Edinburgh Tram Inquiry Office Use Only
Witness Name: Jason Chandler
Dated:

THE EDINBURGH TRAM INQUIRY

Witness Statement of Jason Chandler

My full name is Jason Roy Chandler. My contact details are known to the Inquiry.

My current occupation is Director of Engineering and Design at Balfour Beatty Power Transmission and Distribution. My role in the tram project was Project Manager for delivery of the design for the tram civil infrastructure for Parsons Brinckerhoff.

Statement:

Introduction

1. I will supply my CV for the Inquiry; however, I can also give details of my role and responsibilities while working on the tram enquiry. I started on the Tram Project in September 2006, and I had overall responsibility for the delivery of the design as Project Manager. I managed a varying team in terms of size over the duration of the project, with about 150 people at the height of the project. I was the nominated person to talk to the client. Basically I was managing the SDS design on a day-to-day basis.

2. I had worked for Parsons Brinckerhoff (PB) for approximately eight years. Prior to that, I had been the Design Manager for Mersey Tram. I had worked on numerous multi-disciplinary complex projects in the rail environment doing a very similar role, managing teams of people in various disciplines, which I did for a considerable period of time. I have been a light rail person working on numerous projects including Construction Manager for the Wimbledon

branch of the Croydon Tram Link, design support for the Birmingham Metro, the Merseytram design and numerous light rail schemes, as well as metro schemes. I also worked on the London Underground in both design and delivery phases. I have been responsible for providing evidence to support the introduction of the Wednesbury to Brierley Hill extension of the Midland Metro, I provided the expert witness for engineering for that initiative, which was to secure the powers for the extension of the scheme.

3. I left the Edinburgh Tram Project to work as the Design Delivery Manager for Electricity Alliance East for Balfour Beatty. I was responsible for the delivery of design this time for High Voltage Power for Balfour Beatty for Electricity Alliance East and after doing that role for about 12 months, I became the Engineering Director for Power Transmission and Distribution for Balfour Beatty which is the role I hold currently.

4. When I started (2006) on the Edinburgh Tram project, my predecessor was Paul McCauley. My experience in light rail and light rail delivery in the UK, my knowledge of Parsons Brinckerhoff and the contacts I had within Parsons Brinckerhoff made me better placed to deliver the complex scheme than Paul who was new to PB in the UK, making it more difficult for him to draw upon PB's extensive capability. PB management took the decision to put me as the Project Manager, which I believe was welcomed by Transport Initiatives Edinburgh (TIE).

5. Initially the PB Project Director was David Hutchinson, but he was subsequently replaced as PD by Steve Reynolds as it was considered that the scheme commanded somebody of PB UK Board level experience for the scheme. I was hands on in terms of the delivery. Steve was engaging with senior levels within TIE, TEL, Transdev and City of Edinburgh Council. That role was deemed necessary by PB and Steve became a full-time representative of PB on the scheme.

6. Alan Dolan and Kim Dorrington were also senior management level reporting to myself. We were a very effective team, and engaged very well at the relative levels. I had responsibility for PB's design and all of the disciplines across that. We had a very large team operating over a number of offices. Alan Dolan ran design management from the Edinburgh office. At the start of the scheme Kim Dorrington was in charge of the Requirements Definition for the design. We had clearly defined roles for the team. We split the route into three sections and I appointed a dedicated Design Manager for each of these. After the Requirements Definition Stage Kim Dorrington co-ordinated the efforts of the Design Managers.

7. Alan Dolan was my assistant and we managed the delivery of the design together, with me taking ultimate responsibility. Kim reported into us, as can be seen from the organisational structure on the chart (referring to System Design Services (SDS) Organisation Chart **CEC01503444**). It was a large, complex project and the four of us were the senior management team. I was in charge of PB's responsibilities for design delivery reporting to the PB Project Director. I implemented a very clear structure for the entire SDS design team.

8. The SDS Organisational Chart (**CEC01503444**) reflects the structure that I have used several times previously at PB and since, and it works very well for complex design management. It did change, we had numerous versions of the chart as the project progressed and whilst the one I am referring to is October 2007, there were numerous changes after that for several years.

9. The PB staff, TIE and the sub-contractors had a complex working relationship. At the start of the project, we were working directly for TIE. Later SDS were novated and we worked directly for BSC, Bilfinger Berger, Siemens and CAF. This represented a fundamental shift in the relationship.

10. There was considerable experience within the PB team, with numerous specialists in tram and light rail. A lot of the PB people had worked on tram

schemes previously and knew each other. We could draw upon whatever tram knowledge we needed should we have any gaps in the knowledge of the team working on the scheme. Across the spectrum of structural design, earthworks design, trackform, power systems, communications, we had expert people. We had done a lot of work historically on tram design delivery. We also had expert knowledge on parts of the tram that we were not responsible for, such as the rolling stock.

11. We could draw upon knowledge from other parts of PB quite easily. That is worldwide; it was not just the UK. We had access to PB colleagues in the United States and we could reach into the organisation if there were particular issues that we needed support to resolve.

12. Schedule Two of the SDS Contract **(CEC00839054)** listed key personnel for the project. These were as follows:
(a) David Calver. Original Project Manager who was replaced by Paul McCauley. I then replaced Mr McCauley.
(b) David Simmons. Deputy Project Manager, managed the design delivery for Halcrow, one of our sub consultants. He worked on the project for the entirety of the scheme.
(c) Andy Dixon. Chief Engineer and has a broad experience of design and delivery on light rail. He worked on the project for much of the SDS involvement in the scheme.
(d) Chris Mason. Assistant Engineering Manager with a considerable wealth of light rail experience. He moved on once the requirements definition phase was resolved and the Preliminary Design phase was progressing well.
(e) Rick Finch. Approvals Manager and a Halcrow person, he managed the process of securing the planning approvals, consents, and third party stakeholder interests. He was in the team for 3 to 4 years then left Halcrow and was replaced by Laurie Mentiplay.
(f) Colin MacDonald. Construction Manager from the perspective of the design; making sure that what was delivered through design was constructible. Prior to our novation, SDS had certain responsibilities regarding

design constructability. Colin was on the project for a couple of years and then left.

(g) Bob Clark. Stakeholder Manager and worked particularly with TIE but also with all the other third party stakeholders. He managed third party issues and consents that needed to be discharged along with the Approvals Manager. Bob was there for the entirety of the scheme.

(h) Billy Johnson. Safety Quality Systems Assurance Manager. He made sure the design met the obligations of safety but also ensured the design was fit for purpose in terms of quality and requirement. Billy was replaced by Martin Conroy undertaking the same roles and responsibilities.

13. Replacements happened over the duration of the SDS contract. Some people moved on to completely different careers, new employers and also where a skill set had changed and where a different skill set was required, those changes were also made. This was true for Halcrow's and PB. There were no key roles where we did not have a suitably experienced member of staff because somebody had left the scheme.

14. Looking at SDS Organisation Chart again (**CEC01503444**) SDS had, at the peak, 157 people either working full-time or part-time on the scheme. There was a core team that was located in Edinburgh. Beyond the Requirements Definition Stage either sharing office accommodation with TIE when reporting to TIE, or subsequently when we were novated into the Bilfinger Berger/Siemens organisation in their office. Our core team, varied, but pivoted around 25 people based in those offices, supported by PB and Halcrow staff based in several locations around the UK. We had numerous offices in Glasgow, Inverness, Godalming, Croydon, Leeds, Manchester, London, and Newcastle. This is fairly typical. What it enabled us to do was draw upon the best resource we could from around the UK. The core team was based in Edinburgh until the end of the SDS involvement on the project.

15. We did not actually change the style of the structure of the team at any point of the scheme. People joined and left and as the scheme neared completion,

the number of people reduced. People were appointed to take responsibility for elements of delivery of the scheme according to their skill sets. It route was split into 3 main sections, with a section manager for each of those sections to co-ordinate the design. The design was also split by discipline. There was a roads team, track, structures, power supplies, telecoms, architectural and each had nominated leads for those disciplines. It was a really well functioning structure and it meant everybody was clear as to who they reported to and what their core responsibilities were in that delivery.

16. In relation to staff working hours the core team worked full-time. The majority of the team leaders who are referenced in the organisation chart were full-time and it then depended on individual roles as to whether employees in the wider team were full-time or not. The track design team were full-time, whereas for the environmental team, the team leader was full-time, but some of the people in the team or particular experts would only be brought in to give support where it was required.

17. We managed the geographical spread of the team. To bring such a large team together into one office located in Edinburgh would obviously be extremely expensive, especially as not all of them were working full-time on the scheme. Because the IT systems for PB and Halcrow, were particularly good, it was not prohibitive for people to be based remotely, the team had a very close working relationship. The fact that PB had a strong core team made it possible. The core was instrumental in the success of interfacing the communications between the various different designers within the team. The fact others were based in numerous offices was not really a problem. SDS had enough people with expert detailed knowledge based in the core team to manage the design and make decisions. The core team travelled where necessary. If a team meeting was required we did travel. Within SDS, there was quite an open relationship. If a structured meeting with Halcrow was required, it would be arranged, sometimes in their offices and sometimes at PB's. Travel was kept down to a reasonable level because that in itself is quite

costly and disruptive. This system worked well and there was a seamless relationship between the various different offices.

18. It would have been ideal to have the team all based in the same office, the PB team, the Halcrow team, the architects, TIE and the contractor all sitting in one office, communications would have been simpler. But the way we managed the SDS interaction and the way that the teams managed themselves worked very well.

