not repudiated, it is reasonable to assume that they would have been engaged upon the various works comprised in clause (b) of schedule 1 to the Supplemental Agreement for a period stretching substantially beyond the summer of 2004. In assessing what that period would be, I must disregard any delays flowing from design changes by Mott after 15th February. The best assessment that I can make is a period of one year from 15th February 2004. On this basis CB are entitled to recover 36.5% of the lump sum allowance for on-costs, bonds and insurance. I therefore award £259,150 under this head.

Provisional sums

1315. In paragraph 127 of CB's re-re-re-amended Scott schedule 2 CB claim the sums which they paid to Bابتie and Enob after 15th February as provisional sum items. It can be seen from sheet 18/19 of CB's application number 23 that almost the entirety of the claim relates to Enob.

1316. Multiplex contend that Bابتie's fees after 15th February fall within the £12 million lump sum. I accept this submission. The final paragraph of schedule 1 to the Supplemental Agreement (set out in chapter 17 above) makes it clear that costs payable to Enob fall outside the £12 million lump sum. However, there is no similar provision in respect of Bابتie's fees. Since the parties specifically turned their minds to provisional sums, they would have included such a provision in respect of Bابتie if that was intended.

1317. The second point raised by Multiplex is that this item forms part of reimbursable costs under clause (c) and therefore no overheads or profit should be added: see paragraph F 8.85 of Multiplex’s closing submissions. I do not accept this argument. For the reasons discussed earlier the costs payable to Enob for intumescent painting fall outside the scope of the Supplemental Agreement. It can be seen from document 2 of schedule 3 to the Supplemental Agreement that “fire protection” was a matter for which Multiplex was responsible.

1318. For the reasons set out in chapter 17 above, I hold that overheads and profit at the rate of 13% should be added to Enob’s costs.

1319. The third point raised by Multiplex is that CB should give credit for cost saving which they made through not having to apply ordinary paint to the steel treated by Enob.

1320. For the reasons set out in chapter 17 above, this is a good point. CB must give credit in the sum of £181,530.15.

1321. Accordingly CB are due £584,570.65 for provisional sums post 15th February 2004.

CHAPTER 28. CONCLUSION RE SCHEDULE 2

1322. At a post trial hearing on 29th – 30th July I discussed with counsel the effect of the decisions set out in chapters 10 to 27 above, and ruled upon certain matters where the parties required the assistance of the court. Following that hearing counsel have agreed that the effect of the court’s decisions on the various schedule 2 issues is as set out in the following table:

Valuation up to 15 February 2004		
1.0	Preliminaries	
1.1	Project Management	£2,601,713.00
1.2	Site Management	£245,112.00
1.3	Design and Engineering	£1,729,871.00
1.4	General Site Preliminaries	£2,623,620.00
1.5	Sub total	£7,200,316.00
2.0	Work Activities	
2.1	Valuation of Arch	£5,553,390.72
2.2	Valuation of Roof steel	£1,606,713.05
2.3	Valuation of Bowl steel	£8,987,708.16
2.4	Pre Cast Erection	£241,008.33
2.5	Metal Decking Erection	£166,608.00
2.6	Sub total	£16,555,428.26
3.0	Variations	£2,370,728.00
4.0	Provisional Sums	
4.1	Babtie	£376,290.00
4.2	Enob	£502,610.90

4.3	Arch access system	£285,000.00
4.4	MPX deduction for over recovery on treatment of steel	-£228,641.88
4.5	Sub total provisional sums	£935,259.02
5.0	Total on valuation up to 15 Feb	£27,061,731.28
	Valuation post 15 February 2004	
6.0	Schedule 1(f) black steel	£2,305,557.74
7.0	Valuation of work done £12m	
7.1	Design	£703,170.20
7.2	Drafting	£347,294.95
7.3	Fabrication	£4,424,319.57
7.4	Buyouts	£1,228,650.00
7.5	On-Costs	£259,150.00
7.6	Sub total £12m scope	£6,962,584.72
8.0	Provisional sums	
8.1	Enob	£766,100.80
8.2	Babtie	£0.00
8.3	MPX deduction for over recovery of steel treatment costs	-£181,530.15
8.4	Sub total provisional sums	£584,570.65
9.0	Variations post 15 Feb	£101,700.00
10.0	Site costs: Schedule 1(c)	
10.1	Site costs	£7,956,509.00
10.2	Off site admin and overheads	£403,156.00
10.0	Sub total site costs	£8,359,665.00
11.0	MPX Sublets	£1,280,699.83
12.0	Total on valuation post 15 Feb	£19,594,777.94
18.0	VALUATION OF WORKS	£46,656,509.22

1323. I agree with counsel's analysis as set out in that table. Accordingly, I hold that the total sum which CB have earned for work done and materials supplied up to the date of repudiation is £46,656,509.22.

1324. I shall consider in chapter 38 below the overall effect of this decision, after taking into account interest, payments made pursuant to interim certificates, payments made pursuant to adjudication awards and so forth.

PART 4. SCOTT SCHEDULE 4

CHAPTER 29. SCHEDULE 4A

1325. I shall use the term “repudiated subcontract steel” as shorthand for the steel which CB was obliged under the subcontract to fabricate, paint and deliver to site, but which CB failed to fabricate, paint and deliver to site by reason of repudiating the subcontract. As a result of the Heads of Agreement and the Supplemental Agreement, much of CB’s fabrication and painting responsibilities had been hived off before the date of repudiation. By the 2nd August 2004 CB’s responsibilities were limited to (a) fabricating defined parts of the bowl steel, (b) painting those steel members which required ordinary paint and (c) applying primer to those steel members which required intumescent paint.

1326. Multiplex employed ZNS in Holland under contract WP 2755-1 to fabricate, paint and deliver to site the repudiated subcontract steel. Multiplex claim the costs of that exercise in Scott schedule 4A.

1327. Multiplex are entitled in principle to recover as damages the amount by which those costs exceeded the sums which, absent repudiation, Multiplex would have paid to CB for fabricating, painting and delivering to site that same steel. I say “in principle” because, as events turned out, Multiplex actually saved money by employing ZNS to fabricate, paint and deliver to site the repudiated subcontract steel. The sums which Multiplex paid to ZNS for providing those services were substantially less than the sums which Multiplex would have paid to CB under the subcontract (as amended by the Supplemental Agreement) if CB had fully performed. This curious result arises in part from Multiplex’s success in relation to schedule 2. As a consequence of the terms of the subcontract (as amended) Multiplex do not have to pay for fabrication and painting done by CB after 30th June and Multiplex do not have to pay for work in progress as at that date. In other words, as a result of the repudiation, Multiplex receive at no cost the benefit of certain fabrication and painting done by CB, but Multiplex must give credit for that benefit when claiming damages. Thus the assessment exercise which I must undertake in relation to schedule 4A will produce not a sum of damages due, but a sum for which Multiplex must give credit in their damages claim.

1328. I shall first identify the various costs which Multiplex incurred through employing ZNS to fabricate, paint and deliver the repudiated subcontract steel. I shall then use those costs as a basis for calculating the credit which Multiplex must give against their claim for damages for repudiation.

The split between Schedule 4A and Schedule 4F

1329. It will be recalled that CB repudiated not only the subcontract (as amended) but also the purchase order. Under item 1 of the purchase order CB were obliged to receive the “China steel returned unmade” and to use that steel to fabricate, paint and deliver to site the steel members identified in schedule 3 to the purchase order (which was essentially the same as schedule 3 to the Supplemental Agreement).

1330. In breach of item 1 of the purchase order CB completed only part of this work before repudiation. In chapter 18 above I have made the following findings:

- i) 1,798.1 tonnes of black steel were sent back from China to the UK.
- ii) CB fabricated 305.5 tonnes of that black steel pursuant to item 1 of the purchase order before repudiation.

- iii) As at the date of repudiation 394.24 tonnes of steel emanating from China were in planning and 53.68 tonnes of steel emanating from China were in fabrication.

1331. I shall refer to the steel members which CB failed to fabricate (or fully to fabricate) and paint, as required by item 1 of the purchase order as the “repudiated China steel”.

1332. Multiplex employed ZNS pursuant to contract WP 2755-1 to fabricate, paint and deliver the repudiated China steel. Multiplex claim the cost of that exercise (less the notional sums which Multiplex would have paid to CB, if CB had not repudiated item 1 of the purchase order) in Scott schedule 4F.

1333. Although ZNS in their dealings with Multiplex concerning contract WP 2755-1 made no distinction between repudiated subcontract steel and repudiated China steel, it is necessary for the court to draw such a distinction. The sums which Multiplex paid to ZNS in respect of repudiated subcontract steel form part of the schedule 4A claim. The sums which Multiplex paid to ZNS in respect of repudiated China steel form part of the schedule 4F claim. The credit which Multiplex must give against their claims in each of those two schedules is substantially different.

1334. For the reasons set out in the section of this chapter dealing with fabrication and coatings, most of the costs allowed will be apportioned 48% to schedule 4A and 52% to schedule 4F.

The contractual arrangements between Multiplex and ZNS

1335. Before embarking upon the schedule 4A issues, I must first outline the contractual arrangements between Multiplex and ZNS. I must also consider whether those arrangements were reasonable. CB maintain that those arrangements were not reasonable. Mr Williamson put CB’s case graphically in paragraph 479 (1) of his opening note: “CBUG is not liable for Multiplex being taken to the cleaners”.

1336. The contractual arrangements concerning steel fabrication and painting, which ZNS were engaged to undertake following CB’s repudiation, were outlined in evidence by Mr van Rooijen, Mr Bicknell and Mr van Gils. I am satisfied on the evidence that Multiplex engaged ZNS to carry out the outstanding bowl steel fabrication and painting by letter dated 12th August 2004; that contract WP 2755-1 was drawn up, but never signed; that the precise terms were the subject of ongoing debate as work progressed; that agreement as to ZNS’s remuneration was finally reached in March 2006 and recorded in the deed of release, as amended in manuscript during final negotiations. The reasons why ZNS refused to commit themselves to the proposed terms during the course of the works were twofold: first, the price of steel was escalating (see van Gils, cross-examination at day 11 page 45); secondly, ZNS were in a strong bargaining position following CB’s departure from the scene. When I refer in this judgment to “contract WP 2755-1”, it should be noted that strictly speaking I am referring to a draft contract whose terms were not finalised until March 2006.

1337. Under the settlement agreed in March 2006 ZNS received £3.53 million as payment for all materials and services supplied to Multiplex under contract WP 2755-1. That sum was arrived at by taking the total of all sums set out in ZNS’s final account and deducting £140,590.99 as settlement adjustment. See the deed of release at M4A-2/367 – 370. The settlement adjustment proposed in the final account was £100,000, but it can be seen from

the manuscript notes made during final negotiations that a further £40,590.99 was deducted so as to reach the round figure of £3.53 million.

1338. In considering whether the sums paid to ZNS should form part of Multiplex's damages claim, the court is not required to carry out its own evaluation of ZNS's work. It is the court's function to determine whether the contractual arrangements made by Multiplex were reasonable and whether the final settlement was reasonable in the circumstances. In approaching such an issue, the court is not disposed to be unduly censorious towards the claimant, in view of the fact that the claimant was extricating itself from the consequences of the defendant's breach of contract: see *Lodge Holes Colliery Company Ltd v Wednesbury Corporation* [1908] AC 323 at 325; *Banco de Portugal v Waterlow & Sons Ltd* [1932] AC 452 at 506; *McGlenn v Waltham Contractors Ltd* [2007] EWHC 149 (TCC).

1339. Mr Williamson criticises the terms which Multiplex included in contract WP 2755-1 as over-generous in a number of respects. He also criticises the final settlement reached as (a) being over-generous to ZNS and (b) going beyond the terms of contract WP 2755-1. Mr Williamson has put his points fairly in cross-examination and has set them out clearly in written submissions (although time did not allow for oral elaboration in closing speeches). I reject all of those criticisms.

1340. Following CB's repudiation Multiplex were in a weak bargaining position and ZNS (who were already fabricating steel for Wembley under contract WP 2755) were in a strong bargaining position. Multiplex negotiated as best they could and settled with ZNS upon the best terms they could achieve. I am satisfied that all the terms which Multiplex agreed with ZNS were reasonable and that the final settlement agreed in the deed of release was reasonable.

1341. Because the final settlement figure was less than the invoiced figure by a modest amount the sums which ZNS invoiced to Multiplex under contract WP 2755-1 must be reduced by a factor, which counsel have called the "compromise factor". The compromise factor was pleaded by Multiplex as .962. Mr Hart did his own calculations and arrived at a compromise factor of .962. Dr Mastrandrea now asserts that the compromise factor should be .969. I reject this assertion for two reasons. First, .962 has become an agreed figure. Secondly, I am not persuaded by Dr Mastrandrea's evidence that the agreed figure of .962 is wrong. I shall therefore apply a compromise factor of .962.

1342. Having dealt with those preliminary matters, I now turn to the individual heads in schedule 4A.

Transport

1343. I am satisfied on the basis of (a) the evidence of Mr van Gils and (b) the cross-examination of Mr Hall (both summarised in chapters 2 and 3 above) that 3,698 tonnes of Wembley steel were transported from the UK to Holland. I am also satisfied on the evidence that ZNS transported 2,383 tonnes of fabricated steel back to Wembley.

1344. Multiplex contend that the explanation for the discrepancy between the above two figures is that a large quantity of the steel shipped across to Holland turned out to be scrap. CB deny that this was the case. CB argue that it is inherently unlikely that they would have shipped some 1,313 tonnes of scrap across the North Sea. CB submit that probably the steel rejected as scrap was in fact roof steel (as originally pleaded by Multiplex).

1345. This issue was explored in the cross-examination of Mr van Gils and Mr Hall, as outlined in chapters 2 and 3 above. I have reviewed the oral and written evidence of those witnesses, as well as the photographs. I consider that ZNS were well able to identify whether or not steel was scrap, and I accept ZNS's characterisation of this material as scrap. It has not been established that ZNS made any profit from selling this scrap, for which credit should be given. Certainly ZNS gave no such credit in their settlement with Multiplex and the settlement cannot be impugned as unreasonable on that basis.

1346. CB criticise Multiplex for paying costs plus a 12.5% uplift in respect of transport. CB contend that Multiplex should have paid rates for transport, as set out in the schedule of rates at T37/57. I consider that if Multiplex had been engaging Hollandia in conventional circumstances, an agreement should have been reached on the basis of rates for transport. But these were not conventional circumstances. Multiplex were in a weak bargaining position for the reasons discussed above.

1347. I allow the claim for transport costs in the sums pleaded, subject to one qualification. For the reasons set out in the "fabrication and coating" section, the costs of transport back to the UK must be reduced by 15%.

1348. The total transport costs must then be apportioned 48% to schedule 4A and 52% to schedule 4F. Accordingly the transport costs to be included in schedule 4A are £127,496.47.

Receiving, sorting and storing steel

1349. I accept Mr van Gils' evidence (as summarised earlier) that the steel arriving in Holland was in a disorderly state and required sorting. It was reasonable for ZNS to make a charge for this.

1350. As can be seen from the deed of release at QC 88/19, ZNS claimed £327,702.19 in respect of receiving, sorting, storage and related services. Under the final compromise ZNS were paid £315,249.51.

1351. I have considered all the points which were put to Mr van Gils in cross-examination (summarised in chapter 2 above and also in CB's closing submissions). I am satisfied that the deal struck with ZNS was reasonable. The rate of £97.50 per tonne was not unduly generous to ZNS. As Mr van Gils observed in evidence, Multiplex were not a soft touch in negotiation.

1352. Indeed, whatever other criticisms may be made of Multiplex, neither undue timidity in negotiation nor excessive and unreasonable generosity towards subcontractors is generally one of their faults. See the numerous "Wembley" judgments on Bailii over the last two years.

1353. I do not accept that a discount should be made on the grounds that some fully fabricated steel was included amongst the batch sent to Holland. These items were probably steel members completed post 22nd June and still at Darlington when CB repudiated. They would have been caught by the general instruction post repudiation to send all steel at Darlington to ZNS.

1354. I allow this head of claim in full. The sum of £315,249.51 must be apportioned 48% to schedule 4A and 52% to schedule 4F. Accordingly the costs of receiving, sorting and storing steel to be included in schedule 4A are £151,319.76.

Reviewing status of part-fabricated steel

1355. ZNS included a 10% “inefficiency rate” as set out in the deed of release. This was intended to compensate ZNS for reviewing the status of part fabricated steel. The rationale of such a charge is that a fabricator usually undertakes the whole process. It is most unusual for him to receive a large quantity of steel in various stages of fabrication and then be asked to finish off the job.

1356. It can be seen from the “details” sheet at M4A-2/370 that the 10% “inefficiency” rate was added to the fabrication costs, excluding coating.

1357. I have considered Mr van Gils’ written and oral evidence on this issue. I am quite satisfied that this was a proper head of charge. I do not accept that this review exercise involved any overlap with the receiving, sorting and storage discussed above.

1358. I shall allow a 10% addition to the fabrication costs (excluding coating) in schedule 4A and schedule 4F, in order to cover the costs of reviewing the status of part fabricated steel.

1359. Accordingly the sum to be included in schedule 4A is £70,798.24.

Purchase of steel materials

1360. This is a claim for steel purchased by ZNS in order to complete the fabrication of the repudiated subcontract steel.

1361. I am satisfied on the evidence of Mr van Gils that ZNS purchased 686 tonnes of steel which they used for the purpose of fabricating bowl steel for Wembley. I am also satisfied that Multiplex agreed to pay ZNS for that steel at cost plus a 12.5% uplift, less the compromise factor. That settlement was a reasonable one.

1362. The question which I have to address is whether those costs paid out by Multiplex are recoverable as against CB.

1363. For reasons set out in the next section, I conclude that 350 tonnes of steel fabrication undertaken by ZNS for Multiplex are not chargeable to CB. Adopting a wastage factor of 7.05%, those 350 tonnes of fabricated steel would have been produced from 377 tonnes of black steel. That represents 55% of the steel purchased by ZNS.

1364. The next point to note is that some of the steel purchased by ZNS was steel plate. Any steel plate purchased by CB (if they had not repudiated) would have been charged separately to Multiplex. See clause (f) of schedule 1 to the Supplemental Agreement. The same position would apply, at least by implication, under the purchase order. I have seen no evidence that any steel plate was shipped back from Shanghai to the UK, and it is most unlikely that SGT would have included any steel plate in the shipments.

1365. The amount of steel plate included in ZNS’s purchases is addressed in defendants’ supplemental 9. That was put to Mr van Gils in cross-examination and his considered

comments were subsequently added to supplemental 9 as a separate column. Having considered that evidence I am satisfied that 30% of the purchase costs incurred by ZNS were attributable to steel plate.

1366. The above percentages (55% and 30%) are overlapping. Accordingly, the combined effect of my conclusions set out above is that 39% of the material costs which Multiplex paid to ZNS are recoverable in this litigation. Accordingly, in schedule 4A I shall include 39% of the sum paid to ZNS in respect of the purchase of steel materials.

1367. The reason why I attribute this sum entirely to schedule 4A is that more than sufficient steel came back from Shanghai to enable ZNS to produce the repudiated China steel (see the analysis of the split between schedules 4A and 4F set out above). Some of that steel was shipped direct from Felixstowe to Holland. Some of that steel was first transported from Felixstowe to Darlington, before setting off once more to Holland. Therefore any shortfall in black steel encountered by ZNS must be referable to non-China steel.

1368. Accordingly the sum to be included in Schedule 4A is £185,480.42.

Fabrication and coating

Quantity of steel fabricated and painted by ZNS

1369. Multiplex contend that ZNS fabricated and painted the steel members listed in appendix 1 to Scott schedule 4A, and that these steel members collectively constituted the repudiated subcontract steel. I shall refer to these steel members as “the appendix 1 steel”. The total weight of the appendix 1 steel is 1,140 tonnes.

1370. Multiplex contend that ZNS fabricated and painted the steel members listed in appendix 4 to Scott schedule 4F, and that these steel members collectively constituted the repudiated China steel. I shall refer to these steel members as “the appendix 4 steel”. The total weight of the appendix 4 steel is 1,243 tonnes.

1371. The total weight of the appendix 1 steel and the appendix 4 steel combined is 2,383 tonnes. This figure differs by 2 tonnes from the figure of 2,385 tonnes which, according to Mr van Gils, ZNS fabricated under contract WP 2755-1. This difference of 2 tonnes is due to rounding carried out on a number of occasions when arriving at each of the two totals. Nothing turns on that difference. I shall take the correct total as 2,383 tonnes.

1372. I am satisfied on the evidence that ZNS did indeed fabricate the appendix 1 steel and the appendix 4 steel. I am also satisfied that the weight of the appendix 1 steel is 1,140 tonnes and that the weight of the appendix 4 steel is 1,243 tonnes. It is also clear from Mr van Gils’ evidence and the deed of release that ZNS charged Multiplex £1,841,433.68 for fabricating and painting that steel, which was reduced by the compromise factor to £1,771,459.20. It is therefore necessary to consider whether this sum, suitably apportioned between schedule 4A and schedule 4F, should form part of Multiplex’s claim for damages.