19. The geographical spread is normal for PB on such a project. At the time PB had worked on every tram system in the UK and I had personally worked on most of them, as had a lot of the team. It was not the first time that we had worked in this way and generally it worked very well. The work that we were doing on Edinburgh Tram was typical of the role that we had undertaken on the other light rail schemes, providing detailed design and consultancy services. Many of the team transferred to Edinburgh from Merseytram where PB was also responsible for developing the design of very similar tram systems. We had also delivered similar designs for Midland Metro, Manchester Metro, Croydon Tramlink and many of the team had worked on these schemes previously.

20. Some of the design services were subcontracted work, Halcrow were our main sub-consultant. Halcrow were responsible for the structural design, the earthworks design, the roads design and the approvals and consents. Halcrow were based primarily in Edinburgh.

21. Ian White Associates provided architectural and planning support services to SDS. They had a detailed knowledge of the requirements and the particular architectural issues around Edinburgh. Ian White Associates were based in Edinburgh.

22. Corderoy were our costs experts. Before the construction contractor was appointed, Corderoy supplied construction cost estimates. The designers

delivered the design and Corderoy provided the cost estimate for the construction of that design. They were experts in tram scheme costs. Corderoy drew upon staff from offices from various parts of the country to deliver Edinburgh tram cost estimates.

23. Rupert Taylor was the noise and vibration expert. There were particular requirements to ensure that the introduction of the tram system did not have a detrimental impact on the ambient noise and vibration experienced. For example, the Playhouse Theatre; a tram moving past it was not to be heard and/or significant vibration transmitted into the structure. Rupert was based in Manchester, he was not full time and asked to provide advice and input to the design as required.

24. I am not too sure whether ITC were PB's subcontractors, or what they did.

25. Regarding the initial tram Lines. The decision was made by TIE that the Roseburn Section to the Waterfront would not be built and that the line from Edinburgh Airport to Leith would be constructed and operated stand-alone, at least initially, but SDS were instructed to complete the design of the Roseburn corridor to the Waterfront. The reason given by TIE was that should funding ever become available to build it; there was design ready to be built. SDS developed the design to detailed level for the Roseburn corridor, which was the disused or abandoned corridor down to Crewe Toll on the Waterfront. There were numerous approvals and consents requirements.

26. With regard to pre-novation design works, I would refer the Inquiry to the contract terms regarding the scope of design responsibility. SDS were required to produce a design that did not specifically reference specific manufacturer's components as these were being selected and procured by the contractor. In the case of the tram-stop shelter, SDS delivered a design for the tram-stops that showed generic tram-stop shelters that met the requirements of CEC, it had to be of a glass form and be of a particular size etc. But SDS did not select the specific shelter manufacturer. In the case of

the track form, SDS designed a generic track type that showed the broad shape of what it would look like and the form that it needed to be, but the actual component selection for that track form was the contractor's responsibility.

27. In relation to post-novation design, the contractor was to appoint and confirm the components that were being installed. They then completed the design. The track form they were due to complete, for example.

28. There were various conditions around the approval. When SDS delivered the design up to the point of novation, the council approved the design with certain conditions attached which were to be resolved once the particular component selection had been completed. To overcome these conditions the contractor had to confirm what those particular components were. SDS developed a detailed design for the entire infrastructure except the tram, the communications system and the power supply system, as these were dependent upon the particular component selection by the contractors.

29. The INFRACO consortium completed some of the track form design, so they added the detailed components to the track form design. Their systems design, the likes of the telecoms, Siemens completed based upon their component selection. They took certain key elements of the design that were very bespoke to their offer and completed those, SDS completed the more generic civil design. We supported BSC post-novation with the completion of the design, and supported them to discharge outstanding approvals conditions.

30. In respect of the EARL project, that is the Edinburgh Airport Rail Link, PB were not involved in the design, certainly not in this contract. I cannot remember if Halcrow were in any way involved, but if they were it never impacted on the tram design.

31. When the EARL project was cancelled (summer 2007) that had a significant impact on the tram scheme. There was a review of how an interchange station

with heavy rail could be achieved. This resulted in a significant change in that particular section of the route and the way that the heavy rail would interface with the light rail to provide a link to the airport. There was a considerable impact on the scheme because of that change.

32. That impact was the introduction of a new tram-stop. The heavy rail link was then managed by Network Rail into that interchange station which included a new tram-stop. The interchange tram-stop was not part of the original requirements for the scheme. It was a very complex tram-stop. Any interface with heavy rail generally is quite complex. It was over a couple of floors with road access from the very busy A8. Even the site itself was particularly constrained with existing services. There were very large live water mains and other services present that that we had to overcome with the new design.

The SDS Contract

33. With regards to the delay in the signing of the SDS Contract I joined the project in March 2006 and I had not been involved at all until that point. I do not know why there was a delay in the signing.

34. I do know that when I joined, the delay resulted in a reduction in time available for the Requirements Definition Phase, as there had been quite a rush to get the submission done for Christmas 2005.

35. I was familiar with the contract terms and made reference to the contract terms where appropriate.

36. I was not involved in the tender or negotiation process of the SDS Contract; I was not involved with the scheme at that point.

37. Prior to PB's appointment, a route for the tram had been identified, along with the locations, or proposed locations, of the tram-stops and likely structures that would be in place. Some of the optioneering had been done in order to

secure the powers for the scheme. A lot of work had been done to secure the powers and to negotiate the third party approvals for the scheme. Some of the optioneering or a lot of the optioneering had been done, and promises had been made about what the form of the tram network would be. Typical of this was Edinburgh Gateway Bridge: it had already been determined that it would be an elevated structure, an open structure, crossing over the heavy rail, with concrete pillars. That was predetermined before we started the contract and we had to develop the design in accordance with these promises. The route had been defined; the locations of the tram-stops, the general look of the infrastructure in some instances had been predetermined. SDS had a set of requirements that had been derived through the parliamentary process to secure the powers. Scott Wilson was a leading party for the design within that.

38. Prior to SDS involvement there were certain sections of the route that had been given more attention than others. This was due to the proximity of the route to resident's houses or historic buildings, complex road junctions etc. The residents at Baird Drive took a keen interest in the construction of the tram system. At that section a lot of optioneering was done in terms of elevation in respect of those properties. For other sections, where the tram was not in close proximity to residential properties or not impacting on stakeholders, less detailed development of the scheme had been done prior to SDS involvement. For the majority of the route quite a lot of detailed work had already been done, mainly because the route takes the tram through a lot of prestigious parts of Edinburgh city centre.

39. Changes were made and the design did evolve during the initial Parliamentary stage but I really cannot remember specific examples.

Contract: Scope of Services - Design

40. The SDS Contract (**CEC00839054)** refers to completion of the design by INFRACO (e.g., Recital E and clause 1.1). INFRACO were to complete the design associated with their component selection, for example, the track form.

INFRACO decided what the track form was going to be, there are numerous different types of track form. BSC made the final component selection and procured the materials and they completed the design associated with those elements. We supported them by guiding them through the approvals and consents that needed to be discharged that were associated with these components.

41. Through the negotiation stage of the contract with INFRACO it became obvious that our support, up to the point of novation, would be key to them securing the discharge of outstanding approvals conditions, so it was not quite as simple as BSC introducing their components into our detailed design. There were numerous third party approvals that required final discharge. SDS played an important role in guiding them through the process of discharging those outstanding conditions.

42. The services SDS were to provide under the contract were the civils and infrastructure design associated with the tram system. We did not design the trams, but we had responsibilities regarding the design of civils and infrastructure. For the track a generic solution was prepared. SDS also designed the earthworks and the structures. The power supplies, telecoms systems were developed up to a point of a system design but not the detailed design, because the detailed design required completion and component selection and this was specific to the contractor's proposal and their chosen suppliers. For the tram overhead line poles, SDS produced a design for the OLE system including the look of the poles and designed the positions of all of the tram poles along the streets, but did not select the final pole because that was the contractor's decision. SDS produced generic designs that could then be populated with specific components.

43. SDS had responsibilities for the design up to component delivery for the tram depot; this included the safety aspects of the tram: consultation with the competent person in respect of HMRI was our responsibility also.

44. The main design evolved during the various different phases of the scheme. At the early part of SDS involvement, there was the Requirements Definition Phase (RDP) which outlined what the design was going to look like, what form it would take and what the performance was going to be for the various different elements of the scheme.

45. Then at Preliminary Design Phase (PDP), from January 2006 to June 2006, we expanded the design that we inherited through the parliamentary process and took that into a position where the preliminary design was complete, so there was more detail with the scheme. Then, from the PDP stage, post-June 2006, we developed the Detailed Design (DDP), refining the design so that it would be something that could be constructed once the preferred contractor had been identified. At the point at which we completed our detailed design, the intention was that the contractor could then just apply their components, their final elements of the design, discharge any outstanding conditions associated with those components, and then move into the construction phase.

46. The Employer's Requirements were really the benchmark for the scheme. All of the performance requirements and all of the functionality of the scheme were detailed within the Employer's Requirements. In terms of the verification and validation, the ERs provided the benchmark reference for through the development of the design and into the operational stages of the scheme.

47. An important feature of the SDS programme assumptions was that although the scheme was split into phases, there was not to be a pause between the phases. The phases progressed from one into the next without any delay. Because of the timescales for the project, we could not afford a delay between phases.

48. The Functional Requirements document (produced within the RDP) detailed what the performance of the tram and the system were to be. That was used as the basis for the development of the design from then onwards.

49. The route was divided into parts or sub-sections which is a very common way of working to ensure that all of the design is progressed not just focussing on the more challenging/interesting sections. If the design was developed sequentially from one end of the scheme to the other, any blocker or a delay in any one of those sections could delay the design for the rest of the scheme. There were numerous blockers along the route, so SDS could not work from one end to the other.