Whether a deduction should be made for intumescent painting

1373. Both Dr Mastrandrea and Mr Hart are agreed that in so far as the above figure includes payment for intumescent painting, that sum should be deducted. This is because intumescent painting was not included in CB’s original subcontract sum nor in the £12

million lump sum under the Supplemental Agreement; on the contrary, it was the subject of a provisional sum.

1374. At first sight it appears that ZNS's charges did include an element for intumescent painting. This is because "P4" (the code for intumescent painting) appears against many of the steel members referred to in ZNS's fabrication invoices: see appendix 5 to Scott schedule 4A. I am satisfied, however, that this cannot be right, essentially for the reasons put forward by Mr Stewart. The Package Scope Definition for contract WP 2755-1 provides on page 18 (QC 54/242):

"The fabricator is not responsible for the application of intumescent painting."

1375. Furthermore Mr van Gils made it plain in paragraph 82 of his witness statement that ZNS did not do the intumescent painting. This was left for Enob to do. The explanation for the code "P4" in ZNS's invoices is that this denoted steel pieces which ZNS had primed and which would require intumescent paint in the future.

1376. The above conclusion is further supported by the M1A bundles. A number of the surveillance checklists in those bundles refer to steel pieces which had arrived from Holland in primer only and which required intumescent paint.

How much of the steel fabricated by ZNS is recoverable against CB?

1377. Mr Hall has undertaken 13 separate exercises on the steel fabricated by ZNS. (All steel fabricated by ZNS was also painted with either primer or ordinary paint, but this is not a matter which needs to be repeatedly mentioned in the following paragraphs.) In those exercises he has identified steel pieces which he contends fall into the following categories:

- i) Cancelled
- ii) Fabricated and delivered by CB
- iii) Louvre steel post 15th February variation
- iv) New items post CB
- v) Post CB variations
- vi) Part of Hollandia scope
- vii) Stated on database 4/11/2004 as being refab.

1378. Mr Hall's exercises are contained in bundle QC91. A small number of items in each of these categories were explored during the cross-examination of Mr van Gils.

1379. The upshot of Mr Hall's exercises (if everything he says is correct) would be that of the 2,383 tonnes fabricated by ZNS, some 706 tonnes (i.e. 30% of the total) are not recoverable in either schedule 4A or schedule 4F.

1380. Multiplex have responded with an analysis of specimen items in Mr Hall's various categories. The Multiplex exercises are contained in bundle Y6. A small number of the Multiplex exercises were put to Mr Hall in cross-examination.

1381. The written exercises which have been undertaken by the parties have involved the individual consideration of several thousand different piece numbers. Only a minute fraction of these have been dealt with in oral evidence. The remainder of the exercises have been left for my consideration in writing. I can only deal with these issues on the basis of overall impression and assessment. In forming this overall impression and assessment I gain assistance from the correspondence which Multiplex sent to Hollandia/ZNS in 2006. I shall now summarise that correspondence.

1382. By letter dated 20th July 2006 Mr Muldoon informed Mr van Rooijen that up to 400 tonnes of unused structural steel was sitting at East Lane, which equated to an unnecessary cost to Multiplex of some £480,000; and that Multiplex proposed to recover from Hollandia the unnecessary costs which Multiplex had incurred. This letter was accompanied by 81 photographs. Mr van Rooijen replied by email on 22nd August, disputing the claim on a number of grounds. These included the difficulties of identifying unmarked steel, changes which meant that steel could not be used and late arrival of steel at East Lane. Mr van Rooijen also asserted that the steel included some PPT steel and some temporary steel.

1383. On 23rd August Mr van Rooijen and Mr Muldoon made a joint inspection of the steel at East Lane. By letter dated 16th October Mr van Rooijen made similar points to those in his previous email. He added:

“both parties, Multiplex and Hollandia, were well aware that by bringing such an enormous amount of fabricated steel to East Lane and all steel that was in fabrication to ZNS in Holland, that at the end of the project there would be quite some steel left over.”

1384. I read this letter as giving some support to CB's contention that the decision taken by Multiplex on 22nd June to gather all fabricated steel at East Lane caused considerable difficulties in locating steel.

1385. On 27th October 2006 Mr Muldoon wrote to Mr van Rooijen. He pointed out that the steel at East Lane included 285 identifiable pieces of steel, which together weighed 174 tonnes. He considered that Hollandia had not produced any excuse for failing to locate and use at least these steel pieces.

1386. Both Mr Muldoon and Mr McGregor were cross-examined about this correspondence. I regard Mr Muldoon's evidence as more relevant, since Mr Muldoon signed the relevant letters and took part in the joint inspection on 23rd August 2006. Mr Muldoon stated that his letters of 20th July and 27th October were drafted by a quantity surveyor working on the Hollandia account. Mr Muldoon approved and signed the letters. The claims contained in those letters were made in good faith.

1387. The question which then arises is whether Hollandia's and Multiplex's failure post 2nd August 2004 to locate pieces of steel which were present in East Lane can be laid at CB's door. Some steel pieces were hard stamped; some were tagged and some had lost their tags. In so far as steel pieces had lost their tags, it is by no means clear that this was CB's fault.

Multiplex organised the transport to Wembley of the majority of steel at East Lane. It is clear on the evidence that the steel was handled roughly, and I am satisfied that this caused a number of tags to be lost. Leaving that point on one side, however, I have come to the conclusion that CB cannot be held responsible for any failure to identify pieces of steel which were held at East Lane. I reach this conclusion for four reasons:

- i) Mr McGregor conceded in his oral evidence that Multiplex and Hollandia did not have any real difficulty in identifying steel which was stored on site or at East Lane; they could go and look at it; also most of the steel stored on site and at East lane had tags.
- ii) Although I do not accept that East Lane was as well ordered as Multiplex maintain, I am satisfied that the steel pieces which went to Wembley following the instruction of 22nd June were capable of being identified. It was not CB's fault if they were not so identified.
- iii) I accept CB's evidence that there was considerable confusion in the way that Multiplex dealt with steel pieces after their decision of 22nd June.
- iv) Multiplex's claim made in good faith against Hollandia rested on the premise that steel pieces which were present in East Lane but not used were readily capable of being identified.

1388. I appreciate that some fully fabricated steel pieces were at locations other than East Lane as at 2nd August 2004. However, on the basis of the evidence of Mr Perkins and Mr Cumberland I am satisfied that such steel represents a very small proportion of the whole. It does not affect my overall conclusions.

1389. Having considered all of the evidence, including the 2006 correspondence, Mr Hall's exercises and the Y6 exercises, I make the following assessment. Out of the 2,383 tonnes fabricated by ZNS, some 350 tonnes are not the responsibility of CB. This is because either the steel pieces had been fabricated and delivered by CB but not found by Multiplex and Hollandia, or the steel pieces fell into one of the other categories discussed above. Accordingly, the cost of fabricating 2,033 tonnes forms part of Multiplex's damages claim. That cost, after allowing for the compromise factor, amounts to £1,512,003.

1390. This must be apportioned pro rata between schedule 4A and schedule 4F. On the basis of quantities of steel fabricated in each category, 48% is assigned to schedule 4A and 52% is assigned to schedule 4F. Accordingly, the fabrication and coating costs assigned to schedule 4A are £725,761.44. The fabrication and coating costs assigned to schedule 4F are £786,241.56.

Additional fabrication

1391. ZNS claimed £433,247 against Multiplex for additional fabrication, as set out under the heading "site instruction 24092-401" in the deed of release. After applying the compromise factor Multiplex paid £416,783.61 in respect of this head.

1392. There are 532 pages of invoices, which make up ZNS's claim under this head. These are to be found at pages 12 to 544 of bundle M4A-3 and they are summarised by Multiplex in

appendix 6A to Scott schedule 4A. ZNS added an uplift of 7.5% for overheads and profits in order to arrive at its original claim for £433,247. I am satisfied that Multiplex acted reasonably in settling this claim for £416,783.61.

1393. Mr Hall has done a detailed analysis of the invoices relied upon by Multiplex. This is to be found at QC 91/27-72 and also at X3/tab 8. Extracts from this analysis were put in cross-examination to Mr van Gils and accepted by him.

1394. The invoices are for a miscellany of items: bolts, erection aids, tools, wedges, shimplates, steel pins for the PPT etc. Many of these were not items which CB were obliged to provide under the lump sum provision of the Supplemental Agreement. However, I do not accept that the entirety of appendix 6A can be dismissed. For example, I am satisfied on the evidence that shimplates should be regarded as part of the permanent works, rather than erection aids. Also Mr Hart in his report accepts that a number of items listed in appendix 6A formed part of CB's lump sum works.

1395. Having considered the evidence on both sides, the best assessment that I can make is that approximately half of the sums claimed in appendix 6A relate to items which CB were obliged to provide under the subcontract as amended by the Supplemental Agreement. I shall therefore take a figure of £208,391.80. Of this sum 48%, namely £100,028.06, must be allocated to schedule 4A.

Non-destructive testing

1396. ZNS carried out non-destructive testing for Multiplex. ZNS claimed £66,826 for this work in the deed of release and settled for £64,286.94 after applying the compromise factor.

1397. Having considered the evidence of Mr van Gils and Mr Hall, I am satisfied that ZNS carried out this work. I am also satisfied that it was reasonable for Multiplex to pay £64,286.94 to ZNS for carrying it out.

1398. I shall therefore apportion 48% of that sum, namely £30,849.09, to schedule 4A.

Site management, insurances and overheads

1399. Multiplex claim an additional 14.77% on top of what they paid to ZNS, in order to cover their site management, insurances and other overheads. Whilst no doubt Multiplex incurred costs of this nature, they would have incurred similar costs if CB had remained in place and had completed the fabrication of their portion of the bowl steelwork. I shall leave this item out of account on both sides when calculating the credit which Multiplex must give to CB in respect of schedule 4A.

Deductions

1400. Of the further deductions proposed by CB, the only one which I regard as valid is the deduction for currency exchange rate differences. The deduction attributable to schedule 4A is £10,553.52.

Calculation of credit due to CB

1401. It can be seen from the foregoing that Multiplex incurred costs of £1,381,179.96 in employing ZNS to fabricate, paint and deliver the repudiated subcontract steel.

1402. If CB had not repudiated, they would have fabricated, painted and delivered all of the steel which was their responsibility under the Supplemental Agreement. They would have been paid £7.19 million for so doing: see paragraph 4.17 of Dr Mastrandrea's report, with which Mr Hart agrees. In the event, CB have only recovered £4,424,319.57 for fabricating, painting and delivering steel to site post 15th February 2004: see chapter 28 above.

1403. Thus it can be seen that as a result of the repudiation Multiplex have avoided the need to pay £2,765,680.43 to CB. This saving exceeds the sums paid to ZNS for fabricating, painting and delivering the repudiated subcontract steel. Accordingly, Multiplex have in this respect made a gain of £1,384,500.47 as a result of CB's repudiation.

CHAPTER 30. SCHEDULE 4C

Introduction

Definitions

1404. I have outlined the nature of Scott schedule 4C in my judgment dated 19th March 2008 concerning Multiplex's application to amend. I shall not repeat that exposition. In this chapter I shall refer to claims 1 to 5 compendiously as "schedule 4C". I shall refer to the three claims which were formerly within schedule 4D, but have now migrated to schedule 4C, as "the three migrated claims". I shall refer to the forty claims which remain within schedule 4D after the departure of the three migrated claims as "schedule 4D". I shall refer to schedule 4C, schedule 4D and the three migrated claims compendiously as the "design and drafting claims".

1405. I shall refer to Hollandia's design and drafting work which was the subject of certificate 22 as "Hollandia's design and drafting work".

Multiplex's design and drafting claims

1406. Multiplex claim as damages against CB some 90% of the cost of Hollandia's design and drafting work. Multiplex contend that, absent repudiation, CB would have carried out that design and drafting work as part of CB's lump sum works under clause (b) of schedule 1 to the Supplemental Agreement.

1407. Multiplex's design and drafting claims fall into three parts. Schedule 4C comprises claims relating to the permanent works. Schedule 4D comprises claims relating to the temporary works and erection engineering. The three migrated claims hover between the two categories and will require more specific consideration.

1408. I shall assess Multiplex's claims in schedule 4C, leaving on one side any credit which may be due in respect of outstanding portions of the £12 million lump sum specified in clause (b) of schedule 1 to the Supplemental Agreement. Having assessed those claims, I shall then consider what credit Multiplex must give.

Contract WP 9050

1409. Contract WP 9050 was initially the contract between Multiplex and Hollandia, whereby Hollandia undertook to audit CB's roof design (as outlined in judgment 1). This contract was expanded to cover all Hollandia's design and drafting work.

1410. The total payment claimed by Hollandia under contract WP 9050 for all their design and drafting work was £10,402,193, as set out in certificate 22, dated 31st March 2006. This claim was compromised in the sum of £10 million under a deal struck between Hollandia and Multiplex on 7th April 2006.

1411. Out of that £10 million payment to Hollandia, Multiplex apportion £3,696,299 to schedule 4C claims, £4,270,672 to schedule 4D claims and £1,023,571 to the three migrated claims. Thus it can be seen that Multiplex seek to reclaim £8,990,542 (i.e. 89.9% of their total outlay) against CB. Multiplex add 14.77% to these claims to cover site management, insurances and overheads.

1412. The copy of certificate 22 which Multiplex have incorporated into Scott schedule 4C (namely appendix A to schedule 4C) has caused very considerable confusion, because the figures do not match up with the pleadings. This confusion was not resolved until day 28 of the trial, when a different version of certificate 22 (said to be a hard copy of the electronic version) was added to the trial bundle. This now appears in bundle T74. The new version of certificate 22 effectively supersedes the old one. I shall treat all references in Scott schedule 4C to "Appendix A", as if they were references to bundle T74.

Inconsistency with Multiplex's claim against Mott

1413. On 5th October 2007 Multiplex sent a letter of claim to Mott pursuant to the Pre-Action Protocol for Construction and Engineering Disputes. This letter was carefully drafted. The letter comprises 1,539 paragraphs and spans some 340 pages. The letter includes the following passages:

"56. At a fundamental level, Mott MacDonald's design of the steelwork for the Wembley Stadium Project was: (i) not constructible; (ii) not correct; (iii) not complete; and/or (iv) not co-ordinated."

"391. Further changes to the T7 truss were made after Revision H. Changes to the T7 end reactions occurred on 10 February 2004 and 21 September 2004 (Revision J of the FC drawings)."

"392. Mott MacDonald made a further and highly significant change to the design of the T7 truss during December 2004 and January 2005. Mott MacDonald changed all of the connection forces in the T7 truss and also made significant revisions to the member sizes of the principle members in the truss. This design change was particularly disruptive as, at the time the change was introduced, Hollandia had just completed the drafting work on the T7 truss and had commenced fabricating the T7 truss sections."

"393. Mott Macdonald has previously attempted to attribute this revision to changes of the weight of the Moving Roof advised by Hollandia, however, as set out in Section F4 of this letter, Mott MacDonalds estimate of the Moving Roof dead load was incorrect and appropriate load contingencies were not used in Mott MacDonald's design. Further, Mott MacDonald failed to notify Multiplex that it was undertaking a

re-design of the T7 truss in December 2004 and January 2005 despite the fact that an engineer from Mott MacDonald was resident in Hollandia's office and would have been aware that fabrication of the T7 truss had already commenced. Mott MacDonald's failure to notify Multiplex of these very late changes to the design of the T7 truss falls well below the standard of reasonable skill, care and diligence as may be expected of a qualified, experienced and competent structural design engineer on a project of this nature."

"492. Mott MacDonald's estimated Moving Roof dead load was incorrect and appropriate load contingencies were not used in Mott MacDonald's design. The final weight of the Moving Roof was approximately 200 tonnes heavier than the self-weight calculated by Mott MacDonald, representing approximately a 25% increase in its self weight."

"642. From the period on or around 8 November 2004 onwards, Hollandia completed the remaining design, fabrication and erection of the steelwork. They continued to be beset by changes and deficiencies in the design of the steelwork and in particular, design deficiencies in connection with the PPT and the moving and fixed roofs (as is discussed in more detail in section E and F of this Letter of Claim)."

"643. Throughout this period, Multiplex reprogrammed its work on several occasions to overcome the impact of Mott MacDonald's design breaches."

"977. Multiplex has ultimately settled claims made by Hollandia for amounts payable in relation to the design and drafting of the steelwork (under Order 9050) and the on-site erection of the steelwork (under Order 2760). Multiplex and Hollandia have settled Hollandia's claim for design and drafting of the steelwork for a total of £10,000,000. However £5,709,106.01 is currently being sought from CBUK in relation to the design and drafting of the steelwork associated to the Bowl performed by Hollandia. The balance of those costs are, in part, costs incurred by Hollandia in the period surrounding CBUK's repudiation on 2 August 2004 and the resulting 'learning curve' from Hollandia BV and this portion of the costs amounts to £1,625,520.63."

"978. Notwithstanding that cost, Multiplex asserts that an additional £2,665,373.36 of design and drafting work was caused by variations to the design of the steelwork which were introduced by Mott MacDonald and Multiplex seeks the sum of £2,665,373 from Mott MacDonald as a result of those variations (and those variations are discussed, in part, in Sections E and F of this letter and Multiplex will provide further particularisation in due course)."

1414. It can be seen from the above passages that Multiplex hold Mott responsible for a substantial part of the £10 million design and drafting costs which Multiplex incurred. It is appropriate to bear this in mind when examining the schedule 4C claims, the schedule 4D claims and the three migrated claims.

The paragraph numbering of Scott schedule 4C

1415. The first two pages of schedule 4C contain paragraphs numbered 1 to 7. After that the numbering sequence starts all over again and there are 55 numbered paragraphs on pages 4 to 34. Whenever I refer to a paragraph number of schedule 4C, I am referring to the series of 55 numbered paragraphs starting on page 4.

1416. Schedule 4C is also divided into sections headed “Step 1”, “Step 2” and “Step 3” and into “Items”, which are numbered 1 to 10. This parallel numbering system adds confusion rather than clarity to schedule 4C and I shall disregard it.

Schedule 4C claim 1

1417. Schedule 4 claim 1 is for the costs incurred by Hollandia during August and September 2004 in (a) understanding the status of design and drafting as at 2nd August 2004 and (b) establishing a team to complete the design and drafting of the permanent works: see paragraphs 1 and 2 of schedule 4C and paragraphs 5.8 – 5.11 of Multiplex’s closing submissions.

1418. Claim 1 is, in principle, a sound claim. Following CB’s repudiation, Hollandia as the new steelwork designers first needed to gain an understanding of design work to date (save in so far as they had already gained an understanding through their role as erectors and as auditors of the roof design). Hollandia’s task during August and September was made the more difficult by reason of CB’s deliberate policy of withholding information. I shall therefore turn to that aspect first.

CB’s deliberate policy of withholding information

1419. In July 2004 feelings were running high on both sides. Multiplex was engaged upon a policy which was ruthless but lawful. Multiplex issued certificates 37 and 38 in huge negative sums in clear breach of their contractual obligation to consult. Those breaches of contract were to be deplored, but they did not amount to repudiation. See judgment 1, paragraphs 626 – 630.

1420. On 2nd August Multiplex and CB parted company in acrimonious circumstances, each alleging (and believing after taking legal advice) that the other had repudiated. This court has subsequently held that CB was the repudiating party, but in the heat of battle neither party could then foretell how the legal dispute would play out. In August 2004 CB embarked upon a policy of deliberately withholding design information. This conduct was certainly no less deplorable than the conduct of Multiplex.

1421. A number of internal documents of CB evidence a deliberate decision to withhold design information from Multiplex and Hollandia. Mr Stewart put these documents to Mr O’Neil in cross-examination and secured admissions as set out in chapter 3 above. Mr Taylor of DLT gave answers to the same effect in cross-examination.

1422. The parties have devoted much energy to analysing the detailed evidence about this aspect of the case, both in their closing written submissions and in supplementary documents lodged during final speeches. I am not going to be lured into this arena. It is not for this court to explore the morality of the parties’ conduct. Nor is it necessary for me to decide when and by whom CB’s policy was devised. What is important for present purposes is to establish when CB released the relevant design information and what effect the delayed release had upon the costs which Multiplex incurred.

1423. I am satisfied on the evidence that during August and September CB at first withheld important design information and then delayed in handing it over. I am also satisfied that during late August and September CB progressively handed over all the available design information, as requested by Multiplex and Clifford Chance. When the design information reached Hollandia it was in a disorderly state. This was in part the fault of CB and in part the fault of Multiplex: see the cross-examination of Mr Boks at day 11, pages 84 – 96.

1424. The delays on the part of CB materially increased the costs which Hollandia incurred (and charged to Multiplex) for understanding CB's design and preparing to pick up the reins.