50. Referring directly to paragraph 2.4, schedule 1 of the SDS Contract (**CEC00839054)** in relation to the Preliminary Design requirements. SDS has responsibilities regarding design development for each of the sectors and subsectors. During the RDP the functionality was developed so that SDS could develop the infrastructure through Preliminary Design and onto the detailed design. SDS developed the tram-stops, the track alignment, the technologies around the telecoms, the power supplies, and ensures that there was sufficient room within the corridor to fit the infrastructure in, and develop it to a point where the system was going to be safe and be confident that a detailed design could be developed with no showstoppers. Ensure that the tram system would fit into the space secured through the Parliamentary process. Check for constraints that we simply could not overcome through the development of the detailed design. SDS had to be able to demonstrate to CEC and TIE that it was possible within the land take that had been secured, that it was constructible, that there were not going to be any real problems in constructing the scheme, and that it would be fundamentally safe in its operation.

51. The difference between the preliminary design and the detailed design was the extent of the development of the detail for the different disciplines. For some of the disciplines the level of design was fairly simple. In the case of the systems and comms design the number of ducts required along the route was determined and the duct sizes, checks were then made to ensure that there was sufficient space to fit the ducts along the route. . For disciplines like the track alignment and roads design, it was very important at the preliminary

design stage to undertake sufficient design to prove that the tram tracks could fit into the approximate existing profiles of the roads and understand the impact of the associated road works.

52. During the detailed design phase, SDS developed sufficient detail for the systems and communications power design to provide a reference design that the contractor then could tweak and add their particular components to, to develop that final design. For the track and roads design, SDS developed the vertical and horizontal geometry for the entire scheme, all of the road markings, kerb positions, and a very detailed design.

53. The detailed design would be sufficient for construction but for the inclusion of the components selected and procured by the contractor. If components were selected that were outside of the parameters of the SDS detailed design, this may require further redesign and revisits to approvals and consents. It was very important that the Employers Requirements document was robust, so it was clear to the contractor what was required and what assumptions had been made in the development of the detailed design, the preliminary design and the requirements definition documents. The contractor should be able to just select their particular components, ensure that they satisfied the Employers Requirements and outstanding planning and approvals conditions from CEC and third party stakeholders, and then introduce them into the design.

54. In relation to *"issued for construction"* drawings, the only proviso, from an SDS perspective, is that the issued for construction drawings were subject to that final component selection. We could issue for construction drawings that were ready to build. The only issues then were any component selections that the contractor made. Where SDS issued For Construction version drawings prior to novation, there was still an element of design that needed to be completed by the contractor in many cases to complete those drawings and those packages.

55. Referring to paragraph 2.6.2.3 of schedule 1 of the SDS Contract (**CEC00839054)**, and the term *"'produce a costed programme of the design and its construction"* SDS produced a design programme monthly from the start of the scheme, and that really was the SDS reference for progress throughout the development of the scheme.

56. SDS were also required to produce a generic construction programme. Up to the point of novation, SDS supported TIE in ensuring that the scheme was constructible within the timescales. SDS produced a generic construction programme to support the completion of the scheme. From the point of novation, that was provided by the contractor.

Contract - Design Review

57. Referring to paragraph 2.8 of schedule 1 and schedule 9 of the SDS Contract I can explain the design review process. In practice, we submitted our preliminary design to TIE and that was reviewed. They had Technical Support Services (TSS), which was largely Scott Wilson, in support of them as their tram experts, reviewing the design. Then, in the detailed design phase, we were co-located with TIE, so we had regular design reviews, which were part of the emerging design. TIE and TSS were involved the design as SDS developed it. The review process was based upon formal packages submitted to TIE. For Preliminary Design they reviewed them and made comments. During the detailed design stage SDS were co-located at tie's office, so there were formal design review meetings regularly, weekly, with constant dialogue around what was going on in between these formal reviews, design progress and issues, and constant reviews around the detail of the design.

58. For TIE and their advisers to review the preliminary design within 20 days would be ambitious if they had not been involved as it was produced. There was, however, constant dialogue around the development of that preliminary design, so it would not be unrealistic to expect the review to take place in those timescales.

59. There was also a lot of pressure from TIE to move forwards with the detailed design. SDS had already agreed during the preliminary design phase that we would not wait for the 20 days for the TIE comments on the Preliminary Design. SDS would proceed into the detailed design phase and then any comments that were issued would be addressed during detailed design development. The project did not have the time to wait even for the 20 days to proceed with the detailed design.

60. The requirements for the preliminary design were laid out in the contract, as we detailed in previous questions. TIE's part of the review was to check that we had achieved what the intent of the preliminary design phase was, which was to deliver a design that demonstrated that the scheme was constructible, and met the functional requirements to demonstrate there were no 'showstoppers' on the scheme. Where there were issues to be resolved we highlighted them to be taken forward for resolution during the detailed design phase.

61. It was a difficult task to complete the review of the Preliminary Design within 20 days. It would take a number of people with the correct relevant experience, but it should have been possible.

62. The preliminary design (and detailed design) was reviewed by the TSS, Scott Wilson. TSS had an on-going involvement, because of their involvement before SDS were appointed; they provided the continuity between the parliamentary process and the development of the design, all of the way through to detailed design. They had a lot of background on the scheme and historic development and what the issues were around the parliamentary process to secure the powers, so they provided that vital link back to the previous stages of the project design development.

63. Referring to paragraphs 3 and 7 of schedule 9 of the SDS Contract (**CEC00839054)**, and TIE's entitlement to reject a design, I think this is down to their use of the contract. The general approach adopted by TIE was that if a

third party stakeholder was not satisfied with the design or if TIE themselves were not happy with an element of the design, through the contract they expected SDS to change the design. They did not accept any of that to be a change; no matter how many times the design was repeated. TIE considered that SDS were responsible for developing options until was all stakeholders were satisfied with the scheme design.

64. The impact of this approach was the delay to the scheme, and that was realised when we got to the point of novation, because we should have completed the design by this point. Because of the constant iteration of design development, it meant that the design had not been completed by the time that SDS were novated into the contractor, and that was important in the subsequent issues between the contractor and TIE.

65. TIE's view was that SDS would iterate the design until all approvals were secured and they seemed consider that was appropriate. SDS received little support in the resolution of stakeholder issues. It appeared that TIE were not considering the impact of failure to resolve issues, they were 'stored up' creating a significant problem that was realised later in the scheme. SDS tried to help TIE by constantly communicating these issues and warning of the impact on design progress. This served only to encourage TIE to increase the pressure on SDS to undertake a wider scope. This was one of the issues that Steve Reynolds focused on the lack of decision making and freezing the design meant that the scheme stored up problems for later. The result was a snowball of issues. It was impossible to progress the design from one end of the route to the other, because there were numerous issues delaying progress at many locations along the route, largely driven by a lack of positive decision-making to allow the scheme to progress.

Contract – Procurement Support

66. The phrase *"all technical documentation"* referred to in paragraph 3.1.1 of schedule 1 of the SDS Contract (**CEC00839054)** is the documentation that would normally be required by a contractor to be able to price the works. What

the infrastructure will be and the form of the structures. Sufficient detail for them to be able to develop a construction price, along with a robust risk and opportunities register for that construction. In their component selection, they would want to understand their risks and any opportunities. In my opinion the SDS output was an appropriately developed set of detailed documents for them to develop their robust price.

67. TIE's intention was that SDS would have completed the design prior to appointment of the contractor. The aim was that it could be developed in sufficient detail so that it could be priced by the contractor up to that point of component selection. The contractor was free to select their own tram shelter and negotiate with suppliers. SDS had to present a tram shelter that you could choose from one of a number of suppliers then go and buy a tram shelter that was in the form of that generic shelter. SDS could not name a particular manufacturer or use their designs prior to component selection by the contractors.

68. It was the first time that I personally have been part of the novation process. The development of the design was on-going at the same time as the contractor procurement process, which caused issues. This was exacerbated because the design was not as progressed as far towards completion due to the iterations of design and lack of progress with key decisions. The design was still being finalised very late in the procurement of the contractor, so there were more areas of uncertainty for them to price than they (the contractor) would have otherwise liked or that TIE would have wanted.

Contract - Utilities

69. Referring to paragraph 3.2 of schedule 1 of the SDS Contract (**CEC00839054**) which obliged PB to *"provide assistance to TIE with the management of an advanced utilities diversion programme"*, my understanding was that it really was to support TIE in their management of those utilities diversions. As it says in 3.2, this included supporting them with what survey was required, what

services needed to be moved along the corridor, which included providing them with a swept path of the tram infrastructure so that they could determine what utilities needed to be moved, agreeing the extent of the move.

70. An example of the support provided is the identification of the locations where the utilities were required to be moved to allow the tram infrastructure to be built and operated. It was not just about the footprint of the track on which the trams would operate. It was making sure that we did not move utilities into an area that was going to be used for the overhead line structures, the poles and other civils works such as power and communications ducts for the tram. TIE required an understanding of what that swept path was to be for the tram, SDS then supported with areas of critical design. TIE had contracts in place with the utilities companies for them to develop the design for their own utilities, but some of the locations had numerous utilities that needed to be moved, and so a combined design was required for all of the utilities. At key locations, SDS provided that combined, interfaced design and scoped those utilities diversions that needed to take place.

71. There is also mention of *"critical design"* in paragraph 3.2; this is where there are numerous utilities all crisscrossing at a particular point. For a lot of the infrastructure, all of the utilities were aligned, were parallel, and it was possible to move them as a block, be they gas, water, electric utilities, they could be moved almost laterally. For those areas, the diversions were designed and managed through the various utilities providers and agreements were in place with those, but in certain key locations those services actually were running parallel and perpendicular, and there were particularly complex junctions, and that is where we were involved to ensure the 3 dimensional planning of those diversions and to draw them together to make sure that there was a functioning utilities diversion at the end of the project. Where space was tight, for the introduction of the tram and to get the utilities in, we provided that critical design associated with those particular locations

72. To minimise diversion requirements and outturn costs, SDS tried not to relocate services where possible. If there were particularly large and expensive utilities to divert, attempts were made to modify the tram infrastructure to accommodate the existing services. Where there were delicate, old services, efforts were made to avoid moving them or working on them and bridge over them instead. We looked to use side access for manholes, for example, to existing services, so they could be left in position with a different way of accessing those services for inspection and maintenance.