The design and drafting costs which Hollandia incurred in August and September 2004 and charged to Multiplex

1425. The design and drafting costs incurred during August and September by Hollandia and their subcontractor Oakwood (now transferred from CB) are set out in appendix 1 to Scott schedule 4C. The total shown in appendix 1 is £375,310.

1426. Dr Mastrandrea has reviewed appendix 1 and spotted a number of errors, some resulting from the long running confusion over certificate 22. Dr Mastrandrea has produced a revised version of that appendix which appears as appendix 2.1 to Dr Mastrandrea's schedule 4 report (tab C5 of bundle B7-4/2). These costs, including a 10% mark up on Oakwood's costs, amount to £390,544. Mr Hart accepted in cross-examination that such a mark up would be normal and the figure of 10% did not surprise him: see day 27, page 175.

1427. I am satisfied on the evidence that during August and September 2004 Hollandia and Oakwood staff worked for the number of hours shown in appendix 2.1 and that Hollandia invoiced Multiplex for those sums. I accept that Hollandia added a 10% mark up to Oakwood's costs and that in the circumstances this was a reasonable mark up.

1428. It has not been demonstrated that the reductions proposed by Mr Hart at paragraphs 1085 – 1087 of his report should be made. Before Multiplex settled Hollandia's claim, Multiplex audited Hollandia's accounts and one of those involved in the audit spoke Dutch: see Mr Bicknell's statement paragraph 13.

1429. It can be seen from certificate 22 that Hollandia claimed a total of £10,402,194 for design and drafting work carried out between 2004 and 2006 and that this sum was reduced to £10 million in the final settlement between Hollandia and Multiplex. Accordingly, as Dr Mastrandrea states in paragraph 3.4 of his schedule 2 report, all of the individual claims in schedule 4C should be adjusted by a compromise factor of .961.

1430. On this basis, I find that Multiplex paid to Hollandia £375,313 for work done by the design and drafting team in August and September 2004. This payment was reasonable.

1431. Multiplex contend and Dr Mastrandrea understands (see paragraph 3.14 of his report) that during August and September 2004 the Hollandia/Oakwood team were solely engaged upon gaining an understanding of the previous design work and setting up a design team. That team comprised Hollandia staff, Oakwood, DLT, Consteel and Jacobs Babtie (as third party checker).

1432. Mr Hart observes at paragraph 1061 of his report that Oakwood's work would not have been unduly disrupted by CB's repudiation. However, this paragraph was written on

the incorrect assumption that, upon being re-appointed by Hollandia, Oakwood had access to all their pre-existing drawings and design information. See Mr Hart's cross-examination at day 27, pages 168 – 169.

1433. I am satisfied that during August and September Hollandia and (despite their pre-existing role) Oakwood did indeed spend time and incur costs in mastering the design work to date, in setting up a new design team and preparing to move forward. I reach this conclusion on the basis of the evidence of Mr Montijn, Mr Boks, Mr McGregor and Mr Perkins. As set out below, however, that is not the whole of the picture.

1434. First, as Mr Boks explained in cross-examination, Hollandia as the new erectors had to spend time and incur cost in reviewing CB's connection designs for the bowl and the PPT. This exercise flowed from the decision to change erectors and would have been undertaken in any event. It was not caused by CB's repudiation.

1435. Secondly, during August and September the permanent works design team also had to do a substantial amount of checking work as a result of changes to the moving roof loads. The first tranche of that work was written up in Hollandia's report dated 6th September (QC61/162 – 177). That report involved a substantial amount of work: see Mr Boks cross-examination at day 11, pages 109 – 111. This work continued beyond September 2004.

1436. Thirdly, Hollandia as the new erectors were proposing to adopt a different erection methodology for the roof. This impacted upon the design of the permanent works. In a letter to Multiplex dated 9th September (QC 65/18) Mott stated:

“We are currently reviewing and returning roof fabrication drawings. Following our meeting with MPX and Hollandia on 29 July 2004, it is apparent that Hollandia have differing views to CBUK with respect to the provision of length adjustment and tolerance during construction of the roof. Particular elements include CTs, bracing, purlins and the underslung rafters.

Our review of the roof fabrication drawings is for general compliance with our contract documents (which describe the structure in its permanent condition). Our review does not encompass provisions that the contractor may feel are necessary for their erection requirements. On the recently returned Phase 66 drawings, we have highlighted this point with respect to the bracing and CT elements by annotating the appropriate drawings. However, this is relevant to all roof fabrication drawings.

Before Hollandia commence fabrication, they should review the drawings and confirm or otherwise that the drawings provide the necessary provisions they require for their erection methods and sequence.”

1437. This letter was debated with Mr Boks in cross-examination on day 11. I am satisfied on the basis of the documents and Mr Boks' evidence that Hollandia's preferred erection methods had the consequence that CB's connection designs and steelwork drawings for the roof needed to be reviewed and revised. This generated a substantial amount of work both in August and September 2004 and for a long time afterwards.

1438. Having reviewed all of the factual evidence, in particular the documents generated in August/ September 2004 and Mr Boks' comments on those documents, I conclude that approximately 60% of the work done by the permanent works design team in August and

September 2004 falls within schedule 4C claim 1; the other 40% is attributable to the matters identified above and is unrelated to CB's repudiation.

1439. I therefore assess schedule 4C claim 1 in the sum of £225,188. If CB had not been so deliberately obstructive during August and September 2004, Hollandia's task in mastering the design work to date would have been substantially easier and claim 1 would have been assessed in a much lower sum.

Schedule 4C claim 2

1440. Schedule 4C claim 2 is for the cost of managing and controlling the permanent works design and drafting team between October 2004 and March 2006. The pleaded claim, after discounting for the settlement factor, is £231,826.

1441. Mr Boks and Mr Verhoeven managed the permanent works design team within Hollandia. Mr Knowles managed the Oakwood drafting team for permanent works. The number of hours worked by Messrs Boks, Verhoeven and Knowles between October 2004 and March 2006 are set out in appendix 3 to Scott schedule 4C (M4C-1/64). Dr Mastrandrea has spotted a number of errors in schedule 4C and has produced a revised version as appendix 2.3 to his schedule 4 report (B7-4/2 tab C6). Dr Mastrandrea's total figure is £241,149. After applying a compromise factor of .961 this figure is reduced to £231,744.

1442. Mr Hart arrives at a lower figure. I am satisfied, however, on the evidence that Multiplex did incur the costs set out in appendix 2.3. Therefore I should take the figure of £231,744 as my starting point.

1443. For the reasons set out in the following sections of this chapter, the vast majority of the time of the permanent works design and drafting team between October 2004 and March 2006 was devoted to matters which were unrelated to CB's repudiation. I assess that only 10% of the managerial time was related to the completion of unfinished work left by CB. I therefore assess schedule 4C claim 2 in the sum of £23,174.

Schedule 4C claim 3

1444. Schedule 4C claim 3 is a claim for the cost of completing the design and drafting of the bowl steelwork. The pleaded claim, after discounting for the settlement factor, is £188,365.

1445. The build up of this claim (excluding the mark up and the discount for settlement factor) is set out in appendix 4A to Scott schedule 4C. The claim is for 6,087 hours work said to have been done by Oakwood in connection with the bowl steelwork between October 2004 and June 2006. According to paragraphs 23 to 27 of schedule 4C, the work undertaken comprised:

- Completing the connection designs for the bowl;
- Understanding the status of retro squad work, following the disbanding of CB's retro squad;
- Completing the retro squad drawings;
- Completing the steelwork drawings for the bowl.

1446. Oakwood did not deal with retro-fit work. Accordingly, it is only the first and last items in this list with which the court is concerned.

1447. Dr Mastrandrea has spotted a number of errors in appendix 4A and has produced a revised version at appendix 2.4A of his report. The total on page 4 of Dr Mastrandrea's appendix 2.4A is 5,346 hours work, costed at £177,629 based on an average rate of £30.20 per hour. Dr Mastrandrea then adds to that total other sums for items the subject of an amendment application which was refused on 19th March 2008: see judgment 5. I accept Dr Mastrandrea's corrections of detail to appendix 4A. I shall therefore take his figure of £177,629, reduced by the compromise factor to £170,701, as my starting point. As a first step, I must disregard those costs incurred after March 2006 (£6,637 according to pages 3 and 4 of Dr Mastrandrea's schedule), since they were waived in the settlement between Hollandia and Multiplex.

1448. Despite Mr Hart's reservations at paragraphs 1103 to 1113 of his report, I accept that Oakwood staff at the Manchester office did indeed do 6,087 hours of work between October 2004 and June 2006. The question which I have to address is how much of that work constituted completing the design and drafting of bowl steelwork.

1449. In chapter 24 above I have held that the design and drafting of the bowl (excluding post 15th February variations) were 95% complete on 2nd August 2004, when CB repudiated. In making this finding I have had to reconcile, as best I can, many inconsistent pieces of evidence. In particular, Mr Perkins' schedule at QC 51/49 – 50 indicates that as at 2nd September Oakwood would need to do 3,749 hours work to complete the design and drafting of the bowl. On the other hand Mr Boks at paragraph 23 states that most of the design and drafting of the bowl was complete by December 2004. According to appendix 4A Oakwood only did 1,166 hours work on the bowl up to December 2004 (reduced by Dr Mastrandrea in his appendix 2.4A to 1,076 hours). According to Mr Boks, after mid-October most of the work done in relation to the bowl merely consisted of obtaining approvals from Mott, who were rather slow in responding: see day 11, pages 105 – 107. Having considered all of the evidence referred to in chapter 24 above, as well as the material cited by the parties in relation to schedule 4C claim 3, I conclude that there were about 3,000 hours work outstanding on the design and drafting of bowl steelwork when CB repudiated. The remaining work done by Oakwood during the relevant period must have been related principally to the design and drafting of roof. See the cross-examination of Mr Boks.

1450. It will be recalled from earlier chapters that a significant amount of design and drafting work undertaken by CB and Oakwood arose out of post 15th February variations. I estimate that if CB had not repudiated, about half of the outstanding design and drafting for the bowl would have been variation work for which CB would have been entitled to payment. Accordingly, Multiplex's "loss" under schedule 4C claim 3 lies in the fact that they have had to pay Hollandia for 3,000 hours of design and drafting of bowl steelwork, rather than 1,500 hours. Oakwood's average hourly rate in respect of this work was £30.20 per hour. After adding a 10% mark up and then allowing for the compromise factor, I quantify this loss at £47,887.

1451. I therefore assess schedule 4C claim 3 in the sum of £47,887.

Schedule 4C claim 4

1452. Schedule 4C claim 4 is for the costs of design and drafting work associated with the remedial work the subject of Scott schedule 1D.

1453. Although no-one would guess it from the pleadings, the particulars of this claim are set out in column 5 of appendix 4B to Scott schedule 4C (the column headed “Wembley site”). See paragraph 30 of judgment 5 and paragraph G 5.175 of Multiplex’s written closing submissions. Accordingly, it can be seen that Multiplex are claiming for 15,609 hours of work done by Oakwood, costed at £29.50 per hour. This amounts to £460,466, exclusive of mark up. Dr Mastrandrea at his appendix 2.4B produces a revised version of the “Wembley site” column which arrives at a total of £473.438, based upon an average hourly rate of £36.58 per hour.

1454. It will be recalled from chapter 7 above that in schedule 1D Multiplex are claiming £315,417, reduced by Dr Mastrandrea to £202,033. Thus the pleaded claim for associated design and drafting work is substantially higher than the pleaded claim for remedial works. As Mr Stam observed during cross-examination, Multiplex’s pleaded claims in this regard seem “a bit out of whack”: see day 10 page 46.

1455. It will also be recalled from chapter 1 above that out of the 235 items pleaded in schedule 1D, Multiplex have succeeded in full on 30 items, Multiplex have succeeded in part on 22 items and Multiplex have failed on 203 items. In the result Multiplex have recovered remedial costs of £42,109.50. I must now assess the design and drafting costs associated with items on which Multiplex have been wholly or partially successful.

1456. In relation to this exercise I have not been greatly assisted by the annex to Mr O’Neil’s witness statement. The design and drafting costs proposed in columns 12 and 13 of that document are so low as to lack credibility. I bear in mind, of course, Mr O’Neil’s general discussion of design costs in section 12 of his witness statement.

1457. It is clear to me there were significant design and drafting costs associated with the schedule 1D remedial works. Indeed this is apparent from the site works instructions and attached sketch plans in bundles M1D-1 to M1D-5. In addition to the pure design/drawing work, Hollandia also had to survey the steelwork in order to identify the defective and incomplete items. Bearing in mind (a) the nature of the remedial works and (b) the evidence adduced in relation design and drafting costs in Scott schedule 2, I conclude that it would be reasonable to allow an average of twenty hours for Oakwood in relation to each item fully proved in schedule 1D and an average of ten hours for Oakwood in relation to each item partially proved. On this basis Multiplex are entitled to recover the costs of Oakwood working for 820 hours. Oakwood’s average hourly rate was £36.58 per hour in respect of this work, to which Hollandia reasonably added a 10% mark up. Therefore the total cost of those 820 hours was £32,995. This must be reduced by the compromise factor of .961.

1458. Accordingly I assess schedule 4C claim 4 in the sum of £31,709.

Schedule 4C claim 5

1459. Schedule 4C claim 5 is for the costs of completing the roof connection designs and drawings. Multiplex plead that Hollandia charged £2,037,135 in relation to this work and that after discounting for the compromise Multiplex paid £1,958,380. Multiplex’s original particulars of this claim appear in appendix 5 to schedule 4C. Dr Mastrandrea produces a revised version of appendix 5 in his appendices 2.5 (O) and 2.5 (ZN). Dr Mastrandrea’s

totals are £2,057,960 gross or £1,977,700 after applying the compromise factor. These totals are very close to the figures pleaded by Multiplex after re-amendment on day 6.

1460. Claim 5 is expressly limited to the fixed roof. No claim is made in respect of the design and drafting work carried out by Hollandia in respect of the moving roof: see paragraph 34 of the claimant's reply to the defendants' amended response to schedule 4C (A2/1045). Multiplex's decision to exclude the moving roof from their claim is obviously sensible, in view of the substantial changes made by Mott to the primary design of the moving roof after the date of CB's repudiation. Furthermore the design and drafting for the fixed roof involved about three times as much work as the design and drafting for the moving roof: see Mr Wilkinson's cross-examination at day 18, page 144.

1461. The permanent works team which carried out the work the subject of claim 5 comprised members from Hollandia, Oakwood, DLT and Babbie.

1462. I have held in chapter 24 above that as at 2nd August 2004 the design and drafting of the fixed roof permanent works (excluding post 15th February variations) were 90% complete. At first blush therefore it seems odd that the remaining permanent works design and drafting should have cost a sum in the region of £2 million, as alleged by Multiplex.

1463. The explanation for this oddity is that a large part of the work for which Multiplex claim in Scott schedule 4C claim 5 is not "completion" work at all. It is pleaded as work to correct deficiencies in CB's pre-repudiation designs and drawings. The corrective design work is pleaded by Multiplex as falling into three categories:

- A. Work to cater for the flexibility and tolerances required to construct the roof members.
- B. Work to achieve an adequately shaped and functional roof.
- C. Work to provide a design capable of fabrication and erection by the relevant completion date.

1464. In appendix C to Scott schedule 4C ("appendix C") Multiplex set out 128 items of design work, which constitute the subject matter of schedule 4C claim 5. Multiplex allocate 97 of the items to categories A, B and C, thereby denoting that these were items of corrective work. Multiplex contend that the remaining 31 items constituted the completion of designs and drawings which CB had left incomplete. These 31 remaining items are allocated to category D.

1465. The 128 items of design work which form the subject matter of claim 5 are each described with a brief phrase in appendix C, for example "opening added" or "walkway stools revised". In respect of 18 of those items, Multiplex provide further description either in schedule 4C or in further information (A2/1310A – 1310P). In respect of the remaining 110 items, Multiplex provide no further elaboration. I am bound to say that this is a somewhat unconventional way in which to plead a £2 million claim for defective design. The history and evolution of this pleading has been narrated in paragraphs 555 to 561 of CB's opening note and need not be rehearsed in this judgment.

1466. I shall now address the four categories of design work pleaded by Multiplex.

Category A

1467. Multiplex identify 23 items of design work as falling into category A, namely items 1, 2, 6, 10, 11, 27, 28, 34, 40, 42, 43, 47, 51, 58, 61, 71, 76, 82, 90, 98, 100, 121 and 125.

1468. Multiplex's pleaded case in respect of category A is that CB's designs of steel members were defective in that they did not allow for construction tolerances. In other words, upon being erected the steel pieces would not have fitted together. See schedule 4C, paragraph 39.

1469. Multiplex have not adduced any independent expert evidence in respect of the category A items. Nevertheless Mr Boks dealt with five category A items in his witness statement and it is right that I should consider his evidence in relation to each of those items. Fortunately these five items all fall within the group of 18 items, in respect of which Multiplex have given some elaboration in their pleadings.

1470. Item 2 is an allegation that the 10 mm packs specified by CB at each side of rafter purlin connections provided insufficient allowance for expected deviations in rafter top chord straightness. Accordingly Hollandia increased the width of packs to 20 mm. Mr Boks supports this criticism of CB's design in paragraph 86 of his witness statement. In cross-examination Mr Boks was asked to consider paragraph 146 of Mr Taylor's witness statement. In that paragraph Mr Taylor asserts that CB's allowance of 10 mm was reasonable, given CB's erection methods, and that the change to 20 mm was simply a consequence of Hollandia's different approach to erection. Mr Boks candidly said that he had no opinion one way or the other on this matter and he could not assist the court. See day 12, pages 27 – 28.

1471. Item 11 relates to rafters R6 and R7. As can be seen from the roof plan, these two rafters form part of phases 63 and 65 of the south roof. They run between the PPT and truss T7. Multiplex plead that CB's connection designs at each end of these rafters allowed insufficient tolerance to facilitate erection. Mr Boks supports this criticism at paragraph 86 (b) of his witness statement. He explains that the PPT and truss T7 were installed before the rafters. In order to enable the rafters to be installed, Hollandia adopted two measures. First, they fabricated the rafter connection plates over size, so that they could be cut to size on site. Secondly, they omitted the pin holes when fabricating the plates, so that these holes could be cut on site in the correct position. In cross-examination Mr Boks was asked to consider paragraphs 151 and 152 of Mr Taylor's witness statement. In those paragraphs Mr Taylor states that CB and Hollandia had different methods of erecting rafters R6 and R7; both methods were feasible; the changed connection design was simply a consequence of adopting Hollandia's method of erection. Mr Boks said very frankly that he did not have sufficient knowledge to say whether Mr Taylor was correct. See day 12, page 30, lines 20 – 21.

1472. Items 27 and 28 relate to truss T7. This is the massive truss which sweeps across the stadium from east to west and supports the northern edge of the south roof. CB's design provided for the main members of truss T7 to be welded on site. Multiplex plead that Hollandia did not have confidence in this approach and therefore resolved to build the truss in large sections at their factory. Mr Boks supports this criticism in paragraph 86 (c) of his statement. He states that the joints would have taken a considerable time to build on site and that there was a serious risk the joints would not be sufficiently precise in terms of tolerances. Mr Boks maintained that view in cross-examination: see day 11, pages 97 – 99.

1473. Mr Taylor holds the opposite view, as set out in paragraphs 177 – 182 of his witness statement. Mr Taylor points out that, although Hollandia fabricated larger sections in their factory, it was inevitable that some joints on truss T7 would be welded on site.

1474. I am quite satisfied that Mr Taylor is correct on this issue. Self-evidently a steel truss which is over twice the length of a football pitch could not be transported by road to Wembley. It had to be transported in sections and welded together on site. CB and Hollandia differed in their approach as to the size of the sections to be assembled. Both approaches were perfectly reasonable. There is no analogy between (a) the problems which arose when the arch was assembled on site and (b) the assembling of truss T7.

1475. Item 43 relates to the catenary tubes which run next to the rafters. Multiplex plead that, as designed by CB, these tubes could not be adjusted as necessary during construction. Mr Boks supports that criticism in paragraph 86 (d) of his witness statement. Mr Taylor, on the other hand, maintains that the catenary tubes could readily be erected by CB's method and that Hollandia's design change was simply a consequence of Hollandia's preferred erection methodology. In cross-examination Mr Boks said that he could not comment on this issue.

1476. In respect of the five items discussed above Multiplex have failed to prove their case. I reject the allegation that CB's designs of the rafter purlin connections, rafters R3 and R6, truss T7 or the catenary tubes were defective in the respects alleged.

1477. Multiplex have no evidence to substantiate their case in respect of the other eighteen items in category A.

1478. I reject the category A claims.

Category B

1479. Multiplex identify 4 items of design work falling into category B, namely items 54, 108, 122 and 127.

Item 54 reads "runway girder re-modelled and infills added".

Item 108 reads "Pre-set of 70 mm added to box girder".

Item 122 reads "vertical camber added to node points of horizontal vees".

Item 127 reads "width of top flange to box girders revised."

1480. Multiplex do not plead any further elaboration of the individual items, although there is some general commentary on the category as a whole.

1481. The supporting evidence given by Mr Boks comprises the following sentence: "To achieve a correctly shaped and functional roof the permanent works team had to be mindful of the complex forces and movements that the fixed roof had to absorb".

1482. Multiplex have failed to adduce evidence to substantiate the case in respect of the four items in category B. I reject the category B claims.

1483. There is some discussion in Multiplex's closing submissions about the finite element analysis which Hollandia carried out. This was an exercise which Hollandia were bound to carry out as the new erectors. It does not impact upon the category B claims.

Category C

1484. Multiplex identify 70 items of design work falling into category C, namely 4, 5, 8, 9, 12 – 15, 18 – 26, 29, 30, 32, 33, 35, 37, 44, 46, 48 – 50, 52, 53, 55 – 57, 59, 60, 62, 64, 65, 67, 75, 77 – 81, 83 – 86, 89, 91 – 93, 95, 96, 99, 102 – 107, 109 – 112, 114, 123, 124 and 128.

1485. Multiplex do not plead any detail in respect of these 70 items, beyond the laconic phrases which appear in appendix C. In general terms, Multiplex's case is that Hollandia adopted a different erection methodology for both the north roof and the south roof; this new methodology necessitated a number of changes to the permanent works design; CB should bear the costs of those design changes.

1486. Both Mr Montijn and Mr Taylor in the course of their evidence explained the substantial changes which Hollandia made in erection methodology. I have given a very brief summary of that evidence in chapters 2 and 3 above. On the basis of that evidence, I make the following findings of fact. CB's intended erection methodology was perfectly feasible. It would have been successful if CB had remained as erectors. Hollandia, as the new erectors, perfectly reasonably adopted a different methodology. The differences between the two methodologies arose because of (a) the preferences of different steelwork erectors and (b) in some instances (e.g. truss T7) reasonable differences of opinion as to which course would be more advantageous. I reject the suggestion that CB's design was defective in any of the seventy respects alleged in this section of claim 5.

1487. I therefore dismiss the category C claims.

Further comment on categories A, B and C

1488. Categories A, B and C are the defective design claims. They are not supported by independent expert evidence. Although Mr Boks is a factual witness, given the nature of this case I would accept his evidence if and in so far as Mr Boks were able to substantiate the category A, B and C claims. However, as discussed above, he is not able to do so.

1489. Mr McGregor in his witness statement gives an account of Hollandia's reported concerns about some aspects of CB's roof design. However, that evidence is narrative only. It does not begin to establish a case that CB's roof design was defective or deficient in the ninety seven respects which are alleged.

1490. I therefore reject the ninety seven claims advanced in categories A, B and C on the simple ground that Multiplex have failed to prove their case. In so far as it is relevant, I should add that Mr Taylor deals with each of the criticisms of CB's roof design in a lengthy section of his witness statement (paragraphs 85 to 288) and he demonstrates convincingly that CB's roof design was satisfactory.

Category D

1491. Multiplex identify 31 items of work as falling into category D (i.e. genuine completion work), namely items 3, 7, 16, 17, 31, 36, 38, 39, 41, 45, 63, 66, 68 – 70, 72 – 74, 87, 88, 94, 97, 101, 113, 115 – 120 and 126. It is not easy to marry up these 31 items with the description of the "completion" work set out in paragraphs 52 – 55 of schedule 4C.

1492. In paragraphs 90 – 95 of his witness statement Mr Boks gives a general description of the work required to complete the design and drafting of the roof. Mr Boks amplified this in cross-examination on day 11. The “completion” work which Hollandia undertook included obtaining approvals from Mott, completing some outstanding connection designs and designing walkways for the roof. Mr McGregor gave evidence to the same effect: see paragraphs 179 – 185 of his witness statement.

1493. I am satisfied that Hollandia did do “completion” work of the kind described by Mr Boks. This roughly equates with the 10% of design and drafting for the fixed roof permanent works, which CB left outstanding on 2nd August 2004: see chapter 24 above. Because Hollandia and their subcontractors were stepping into the breach after CB’s repudiation, this work would have been more expensive than it would have been if performed by CB.

1494. On the other hand, it is clear from the cross-examination of Multiplex’s witnesses that the vast majority of the roof design costs arose from matters unrelated to CB’s repudiation. These matters included (a) numerous substantial changes made by Mott to the primary design of the fixed and moving roofs, (b) changes to the permanent works design, flowing from Hollandia’s change of erection methodology, (c) miscellaneous events, such as the unfortunate accident of Mr Stam and the need to replace him at short notice.

1495. The parties, with their customary enthusiasm, adduced a great deal of evidence about Mott’s changes to the primary design and the minutiae of Hollandia’s new erection methodology. It is not necessary for me to embark upon an analysis of that evidence, although I bear it in mind. The court’s task is a more limited one, namely to value the work done by Hollandia and their sub-contractors (and charged to Multiplex) in order to complete outstanding design and drafting for the fixed roof permanent works. Having reviewed all of the evidence, the best assessment which I can make is £100,000.

1496. Accordingly, I assess schedule 4C claim 5 in the sum of £100,000.

Overall evaluation of schedule 4C

1497. For the reasons set out above I value the claims in schedule 4C as follows:

Claim 1	£ 225,188
Claim 2	£ 23,174
Claim 3	£ 47,887
Claim 4	£ 31,709
Claim 5	<u>£100,000</u>
Sub-total	<u>£427,958</u>

1498. The credit item which Multiplex set out on page 34 of schedule 4C has already been taken into account, and so that does not require further assessment.

1499. Multiplex add 7.5% in respect of site management, 3.47% in respect of insurances and 3.8% in respect of overheads. Despite Mr Hart’s comments at paragraph 1167 of his report, I accept that Multiplex incurred on-costs of that nature. However, those percentages should be aggregated, rather than applied sequentially as set out in Multiplex’s pleading. I shall therefore add 14.77%, namely £63,209. Thus the overall total becomes £491,167.

1500. Multiplex must give credit against this claim for the gains which they have made as a result of CB's failure to complete design and drafting. As set out in chapter 24 above, the £12 million lump sum specified in the Supplemental Agreement included £1,679,000 in respect of design and drafting. CB earned £1,050,465 of that sum before repudiation. Accordingly, Multiplex avoided the need to pay the remaining £628,535 of that sum. Multiplex also avoided incurring on-costs at the rate of 14.77% in respect of that expenditure. Therefore, Multiplex must give credit in the total sum of £721,370 against their claims in schedule 4C.

1501. In the result, my decision in respect of schedule 4C is that the gains for which Multiplex must give credit exceed the damages which Multiplex would otherwise be entitled to recover by £230,203. Accordingly, the claim for damages in schedule 4C is dismissed.

CHAPTER 31. SCHEDULE 4D

1502. In Scott schedule 4D Multiplex claim damages for CB's failure to complete the erection engineering and the design and drafting of temporary works.

1503. "Causation defence one" is the term which has been used throughout the trial by both parties as a shorthand for CB's first line of defence to Scott schedule 4D. I shall follow suit in using that term. The essence of causation defence one is that even if CB had not repudiated, Hollandia rather than CB would have carried out the erection engineering, design of temporary works and drafting of temporary works. Accordingly, Multiplex would have incurred the costs set out in schedule 4D in any event. Therefore Multiplex fail the "but for" test and schedule 4D is extinguished in its entirety (paragraph 1265 of CB's closing submissions).

1504. "Causation defence two" is the term which has been used to denote CB's second line of defence to Scott schedule 4D. The essence of causation defence two is that there was a radical re-design of erection engineering after 2nd August 2004. This was not caused by CB's repudiation, but arose from design changes required by Mott and erection methodology changes required by Multiplex and Hollandia. The vast majority of costs claimed in schedule 4D arise from this radical re-design of erection engineering.

1505. I shall begin this chapter by addressing causation defence one. I shall use the phrase "erection engineering" as a shorthand for erection engineering, design of temporary works and drafting of temporary works. These three activities are interrelated. They can be viewed globally for the purpose of considering causation defence one.

1506. I shall first review the evidence bearing on causation defence one and make appropriate findings of fact. I shall then consider the authorities cited by counsel and the submissions advanced on the basis of those authorities.

The Evidence

Mr Muldoon

1507. During the second trial (re preliminary issue 11) Mr Muldoon was cross-examined about the arrangements which he would have been made for erection engineering, if CB had

not repudiated. That cross-examination included the following passages on day 20 of the second trial:

PAGE 73

“Q. So the position was this, was it not, by 14th May, that scenario 1 had fallen away and scenario 2 was the scenario with which you and Hollandia were moving forward?

A. Yes. There were three scenarios, though. Scenario 1 is that CBUK continue, scenario 2 is that Hollandia take over in accordance with CBUK's methodology and scenario 3 is Hollandia with Hollandia's methodology. By this stage, yes, scenario 3 is they are looking to

take over it, if they do take over it, in accordance with their own methodology. There was finetuning of the erection that was -- which was coming forward from Hollandia, which could have been to the benefit of us.

Q. Mr Muldoon, you are quite correct to pick me up and say there are three scenarios and let us just for the transcript -- you have correctly identified them.

Scenario 1; CBUK continue with a new fixed price for erection, yes?

A. Stay as it is, yes. At that stage I think CBUK had made it clear that they were not going to give us a new fixed price for erection, they were only ever going to proceed on a cost plus basis. I forget the time at which that happened.

Q. It may not happen for these purposes. Scenario 1, CBUK continue with erection.

A. Correct.

Q. Scenario 2; CBUK are given notice, Hollandia take over erection but on the basis of CBUK's temporary works, erection engineering, methodology and so on and so forth. A. Yes.

Q. Scenario 3; Multiplex give to Hollandia the whole erection responsibility, including temporary works, erection engineering and so on. A. Yes.

Q. What I am putting to you, Mr Muldoon, is that by 14th May as between yourselves and Hollandia it was scenario 3, and scenario 3 only, which was in contemplation. A. That would be fair to say. Although scenario 1 was obviously still in the picture.”

PAGE 76

”Q. At that stage, the schedule 1(c) works had been removed from CBUK, as we have seen? A. The schedule 1?

Q. Supplementary agreement schedule 1(c) has some cost plus works which are described, for shorthand, as erection. A. Yes.

Q. And the notice that we have just looked at removed those from CBUK, did it not?

A. Correct, yes.

Q. But the schedule 1(b) works remained with CBUK. A. Yes, being the 12 million scope.

Q. The fixed price 12 million. What Hollandia were to carry out included the provision of erection engineering.

A. That was what we had to do at that point in time. That was not envisaged at the heads of agreement but that is what we had to do at that point in time.

Q. That is what you engaged Hollandia to do? A. Yes.

Q. Erection methodology, if that is different? A. Yes.

Q. Design of temporary works? A. Yes.
Q. Provision of temporary works? A. Yes.
Q. And that is what they then set out to do. A. That is what we had to set out to do, yes.
Q. Just a small point if we may on the -- I am sorry, Mr Muldoon, you wanted to refer us I think to a document in file C5? A. C5/10.
Q. I did not get the reference, did you say page 10? A. Page 10.
Q. So just before we leave this particular topic, perhaps we should turn that up. A. This document solidified from my perspective the fact that we could no longer leave the erection engineering and temporary works as contemplated by the supplementary agreement with CBUK, because CBUK were at this point in time refusing to take responsibility for any of that work. So they said, basically: if you are going to use another erection contractor then everything we have done under our current 12 million in relation to the temporary works and erection engineering methodology goes by the wayside.
Q. But this letter is dated 27th July, is it not? A. Correct, just before they left site.
Q. Just before CBUK left site and substantially after you had engaged Hollandia. A. Correct”

PAGE 95

”Q. The agreement so far as erection was concerned was that the schedule 1(c) works could be taken from CBUK and given to another party. A. Correct.
Q. This document was prepared before CBUK had left site. A. Correct.
Q. And at that stage you contemplated that CBUK would continue to perform their schedule 1(b) works. A. Yes.
Q. And you are setting out, are you not, as you say in the attached schedule, which matters have gone to Hollandia and which matters have remained with CBUK?
A. Yes, but that does not mean there will not be a variation to the 12 million.
Q. And the matters that have moved to Hollandia are essentially the whole of erection, are they not, not merely the provision of labour to carry out erection?
A. Yes, hence there may have been required a variation. There was nothing that restricted the 12 million from being varied, as CBUK attempted to do as well.
Q. But Mr Muldoon, save for the provisions of schedules 1(b) and 1(c) of the supplemental agreement there had been no agreement, had there, to take away erection works from CBUK?
A. Sorry, you have to repeat that.
Q. Save for the provisions of the supplemental agreement and previously the heads of agreement, there had been no agreement to take erection works from CBUK, had there? A. Such as temporary works?
Q. No. There had not, had there? A. There had been discussions that they would have to be the responsibility of the erection contractor.
MR JUSTICE JACKSON: Sorry, there had been discussions that what would have to be the responsibility of the erection contractor?
A. Because if Hollandia was going to take over the erection methodology, there were adjustments that they wanted to make and they wanted to do it their way, so therefore the most practical way was for them to take over some of the temporary works in relation to that.
MR WILLIAMSON: But what certainly had not been agreed with CBUK was that the cost of Hollandia taking over the temporary works,

preparing their own erection engineering methodology, designing the temporary works, fabricating the temporary works and erecting the temporary works would be carved out of the 12 million. A. No, that opportunity never came forth”

1508. The letter which Mr Muldoon was referring to on pages 77 - 78 was CB’s letter to Multiplex dated 27th July (C5/10 in the trial bundle for the second trial, QC 48/19 in the trial bundle for the third trial).

1509. I have considered the whole of Mr Muldoon’s cross-examination in the second trial, of which the passages quoted above form part. I have also considered the documents referred to.

1510. Mr Muldoon’s evidence at the third trial does not, in my view, affect the evidence which he gave at the second trial on this topic. See paragraphs 75 – 81 of Mr Muldoon’s fourth witness statement and the debate between counsel about the effect of those paragraphs at day 33 pages 132 – 149.

Mr Montijn

1511. Mr Montijn gave evidence about Hollandia’s role in the period March to August 2004. In March Hollandia was engaged to audit CB’s design and erection methodology for the roof, as well as to produce its own erection methodology. At day 12 page 161 Mr Montijn summarised Hollandia’s role in this way: “We were devising – we had to do erection engineering as if we would do it, as if we would be the erection engineers”.

1512. Thereafter Hollandia allocated a separate project number for erection engineering, and through the period May to July Hollandia’s erection engineering team steadily grew in size.

1513. On 6th July Multiplex appointed Hollandia as the new erectors to replace CB with effect from 28th July. By this date Hollandia were well advanced in preparing to take over responsibility for erection engineering. See day 13, page 10:

“Q. would it be fair to say that by 6th July you were quite well advanced in relation to planning for erection engineering?

A. Yes, I was very busy setting up the team and the organisation for that”

1514. Mr Montijn went on to make it clear that he considered the functions of erection and erection engineering to be inseparable. After 6th July he understood that Hollandia were going to undertake both functions. After 28th July he understood that Hollandia had been engaged to perform both functions. It was in the belief that Hollandia were now responsible for erection engineering that Mr Montijn prepared his slide show for the 2nd August meeting, in order to illustrate his proposed changes in erection methodology. See Montijn cross-examination on day 13 at pages 18 to 22, re-examination at page 121 and the printouts of the slides at QC49/205.2 to 205.54.

1515. I do not regard Mr Van Rooijen’s third witness statement as being inconsistent with that evidence. Mr Van Rooijen was not cross-examined at this trial, although he gave oral

evidence at an earlier stage of the litigation. It should be noted that “28th July” in paragraph 16 of his third witness statement is a slip for 28th June. Contrary to Mr Stewart’s submissions at day 33 pages 128 – 131, paragraphs 11 to 16 of Mr Van Rooijen’s statement do not lead to the conclusion that Multiplex first engaged Hollandia to do erection engineering after CB’s repudiation.

1516. The most pertinent parts of Mr Van Rooijen’s evidence for present purposes seem to me to be paragraphs 14 and 15 of his second witness statement (prepared for the trial of preliminary issue 11), in particular the last sentence of paragraph 15.

“As far as I am concerned, from the moment Hollandia took over erection, we also took over responsibility for the design and fabrication of the temporary works”

Mr McGregor

1517. Mr McGregor accepted that when Hollandia became erectors “Hollandia were leading the process of erection engineering, because they had to if they were going to be responsible for making sure the roof was safe during erection”. He went on to argue, however, that Cleveland Bridge would still have some subordinate role in relation to erection engineering. See day 14, pages 101 to 108 and 113 to 114.

1518. Item 18 of the minutes of the meeting between Multiplex and Mott on 15th July reads: “MPX confirmed Hollandia will be responsible for erection engineering”. Mr McGregor was the senior representative of Multiplex present at that meeting.

Findings of Fact

1519. On the basis of all the evidence, I am quite satisfied that from 30th June, when Mr Muldoon gave notice removing erection and site works from CB, it was his firm intention that Hollandia should also carry out erection engineering. There were perfectly rational reasons for this decision. In particular, Multiplex had lost confidence in CB, whereas Hollandia had gained Multiplex’s confidence during the audit period. By 30th June, whatever the contractual position may be, it seemed impracticable to Mr Muldoon for Hollandia to do the erection and for CB to do the erection engineering. Furthermore, for programming and other reasons Multiplex intended to adopt Hollandia’s erection methodology.

1520. As from 30th June Mr McGregor, like Mr Muldoon, intended that Hollandia should take over erection engineering. Mr McGregor’s evidence about a subordinate role which CB might have undertaken was both confused and unconvincing. In any event the Supplemental Agreement did not empower Multiplex to impose some subordinate role upon CB in relation to erection engineering, after transferring the main responsibility to another contractor.

1521. Hollandia understood from March 2004 onwards that if they were appointed erectors they would also become responsible for erection engineering. The likelihood that they would be so appointed increased progressively through the period March to June: see judgment 1. In early July Multiplex informed Hollandia that they definitely would be taking over both erection and erection engineering. Hollandia took over both functions with effect from 28th

July. Neither Mr Montijn nor anyone else who was closely involved at a senior level at that stage regarded it as feasible to separate the functions of erection and erection engineering.

1522. Contrary to Mr Muldoon's evidence, I do not consider that CB's letter dated 27th July had any impact on Multiplex's decision-making process in this regard. Multiplex would have acted in precisely the same way, whether or not that letter had been written.

1523. Thus in the period between 28th July (when Hollandia became erectors) and 2nd August (when CB repudiated) two different companies were responsible for erection engineering. Hollandia were responsible for erection engineering, because they were engaged as erectors and both Hollandia and Multiplex were proceeding on the basis that erection and erection engineering went together. CB were responsible for erection engineering because that is the correct interpretation of the Supplemental Agreement, as declared by the Court of Appeal in CA judgment 2. Clearly there would have had to be some resolution of this anomaly if CB had not repudiated, but that is a topic to which I shall return later.

1524. On 12th August 2004 Multiplex wrote to Hollandia instructing them to undertake the design and drafting of permanent works. In so far as that letter also embraced erection engineering, it was merely confirming an agreement which had previously been reached between Multiplex and Hollandia.

The Law

1525. I shall begin by reviewing the authorities upon which counsel have relied in relation to causation defence one.

1526. In *Maredelanto Compania Naviera v Bergbau-Handel GmbH* ("The Mihalis Angelos") [1971] 1 QB 164 charterers cancelled a charterparty on 17th July 1965, just three days before they would have had a contractual right to terminate on the ground that the vessel was not "ready to load" in Haiphong. The Court of Appeal held that if the charterers' conduct on 17th July had constituted a repudiation, then the measure of damages would be nil. At pages 196G to 197A Lord Denning MR said this:

"Seeing that the renunciation itself is the breach, the damages must be measured by compensating the injured party for the loss he has suffered by reason of renunciation. You must take into account all contingencies which might have reduced or extinguished the loss. That is made clear by the very first case in which that doctrine of anticipatory breach was established, in *Hochester v. De la Tour* itself (1853) 2 E. & B. 678, 686-687. It follows that if the defendant has under the contract an option which would reduce or extinguish the loss, it will be assumed that he would exercise it. Again, if it is reasonable for him to take steps to mitigate his loss, he must do it. And so forth. In short, the plaintiff must be compensated for such loss as he would have suffered if there had been no renunciation: but not if he would have lost nothing."

1527. At pages 202G to 203A Edmund Davies LJ said:

“But the true test in a case of anticipatory breach is: ‘What would the position of the parties have been if the defendant had *not* wrongly announced his refusal to fulfil his part of the contract when the time for performance arrived?’ One must look at the contract as a whole, and if it is clear that the innocent party has lost nothing, he should recover no more than nominal damages for the loss of his right to have the whole contract completed. The assumption has to be made that, had there been no anticipatory breach, the defendant would have performed his legal obligation and no more. ‘A defendant is not liable in damages for not doing that which he is not bound to do’: Scrutton L.J in *Abrahams v. Herbert Reich Ltd.* [1922] 1 K.B. 477, 482, cited with approval by Diplock L.J. in *Lavarack v. Woods of Colchester Ltd.* [1967] 1 Q.B. 278, 293.”