73. SDS supported with advice on complex issues. What SDS tried to do was produce a sympathetic infrastructure design around the existing services, but it was unavoidable to move a large number of services. The general intention was there were no services to be left under the tram infrastructure. Services were not to be left underneath the running tracks of the tram.

74. For investigation and design of utility diversions SDS had certain management function regarding surveys of the existing utilities and proposed the locations of those surveys. SDS was not directly responsible for the development of all of the design for the service diversions and were in more of a reactive supporting role. TIE-managed the operation of the services relocation and SDS provided support. As stated in clause 3.2, SDS provided assistance to TIE with the management of the utilities programme, not the actual management of the programme. It was not the same contractual arrangement as the rest of the scheme although TIE did ask SDS to undertake a wider role and accept more responsibilities.

75. There was a programme for the utilities diversion and construction, but SDS did not produce a programme for the utilities design. SDS were only responsible for producing the critical design. When it was identified that a design was required, SDS provided a timescale to support with that. The service was provided on an as-required basis.

76. Investigation and design work was also carried by the utilities companies themselves, TIE had contracts in place with those utilities companies to do that. Quite often, TIE would ask SDS to provide this support and for a long time TIE asked SDS to be more involved and deliver utilities designs that were not part of the SDS scope. We objected to providing these services free of charge and were often asked to provide these as part of our contracted scope but SD repeatedly referred TIE back to the contracts that were specifically written to manage these works by the utilities owners.

77. SDS had certain responsibilities regarding avoidance of relocation of utilities into an area where we would then construct some of the infrastructure for the tram. We were responsible for developing the exclusion zone for those utilities. That was one of the important features of the preliminary design stage; to identify where the utilities diversions were required and to confirm where the tram infrastructure to be positioned.

Contract – Stakeholder Management

78. SDS had certain responsibilities regarding obtaining the views of the various stakeholders. We had a third party stakeholder manager, Rick Finch. SDS would obtain the views of stakeholders. It was another example where we were assisting TIE. The intention was that SDS would, through the development of the design, take appropriate steps to minimise the impact on those third party stakeholders. That included large organisations such as Network Rail, some of the big department stores along Princes Street, BAA and also the general public. It was an assisting role to TIE. The ultimate responsibility was for TIE to secure those third party approvals, and there were many third party requirements post the parliamentary process that SDS provided support with.

79. Stakeholder management was a TIE responsibility. In practice, what happened was that SDS were increasingly asked for assistance and TIE's

management of that process largely was to request SDS to repeat the design to offer different solutions to the stakeholders, rather than to manage the expectations of the third party stakeholders. With such a large number of third parties involved, it is very difficult to satisfy aspirations of all parties whilst introducing a tram system. What commenced as a role supporting TIE really turned into an optioneering exercise that was just on-going throughout the development of the detailed design.

80. I'll need to quote from paragraph 3.3 of schedule 1 of the SDS Contract - *"The SDS provider shall assist the client to minimise the adverse impact of the implementation of the tram network on stakeholders and the general public. This shall include securing, implementing and incorporating into the design all necessary and other third party agreements."* They are third party agreements so we could include them all, which SDS did. That was through the parliamentary process. *"Assisting by providing all technical details"*, which SDS were responsible for.

81. Further *"Liaising with CEC, Scottish Executive, and Historic Scotland, as required by TIE."* SDS attended many meetings and consulted with them throughout the development of the design. *"Participating as appropriate with community liaison groups"*, SDS participated and supported with many community liaison groups. *"Information initiatives"* so media. SDS supported with the communications with stakeholders and had a member of the team dedicated to undertake this. Then it says, *"Assisting with the discharge of all parliamentary undertakings"* which was also done.

82. SDS were trying to develop a design for the tram system in a limited timescale, also with the procurement process that was on-going for the trams themselves and the construction contractor. We supported TIE and assisted with those consultations. There was quite an onerous timetable and programme to get the infrastructure designed such that it could be procured and built.

83. The designer of a scheme normally acts in support of the client in securing stakeholder acceptance of the proposed design. The designer has no real power over the stakeholders and the final decision regarding the aspirations of the stakeholder resides with the client as it typically impacts on the cost, programme, performance and look of the completed tram scheme.

Contract – Transport Modelling

84. There are several layers to transport modelling. Briefly, the intention of transport modelling on this project was to make sure that the introduction of trams was achieved without significant impact to the flow of the traffic around the city.

85. SDS had responsibilities regarding junction models. There was a modelling suite that was developed and owned by the Joint Review Committee (JRC), who reported to TIE. We provided the junction modelling and the local area modelling models. We were responsible, as SDS, for the junction models and the local area models that were then fed into the wider area models that were managed by the JRC.

86. We provided the detailed model and the JRC then ran the modelling suite, which was broader. If we introduced a tram across a junction on Princes Street, JRC modelled the wider area model to predict what the impact was likely to be on junctions that were three or four streets away from the route. The broader area traffic modelling was done by JRC.

Contracts - Consents

87. Referring to Clause 5 and paragraphs 2.6.1.2 and 2.6.2.4 of schedule 1 of the SDS Contract, 2.6.1.2 was the clause that TIE constantly referred back to as one of our core obligations to perpetuate the dialogue with third party stakeholders surrounding the approvals and consents. What 2.6.1.2 states that the SDS provider shall produce the detailed design of the tram network so

that the design has a full approval of the client and all the approval bodies. TIE interpreted this as an open ended obligation to continue to deliver design iterations until all those third parties were content and SDS had secured their approval.

Contract – Scope of Services - Surveys

88. SDS managed numerous surveys in the early stages of the scheme. We did photographic, topographical, archaeology, environmental, ecology, radio, noise and vibration surveys. Some of those were done in order to develop the scheme. We required to know the ground conditions and the existence of some underground structures such as cellars, culverts and buildings along the route.

89. Other surveys were around ensuring that post the scheme there was not a detrimental impact. Noise and vibration for example. Survey was undertaken to provide a benchmark pre-tram so that any detrimental impact on local residents, the general public and wildlife could be calculated develop the design and any mitigation measures required.

90. In reference to clause 2.3.3 of schedule 1 of the document (SDS Contract), I think SDS managed all of those surveys and others. These are the ones that were listed, but SDS did others along the way as well.

91. SDS supplied TIE with notice of the investigations and surveys and we also supported them with the communications to third parties, notifying them that the surveys would be taking place and seeking their permission where it was required. If access to somebody's property was required we would support TIE in that communication.

Contract: Programming and Timescales

92. SDS developed a Primavera-based programme (Primavera software used for engineering and construction project management) that was maintained, updated and progressed throughout the scheme, from the client's definition stage through detailed design and beyond novation, through to the completion of the SDS services.

93. Reference is made too many clauses within schedule 1 of the SDS Contract (**CEC00839054**) I just cannot comment on the development prior to my involvement. SDS developed a Primavera programme that was supplied to TIE. TIE owned the master programme for the scheme including items such as business case development, appointment of the contractor, tram supplier and construction start dates. SDS supplied data for the development of the design and the consents and all other services within our scope and provided that to TIE, but TIE were the owner of the master programme for the overall scheme. They had their own planners and responsible people for the management of that overall programme.

94. SDS religiously submitted our design programme. SDS rarely received the master programme from TIE. TIE did not recognise the delays caused by failure to resolve numerous critical issues. SDS could not force decisions from all stakeholders. SDS had to produce a deliverable that met the master programme but were really struggling what with all the practical problems of securing these approvals and consents.

95. SDS were attempting to satisfy all third party stakeholders, including CEC, whilst sticking to a design programme that had key dates for issue of documents. SDS were doing whatever it took to secure the approval and consent from stakeholders whilst attempting to deliver to programme dates. The prolonged approvals and consents obligations made achieving programme dates extremely difficult to achieve, impossible in many cases.

96. That was the biggest problem in the delivery of the design. As the owner of the master programme, TIE understood that SDS had to complete design by particular dates but provided little support or direction in securing approval of design from third parties. TIE knew as the owners of the master programme that the approvals and consents negotiations were on-going because they were attended many of these discussions/meetings. Time went by and effort was expended but the lack of ability to reach conclusion on the design options and obtaining key decision was our most significant problem.

97. The SDS programme was up to date and accurately progressed. In the time that I was involved with the project, it was meticulously kept up to date. I am not so sure about the master programme. TIE often did not issue an updated master programme for several months.

98. I cannot comment on the agreed programme when the SDS Contract commenced as I was not involved,

99. TIE did maintain the Master Project Programme.

100. I'm not sure if SDS supplied an Outline Design programme within 30 days of the contract being executed. At the start of the project at the point that I became involved with the project in March 2006, the SDS programme was not in a state of development that supported the design delivery. It was overly complex. It was completely rewritten from about March/April time 2006. That was one of the first things I did as the Project Manager. This did not result in a material delay to the scheme and the design progressed as the programme was finalised.

101. From about that time from about March/April time 2006, SDS completely rewrote the programme in line with the original deliverable dates, but the content of the programme was rewritten.

102. The SDS Preliminary Design Programme at the stage when I was involved was achievable and we were very confident that we could achieve the programme.