1528. At pages 209H to 210B Megaw LJ said:

“In my view, where there is an anticipatory breach of contract, the breach is the repudiation once it has been accepted, and the other party is entitled to recover by way of damages the true value of the contractual rights which he has thereby lost; subject to his duty to mitigate. If the contractual rights which he has lost were capable by the terms of the contract of being rendered either less valuable or valueless in certain events, and if it can be shown that those events were, at the date of acceptance of the repudiation, predestined to happen, then in my view the damages which he can recover are not more than the true value, if any, of the rights which he has lost, not having regard to those predestined events.”

1529. In *Fairchild v Glenhaven Funeral Services Ltd* [2003] 1 AC 32 it was held that employees could recover damages for mesothelioma, even though they could not prove on balance of probabilities which of the defendant employers had been responsible for the fatal exposure. Since this is principally a tort case, it is less relevant to my task. I do, however, accept, as Mr Stewart has pointed out, that this is a case in which claimants were excused on policy grounds from satisfying the “but for” test.

1530. In *Six Continents Retail Ltd v Carford Catering Ltd* [2003] Adj LR 11/05 the defendant project manager sent a letter warning of the fire risk which he had created. The trial judge held that the claimant’s failure to act upon that letter broke the chain of causation. The Court of Appeal reversed that finding. Mr Stewart relies upon paragraphs 18 to 22 of the judgment of Laws LJ, who gave the principal judgment. In paragraphs 19 – 21 Laws LJ demonstrated that finding a break in the chain of causation was an evaluative exercise. At paragraph 22 he continued:

“The true question here is whether the appellant’s failure to respond to the letter of 21 January 1997 ought to absolve the respondents of what would plainly otherwise be their responsibility for the fire. For my part, I think it plain that the risk of a fire of this kind was, on the face, well within the scope of outcomes which the respondent’s contractual duties were

intended to avoid. So much appears, I think, from the catalogue of obligations cited by the judge at paragraph 38 which I have set out. Accordingly, even if the letter of 21 January 1997 and the enclosed fax did not constitute a warning of a risk of fire of the kind which occurred on 9 March 1997, a question to which I will come in a moment, it was a warning of an outcome which the respondents themselves should have prevented from happening. I find it very difficult to see how the giving of such a warning ought to transpose the burden of avoiding that very outcome, from the respondents, who owed a duty in effect to prevent it, to the appellants who were the beneficiaries of that duty.”

1531. Buxton LJ and the Vice-Chancellor agreed with that judgment.

1532. In *Golden Strait Corporation v Nippon Yusen Kubishika Kaisha* (“*The Golden Victory*”) [2007] UKHL 12; [2007] 2 AC 353 shipowners chartered *Golden Victory* to charterers for seven years under a charterparty which allowed for cancellation in the event of war. The charterers repudiated in December 2001. In March 2003 a war broke out, which would have entitled the charterers (absent the repudiation) to cancel. The arbitrator held that the owners were only entitled to recover damages up to March 2003. That decision was upheld successively by Langley J, the Court of Appeal and the House of Lords. The House of Lords reached their decision by a majority of 3:2.

1533. Lord Scott delivered the principal speech for the majority. At paragraph 30 Lord Scott said this:

“If a contract for performance over a period has come to an end by reason of a repudiatory breach but might, if it had remained on foot, have terminated early on the occurrence of a particular event, the chance of that event happening must, it is agreed, be taken into account in an assessment of the damages payable for the breach. And if it is certain that the event will happen, the damages must be assessed on that footing.”

1534. After quoting from the judgment from Megaw LJ in *The Mihalis Angelos*, Lord Scott continued:

“Another way of putting the point being made by Megaw LJ is that the claimant is entitled to the benefit, expressed in money, of the contractual rights he has lost, but not to the benefit of more valuable contractual rights than those he has lost.”

1535. Lord Scott considered that the “assessment at the date of breach” rule usually achieved the right result, but on occasions that rule had to yield.

1536. In paragraph 36 of *The Golden Victory* (a paragraph upon which both Mr Stewart and Mr Williamson place reliance) Lord Scott said this:

“The same would, in my opinion, be true of any anticipatory breach the acceptance of which had terminated an executory

contract. The contractual benefit for the loss of which the victim of the breach can seek compensation cannot escape the uncertainties of the future. If, at the time the assessment of damages takes place, there were nothing to suggest that the expected benefit of the executory contract would not, if the contract had remained on foot, have duly accrued, then the quantum of damages would be unaffected by uncertainties that would be no more than conceptual. If there were a real possibility that an event would happen terminating the contract, or in some way reducing the contractual benefit to which the damages claimant would, if the contract had remained on foot, have become entitled, then the quantum of damages might need, in order to reflect the extent of the chance that that possibility might materialise, to be reduced proportionately. The lodestar is that the damages should represent the value of the contractual benefits of which the claimant had been deprived by the breach of contract, no less but also no more. But if terminating event had happened, speculation would not be needed, an estimate of the extent of the chance of such a happening would no longer be necessary and, in relation to the period during which the contract would have remained executory had it not been for the terminating event, it would be apparent that the earlier anticipatory breach of contract had deprived the victim of the breach of nothing.”

1537. Lord Carswell delivered a speech to the same effect. Whilst approving the Court of Appeal’s decision in *The Mihalis Angelos*, he disavowed any requirement of predestination in respect of post-breach events negating loss. At paragraph 61 (to which both Mr Stewart and Mr Williamson draw attention) Lord Carswell said:

“It is in my opinion important to read this statement in the context of the case which the Court of Appeal was deciding. It was completely certain, or predestined, that the contingency on which the charterers were entitled to cancel the contract would occur, since it was physically impossible for the ship to reach Haiphong by 20 July, the date on which she was to be ready to load at that port and the date on which the charterers could cancel if she was not so ready. Megaw LJ’s statement was entirely correct, for the event was predestined to happen and the consequence which he set out in the passage which I have quoted had to be regarded as following. It might be doubted whether Megaw LJ intended to enunciate a general rule limiting consideration of subsequent events to those predestined to happen, seen from the date of acceptance of repudiation, and it may be observed that neither Lord Denning MR nor Edmund Davies LJ went so far as to tie the consideration of subsequent events to those which could be seen at the date of repudiation as certain to happen. If, however, the meaning to be taken from Megaw LJ’s statement is that only events predestined to happen will qualify to bring

the exception into operation, then I must decline to accept that as correct, for the reasons which I shall set out.”

1538. Lord Brown derived less assistance from *The Mihalis Angelos* than his colleagues. Referring to the decision at paragraph 74, he said:

“It was an all or nothing case. The voyage either would or would not have taken place. Not so here: the question rather was whether and if so when the charterparty would have been ended under clause 33 before the completion of its nominal term. Even had war not broken out by the time damages came to be assessed I can see no reason why that question should not have been addressed in the conventional way, i.e by making the best possible assessment of the likely course of future events as at the date of assessment. As Lord Denning MR said in *The Mihalis Angelos* [1971] 1 QB 164, 169: ‘You must take into account all contingencies which might have reduced or extinguished the loss.’ It was hardly a novel proposition.”

Review of authorities

1539. In relation to *Fairchild*, Mr Stewart draws attention to paragraph 12, in which Lord Bingham discourages a mechanistic approach to causation. He cites paragraphs 37 to 40, in which Lord Nicholls discusses exceptions to the “but for” requirement and circumstances in which the causation threshold may be lowered (including the well known “two huntsmen” paradox). Mr Stewart also cites the general guidance given by Lord Hoffmann at paragraphs 48 to 52.

1540. I bear in mind all of the general guidance given in *Fairchild* by way of background. However, this House of Lords’ decision does not provide direct assistance in relation to causation defence one. No-one suggests that there are policy considerations in the present case analogous to the powerful policy considerations present in *Fairchild*, which led to the relaxation of the ordinary causation rules.

1541. The House of Lords has made it clear that *Fairchild* does not herald a general relaxation of the causation rules. This aspect is discussed by Lord Hoffmann in an interesting article in the Law Quarterly Review (“Causation” 121 LQR, 592). Lord Hoffmann summarises the position at page 601:

“So *Fairchild* is an exceptional case in which the House of Lords, in particular circumstances, enabled a claimant to finesse what would otherwise have been an insuperable evidential problem and *Gregg v Scott* exemplifies the general rule that insuperable evidential problems are the claimant’s hard luck.”

1542. The present case falls within the general rule, as discussed in Lord Hoffmann’s article.

1543. Of the authorities cited by counsel, the two from which I derive greatest assistance are *The Mihalis Angelos* and *The Golden Victory*. Both these cases illustrate circumstances in which post-repudiation events can be taken into account as reducing the damages recoverable for repudiation. The width of the principle that may be derived from these authorities is a topic which may need to be explored in future cases. For present purposes, however, I can look at the matter quite narrowly. In my view the principles stated in *The Mihalis Angelos* and *The Golden Victory* can be applied by analogy to construction contracts. I derive the following proposition. If a contractor (D) repudiates at a time when the employer has resolved to remove certain of D's obligations and has already engaged another contractor to perform those obligations, the court in assessing damages should disregard D's failure to perform those particular obligations.

1544. The reason why the court disregards this theoretical head of loss is that in such a situation the assessment at date of breach rule should yield to the compensatory principle, which underlies the law of damages. Furthermore, in the context of commercial contracts there generally are no policy considerations of the kind discussed in *Glenhaven*, which might permit the claimant to bypass the "but for" test.

Analysis of Mr Stewart's Submissions

1545. In his closing speech on day 33 Mr Stewart advanced five propositions in relation to causation defence one. These were:

- i) The court must value what Multiplex lost on 2nd August 2004.
- ii) What Multiplex lost on that date was a fixed price contract, requiring CB to undertake work including "all the temporary works and erection engineering design for Wembley Stadium" page 24, lines 16 – 22).
- iii) The fixed price contract was advantageous to Multiplex by reason of clause 2.1 of the Supplemental Agreement.
- iv) As at 2nd August 2004 Multiplex had not lost its rights against CB, even if the court finds that Multiplex had by then engaged Hollandia to do "the precise same job". A man may employ two architects to design his house. If one architect repudiates, it is no answer for the second to say: "you didn't need to have me doing it, you had already engaged another architect do the same job" (pages 25 – 26).
- v) The best way to measure Multiplex's loss would be to look at the cost of engaging someone else to undertake the fixed price contract with the constraint imposed by clause 2.1. However, this course was not available. The opportunity to negotiate a fixed price contract with Hollandia was lost because of CB's repudiation. Multiplex was obliged to enter into a costs plus contract with Hollandia in respect of engineering and design work. The benchmark should be what CB thought it would cost them to complete, as revealed by their July board minutes. The measure of damages is what Multiplex paid to Hollandia for performing the obligations which CB repudiated.

1546. Broadly speaking, Mr Williamson accepted Mr Stewart's propositions 1 to 4, but took issue with proposition 5. I too accept the general thrust of propositions 1 to 4. In relation to the "two architects" example, the repudiating architect does not automatically have a complete defence in relation to damages. Whether or not the repudiating architect is liable for more than nominal damages must depend upon all the circumstances of the case. The employer may well have had good reason to engage two architects, for example because he wished to choose the more attractive or the more economical design or because he wished to draw upon the ideas of both architects.

1547. Mr Williamson principally took issue with Mr Stewart upon proposition 5. That therefore is the contention upon which I must focus.

1548. I accept Mr Williamson's submission that the benefit which CB may have gained from repudiating is irrelevant to assessing damages for repudiation. There are cases where the court takes into account that benefit, e.g. *Attorney General v Blake* [2001] 1 AC 268. However, as Mr Williamson points out, the present case does not fall within the exceptional category of cases exemplified by *Blake*.

1549. In my view, the fallacy underlying Mr Stewart's proposition 5 is that CB's repudiation did not cause Multiplex to engage Hollandia to undertake erection engineering. Multiplex had already engaged Hollandia to undertake erection engineering before CB repudiated and had no intention of allowing CB to perform that task. It is clear on the evidence that Hollandia were not willing to enter into a fixed price contract for erection engineering. In view of the design changes emanating from Mott and the looming major changes in erection methodology, such a fixed price contract would not have been feasible in or after August 2004.

1550. I have come to the conclusion that the proposition derived from the review of authorities and set out above is directly applicable to this case. If a contractor (D) repudiates at a time when the employer has resolved to remove certain of D's obligations and has already engaged another contractor to perform those obligations, the court in assessing damages should disregard the D's failure to perform those particular obligations. That proposition must apply both as between employer and main contractor and as between main contractor and subcontractor.

1551. In the present case, Multiplex must satisfy the "but for" test, if they are to succeed on causation. Multiplex cannot evade that requirement by relying upon the principles stated in *Glenhaven* or upon some variant of those principles. Indeed this is acknowledged in paragraph 4 of Scott schedule 4D, where it is pleaded that Multiplex have satisfied the "but for" test. On the evidence, however, paragraph 4 has not been proved. On the contrary, it is now clear that absent CB's repudiation Multiplex would still have engaged Hollandia to do erection engineering and would still have incurred the various costs set out in schedule 4D.

1552. The "plan" upon which Multiplex rely has been discussed in chapter 30 above. Contrary to Mr Stewart's submissions at day 33 pages 154 – 159, I do not consider that the plan has any impact upon causation defence one. CB's delay in handing over design information to Multiplex did not affect Multiplex's (prior) decision to engage Hollandia to do erection engineering. That delay did not increase the cost to Multiplex of the erection engineering services which Hollandia provided.

1553. In the result, therefore, causation defence one succeeds in principle. That leaves one further topic for consideration. If CB had not repudiated, by what means would Multiplex have removed erection engineering from CB's lump sum works under the Supplemental Agreement, and what would have been the financial consequences? Mr Muldoon believed that he was entitled to issue a variation instruction, omitting erection engineering and adjusting the £12 million lump sum accordingly. However, as Mr Williamson demonstrated in his supplementary note submitted in January 2007, that belief was not correct. A variation clause entitles the employer to omit work which he no longer requires. Absent specific provision to that effect, a variation clause does not entitle the employer to omit work for the purpose of giving it to another contractor. See *Abbey Developments Ltd v PP Brickwork Ltd* [2003] CILL 2033 at paragraphs 31 – 50; *Trustees of the Stratfield Saye Estate v AHL Construction Ltd* [2004] EWHC 3286 (TCC) at paragraphs 35 – 36.

1554. It should be noted that Mr Williamson's supplementary note of January 2007 was an analysis of the legal position. It was not a statement of CB's intentions or wishes (as suggested in Multiplex's closing submissions at section A paragraph 6.4.4 and section G paragraphs 5.245 – 5.246).

1555. Not only was Mr Muldoon mistaken about the legal position. So also were CB. CB were under a different misapprehension, namely that under the Supplemental Agreement they were no longer obliged to do erection engineering. In this somewhat confused situation what resolution would have been reached between the parties, absent repudiation? Mr Williamson submits that erection engineering would have been removed from CB and that no adjustment would have been made to the £12 million lump sum: see day 36 pages 175 – 180. Mr Stewart submits that CB would not have been willing to do a fair and reasonable deal; but if such a deal had been done, then a substantial deduction would have been made from the £12 million lump sum under schedule 1 (b) of the Supplemental Agreement: see day 36 pages 181 – 183.

1556. The first question is how I should approach the problem. Mr Williamson, in reliance upon *Allied Maples v Simmons v Simmons* [1995] 1 WLR 1602, submits that "conceptually one would have to look at that as some sort of loss of a chance situation" (day 36, page 175, lines 20 – 22). I am not sure that that is correct. The hypothetical negotiation is a negotiation between the claimant and the first defendant in the present litigation, not negotiation with a third party. See *Allied Maples* at pages 1610 to 1614. It seems to me that I must look at all the evidence, such as it is, and do my best to determine what would have happened.

1557. On this approach, and having re-read the evidence and counsel's submissions, I am quite satisfied that no deduction at all would have been made from the lump sum. I reach this conclusion for five reasons:

- i) Once erection had been removed from their responsibilities, CB had no wish to do erection engineering. They would have been unperturbed to hear that they were not doing it.
- ii) At the material time CB believed that they had no responsibility for erection engineering. Although, as revealed by the Court of Appeal in judgment 2, that belief was wrong, it was not an unreasonable one to hold.

- iii) CB would have had no reason to take legal advice in order to ascertain the true interpretation of the Supplemental Agreement on this point. They would have been entirely content to be told that they were not doing erection engineering.
- iv) If for any reason CB had taken advice, they would have come to realise (a) that erection engineering was part of their contractual responsibilities and (b) that Multiplex had no legal right to deprive them of that work, even though self-evidently Multiplex were not going to let them do it. CB would have thus realised that they were in a strong bargaining position.
- v) Mr Muldoon had reached a firm decision that CB would not do erection engineering. He may have desired to obtain some reduction in the lump sum on that account, but he was in no position to achieve that. If he had decided to press his claim for a reduction, he would have taken legal advice and he would have been told that he had no contractual right to omit erection engineering from the subcontract and that clause 4.6 of the subcontract had no application to that situation. This meant that Multiplex were in a hopeless bargaining position. They could not threaten to change tack and force CB to do the erection engineering, because by August self-evidently that was not feasible and would not be acceptable to Hollandia.

1558. If, contrary to my view, this question should be approached on a loss of chance basis, then my conclusion would be the same. The considerations set out in the previous paragraph are, in my judgment, powerful ones. There is no significant chance that, if CB had not repudiated, they would have been prepared to forego part of the £12 million lump sum in consideration for not having to do erection engineering.

1559. Let me now draw the threads together. For the reasons set out above, causation defence one succeeds. No consequential adjustment needs to be made to the £12 million lump sum. Multiplex have failed to prove that any of the costs and losses set out in Scott schedule 4D were caused by CB's repudiation or indeed by any other breach of contract.

Obiter

1560. In these circumstances (and contrary to my original intention) it is not necessary to embark upon a lengthy analysis of the documents and evidence concerning each individual item in schedule 4D. This would greatly extend the length of the judgment to no useful purpose. Nevertheless, it is clear simply from reading the cross-examination of Mr Montijn on day 13 that the vast majority of the costs claimed in schedule 4D arose from matters unrelated to CB's repudiation. Design changes by Mott and changes of erection methodology (recommended by Hollandia and accepted by Multiplex) generated a massive amount of erection engineering and temporary works design/drafting.

1561. Let me take one example only, schedule 4 claim 16, item E15. The arch load transfer was undertaken by Hollandia in a completely different way from that planned by CB. First, CB had planned to raise the arch to 105 degrees, whereas Hollandia raised it to 109 degrees. Secondly, under Hollandia's scheme the arch load transfer was done after, rather than before,

the erection of the north roof. This meant that the cable net had to be lifted so that the north roof could be erected. That would not have arisen on CB's approach: see Mr Taylor's first statement, paragraphs 335 and 336. (Mr Montijn cannot remember whether or not this matter arose from the changed methodology; however, it sounds feasible that the costs of this operation are included in cost centre E 15: see day 13/ 97 – 98.)

1562. In some instances the schedule 4D work undertaken by Hollandia was a direct consequence of the fact that they were appointed erectors. Such work would have been done by Hollandia, even if CB had remained in post: see Mr Montijn cross-examination at day 13 pages 19, 86 – 87, 129, re-examination at pages 123 – 128.

1563. Schedule 4D contains a number of allegations against CB of defective design. In the light of the cross-examination on day 13, Mr Montijn does not substantiate those criticisms. Nor does any other Multiplex witness make good Multiplex's pleaded criticisms of defective design.

1564. It is clear from examination of Scott schedule 4D that causation defence two applies to a greater or lesser extent to all forty items comprised in that schedule.

1565. If causation defence one had failed, I should have dismissed or cut down the overwhelming majority of claims in schedule 4D on the basis of causation defence two.

Conclusion

1566. The claim for damages in schedule 4D is defeated by causation defence one and is dismissed.

CHAPTER 32. THE THREE MIGRATED CLAIMS

1567. Claims 5, 8 and 19 contained in schedule 4D have migrated to schedule 4C. Multiplex say that these three claims should be treated as forming part of schedule 4C: see paragraphs 11, 13 and 16 of the claimant's amended reply to the defendants' re-amended response to schedule 4D. They were referred to in argument as the "migrated claims". I shall treat them as an annexure to schedule 4C. Thus these three claims become claims 6, 7 and 8 of schedule 4C.

Claim 6 of schedule 4C (formerly claim 5 of schedule 4D): E3: Tolerances/ survey/ pre-cambers/ pre-sets

1568. Claim 6 sets out a series of activities which Hollandia undertook, relating to "establishing the tolerance philosophy for the PPT and roof". These activities are described in paragraph 15 of schedule 4D, a lengthy paragraph which spans four pages.