103. In relation to assigning an *"order of criticality"* and the reasons behind this SDS knew that there were particularly onerous parts of the route that needed to be focused on. They were always going to be particularly key in the procurement process for the contractor and the tram supply, so there were issues that needed to be resolved. There were building developments that were on-going or in progress at early stages, Picardy Place and Forth Ports, for example. SDS knew there was a development that was progressing at Picardy Place and at Forth Ports. There were critical sections of the route that, for various reasons, were in consultation with developers. That was one of the reasons why some developments were identified as being critical. Another such example was the tram depot. With delivery of the trams scheduled, having somewhere to store the trams when the trams arrived meant that the depot design was critical. That was another high priority section of the route.

104. I do not know who was responsible for identifying the *"critical"* elements; I was not involved on the project at the time. I assume it was TIE because they knew from the overall master programme what the developer's intentions and key dates for scheme implementation were. For the delivery of trams into the depot, for example. I cannot remember the basis for criticality but assume it was developer-led due to Edinburgh Airport Rail Link. The airport itself has been the subject of considerable development, even in the last ten years. During the Parliamentary process TIE overcame objections on the basis that they would consult with objectors and provide the opportunity to comment on and influence design, as it progressed.

105. Timescales in the Programme Phasing Structure were ambitious and challenging but not unrealistic. I have known of other schemes where those timescales have been met and I have worked on other schemes where they have been met.

106. The Project Phasing Structure became varied almost immediately, the intention to construct the loop joining Leith to Crewe Toll was shelved because of the significant expense of building the elevated or cantilevered structure along the waterfront. Although part of the intention of the scheme, very early on even before I became involved in 2006, that loop became a horseshoe shape. Then later, the Roseburn corridor was also shelved in terms of the construction of the scheme. SDS completed the design for that section, but not for the design for the entire loop, i.e., between Crewe Toll and Forth Ports because that was shelved almost immediately.

107. SDS produced the Outline Design Programme. A section manager was appointed for each of the design sections. They were responsible for the development of that design so that it was developed simultaneously. We had teams of disciplines that were responsible then for the delivery of the design and supply of the design to those section managers. Halcrow did the same and the approach was consistent.

108. Referring to clause 4.5 of the SDS Contract (**CEC00839054**) and the *"submittal programme"*, we built it into our programme so our programme was very clear regarding the deliverables and the design around a particular discipline. We based the work breakdown structure on sections, subsections and then disciplines. We required design from several of the disciplines to come together to deliver the design of a subsection, so that was how it was detailed on the programme. The programme reflected the design being developed by each of the disciplines, then the submission for approval. There was an informal consultation section on the programme (TIE and CEC), then a formal consultation, then update to comments received and then a final issue of the drawings. It was all managed through our integrated programme and was very clear. All of those approvals could be distilled from the programme this was done as required to supply the various approval bodies of our intent to submit the packages for approval and consent.

109. The submittal programme was distinct from the Outline Design Programme in that the ODP was developed at the start of the scheme. Our actual working programme was far more detailed than the outline design programme at the start. It was built it up to include a very detailed plan of the development of the design, including the approval and consent process.

110. PB did supply TIE with a programme of consents, and it was submitted electronically with an issue sheet through our document control process.

111. Looking at clause 7.4, schedule 1 of the SDS Contract (**CEC00839054**) I can confirm there was a mechanism within 7.4 where we were to notify the client of delay. The challenge with that was around this approval and consent issue. TIE adopted the stance that approvals and consents were the SDS responsibility and we were to do whatever it took to secure those approvals and consents. SDS also had to notify TIE of a delay. The contract called for formal notification of delay, but due to the problem associated with securing approvals and consents, the consequence was a rolling programme of notification letters from SDS to TIE.

112. SDS did write many letters advising of delays, potential delays and the impact of those delays. In particular, they related to our inability to secure firm decisions on pivotal issues around the completion of the design that were being constrained by securing a decision from a third party, CEC, TEL, Transdev, or the various different third party stakeholders along the route, Edinburgh Airport, for example.

113. We carried out notification by letter and we provided dashboards. Eventually SDS produced a drawing of the route annotated with the issues that were outstanding for resolution in order to complete the design, which was updated monthly and issued it to TIE. It had orange boxes on it with the issues identified within those orange boxes and the decision that was required to move them forwards. This was accompanied by a wordy description of

progress with each issue. It also included 'days aged' information to indicate how long the issue had been outstanding.

114. This did not result in the resolution of the issues although it did raise awareness. Although SDS raised the delay and flagged up the issues, we were powerless to actually drive a resolution to most of those issues and required client direction or intervention. We could not force organisations, particularly the third party stakeholders, to make decisions. Some of them are very influential and had their own corporate interests to protect. The difficulty was that although SDS had the obligation through the contract to secure their approval, we could not really force a decision to effect that approval. So SDS were just left in a loop of providing iterations of proposals for design without having the power to force agreement with the third parties.

115. SDS had certain contractual obligations relative to the timing of provision of the design and we understood the importance of the programme and the delivery. That was paramount to SDS.

116. I do not really have a comment on the contractual consequences in the circumstances of a breach of obligation.

Contract – Price and Payment

117. In relation to clause 11, schedule 3 of the SDS Contract (**CEC00839054**) and the main provisions in relation to price and payment of fees, I can confirm the contract was based upon milestone payments and lump sums, as set out in schedule 3. It was quite clearly defined what the payments would be and when they would be made.

118. The main payment milestones were detailed in the contract, so preliminary design, detailed design. We knew what those payment milestones looked like.

119. There was a £1 million incentive introduced and I cannot recall if that was part of the original contract or if it was introduced subsequently. There was a £1

million performance pain and gain arrangement that, commencing at the point of novation. I think there were 137 deliverables left to complete. If we missed the date, we were in pain for that 137th of the £1 million, if we achieved the date, we received the gain.

120. The penalties for not meeting the milestones on time and/or for late delivery of design were retention. SDS did not get the payment until deliverables were made. It was a cash flow issue which was a major concern to PB. SDS did not get paid for a long period of time for work undertaken. I cannot remember specifically but we did not receive the payment for some of the deliverables up to the point of novation.

Contract - Personnel

121. The TIE project director changed several times. Ian Kendal was PD for TIE when I joined the Project. Andy Harper became the project director. Then Matthew Crosse, followed by Steven Bell. They reported to Willie Gallagher. There were quite a number of changes at senior level.

Contract - Mobilisation

122. In relation to sufficiency of staff and skill level, experience, certainly from the time I was involved, SDS had a highly competent team involved on the scheme. There was only one or two people from the core team who opted to leave during the project, so the team was very stable.

123. The biggest issue that we had as the designer of the scheme was the lack of decision making and leadership that was demonstrated to encourage the stakeholders to make the decisions required to get the scheme complete. SDS had the responsibility for achieving the approval and consent but as the overall manager of the scheme, we need support from TIE to manage and to lead the agreements with interested parties and stakeholders.

124. Through the contract, SDS had obligations relative to approvals and consents. SDS had no power to achieve those approvals and consents because we were a consultant working for TIE. Iteration upon iteration of design was delivered in many cases in an attempt to achieve approval and consent; this was extremely demoralising to the delivery team and cost a significant amount of time and money.

125. The fact that the design was not complete at the point of appointing the contractor had a serious impact on the remainder of the scheme. It meant that the ambiguity was there between the contractor and TIE on what the final design would be, and what the actual tram system was going to look like, the finishes etc. That led to a lot of dispute later between TIE and the contractor and was pivotal in the escalation of costs, programme overrun and decline in the relationship between all parties.

Progress of Design - Requirements Definition Phase (RDP)

126. The primary purpose of the Requirements Definition Phase (RDP) was to set the bar for the rest of the scheme, to identify what the performance of the scheme would achieve when SDS had developed the preliminary design, the detailed design and then the contractor's design. What would the scheme achieve in terms of its performance, the operational characteristics, journey times, type of tram-stops. It detailed how the trams would operate, where would it be operated from, what would the operation system would be like, the emergency systems functionality, how the communications systems would work. So it set the performance requirements for the backdrop for the development of the design.

127. SDS supported TIE in the preparation of those requirements documents. In relation to consultation with stakeholders, difficulties that were encountered during the phase, to what extent TIE and CEC participated in the RDP and sufficiency of engagement with CEC, I am sorry but I was not around at the time so I really do not know the background to that.

128. There was an agreed timescale for RDP; the submissions were due by Christmas 2005. There were a lot of comments issued that were resolved post-Christmas and a lot of rewriting of the documents took place in that time. I became involved in March and one reason I became involved was the struggle that was experienced attempting to complete Requirements Definition. These were important documents that set the stall out for the rest of the scheme so I think they were fairly robust by the time I became involved. There was a suite of requirements documents that were produced that we referred to for the rest of the scheme.

129. TIE's response to the RD deliverables is once again not based on my personal experience. My understanding was that TIE thought that it largely as a result of the delay to the signing of the contract

130. At that stage of the project we were working well and progressing the preliminary design. The project team, TIE and SDS were focused on delivery to get the preliminary design developed and delivered. There was no hold point post requirements Definition, SDS were not waiting to get any outstanding requirements definition phase issues resolved, we were progressing very well with the preliminary design in March 2006.

131. In relation to Steve Reynolds email dated 26 July 2007 **(PBH00027328)** and the comment on the RDP report being of poor, this relates to the original document that was put forward that needed to be rewritten. The first iteration when the first submission was made was not as robust as it needed to be and required additional work. Numerous comments were made and received, and updates were made to those documents. This did not cause a material delay to the progress of the design and preliminary design progressed as planned whilst the documents were re-written. Additional resource was brought in to do that and I think we successfully overcame the issue without delaying the delivery programme.