1569. It appears from paragraphs 110 to 115 of Mr Montijn's first statement that these were activities which Hollandia as erectors would have had to do in any event. Mr Montijn confirmed this in cross-examination at day 13 pages 110-112.

1570. I therefore reject claim 6.

Claim 7 of schedule 4C (formerly claim 8 of schedule 4D): E6: assembly and installation of parts

1571. Claim 7 is for the cost of completing the design information for the assembly and installation of all the main elements of the roof: see paragraph 34 of schedule 4D.

1572. Mr Williamson suggested in cross-examination that all of the activities described in paragraph 34 were site work. Mr Montijn replied:

“It is work that happens – it is preparation of work that happens on site”

1573. One activity in paragraph 34 is “design of supports/ stillages as required to assemble elements at ground level”. Mr Montijn agreed that this was the sort of thing that an erector always has to do in order to erect the permanent works: see cross-examination at day 13 page 114. In re-examination Mr Montijn stated that stillages are part of the temporary works.

1574. Mr Taylor (first statement, paragraph 285) recalls that Mr Mark Voort headed the team which was recording time to costs centre E6. Mr Montijn has no recollection about that one way or the other (day 13 page 112).

1575. Mr Taylor also recalls that Mr Mark Voort was based on site for most of the time. Mr Montijn asserts that Mr Voort was on site and that he liaised with the back office. He dealt with everything, including assembly and erection.

1576. In relation to claim 7, I conclude that even if CB had not repudiated, Hollandia would still have done all of the work listed in paragraph 34 of schedule 4D. Hollandia as erectors would not have relied upon any other contractor to do that work. Accordingly claim 7 fails for one of two reasons: either it is an aspect of erection and Hollandia were the erectors, or alternatively this work is an aspect of erection engineering with the consequence that claim 7 is defeated by causation defence one (discussed in chapter 31 above).

Claim 8 of schedule 4C (formerly claim 19 of schedule 4d): E18: Stressing horizontal cable net

1577. Claim 8 is for the costs of a series of activities necessary to plan how to stress the horizontal cable net. These activities are set out in paragraph 63 of schedule 4D.

1578. Mr Montijn explained in cross-examination that there were two cable nets, the eastern one and the western one. One lay between transfer trusses T2 and T3, the other between transfer trusses T4 and T5.

1579. Budget deviation form BD 43 dated 5th August 2005 records that Hollandia were asked to consider an amended sequence for stressing the horizontal cable net before de-propping the main trusses. Mr Montijn cannot remember the outcome of this matter, because he was not on site then.

1580. The spreadsheet in bundle M4D-1 shows that the bulk of the work for this item was done between October 2005 and January 2006. Disclosure has not been given of the documents during this period, which shed light on the history of the horizontal cable nets. Doing the best that I can on the material before me, I conclude on the balance of probabilities that the work done in relation to the cable nets during that period was attributable to variation

instructions or additional information from Mott, which would have entitled CB to additional payment if they had still been in post.

1581. A further and fatal objection to claim 8 is that the design work specified in paragraph 63 of schedule 4D is all part and parcel of erection engineering. Accordingly claim 8 is defeated by causation defence one (discussed in chapter 31 above).

1582. Claim 8 is therefore dismissed.

Conclusion

1583. Multiplex fails on each of the three migrated claims.

CHAPTER 33. DID CB'S REPUDIATION CAUSE DELAYED ERECTION IN AUGUST 2004?

1584. Multiplex's notice under clause 8 of the Supplemental Agreement expired on Wednesday 28th July. With effect from that date Hollandia became the erectors, although CB remained responsible for outstanding design work and for the fabrication of certain bowl steel.

1585. CB repudiated its surviving obligations under the subcontract on Monday 2nd August.

1586. On the date of repudiation there were approximately 5,000 tonnes of bowl steel stored at Wembley awaiting erection. Exhibit 1 to Mr Perkins' second statement shows 500 tonnes of steel at Palace of Industries and 4,500 tonnes of steel at East Lane.

1587. It is agreed between the planning experts that Hollandia erected the following quantities of steel during August 2004:

Week Monday 2nd to Sunday 8th August: 214.5 tonnes
Week Monday 9th to Sunday 15th August: 124.3 tonnes
Week Monday 16th to Sunday 22nd August: 46.8 tonnes.

Thereafter steel erection came to a halt because the workmen were on strike. Thus it can be seen that during August only 385.6 tonnes of steel were erected.

1588. Multiplex's project report no. 22 records that during August erection of the north bowl steelwork slipped from being 15 days behind programme to being 30 days behind programme; erection of the south bowl steelwork slipped from being 25 days behind programme to being 40 days behind programme.

1589. The first question to consider is whether bowl steel was on the critical path during August. Multiplex contend that it was, whereas CB contend that it was not.

1590. The essence of CB's argument is that throughout the period July to November 2004, the completion of bowl steelwork was critically dependent on the construction of the east and

west tunnels; in fact the completion of both those tunnels by PCH was many weeks late. See paragraph 9 (b) of the defendants' amended response to schedule E. This contention is supported in modified form by Mr Crane, CB's delay expert, in section 5 of his expert report. From his analysis of Multiplex's programmes Mr Crane maintains that construction of the east and west tunnels were the driving activities for the critical path in August and early September: see paragraph 5.5.1.

1591. The extent to which the construction of the tunnels in fact delayed the erection of bowl steelwork was explored in the cross-examination and re-examination of Mr Muldoon on day 20. The effect of that evidence was that only a relatively small part of the bowl steelwork was dependent upon the construction of tunnels. At all material times there was much bowl steelwork available to be constructed, which was not dependent upon completion of the concrete slabs forming the roofs of the tunnels.

1592. In oral evidence Mr Crane maintained his assertion that tunnel works were on the critical path in early August, but he accepted that "the construction of the tunnels at some point became no longer critical due to the fact that there was very little steelwork, if any, being erected" (day 29, page 68). Understandably Mr Crane resisted the temptation, which was dangled before him in cross-examination, to proffer his own findings of fact concerning precisely what happened on site.

1593. My conclusion on this issue is that Mr Crane is correct in his reading of the programmes. As planned, the erection of bowl steelwork was indeed critically dependent upon the completion of the tunnels. On the other hand, the delays to bowl steelwork were always greater than the delays to the tunnels. At no time did the problems concerning the tunnels in fact hold back steelwork erection, as Mr Hunter explained at day 29, page 26. During the period pleaded by CB (July to November 2004) tunnel construction did not cause critical delay to the project.

1594. I now turn to the low steelwork erection during August and will examine the cause of that state of affairs.

1595. Multiplex contend that the slippage which occurred during August was caused by CB's repudiation. CB contend that their repudiation had no impact upon Hollandia's erection rate and that there were other causes of delay in August.

1596. I shall first examine the other causes of delay relied upon by CB. These are the following:

- i) Hollandia as new erectors were mobilising on site.
- ii) Hollandia were going through a learning curve, as they became involved in a highly complex part-completed project.
- iii) The turning struts which had been used for erecting the arch were lying across the football pitch and were obstructing areas required for construction activities. Hollandia had to dismantle these struts (a time consuming operation) before they could proceed with erection. See Mr Stam's statement paragraph 100 (ii).

- iv) The workforce were resentful of the dismissal of CB as erectors and uncooperative.
- v) There was an incident on Friday 13th August, when a raker was dropped and the site was largely sterilised for about ten days.

1597. In relation to the first two factors, Hollandia were appointed erectors with effect from 28th July. They were bound to be mobilising and going through a learning curve in August. Mr Hunter, Multiplex's delay expert, did not seriously dispute this: see day 29, pages 31 – 32. Furthermore, in cross-examination Mr McGregor (Multiplex's project manager who was on site at the relevant time) accepted the force of these points.

1598. In relation to the third factor, Mr Hunter agreed that the congestion of the bowl area and the presence of the turning struts would inhibit effective production: see day 29, pages 33 – 34.

1599. In relation to the fourth factor (industrial relations), Mr Muldoon has explained that the workforce came from Darlington and, not unnaturally, their sympathies lay with CB. "They believed that we were the bad guy in the situation" (day 20, page 78). Mr Crane's opinion on this matter was stated as follows at day 29, page 78:

"That was my experience of strikes. When there is a strike, it in my experience – it rarely starts on one day, trouble brews over a matter of days or weeks before it ends up in a strike. So when I looked at the fact there was a five-week strike, I looked at the production figures and saw the production figures falling, in my experience a likely cause of that was industrial relations problems leading up to the strike and I believe, having read the transcripts, that was, in fact, one of the causes at that time of the delays."

1600. In my view, that is a reasonable analysis, which fits with the evidence given by the witnesses who were involved at the time.

1601. As to the fifth factor, on Friday 13th August a raker was dropped by a crane. This was a serious incident, as set out in Mr Stam's report dated 14th August (QC 55/35). As a result all the tower cranes were taken out of service for the rest of that week and all of the following week. Mr Stam explained in cross-examination (day 10, page 9) why Hollandia took the incident so seriously. I have no doubt that Hollandia were right to do so. The consequence was, however, that much less steel could be erected in the period between 13th August and 20th August. After that the workers were on strike and no steel could be erected at all. Similar evidence concerning the raker incident was given by Mr Watkins at day 7, pages 5 – 9.

1602. Mr Hunter did not consider any of the above five factors, when preparing the "delay analysis" at section 5 of his report. When those matters were put to him in cross-examination at day 29, pages 31 to 36, he conceded that they "may" have significant effect on progress. In my view, those matters are bound to have caused significant delay in August. Mr Hunter's failure to take any of them into account fatally undermines his delay analysis.

1603. The five matters set out above, when taken in conjunction with the strike commencing on 21st August, provide a complete explanation for the low production achieved during August and for the slippage which occurred that month.

1604. I turn next to the effect of CB's repudiation during the 18 day period when erection was taking place. The fact that no steel was being fabricated did not present any immediate problem. The position was as stated by Multiplex in their press release of 4th August (approved by Mr Muldoon):

“With regard to the completion of the work, Multiplex confirms that there is a considerable amount of steel stored at the site, so there will be no delay in on-site production.”
(V16/233)

1605. Aerial photographs of the site dated 26th July (I6/ 4-6) show several areas of the bowl where steelwork was available to be erected during August. Even if some of those areas were hampered by the absence of critical pieces of steel, I am quite satisfied that Hollandia had more than enough steel available to proceed with erection throughout August, if other factors had permitted.

1606. The above conclusion is supported by numerous contemporaneous documents. In particular, on 9th August Mr Muldoon reported to John Roberts in optimistic terms about progress on site following CB's departure (V16/226). Mr Muldoon responded to Mr Roberts' enquiry with particular care, because Mr Roberts was the head of Multiplex Australia (day 29, page 132).

1607. Project report no. 22, which relates to August and which was sent to the board, contains a two page project manager's overview (V16/96 – 97). This overview identifies as causes of delay industrial relations and the incident when a raker was dropped. The industrial relations problems are discussed in some detail in paragraph 17.7. There is no reference at all to the stockpile of steel being insufficient or to missing pieces of steel holding up erection. The summary paragraph, 17.7, is also instructive. It states:

“Hollandia must bring in replacement labour in sufficient numbers to ensure erection of steel and precast are brought back to maximum production asap”

1608. In early September 2004 Mr Muldoon attended a meeting with KPMG, Multiplex's auditors. He advised the auditors that Multiplex were on course for completing the Wembley project by September 2005: see day 25, pages 135 to 137.

1609. Multiplex now contend that missing steel and the inability to locate steel following CB's repudiation caused substantial delay in August. This contention is inconsistent with the contemporaneous documents. When Mr Stewart put this contention to Mr Crane in cross-examination at day 29, pages 97 – 98, Mr Crane replied:

“I am saying that there is a lot of talk of missing steel. There is very little in the way of specifics as to what actually was missing. As far as I am aware there are not any detailed programmes at that time which would show the erection sequence and identify which pieces they needed to draw off

and at what point. So I can well imagine that in those circumstances, if they suddenly find that there is a piece missing, it may well cause problems. What does surprise me is that, with a lot of steel like this, there isn't a detailed call-off schedule saying which pieces are needed and when, and from that schedule you could identify then are there any particular critical pieces that we need to get fabricated straightaway. I have not seen any of that information. All I see is a general statement saying there were missing pieces of steel.”

1610. In my view, there simply is no evidence that any particular piece of steel was missing through the fault of CB and that that factor was causative of delay in August. The five factors set out above provide a complete explanation for the low production achieved during August.

1611. Having reviewed all of the evidence, I am satisfied that CB’s repudiation was not causative of any delay to the erection of bowl steelwork during August 2004.

CHAPTER 34. SCHEDULE 4E

The paragraph numbering of schedule 4E

1612. Before addressing schedule 4E, I must first assist the reader by explaining the Byzantine system of paragraph numbering adopted in that schedule and how I propose to refer to paragraphs.

1613. The paragraphs on pages 1 to 7 of schedule 4E are numbered 1 to 21. From pages 8 to 28 two new series of paragraph numbers appear. The paragraphs on left hand side of pages 8 and following are numbered 1 to 49. The paragraphs on the right hand side of pages 8 and following are numbered 1 to 28.

1614. In this judgment whenever I refer to a paragraph number of schedule 4E, unless otherwise stated I am referring to the numbered paragraphs on pages 1 to 7 of schedule 4E.

1615. Finally, schedule 4 E has on some (but not all) pages a discrete column on the left hand side headed “item”. The entries in this “item” column constitute yet another numbering sequence. I have not found this to be of assistance and I shall never make reference to those numbers.

General review of schedule 4E

1616. In Scott schedule 4E Multiplex claim damages for delay caused by CB’s repudiation and related breaches of contract. The breaches of contract relied upon are:

- (a) CB’s breach of the “orderly handover” obligation contained in clause 9 of the Supplemental Agreement;

- (b) CB's breach of the obligation under clause (b) of schedule 1 to the Supplemental Agreement to identify where steel was located and assist Hollandia in finding it;
- (c) CB's repudiation;
- (d) Defective fabrication and erection as set out in Scott schedule 1D.

See paragraphs 5 – 11 of Scott schedule 4E.

1617. Multiplex contend in paragraph 12 of schedule 4E that the steelworkers' strike between 21st August and 26th September "had no impact on Hollandia's progress" to 7th November.

1618. Multiplex contend in paragraph 15 of schedule 4E that CB's repudiation affected Hollandia's productivity during the period 2nd August – 7th November. Multiplex claim damages for delay caused during that period by CB's breaches of contract, pre-eminently the repudiation. I shall refer to the 14 week period (2nd August – 7th November) during which Multiplex contend that CB's repudiation and related breaches of contract exerted a delaying influence as "the repudiation period" or "the relevant period".

1619. In paragraph 16 of schedule 4E Multiplex assert that the delay caused to Hollandia during the repudiation period was 79 days calculated as follows. The repudiation period was 98 days. During the repudiation period Hollandia only erected 1,280 tonnes of steel. Hollandia ought to have erected that amount of steel in 19 days. (This proposition is based upon programme WS05-V3 and an erection rate of about 445 tonnes per week: see the email from Multiplex's counsel dated 28th July 2008 in response to a query from myself). The difference between 98 days and 19 days is 79 days.

1620. The matter is then pleaded starkly in paragraph 17 of schedule 4E as follows:

"For these reasons, it is Multiplex's case that in the period 2nd August to 7th November 2004, the bowl steelwork erection was delayed by 79 days (or 11.3 weeks) as a result of CBUK's repudiation".

1621. Multiplex allege that as a result of those 79 days delay they have suffered losses amounting to £3,761,028: see paragraphs 1 – 49 on the left hand side of pages 8 to 28 and paragraphs 1 – 28 on the right hand side of pages 8 to 28.

1622. Schedule 4E of Multiplex's pleadings appears not have been drafted by either counsel or solicitors, although the legal team have valiantly done their best to support it. As a delay claim, schedule 4E has been formulated in a somewhat surprising and unusual manner. The claim as presented is flawed for five obvious reasons:

- i) There was never an obligation on Hollandia or indeed CB (see judgment 1, paragraphs 548 – 550) to erect steel at the rate of 445 tonnes per week. No-one ever achieved anything approaching that erection rate either before, during or after the repudiation period.

- ii) Although Hollandia had been appointed as erectors on 28th July, they were not required to comply with programme WS05-V3 or indeed with any programme at all.
- iii) As set out in chapter 33, there were powerful causes of delay in August which were unrelated to CB's repudiation.
- iv) The proposition that a five week strike falling in the middle of the relevant period "had no impact on Hollandia's progress" is (with all due respect to Multiplex's ingenious arguments) untenable.
- v) In the last part of the relevant period (i.e. after the end of the strike) Hollandia made generally good progress.

1623. In the course of closing speeches I tactfully drew Mr Stewart's attention to certain difficulties which lay in Multiplex's path in relation to schedule 4E. Mr Stewart submitted that, despite those difficulties, it would be wrong for the court to hold that not a single day of delay was caused by CB's repudiation. There must be at least some days delay. See day 33 pages 189 – 190.

1624. Mr Stewart, as always, put his submissions in the most attractive way possible. The reality is, however, that Multiplex's pleaded case on delay is deeply flawed. The issue upon which I must focus is whether any form of viable delay claim can (a) be salvaged from Multiplex's pleaded case and (b) be sustained on the evidence.

Orderly Handover

1625. Clause 9 of the Supplemental Agreement provided that if Multiplex gave notice under clause 8 (as Multiplex did on 30th June 2004), then:

"the parties will liaise during the 28 day notice period with a view to securing alternative employment for as many of the Sub-Contractor's site employees as possible and ensuring an orderly handover of the works with due respect for consultation and notice requirements."

1626. The obligation imposed by clause 9 was an obligation to liaise. The purpose of the liaison was (a) to secure alternative employment for employees and (b) to ensure an orderly handover of the works. The "works" referred to must be the works on site, because that it is what CB would be handing over at the end of the 28 day notice period.

1627. I am satisfied on the evidence that CB complied with the obligation imposed by clause 9. Indeed (very sensibly) CB's practical co-operation with Multiplex went beyond the limited obligation imposed by clause 9.

1628. On 13th July 2004 Messrs Allison, Hall, Hill and Underwood of CB attended a meeting with representatives of Multiplex, Hollandia and Fast Track, in order to discuss the orderly handover of the site. At that meeting CB agreed to do the following tasks:

1. Survey Bowl

- a. CBUK to provide a register of all surveys that have been submitted to date.
- b. CBUK to provide (i) electronic and (ii) hard copy of all survey information for the project to date both (a) completed and (b) partially complete.

2. Survey Arch

CBUK has already provided all survey information for Arch. CBUK to provide a register.

3. Terrace Survey

CBUK to provide all terrace surveys.

4. Upper Rakers + PPT

CBUK to provide all survey information for the (a) upper rakers and (b) PPT including information relating to the modules which are being assembled in the arena.

5. Embedment Plate

CBUK to supply all survey information relating to core embedment plates.

6. Asset Register of CBUK owned items

CBUK to provide Asset Register of all goods which are owned by CBUK by 16.07.04. CBUK will provide a draft register today 13.07.04. MPX and Hollandia to review and comment.

7. Temporary Works

- (a) Raker support steel and lifting equipment associated with it.
- (b) Roof towers. Toblerone sections.
- (c) Ex-stillage material for the Arch which CBUK had planned to Resident-use for the roof.
- (d) Stools for the PPT.
- (e) Lifting Beams.
- (f) CBUK will provide a register of all temporary works.

8. Lifting Gear

- a. CBUK to provide (i) lift certificates for all lifting gear and (ii) a register of all lifting equipment.
- b. CBUK to also provide all associated procedures.

9. Hire Equipment and Plant

CBUK have updated the list which summarises all plant and equipment on site. (a) CBUK submitted a draft during meeting as attached. (b) MPX/Hollandia will review this list and

advise which items are required to be assigned. (c) CBUK to provide all schedule of rates, hire agreements and the like, relating to all items which are to be assigned MPX.

10. Audit on Status of Project at the Time of Handover

- a. CBUK to provide marked up plans indicating what steel has been erected.
- b. A separate meeting needs to be held between Sigma and Ameron and MPX/ CBUK/Hollandia. CBUK to organise for this meeting to occur this week.
- c. All QA information relating to steel erected on site to be submitted as part of the handover audit.
- d. An audit team made up of CBUK/MPX and Hollandia will go through the building starting Monday 19.07.04 to agree on the status of all works.
- e. MPX note that after the date of handover there will be items of work which remain incomplete. Further discussions as required to agree on how these items will be dealt with. Meeting noted that CBUK may need to have representatives on site to review these items as they arise.
- f. CBUK agree to provide copies of all delivery schedules, go data lists, toilet roll lists, etc. as they currently stand.
- g. CBUK to advise MPX status of all site works.

11. Sundry Items

CBUK to submit a list of all sundry items.

In the original minutes of the meeting (QC 40/74 – 76) the items were not numbered. For ease of reference, I have added in the numbering which was used by counsel during the trial.