Decision in January 2006 to build the tram network in phases

132. I have referred to the report to the Council in January 2006 (**CEC02083547)** regarding available funding and the phasing of the tram network. PB did provide design work for lines 1a and 1b because they (the Council) wanted to have a design complete and available should the funding become available. I think there was always the view that once line 1a had been installed, additional funding might be secured.

133. The designs for both phases were carried out together, during both preliminary and detailed design stages. It was only very late in the scheme that we deprioritised 1b. Unfortunately, for a considerable period of the detailed design stage, the design for section 1b was further advanced than 1a due to the number of critical issues that required resolution, these significantly delayed progress of 1a. The de-prioritisation of 1b only occurred due to the lack of resource available to CEC and TIE to review and approve the design rather than a lack of design progress or SDS resource.

134. There was not any discussion about completing all of the preliminary and detailed design for phase 1a before carrying out design for phase 1b. There was a time when no more design work was carried out on phase 1b, however that was very late and it was more about ensuring that the approvals and consents were resolved for 1a rather than any lack of development of detailed design for 1b. SDS had a design that was fully detailed for 1b, it only needed final approvals and consents. However, due to the fact we did not proceed with 1b this was deprioritised. We got to the point where a contractor could be engaged to finalise component selection but there was little point in doing by that time. It was also draining resource from SDS, TIE, and CEC etc. that could be used to resolve critical issues on Line 1a. I cannot recall precisely when the decision was made to stop design work on 1b but it would have been made by TIE. Preliminary and detailed design for phase 1b was substantially complete at that stage.

Progress of Design – Preliminary Design Phase (to June 2006)

General

135. I do not remember there being many references during this period about TIE's dissatisfaction. Most of them came after the delivery of the preliminary design documents. There was a suspicion that we would not make delivery on the contract date, which was June 2006. Their dissatisfaction or concern was understandable because TIE wanted to make sure that the project kept to programme. In reality, we met the dates and we delivered the preliminary design in line with the original contract obligations.

136. The reasons for dissatisfaction with the SDS PD submission were not justified because the dates for delivery were met and a very robust preliminary design was issued. There was a significant amount of work done in a very short space of time to achieve that. If a review that preliminary design is undertaken the vast majority of what was actually built was entirely in line with that preliminary design that SDS submitted in June 2006. All of the optioneering, charrettes and alternatives considered post this submission amounted to very little change post June 2006.

137. All the work that had been done through the public inquiry and the parliamentary process and then the requirements definition and preliminary design was robust and if reviewed against what has actually been built, it is almost entirely in line with what was achieved up to June 2006. Most of the optioneering that was undertaken post June 2006 amounted changed very little in most cases.

138. If the preliminary design as it was in June 2006 had been developed into a detailed design, it would have delivered what has been built now with few exceptions, avoiding delays and cost resulting from the optioneering and charrettes,

139. In relation to references to difficulties within PB or between PB and its subcontractors I would say that this was a complex project with numerous interfaces, not only between SDS or between disciplines, but also between SDS and our sub consultants. It was a complex process and there were many challenges and lots of difficulties that we had to overcome. But we did that through very robust management from PB and the sub consultants also. The likes of David Simmons, demonstrated very robust management, to get the design complete at the end of preliminary design.

140. By June 2006, I think we were entirely in line with the expectations of the project in terms of delivery at that point. So despite any challenges, we achieved a really successful preliminary design.

141. The difficulties were addressed by robust management. That was one of my responsibilities when I took control of the project, the structure of the team. SDS had clearly defined scopes, split between PB and Halcrow. We had roles and responsibilities identified. With regular dialogue between the various different parts of SDS and TIE at that time, we did a very professional job during the preliminary design phase.

142. TIE's operating methods, this all centres around preliminary design. Once again, it was really trying to confirm the requirements and to obtain the final decisions. As the preliminary design progresses the level of detail increases and the designers home-in on the preferred solution to take into the detailed design phase. During the preliminary design stage a final position for the tram stops would be identified for example and a generic layout produced. During the detailed design the details of the tram stop, the finishes, the shelter size and type, the number and locations of litter bins, ticket vending machines, would be finalised. This is not what happened; instead many options were identified for most of the tram stops, even proposals to relocate some of the tram stops. The idea and the premise that was agreed with the TIE Project Manager, CEC and SDS was that we would submit the preliminary design and continue straight into the detailed design without any pause for client or CEC.

Any comments that came back on the preliminary design, we could then address during the detailed design phase. The SDS design programme reflected this agreement.

143. I note an exchange between Ailsa McGregor and I on change notices (**TIE00001891**), TIE generally just would not recognise change at all. Their view was that anything that required us to do something to achieve an approval and consent was not a change. Their view was if SDS delivered a design and then a third party asked us to change it, for whatever reason that was not a change. It was just something we had to do as part of our obligation to secure those approvals and consents. There was a general reluctance to accept that any such issues were a change to SDS. Even if TIE were happy with the design, if a third party was not then it was our obligation to satisfy that third party, in TIE's view.

144. The frustrations relating to lack of TIE leadership in resolving outstanding decisions were never really addressed until very late in the project delivery, during the construction phase, and they continued to hamper the completion of the design throughout.

145. The impact of indecision around critical issues was massive, a huge impact on the procurement process, the appointment of the consultant and then their ability to progress with the procurement of their componentry and also to meet their obligation through the consultation. So it was pivotal.

146. Throughout this period there were difficulties with traffic modelling and roads design. Traffic modelling in itself is very complex. SDS had responsibilities regarding the detailed junction model, which I think was the TRANSYT (Traffic Network Study Tool) model. SDS were responsible for the detailed junction and the route corridor model. Changing the road layout in any way potentially impacted on the movement of traffic locally and further away.

147. The difficulty was that it also linked to the wider area model that was being delivered by the JRC under TIE's direction. The challenge was to achieve

tram priority to keep it moving and reduce journey times for passengers. The intention was that the tram would always get a green light at road junctions, whilst not impacting on the progression of traffic through Edinburgh city centre or the slightly broader road network.

148. There was reluctance from CEC to accept output from the traffic model until the whole model was finished to the satisfaction of CEC. At the same time, some of the key junctions were subject to developer input, the best example being Picardy Place. Picardy Place was an absolutely key junction in Edinburgh's road network, but there was a developer that had interests around Picardy Place and SDS struggled to complete the detailed model of that junction because of this. This impacted on the wider area model. Numerous design iterations were developed to address what should be done with the roads layouts and associated tram infrastructure at Picardy Place, trying to accommodate a hotel that a developer was proposing and CEC wanted to consider. This is an example of a project delay that went on for several years without resolution.

149. Forth Ports was very similar. SDS were trying to develop the detailed junction modelling without knowing exactly what Forth Ports were going to do with their development. SDS had no power to force decisions for the roads junctions. All SDS could do was repeatedly flex the model and try to achieve approval from Forth Ports.

150. That was also true of Edinburgh Airport due to EARL and the interchange at that particular junction. There were several key junctions along the route where we had issues that were not in our gift to make a decision upon. The decision-making process caused many problems and delays to the scheme. SDS could not make the decision and freeze the design; we just had to keep on iterating the design and every time SDS changed a major junction it had impacts on the wider area traffic model.

151. SDS addressed them by numerous iterations and working as closely as we could with City of Edinburgh Council. CEC had some very proactive people working with us at the detailed level, trying to resolve the junction layouts. Unfortunately, it needed really strong decisions to be made about what we should assume to progress the design. Only with some clear and robust decisions on the functionality of the junctions could we finalise the modelling suit and gain approval, hence the priority to resolve the stakeholder issues.

152. The impact was a huge delay and a huge cost not only to us but the project. When we look now at what has been built, there is little difference to what SDS proposed at preliminary design stage with very few changes. The road layouts - Haymarket being a good example - numerous design versions were produced due to the potential development at Haymarket, the 25-year master plan. That was being developed at the same time. There is a big development opportunity site at Haymarket next to the station. Some of this has since been developed but the main site has not. The master plan output was on-going during that preliminary design and the detailed design phase. SDS could resolve this without clear guidance from CEC and TIE

153. I note letter dated 5 December 2005 from Ian Kendall (**PBH00027510**) and reference to various dates referred to within schedule 1 Appendix 2 of the SDS Contract, particularly surrounding the issue of the preliminary design by June 2006. I will not be able to help you in any way here as it was before my time on the project.

154. From the time I became involved on the scheme, the preliminary design was always to be submitted by June 2006. That was the entire preliminary design in line with what had been identified in the contract. That was what was programmed, delivery of the entire preliminary design by June 2006 and submitted for comment and approval.

155. The primary purpose of the PDP is to increase the level of detail of the design and to identify any key constraints that would seriously impact the detailed design, so to ensure that there was sufficient land to develop the detailed

design and complete the high level optioneering in preparation for the detailed design.

156. SDS worked on all of the disciplines, so structural design, track design, roads design, the depot itself. A preliminary design for the depot was delivered and the infrastructure, for phases 1a and phase 1b.

157. We engaged with CEC and all of the stakeholders to a level where we thought it was appropriate for a preliminary design. There were still detailed design issues to be resolved with those stakeholders, but we engaged with a large number of those third-party consultees.

158. TIE and CEC were engaged in the PDP and they were driving hard to get the preliminary design resolved. There were some very key people making some good decisions and driving through some decisions at that point, which enabled us to achieve the preliminary design submission.

159. While SDS were engaged with CEC I think there could have been more, but we were very confident at that point that we would be able to achieve the approvals and consents at later stages of the scheme. We had not identified any major showstoppers. There was nothing in the requirements definition that we thought was going to cause us a major problem. There were no major issues for third-party consents that were really giving SDS cause for concern or, if there were, we had a plan about how to resolve them. Quite a lot of good work had been done prior to our involvement to address those issues, so the options report for the depot was robust and the likes of Baird Drive, which was a key area, had been done. We did not perceive there to be any real problems. TIE were driving pretty hard to make good, solid decisions at that point and manage stakeholder expectations.

160. A lot of work was done in the six-month period and SDS were pleased with the output in June 2006. We did an awful lot of work in a fairly short space of time and we felt that we had put the project onto a really firm footing to take it

into the detailed design phase. I had agreed with TIE that any comments we received on the Preliminary Design submission would just be incorporated into the detailed design as we progressed. Under normal circumstances, if I thought there was a significant risk of a huge amount of rework, I would have insisted that we pause to avoid progressing the detailed design only later to find that we had progressed a lot of abortive work because the requirements had changed or the client would not accept the preliminary design for some reason.

161. In relation to Trudi Craggs and her supply of information to PB relevant to the design, the preliminary design phase went particularly well. There were several key personnel on the client side that helped get that to a really good position, so I was not overly concerned. I think it was more that with the information that was supplied at that point Trudi had more to go on in terms of what that emerging design looked like and how we needed to secure those approvals and consents. There were a lot of outstanding approvals and consents to be achieved, but we considered this to be entirely possible at that point.

162. Ian Kendall was pushing the progress of the scheme very hard at this point and driving decisions with key stakeholders. Willie Fraser was supporting TIE by doing the same. Trudi Craggs was driving the client decision-making process. As far as I was concerned, I was happy with SDS and the project progress and direction at that point.

163. SDS produced a suite of drawings and documents for preliminary design, entirely in line with what I would have expected to have done. There was one area where I was unhappy with the level of detail that we had developed and that was drainage design for phase 1b, but at that point I was not overly concerned. TIE went to review the PDP deliverables and there was no initial negative feedback.

Progress of Design – Review of Preliminary Design (to end 2006)

164. In relation to the difficulties and delays encountered in approving the preliminary design and progressing detailed design, this did not happen in the 28 days as originally planned.. The length of time taken to review the design reflects the level of detail and the volume of work that had been undertaken. Initiatives like the charrettes, change orders, planning summits, and design approval panels were all part of the preliminary design review process and these became pivotal to the delays that followed.

165. They were resolved, but over the subsequent four years. When SDS submitted the preliminary design, it became obvious to stakeholders realised that this represented a freeze of the design concepts and a last chance to change the overall concept. The preliminary design was the first official submission that we made of design development. That meant our expectation was that if TIE, CEC and stakeholders accepted the preliminary design, subsequent to that would focus-in on the detail to deliver the construction standard drawings.

166. What happened instead was, once CEC, TIE, TEL and Transdev realised that we were getting to that point where if they approved that design it would be locked down, they started to consider what their requirements actually were. All of the issues, charrettes, planning summits etc. were options and variations on the basic tram route. The protracted review process of the preliminary design was actually a review of the concept of the scheme in many instances and after that point parties would lose the opportunity to change.

167. The responsibility of co-ordinating and obtaining agreement on the design requirements of the different stakeholders sat with TIE. We saw it as their responsibility to drive those decisions. We offered up assistance in line with the contract, but once we delivered that preliminary design we thought it was TIE's responsibility to make decisions about what people actually wanted from

an operational perspective, for example, TEL and the City of Edinburgh Council's roads layout. It was for TIE to drive and lead those decisions through consultation. We were supporting them in the consultation as we had done through the preliminary design.

168. The difficulties that arose - this is where people started to reconsider what they actually wanted. Issues such as how many buses would be on Princes Street once the trams were in service, how many tram-stops was there going to be On Princes Street. Decisions that SDS thought had been already made were open for discussion. SDS thought we were producing a preliminary design developing the outline design that had been through a lengthy parliamentary process.

169. What we had not anticipated at the end of the preliminary design was the level of potential change that was to follow. Even very basic decisions about how many tram-stops there were going to be were questioned and the route of the tram itself. Even the option of relocating the depot to Leith was considered. That optioneering had been done several years before and discounted.

170. The impact on SDS was catastrophic. We tried to maintain the progress by developing the detail of the design against that preliminary design, but what happened was we started to do optioneering around very basic elements of what we had assumed previously to be locked-down features or requirements of the scheme. We were looking at what the road junctions should actually look like at a very high level. Should we move the tram-stops or remove some of the tram-stops. These were things that really SDS thought had already been finalised.

171. There were very lengthy delays and dilution of the progress which suddenly stalled. We had intended to continue into detailed design just developing the level of detail from the preliminary design, but the Preliminary Design submission resulted in huge hold-points along the scheme.

172. The issues were not resolved for a considerable period of time. We developed several iterations of solutions. The solution for a typical junction - the likes of Picardy Place - was not just a solution for the road layout. SDS would have to then produce tram geometry for the track and then the tram-stop at that Picardy Place location would change. The traffic modelling associated with that would change. The road layout would have to be changed. Just for one small part of the route, the impact was significant.

173. The traffic modelling, which I have already mentioned as being a particularly challenging aspect of the work, changing one junction potentially impacted on the rest of the junctions of the scheme and the wider model.
SDS needed very clear decisions to be made on what we needed to do to the design for the tram to resolve the issues. If we received those clear decisions, even if it was to make passive provision for the development at Picardy Place and give us an area to avoid, we could have done that. But there was never that clear decision to enable us to move forwards. It was always to provide further options for review by all parties. The impact of that was multidisciplinary change and it also impacted on other parts of the scheme.

174. I can give an overview on the charrettes that took place; these were in reaction to the delivery of the preliminary design. Charrettes were as a result of the various approvals parties' review of the preliminary design and these parties involved started to question what they actually wanted. TIE and CEC set up charrettes to review the solutions that had been developed to date and whether they really wanted that solution or wanted something substantially different. It was a review of the fundamental parts of the route.

175. Charrettes were workshop type meetings. Sir Terry Farrell was involved with them as the planning authority for Edinburgh (he was the Design Champion). He had an assistant that was very involved with the detail of it, Riccardo Marini. CEC were also engaged in the process, as well as TIE, TEL and Transdev. They were high level ideas meetings where options were proposed by the various attendees on what they wanted for various parts of the route.

176. Their effect on the design was devastating. Progress of the design development was unravelling. By fundamentally changing key sections of the route and resorting to basic optioneering significantly impacts on the ability to progress these and other sections. The impact of the process was to start again with some of these sections.

177. SDS really did not understand the need for the charrettes and were not responsible for instigating them. When a review is undertaken of what is actually built it is entirely in line with the preliminary design or very close to it. The SDS preliminary design drawings were very close to what was actually built. This period in the project seemed to be treated as a final chance to fundamentally change decisions that SDS had understood had been made during the parliamentary stage of development.

178. By way of an example, at St Andrew Square, the design was based upon the tram tracks being a twin track design on one side of the square. The charrette reviewed the opportunity to locate one of the two tracks on the other side of St Andrew Square. This represented a fundamental change to what was required for the tram system at St Andrew Square. Not only that, but there was an urban realm development at St Andrew Square that PB/SDS were not leading and St Andrew Square was being redeveloped. Rather than progressing with the detailed design, SDS were back to basic principles of what route to take around St Andrew Square. That was significant and the impact far reaching.

179. Another example was Shandwick Place. The Charrettes reviewed the option to move the position of the tram-stops. There was a tram-stop at Shandwick Place and two on Princes Street. Options were reviewed to move the Shandwick Place tram-stop and completely relocate it to the junction of Princes Street and Lothian Road. That would result in change the road junctions. It would also change the tram modelling and the traffic modelling. The impact was be to start again with all of the associated tram-stop drawings. The charrettes actually produced a set of hand-drawn sketches for us to go away and review those options. It was the sort of optioneering

exercise that PB would typically undertake as the first pass of a design for a tram scheme, producing hand-drawn sketches of what it could look like and that is when we might do artist's impressions.

180. It was a huge backward step. From those hand-worked sketches, we then had to go produce the preliminary design and the detailed design. Unfortunately, what we ended up doing for each of those options was to produce several options. We produced not just one option with the hand-drawn sketch, but there might be two or three. SDS were also asked for any other variants that we could look at on those drawings. It represented a significant step backwards for the scheme design development.

181. As far as design delay was concerned the charrettes were significant. I am certain of that, and most of those issues took not months, but years to resolve.

182. Charrette meetings were frequent; there was a series of them. Sometimes single issues, but I think some of the meetings, addressed two or three issues at the same meeting, but subsequent to that meeting SDS would then be requested to attend specific meetings to plan the further work to progress the options discussed at the charrettes. The detail of the design around all of those sketches was extremely challenging and impacts on all disciplines, structures, tram stops, roads, track alignment, telecoms, power supplies, OHL poles etc.

183. St Andrew Square was a technically challenging section and very difficult to resolve. To get the tram to negotiate St Andrew Square was very difficult because there are vertical and horizontal curves and the tram was likely to be on its performance limits for twist. We had to then talk consult with the tram's potential suppliers on this issue to confirm that this was possible, made more difficult because the tram had not been selected by this point, so the exercise had to be repeated for several vehicles/suppliers. Out of just one charrette that might produce a high-level sketch, there might be several weeks' of

design required to assess whether the solution was possible or not. Our experts were occupied for months reviewing those options.

184. The impact on design progress was very detrimental. Most of the issues took months if not years. This included Picardy Place, St Andrews Square, Haymarket and Charlotte Square and removal/relocation of tram stops on Princes Street.

185. I note a PB letter dated 30th November 2006 (**CEC01829874**) relating to a change of position by CEC with proceeding to detailed design. We were incredibly disappointed. SDS thought that the preliminary design had progressed very well and that we had moved the design substantially further forward. We were not anticipating anything like the level of change that resulted.