1629. Mr Hall gave evidence that CB carried out all of the tasks which were allocated to them at the 13th July meeting. This is demonstrated by the defendants' supplemental 7.2. This supplemental lists the tasks allocated to CB at the meeting and demonstrates by copious cross-references to the bundle that each of those tasks was duly performed. In cross-examination on days 7 and 8, Mr Williamson put supplemental 7.2 to Mr Watkins. In cross-examination on days 14 and 15, Mr Williamson put supplemental 7.2 to Mr McGregor. There was very little in supplemental 7.2 with which either Mr Watkins or Mr McGregor quarrelled.

1630. Having considered all of the factual evidence, I am satisfied that during the handover period CB did all that was asked of them at the "orderly handover" meeting on 13th July.

1631. Multiplex allege in paragraph 5 of schedule 4E that CB "was obliged as part of its lump sum obligations under schedule 1 (b) of the Supplemental Agreement ... to identify where steel was located, whether that be on site or in the stockyards, and to provide assistance to Hollandia in identifying and locating such steel".

1632. I do not accept that clause (b) imposed such wide-ranging obligations upon CB. Indeed compliance with the alleged obligations would have been impossible after 22nd June, since as from that date (much to the annoyance of CB) Multiplex were accumulating all fabricated steel in stockyards at Wembley under their own control.

1633. Much of Multiplex's difficulties in the period after 2nd August were self-inflicted. First, Multiplex failed to pass on to Hollandia important information and documents received from CB. This was clearly demonstrated during the cross-examination of Mr de Meijer on day 8 (briefly summarised in chapter 3 above). Secondly, Mr de Meijer did not start compiling Hollandia's database until early September. Mr de Meijer ought to have started this task two months earlier (during the handover period), as he readily admitted in cross-examination: see day 8, page 144.

1634. By 2nd August the vast majority of all fabricated steel was gathered in Multiplex's stockyards at Palace of Industries and East Lane. Despite the protestations of some Multiplex witnesses, Multiplex were well able to locate all the steel at those venues. Mr McGregor candidly conceded this in cross-examination. At day 15, pages 6 – 7 he said:

“As I said yesterday, steel that was erected on the job, you could see there was no problem with that, it was easy for somebody to go out and check it was there.

Similarly, steel at East Lane, I acknowledge we have got delivery schedule here. Again, that wasn't a problem, you could go down to East Lane and you could identify the steel. The problem was with all of the information relating to the offsite steel. We were provided information by Cleveland Bridge, but in the coming weeks and months, it became very clear that that information was incorrect and inaccurate.”

1635. If Multiplex failed to locate steel at East Lane or Palace of Industries, this was due to their own disorganisation following (a) the change of erectors and (b) the instruction of 22nd June. This disorganisation is graphically described by Mr Patterson at paragraph 34 of his witness statement:

“As soon as CBUK left the project at the end of July 2004 there was a large commotion on site with a lot of steel being moved by Fastrack, the labour supplier employed by Hollandia for erection works. Steel seemed to be being moved in all directions between the pitch, the outer perimeter and East Lane. This lasted for several months.”

1636. The steel which was off site (referred to by Mr McGregor in the above quotation) constituted a minute proportion of the total. There is no evidence that lack of information about that steel was causative of any delay.

1637. Conclusion. For the reasons set out above, I reject the plea in paragraph 5 of Scott schedule 4E that CB were in breach of clause 9.1 of the Supplemental Agreement. I also reject the plea in paragraph 5 that CB were in breach of obligations to “identify” and “assist” imposed by clause (b) of schedule 1 to the Supplemental Agreement. I reject the contention that lack of information from CB was causative of any delay.

The effect of CB's breaches of contract upon the rate of erection

1638. The plea in paragraph 11 of schedule 4E that CB's defects were causative of delay did not loom large at the trial. As set out in chapter 7 above, I have found proved, in whole or in part, 52 of the 235 items pleaded in Scott schedule 1D. There is no evidence that remedial work referable to those 52 items had any impact upon overall progress.

1639. I must, therefore, concentrate upon Multiplex's principal contention, namely that CB's repudiation exerted a delaying effect throughout the period 2nd August to 7th November and caused less steel to be erected during that period than would otherwise have been the case (i.e. if Hollandia had been erectors, but CB had continued to perform their obligations under clause (b) of schedule 1 to the Supplemental Agreement).

1640. In considering what production rate ought to have been achieved by Hollandia, it is important to bear in mind that throughout the entire project Mott were the engineers. Mott, of course, are not parties to this action and nothing which I say here should impact upon the future litigation between Multiplex and Mott. Nevertheless, it is common ground between the parties to this action that there were serious shortcomings in Mott's performance and these shortcomings had the effect of seriously delaying and disrupting the rate of steel erection on site. Many CB witnesses have given evidence to that effect both in the first trial (April to June 2006) and in the present trial.

1641. Multiplex now make allegations to the same effect in their claim letter against Mott. Mr Muldoon has given evidence (and I accept) that Multiplex's claim against Mott has been advanced in good faith. Multiplex's letter of claim against Mott includes the following passage:

"656. However, as the preceding sections demonstrate, the many thousands of breaches by Mott MacDonald of its obligations in the provision of civil and structural engineering services, and the wholly deficient nature of the design of the steelwork, meant that Multiplex's contingency was eroded due to the general delays and disruption experienced as a result and, ultimately, the Project was critically delayed.

"657. As is set out in the preceding chronology Multiplex made numerous attempts to re-programme the works, change the construction logic and thereby ameliorate the affect of any ongoing delay. In particular, Multiplex had devised a 32 month programme in or around late 2003 to complete the works and made several material changes to the construction methodology, including the change to the method of erection of the roof, in an attempt to mitigate the effect of the delay and accelerate the works.

"658. Ultimately, these attempts failed in or around mid to late 2005 when it became impossible for Multiplex to complete the works by January 2006.

"659. In fact, as has been well documented, the stadium did not achieve practical completion until March 2007 and therefore the project was thus critically delayed by approximately 1 year and 2 months, when measured against the client programme of completion by 30 January 2006.

“660. Multiplex acknowledges that critical delay such as that which occurred at Wembley is invariably caused by a range of factors. At Wembley, critical delays to the project was partly caused by, inter alia, the repudiation of CBUK of their contractual obligations and leaving site on 2 August 2004 for a period of approximately 2 months (during which very little steel erection activity occurred) and CBUK’s poor performance generally.

“661. However, having acknowledged the role of some other factors in the critical delay to the Wembley stadium project, Multiplex is firmly of a view that by far the largest cause of ultimate critical delay to the project was the defective design of the steelwork and/or the defective performance by Mott MacDonald of its obligations to provide civil and structural engineering services.”

1642. Both Mr Stewart and Mr Williamson have drawn my attention to different parts of this passage. It is right that I set the whole passage out, so that the parts relied upon by counsel can be read in context. Two important points which emerge from this passage are:

- i) It is common ground in this litigation that Mott’s defective design and repeated design changes delayed and disrupted production at all stages of the project. This factor must, therefore, have affected the erection rate during the repudiation period (as well as at all other times).
- ii) In the context of their claim against Mott, Multiplex allege that CB’s repudiation exerted a delaying effect for a period of approximately two months (i.e. 2nd August – 2nd October). That is contrary to Multiplex’s present claim, namely that CB’s repudiation exerted a delaying effect for 3 months 6 days.

1643. Against that background, let me now examine the effect of CB’s repudiation upon production achieved during the repudiation period.

1644. For the reasons set out in the preceding chapter, I do not accept that CB’s repudiation was causative of any delay between 2nd and 20th August. Between 21st August and 26th September the workforce was on strike and self-evidently no steel could be erected.

1645. What the court must focus upon, therefore, is the period 27th September to 7th November, i.e. contract weeks 105 to 110. During those six weeks the production achieved (as agreed between the experts) was as follows:

Week ending 3 rd October	214 tonnes
Week ending 10 th October	382 tonnes
Week ending 17 th October	264 tonnes
Week ending 24 th October	172 tonnes
Week ending 31 st October	72 tonnes
Week ending 7 th November	<u>175 tonnes</u>
Total	<u>1,279 tonnes</u>

1646. Therefore during weeks 105 to 110 the average production achieved per week was 213 tonnes. Mr Hunter considers that this erection rate compares quite favourably with any other period of Hollandia's production: see day 29 page 54. Furthermore, in most weeks the production was materially higher than 213 tonnes, but the average has been depressed by the low erection rate in the last week of October.

1647. There appear to have been two reasons for low output in late October. First, the weather was bad and this delayed erection: see Multiplex's project report for October at V16/119 and the evidence of Mr Hunter at day 29, pages 39 – 40. Secondly, there appears to have been a problem with the cranes in late October and early November: see the cross-examination of Mr Watkins at day 7, page 131.

1648. By the end of the strike, there were 7,000 tonnes of steel on site and available for erection: see Mr Hunter at day 29, page 42. There is no reference in the contemporaneous documents to shortage of steel or inability to find missing steel as being a cause of delay to erection at any point between 27th September and 7th November. If this had been a cause of delay, I believe that it would have featured and indeed been highlighted in Multiplex's internal documents. Multiplex's concerns during that period, as reflected in the project reports and board minutes were of a different nature. Criticism of Hollandia's performance appears far more often in Multiplex's documents than reference to CB's repudiation.

1649. During November 2004 Multiplex's site team and Multiplex's peer review team both believed that the Wembley project would be completed on time: see Mr Muldoon's cross-examination at day 29, pages 149 – 150.

1650. Mr Hunter has analysed Hollandia's production both during and after the repudiation period. The results of this analysis are set out in Mr Hunter's figure 29 (B7-6/1/109). Figure 29 was the subject of much debate and cross-examination on day 29. CB's proposed amendments to that figure are set out in defendants' supplemental 23. Many of those amendments were subsequently agreed between the experts. I do not propose to recite all of that evidence. Taking matters shortly, it is simply not possible to point to any loss of production in the six weeks from 27th September to 7th November which might be attributed to CB's repudiation. Nor indeed, when one bears in mind the other factors discussed above, is it possible to point to any loss of production during the repudiation period as a whole which might be attributed to CB's repudiation.

1651. Mr Crane has analysed the effect of the "repudiated steel" (i.e. steel which CB failed to fabricate before 2nd August and which ZNS subsequently fabricated). Mr Crane has demonstrated both in his report and in cross-examination at day 29, pages 93 and following, that the repudiated steel did not hold up erection during the relevant period.

Conclusion

1652. My overall conclusion coincides with the opinion of Mr Crane. Multiplex have not proved that CB's repudiation caused any delay to the project or any loss of production during the period 2nd August to 7th November 2004.

1653. Accordingly Multiplex's claim in schedule 4E is dismissed.

CHAPTER 35. SCHEDULE 4F

1654. In Scott schedule 4F Multiplex claim against CB damages for repudiation of item 1 of the purchase order.

1655. As set out in chapter 18 above, CB fabricated some only of the “China steel returned unmade”. CB failed to use the black steel returned from China to fabricate the steel pieces listed in appendix 4 to Scott schedule 4F. In the circumstances Multiplex employed ZNS to fabricate those steel pieces at a cost of £1,295,341.17.

1656. The build up of that cost is apparent from chapter 29 above, which deals with schedule 4A. In short, the component elements of that cost are:

Transport	£138,121.17
Receiving, sorting and storage	£163,929.75
Reviewing status of part fabricated steel	£76,698.10
Fabrication and coating	£786,241.56
Additional fabrication works	£108,363.74
Non-destructive testing	£33,419.85
Credit for currency exchange rate difference	£11,432.99
TOTAL	£1,295,341.17

1657. It will be recalled from chapter 18 above that I have awarded £326,042 to Multiplex for steel fabrication pursuant to item 1 of the purchase order. If CB had fully performed that particular contract Multiplex would have paid to CB an additional £1,326,579 (i.e. 1,243 x £1,067.24). I shall refer to this sum as “the notional cost”.

1658. It was suggested by counsel for Multiplex when this judgment was in draft that, for the purpose of calculating notional cost, the figure of 1,243 tonnes should be reduced to 1,057 tonnes. This argument was based on the proposition that, if CB had not repudiated, the problems of finding steel at East Lane (stored under Multiplex’s control) and similar problems would have been overcome. This is a new argument which was not advanced at trial and which has not been made good on the evidence. I reject that argument.

1659. Multiplex would be entitled to recover as damages the amount by which the total of the actual costs set out above exceeds the notional cost. However, there is no such excess.

1660. Multiplex also make a claim for site management at 7.5%, insurances at 3.47% and overheads at 3.8%. Together these total 14.77%. Mr Hart makes a number of points about these claims, in particular that “Multiplex would always have incurred a cost for site management, insurances and overheads on this work” (report, paragraph 1022). In my view this is a fair point. It has not been established that Multiplex have suffered any loss under this head.

1661. In the result, under schedule 4F I award nominal damages only for CB’s repudiation of item 1 of the purchase order. I assess nominal damages in the sum of £2.

CHAPTER 36. CONCLUSION RE SCHEDULE 4

1662. The consequence of CB's repudiation of the subcontract, as amended by the Supplemental Agreement, is that Multiplex have made both gains and losses. For the reasons set out in chapters 29 – 34 above, the gains exceed the losses. Accordingly, Multiplex have failed to prove any overall loss flowing from CB's repudiation of the subcontract. Multiplex are entitled only to nominal damages for repudiation, which I assess at £2.

1663. Mr Stewart submitted at the outset of the trial that a conclusion that Multiplex have suffered no loss as a result of CB's repudiation would be surprising. I accept that, at first blush, such a conclusion is not what one would expect. It becomes less surprising, however, when one bears in mind: (a) the attenuated nature of CB's obligations as at the date of repudiation; (b) the fact that less than a week before repudiation Multiplex changed erectors (a decision which was bound to cause delay, disruption and expense); (c) Multiplex's success on certain valuation issues, which impact negatively on damages.

1664. Mr Stewart makes the further point that a conclusion that Multiplex have suffered no loss as a result of CB's repudiation is contrary to CB's own perception of the situation at the time. He refers to the minutes of CB's board meeting on 23rd July 2004. According to those minutes, Mr Grant outlined two options to the board, the second of which was stopping work. One consequence of the second option was noted as being a potential liability in damages up to £6 million. I do not see any force in this argument. In late July 2004, the respective legal positions of the parties were unclear and a number of views were possible. It was obviously sensible to draw the attention of CB's board to CB's possible liability in damages. However, nothing in those board minutes or the surrounding documents undermines my conclusions on Scott schedule 4, which have been reached after many weeks of oral evidence and legal argument.

1665. Turning to a separate point, CB contend that they are also entitled to credit against Multiplex's damages claims in schedule 4, in respect of the "unspent" parts of the £12 million lump sum relating to (a) buyouts and (b) on costs. Indeed Mr Williamson submits that Mr Stewart has conceded the point.

1666. In view of my decisions in the earlier chapters, this matter simply does not arise. I shall not therefore trawl through the transcript to see whether Mr Stewart has conceded the point. Nor shall I consider whether, absent any concession, CB's contention would be correct.

1667. Let me now draw the threads together. For the reasons set out in chapters 29 to 36, Multiplex are entitled to recover £2 nominal damages in respect of CB's repudiation of the subcontract and £2 nominal damages in respect of CB's repudiation of the purchase order. The total award, therefore is £4.

PART 5. CONCLUSION

CHAPTER 37. THE LESSON TO BE DRAWN FROM THIS LITIGATION

1668. At the request of counsel, I have deferred finalising this chapter until after hearing submissions on costs. The Technology and Construction Court exists to provide a dispute resolution service to the business community and pre-eminently to the construction industry. In many cases, of which the present is typical, both parties are members of the construction industry; they have a dispute about a final account and usually a cross claim for damages. The normal and sensible way of resolving such matters is for the court to decide questions of principle and for the parties then to sort out the financial consequences. This approach generally leads to the resolution of multi-million pound disputes at proportionate cost, and enables the parties to get back to their real business.

1669. The present case began in conventional manner. At a case management conference in December 2005, I had in effect a “round table” discussion with leading counsel in which we identified the crucial issues of principle between Multiplex and CB. These were then determined as preliminary issues at a five week trial in April and May 2006: see *Multiplex Constructions (UK) Ltd v Cleveland Bridge UK Ltd* [2006] EWHC 1341 (TCC). In the last two paragraphs of my judgment on those ten preliminary issues I said:

“666. Finally I wish to say something directly to the parties. It has been obvious to me that no settlement could be achieved whilst certain fundamental issues were unresolved. The present set of preliminary issues was drafted by counsel precisely in order to break that deadlock. Both parties have had a measure of success on the preliminary issues. Neither party has won an outright victory. With the assistance of this court's decision on the ten preliminary issues, it may now be possible for both parties to arrive at an overall settlement of their disputes, either through negotiation or else with the help of a mediator, who is unconnected with this court.”

“667. I commend this course to the parties, if only as a means of saving costs and management time. If, however, the parties would prefer the court to resolve all remaining issues, then so be it. This court encourages sensible commercial settlements, but nevertheless stands ready to determine every issue which the parties wish to litigate”

1670. Following that judgment the parties attended a mediation. However, instead of reaching a sensible resolution at that mediation, the parties spent the next two years litigating about two matters, namely Multiplex's claim for damages and CB's claim for a final account. Multiplex's claim for damages was subject to a £6 million cap and has, in the event, been assessed at £151,309. CB's claim for a final account involved a host of valuation issues, of which – inevitably – some went in favour of CB, some went in favour of Multiplex, and many were assessed at a figure somewhere between the extreme positions adopted by the two parties. A resolution broadly along the lines of this judgment could have been arrived at by the parties at fractional cost, if both parties had instructed their advisers to go through the accounts together in a constructive spirit taking as their starting point the court's decision on issues 1 to 10.

1671. The procedure adopted by the parties for drawing up the final account on the steelwork package for Wembley Stadium is surprising to say the least. A trial bundle of some 550 ring files has been assembled. The cost of photocopying alone is approaching £1

million. The pleadings, which incorporate schedules, counter-schedules and appendices, run to literally thousands of pages. Each side has fielded a team of experts, solicitors, leading counsel and two or three junior counsel. There have been two rounds of preliminary issues (the second to deal with new matters pleaded in August 2006), two trips to the Court of Appeal, innumerable applications, cross-applications, amendments to the pleadings and finally a three month trial of all valuation and damages issues. Every little point has been fought out, some orally and some on the basis of written evidence and argument. Since 5th June 2006 (when issues 1 to 10 were decided) the parties have run up costs of some £14 million. These costs are in addition to pre-June 2006 costs of some £8 million. That level of expenditure far exceeds the sums which (after stripping out the froth) are seriously in dispute between the parties. Furthermore costs were only limited to that level by reason of the fact that (a) there was a “chess clock” agreement to limit the length of the trial to three months, (b) counsel on both sides worked prodigiously hard to compress their oral presentation into that narrow period.

1672. The final result of this litigation is such that (when costs are taken into account) neither party has gained any significant financial benefit. Instead large sums of costs and a large amount of management time have been expended on both sides to no useful purpose. Both parties have a measure of responsibility for this situation. Over the last two years both parties have brushed aside repeated judicial observations on the wisdom of settling this particular litigation. Each party has thrown away golden opportunities to settle this litigation upon favourable terms. Those golden opportunities continued to arise during the run up to trial and even during the first month of trial. In the judgment on costs, which is about to be delivered, I shall consider the apportionment of responsibility as between the parties for the final unhappy outcome.

1673. The lesson for the future which may be drawn from this litigation is that parties would be well advised to use the dispute resolution service offered by the Technology and Construction Court in a more conventional and commercial manner than has been adopted in this case. Once this court has decided questions of principle, the parties can save themselves and their shareholders many millions of pounds by instructing their advisors to agree reasonable figures for quantum, if necessary with the assistance of a mediator unconnected with the court. If one party is not prepared to negotiate, then the other party can protect its position by making a timely and realistic offer under Part 36. The court’s decision on preliminary issues should be used by both parties as a basis for sensible discussion or at least as a basis for sensible assessment. It should not be used as a platform from which the victor on the preliminary issues launches new and ill thought out claims in order to transform its case on quantum. Finally, I wish to place firmly on record that what has happened in this case is in no way typical of litigation in the Technology and Construction Court.

CHAPTER 38. THE OVERALL RESULT

1674. There are two further issues which must be resolved, before the overall final account between the parties can be drawn up. They are (i) the position in respect of retention monies and (ii) what interest is payable to CB in respect of the sums awarded in chapter 26 for the non-return of temporary steel. These two issues emerged at a late stage and were debated at a post-trial hearing on 16th September 2008 (day 42).

(i) Retention monies

1675. Clause 21.12 of the subcontract conditions provided for Multiplex to deduct retention monies at the rate of 5% from interim payments; for one half of those retention monies to be released on practical completion; and for the balance to be released following issue of the notice of completion of making good defects. In early 2004 the parties agreed upon a new method of dealing with retention, namely that CB would provide a bond to Multiplex in lieu of retention: see clause 15 of the Heads of Agreement and the last paragraph of schedule 2 to the Supplemental Agreement. That paragraph provided for a new clause 39.5 to be substituted in the subcontract conditions as follows:

“In the event that the Subcontractor elects the option to provide to the Contractor a Retention Bond in lieu of the Retention, the Sub-Contractor shall procure and deliver to the contractor a Retention Bond for an amount equivalent to 5% of the Sub-Contract Sum, reducing to 2.5% of the Sub-Contract Sum at Practical Completion ... and following receipt of the Retention Bond ...the Retention deducted by the Contractor from payments shall be paid to the Sub-Contractor.”

1676. CB duly procured the issue of a bond on 7th April 2004. That was after the signing of the Heads of Agreement but before the execution of the Supplemental Agreement, i.e. during the interregnum. The bond was in the sum of £1,514,732.53, which was less than 5% of the subcontract sum. In those circumstances Multiplex did not release the entirety of the retention monies to CB, but only an amount equivalent to the value of the bond. In other words Multiplex continued to retain the amount by which the retention monies otherwise due exceeded the value of the bond. In 2007 disputes arose between the parties as to whether Multiplex were entitled to make calls upon the bond. Those disputes were settled on the basis that CB would pay (and did in fact pay) to Multiplex the value of the bond, namely £1,514,732.53. Multiplex held that sum as retention in lieu of the bond.

1677. In March 2008 the present trial commenced. It appeared from the parties’ opening submissions that there was no issue between the parties concerning retention. Multiplex stated in paragraph 95 of their opening note:

“Now that the Project is complete, CB accepts that CBUK are entitled to the release of the retention levied against the valuations under Schedule 2. However, it is Multiplex’s case that the retention monies withheld can be applied to reduce the sums due to Multiplex by way of damages under Scott Schedule 4.”

1678. There has been some debate between counsel about what that paragraph means. I reject Mr Williamson’s submission that Multiplex were conceding that CB were entitled to the return of the entirety of the retention monies as at 9th March 2007, the date of practical completion. That would be a remarkable concession to make. I accept Mr Stewart’s submissions in this regard. Multiplex were conceding that in March 2008 (i.e. at the end of the 12 months defects liability period) CB were entitled to the return of all retention monies; and that, accordingly, the court in its assessment of sums now due to CB under Scott schedule 2 should make no deduction for retention.

1679. In their opening note CB stated as follows in respect of retention:

“The Sub-contract Documents provide for retention at 5%. In fact, the parties agreed that CBUK would provide a retention Bond in the amount of £1.515 million and no retention would be deducted from CBUK’s interim valuations up to the amount of the Bond, then 5% retention thereafter. ... In fact retention is a complete irrelevance to the valuation exercise which the court had to undertake. Retention is obviously applicable in relation to interim valuations as work progresses. Since, however, this is effectively a Final Account calculation, retention is irrelevant.”

1680. CB’s opening note was consistent with their conduct in the period after the bond was issued. I construe CB’s opening note as saying essentially the same thing as Multiplex’s opening note, namely that retention monies (or their equivalent) were properly withheld by Multiplex in the past, but that the time has now come for their release. The position of neither party changed during the trial. At a post-trial hearing on 30th July (day 40) it was common ground that the sums now to be awarded to Multiplex under Scott schedule 2 should not have any deduction for retention.

1681. Following the post-trial hearing on day 40, the parties endeavoured to agree what interest was due to Multiplex in respect of those monies which (a) had been paid to CB pursuant to adjudication awards and (b) would now be due for repayment following the judgment of the court. The parties then adopted stances which departed from their positions throughout the trial. Multiplex’s new position is that they are entitled to retain the full 5% retention until such future time as a notice of making good defects is issued under the main contract. CB’s new position is that their provision of the bond on 7th April 2004 extinguished any entitlement of Multiplex to retain any retention monies after that date.

1682. I am quite satisfied that neither party should be allowed to resile from the position which they have adopted throughout the trial. The trial has proceeded on the basis that retention monies (or their bond equivalent) were properly withheld during the currency of the works; that one half of the retention was due for release upon practical completion in March 2007; and that the other half was due for release upon expiry of the defects liability period in March 2008. Both parties could, if they had wished, have advanced more ambitious submissions about retention. If any of the arguments outlined at the hearing on day 42 had been raised during the trial, a number of factual issues would have required investigation (as demonstrated by Mr Williamson on day 42). Mr Martin (whose statement was served in September 2008) would have been called and cross-examined. It is now far too late for the complicated factual history of the retention monies and the retention bond to be investigated.

1683. In my judgment both parties’ opening submissions in relation to retention contain admissions within the meaning of CPR Part 14. The effect of those admissions is set out above. Neither party can withdraw those admissions without the permission of the court. In view of the fact that the evidence was called and the trial was concluded some three months before the parties adopted their present positions, each party would be gravely prejudiced if the other were allowed to resile from previous admissions. The Court of Appeal in *Sowerby v Charlton* [2005] EWCA Civ 1610 gave guidance on how the court should exercise its discretion when dealing with an application to withdraw admissions: see in particular paragraphs 35 to 36. In my judgment, the present case is about as strong a case as one can

imagine, in which neither party should be allowed to withdraw previous admissions concerning retention. The enthusiasm of both parties to raise new points and to prolong this litigation must be curbed.

1684. Let me now draw the threads together. Each party should be held to what was the common position throughout the trial. Multiplex were entitled to withhold 5% retention monies (less the value of the bond or its equivalent) up to 9th March 2007. Multiplex were entitled to withhold 2.5% retention monies (less the value of the bond or its equivalent) up to 3rd March 2008. Multiplex have no entitlement to withhold any retention monies after 3rd March 2008.

1685. In those circumstances, I shall not embark upon an analysis of the detailed arguments concerning retention, which counsel sought to advance on day 42. Suffice it to say that if the retention issues had been fully ventilated during trial, I regard it as likely that I should have come to a decision very close to that set out in the previous paragraph.

(ii) Interest on sums awarded in chapter 26

1686. Multiplex contend that no interest should be awarded on the sums awarded in chapter 26. The temporary steel in question was intended for re-use on the Antwerp project and CB have not yet been awarded any subcontract in respect of the Antwerp Ring Road: see paragraph 35 of Multiplex's skeleton argument for day 42. Warming to his theme in oral submissions, Mr Stewart submits that CB gained a benefit from Multiplex's conduct in that they avoided storage costs. CB on the other hand contend that they are entitled to interest on the sums awarded in chapter 26 for the period from 1st January 2006 to date.

1687. The first question to consider in relation to this issue is when Multiplex ought to have returned the items in question to CB. Under clause 9.3 of the Supplemental Agreement (set out in chapter 26 above) Multiplex were entitled to retain the items until they had completed "the unperformed reimbursable cost items". In other words, Multiplex were entitled to retain the items until steel erection was complete. It appears from the photographic evidence that that time arrived on or about 15th May 2006. (The last photograph which Multiplex can produce showing toblerones in use is dated 4th May 2006.) I accept Mr Williamson's submission that no formal demand was required on the part of CB. Multiplex automatically came under an obligation to return the items in question on or about 15th May 2006.

1688. For the reasons set out in chapter 26 above, I reject Mr Stewart's submission that the course of events in relation to the Antwerp project somehow disentitles CB to interest for the non-return of the items. My assessment of the value of the items in chapter 26 is not related to the Antwerp project.

1689. I therefore hold that CB are, in principle, entitled to recover interest on the sums awarded in chapter 26 as from 15th May 2006.

1690. The next issue concerns the rate of interest. Mr Williamson contends that the proper rate is 2.5% over base rate. Mr Stewart contends for a lower rate, namely 1% over base rate. With all due respect to the arguments of leading counsel, and the authorities which they cite, I believe that the correct approach to this problem is a simple one. The sums which CB are obliged to repay to Multiplex (as a consequence of this court having awarded less than the

adjudicator) have at all times exceeded the sums awarded to CB under chapter 26. It does not make sense for the parties simultaneously to be recovering interest against each other for non-payment of monies due. Accordingly, there should be a set off. As from 15th May 2006 CB's indebtedness to Multiplex was reduced by £740,103 (the amount awarded in chapter 26). In calculating the interest to which Multiplex are entitled, this reduction in CB's indebtedness as from 15th May 2006 should be taken into account.

(iii) The bottom line

1691. On the basis of the above decisions in respect of retention monies and interest, the parties have agreed that the financial consequences of the court's decisions in respect of Scott schedule 2 are as follows. Because the adjudicator's valuation of CB's work was higher than this court's valuation, CB must repay to Multiplex part of the monies which Multiplex have previously paid to CB pursuant to adjudication awards. CB must repay to Multiplex the principal sum of £4,020,061.82, together with interest on that sum of £1,886,731.63. CB must repay to Multiplex the sum of £44,758.33, which was interest previously paid to CB pursuant to the adjudicator's order, together with interest on that interest amounting to £12,879.06.

1692. As set out in Part 2 above, CB must pay damages and interest in respect of Scott schedule 1 amounting to £189,811.96. As set out in Part 4 above, CB must pay damages of £4 in respect of Scott schedule 4.

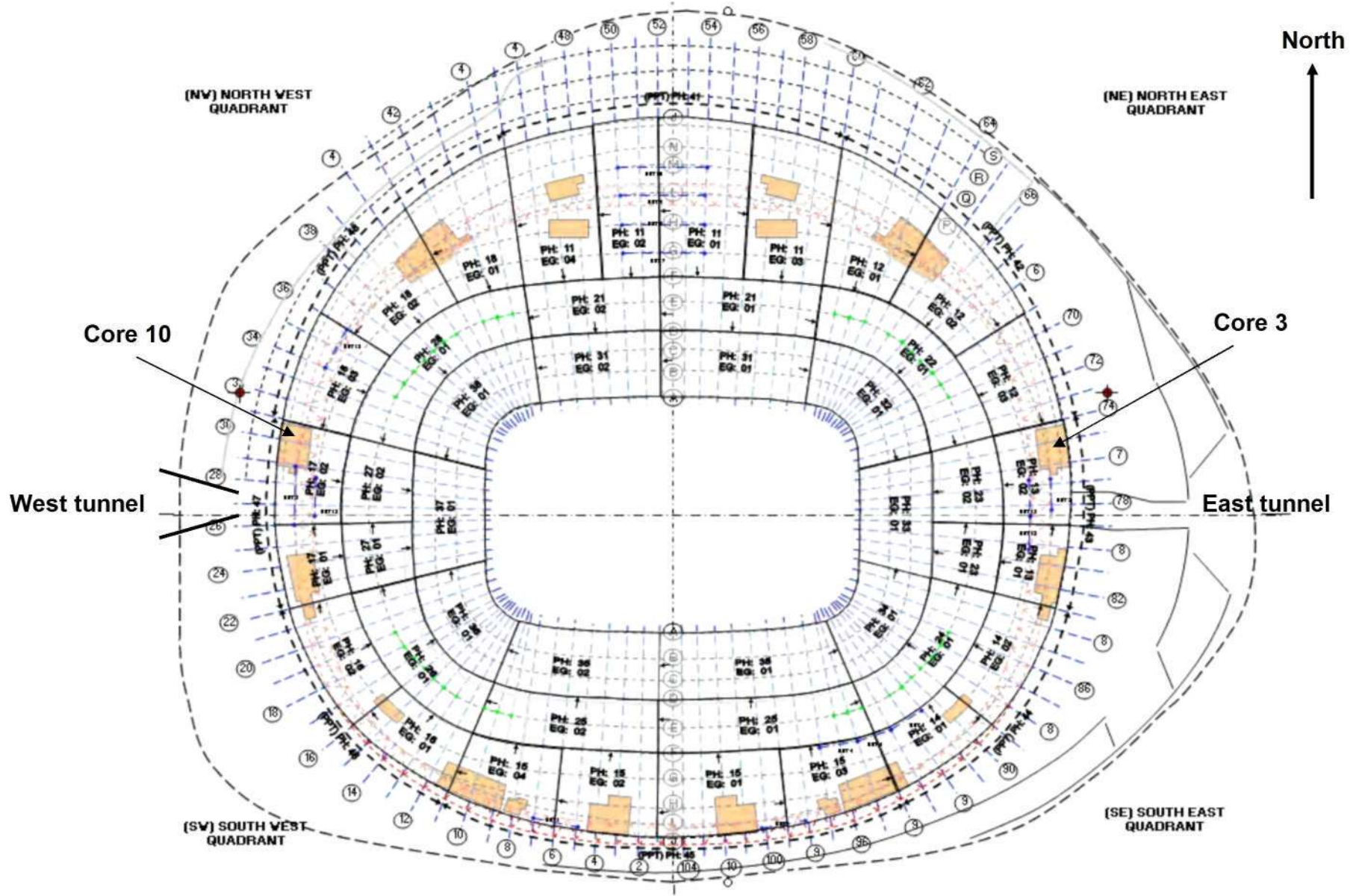
1693. The overall result, therefore, is that CB must pay the total sum of £6,154,246.79 to Multiplex in respect of (a) overpayments previously made by Multiplex, (b) damages for breach of contract and (c) interest. The court will enter judgment accordingly.

Appendix 1

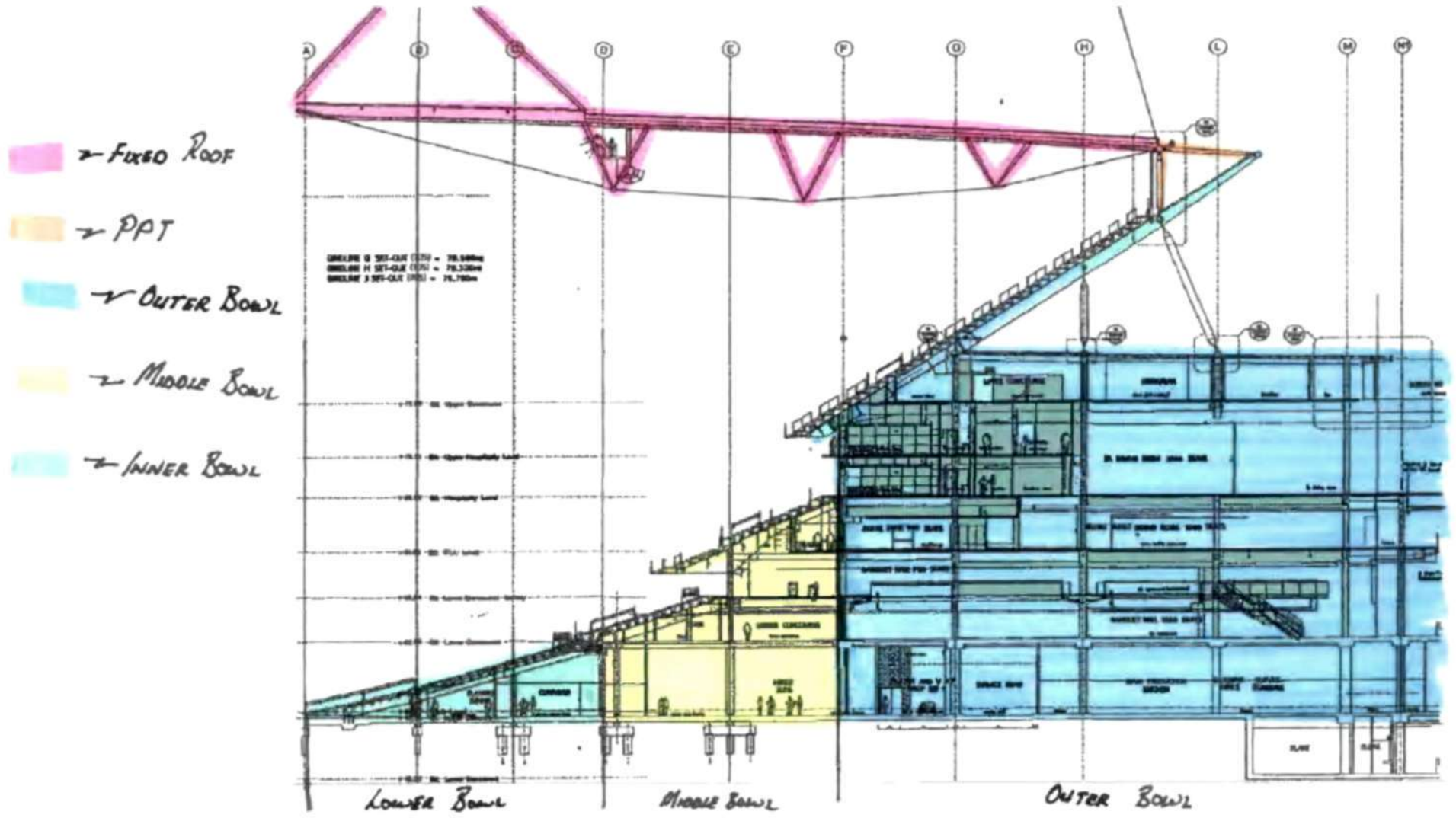
1D Item	SW No.	Category	% Success	1D Claim	FM Value	1B/JT No.	1B Claim	FM Value
Hol 1	11	Cat 4	100	3293.6	2213.5	/		
Hol 6	33	Cat 10	100	59	48.56	7	698.55	642.66
Hol 8	35	Cat 10	100	160	131.68	9, 10	1032.03	949.47
Hol 17	65	Cat 10	100	249	204.93	19, 20	1075.25	989.23
Hol 37	103	Cat 3	100	2077	1954.57	52	476.95	438.79
Hol 52	158	Cat 1	100	1758.75	875.86	83, 84, 85	1184.32	1089.56
Hol 53	159	Cat 1	100	1248.39	621.7	86, 87, 88, 89, 90	1132.19	1041.6
Hol 54	160	Cat 1	100	1470.62	1075.02		1182.73	1088.12
Hol 55	161	Cat 1	100	425.52	311.06			
Hol 61	167	Cat 1	50	1487.08	535.35			
Hol 62	168	Cat 1	50	1362.16	639.53			
Hol 63	169	Cat1	50	2189.49	788.22			
Hol 64	170	Cat 1	50	2441.19	878.82			
Hol 65	171	Cat 1	50	3056.87	1100.47			
Hol 69	175	Cat 1	50	3624.74	1304.9			
Hol 73	179	Cat 1	100	581.11	424.8	104,105 106, 107	844.67	777.1
Hol 74	180	Cat 1	100	394.38	288.3		800.73	736.68
Hol 78	184	Cat 1	100	536.84	392.44			
Hol 81	187	Cat 1	50	1006.66	250.66			
Hol 82	188	Cat 1	50	754.2	187.8			
Hol 84	190	Cat 1	50	1002.37	249.59			
Hol 85	191	Cat 1	100	2299.82	1145.3			
Hol 86	192	Cat 1	100	832.98	778.42			
Hol 87	193	Cat 1	100	1210.87	1136.2	108, 109 110, 111	1168.07	1074.62
Hol 88	194	Cat 1	100	902.53	847.48	112 - 120 -	1170.07	1076.46
Hol 92	198	Cat 1	50	2516.52	626.61	122	1297.23	596.72
Hol 93	199	Cat 1	50	2483.43	618.37	123-124 127, 128	1414.08	650.47
Hol 103	209	Cat 1	50	544.47	135.57		1260	576.6
Hol 106	212	Cat 1	100	788.14	576.12			
Hol 107	213	Cat 1	100	1027	750.74	129-131	1317.31	1211.92
Hol 112	218	Cat 1	100	917.75	670.88			
Hol 115	221	Cat 1	50	600.86	219.61			
Hol 117	223	Cat 1	50	1719.37	618.97			
Hol 120	226	Cat 1	50	3214.61	1157.26			
Hol 121	227	Cat 1	33	4094.14	1200			
Hol 122	228	Cat 1	50	2827.3	704			
Hol 123	229	Cat 1	50	2750.28	684.82			
Hol 124	230	Cat 1	50	507.78	126.44			
Hol 125	231	Cat 1	100	600.86	439.22			
Hol 126	232	Cat 1	50	1393.66	509.38			
Hol 131	237	Cat 1	100	394.99	288.74			
Hol 132	238	Cat 1	50	1209.68	301.21	136-137 138, 139	1179.68	542.65
Hol 133	239	Cat 1	100	934.53	465.4		1169.43	1075.88

Hol 151	267	Cat 1	50	985.28	462.44	169, 170	1182.63	544
Hol 158	279	Cat 16	100	643.89	569.2	180, 181	788.17	725.12
Hol 165	366	Cat 11	100	543	380.1	191, 192	788.17	725.12
Hol 169	384	Cat 16	100	855.96	756.67	198, 199	790.17	726.96
Hol 184	429	Cat 16	100	489.06	432.33			
Hol 198	510	Cat 9	100	345.65	336.31	260, 261	1293.08	1189.63
Hol 199	511	Cat 9	100	691.3	672.93	262	0	
Hol 201	514	Cat 8	100	2494	2463.82			
Hol 250	729	Cat 11	100	10796	7557.2	369	744.6	685.03
Total					42,109.50			19154.39

Appendix 2



Appendix 2



Appendix 2