186. As far as change with the design between July 2006 and June 2007, the intention was that we would not delay the start of detailed design to accommodate preliminary design comments. The programmes did not include a hold point. We went straight into the detailed design. What actually happened, though, was that there was a very significant hold that was almost forced upon us by virtue of the fact that some of the fundamental principles were unlocked because they were standalone. Those five or six areas of the route were not standalone; they were very interrelated. A review of the programme and progress between June 2006 and July 2007 reflects delay in the completion of the development of the design that was significant.

187. I do not recall there being an agreement for the Preliminary Design to be delivered in two instalments, or reference to PD1 and PD2. Once again, I cannot remember the exact detail, but my recollection is that preliminary design developed the civil and structural elements, the physical changes associated with the introduction of the infrastructure. The traffic modelling associated with that infrastructure change was not complete, so SDS were progressing with the traffic modelling analysis at that point to understand what

the impact of the tram introduction and changes to the roads layouts would be. I think that was what PD2 was confirming what the impact on the traffic modelling was going to be because of those infrastructure changes.

188. Now referring to an email from Willie Fraser of TIE on 1 August 2006 (**PBH00006242**) on, among others issues, PB updating their design programme and difficulties that were encountered. It made it very difficult indeed. As Willie alluded to, we could - and what SDS tried to do was to - maintain a programme where we developed the detail of the design as it was submitted in the preliminary design, almost ignoring that the charrettes might have a knock-on effect. But it just became increasingly difficult to do that because securing any approval and consent and moving things forward was not possible because reviewing bodies were reluctant to grant associated approvals.

189. The impact was that the design was on hold. We were recording progress, but it made it very difficult for us to programme what the requirements were for the remainder of the design because we were not sure what the requirements were for the rest of that design. SDS could not really programme how to complete the design development for Picardy Place, for example, because we did not know what the requirements were for that junction i.e. which option was to be selected, to inform that programming decision.

190. The failure to receive comments back on the Preliminary design submission was another factor that caused SDS difficulty in maintaining an updated and accurate programme. These were due from TIE after the 20-day period; the intention was that these comments would be used to inform the development of the detailed design. Even in areas where there were not any charrettes, we were hoping for was the comments back so that as that detailed design progressed we could incorporate those comments, make changes or amendments to the design or address the comments to resolve any client or CEC issues with the design. Comments were not received for a further for six months.

191. There were problems and delays in relation to traffic modelling and referring to my email dated 12th October 2006 (**TIE00000237**) I can explain our concerns. The basis of the contract was that the tram would always get priority along the route so the tram would not wait at road junctions. It would get a green light, effectively, or at least move continuously with the traffic giving the tram priority. The only exception to that is where trams are in opposing directions. If one tram triggers the traffic to stop, if then a tram approached the same junction in the opposite direction within 15 seconds later, would not trigger the traffic to stop because it would start to congest the junction.

192. So, if having the basis that the tram gets priority, SDS produced a theoretical model to map the tram progression along the route and at each of the junctions to ensure it gets priority. The road junctions signalling also linked to this to ensure that priority would be given to the tram. The junctions then link to each other with the traffic management system that is incorporated between the roads systems. Many of the major roads junctions are linked to each other with the traffic signalling system. The system is programmed to keep the road traffic flowing through the junctions as smoothly as possible. The traffic management system is also programmed to facilitate the tram's progress by phasing the junctions. The problem is that if fundamental changes are made to one of the junctions, there is an impact on several of the adjacent junctions because of that linkage between them all.

193. For the likes of Picardy Place where SDS could not finalise the road layout due to the charrettes and developer interests, it made it very difficult to manage the traffic management around the junction. It was not just an impact on that junction; it was an impact on several junctions around it.
The CEC roads team knew that and they had previously tried to implement a scheme where they had radically changed the traffic management in Edinburgh and it did not work very well, so they took the decision to remove it. They had already suffered from one very problematic scheme to change the traffic flow through Edinburgh, so they knew about any fundamental changes to some of these key junctions, the likes of Shandwick Place tram-stop

194. There was a proposal to move that into the junction with Lothian Road. That itself would have caused a huge impact on the traffic junction at that particular location. The removal of one of the tram-stops on Princes Street was another example. So, when with charrettes ideas being proposed, the finalisation of a traffic model and the approval of it became almost impossible.

195. CEC knew that, despite any best efforts from them, SDS and the JRC the model could not be finalised. We had a very good relationship with CEC for the traffic modelling and a very good relationship with the JRC. It was very collaborative and there was no problem, there were no communication barriers. But until some of the key decisions were made about whether all parties wanted two tram-stops on Princes Street or one, whether we move the tram-stop on Shandwick Place up to Lothian Road and what was happening with the junction at Picardy Place, the resolution of that traffic model was not impossible. That meant that the wider area model that the JRC were running was also impossible to resolve.

196. SDS were concerned that a two stage detailed design would result in key decisions being deferred with all parties knowing that there would be a second chance to change, hence deferring a final decision. We could get approval and consent about one version of the detailed design pending resolution of outstanding issues, which is what TIE and CEC wanted. They aimed to issue approval provided that nothing changed, then they would accept the traffic model, but they also wanted opportunity to change and the option to reject the design and the model associated with it i.e. deferring the decision.

197. As a designer, SDS would have preferred to say we will step back. Let all parties make all the decisions based upon what they want and then we re-engage and complete the design. But, due to the procurement process, we had to proceed. SDS were being pressured to deliver the programme and to stick to that programme, but we had many critical decisions that were still outstanding.

198. I note the email from Gavin Murray dated 27th October 2006 (**PBH00007848**) relating to Tram Design Working Group (TDWG) and the delay in the submission of the first planning applications. The TDWG was a requirement of the parliamentary process. One of the promises made during the parliamentary process was that we would establish a tram design working group to give people the opportunity to comment on the design. So, there would be various different third parties and important stakeholders that were involved. The difficulty was the inability to know what we were showing the parties due to the proposed charrettes changes and uncertainty around those, we were presenting solutions to the groups, with interested parties, knowing that there were issues not finalised and there were likely to be design changes.

199. The charrette process was not public, so most of the third parties were not aware of what was happening at these meetings. SDS were put in this very difficult position where we were responsible for informing and consulting with third-party stakeholders - people that were being directly impacted by the scheme - but knowing very well that what we were saying to them was likely to be changed. SDS were put in a very difficult position.

200. Often we were not sure what we could show them and what we could not show them. The TDWG - I cannot remember; I would have to really look at the detail around 1 November, which I cannot quite recall - we were trying to do planning drawings. Most of the charrettes were actually around planning issues, not around technical, performance issues for the tram. It was about what the tram was going to look like in Edinburgh. So, the charrettes were largely around the visual impact on Edinburgh, not the technical performance. A lot of our planning and technical resource were working on the options to understand the impact on tram and traffic performance if we changed the requirements to meet the charrette outputs.

201. Referring to my email of 10th November 2006 (**PBH00008035**) and the attached chain, which includes my criticism of Halcrow, and further emails

(**PBH00008345** and **PBH00008343**) also linked to Halcrow, these are fairly typical exchanges of correspondence during the course of a scheme. There is criticism to a point but it is pretty standard practice. One of the duties of the core SDS team that were based in Edinburgh was to review the programme updates provided by the design team and advise where these dates did not meet requirements for the project. A review is the done by the designers to align with the required dates, look to secure additional resource, or provide reasons why these dates are not possible. Sometimes the delays were as a result of delays that were outside of the designer's control, such as client change or the supply of client or third party information.

202. This is an exchange of emails. It is not something I would have been over concerned about. The emails start to reference the charrettes process. This is actually a representation of the impact of the team looking at the charrette output rather than concentrate on the delivery of their design. The comment *"I have unlinked the charrette DAP (4 hour Meeting with CEC for Approval) from the end of the charrette design to"* shows you that we are starting to try and work out whether or not to include the charrette outputs in the further development of the design. The result is a position where people assume that we are going to have to do more design. The uncertainty made it was very difficult to lead and direct people as to what to do, because of the lack of certainty of what the client and CEC wanted for the tram scheme.

203. SDS did not get clear response on how to proceed, just to assume until we were instructed otherwise, because there was always this perceived contractual position, that it was our responsibility to do whatever anybody wanted. In reality what started to stack up as is visible from some of these emails, is a serious number of blocking issues resulting in an inability for the designer to know what to do next because there were so many unresolved issues. The email reflects that I was trying to say that we are not accepting this revised baseline slip and to do something about it. Halcrow were party to some of the charrette outcomes but as the main consultant we did not want them to start slipping with design development. We were hoping that with

effort the charrette issues would be reviewed and then potentially dismissed; or, be instructed as a change, but it that did not happen. Dates started to move backwards and SDS were reporting that it was not acceptable.

204. SDS had a fairly robust change-management process but it became so unravelled that it was very difficult to actually know what was required to obtain approvals for the design. Instructing the design team as to what to assume on their programme became quite difficult. What I was stating in this correspondence was to ignore the charrettes; just give me an update based on what you know is certain.

205. Moving on to PBs progress report, October 2006 **(CEC00428837)** and whether or not there was changed approach with PB producing all utility design, no, I think that had always been intended. SDS tried to work with TIE and MUDFA but at the time that TIES were not using the agreements they had in place with the utilities bodies to undertake their design. We were repeatedly asked to deliver design that TIE had already agreed with the utilities providers to deliver on their behalf; we were repeatedly asked to undertake design that we were not responsible for. SDS had people embedded within TIE, working constantly with MUDFA. SDS personnel were based in TIE's MUDFA office supporting them through the development of these complex design interfaces.

206. Regarding the emails Martin Rose of PB sent in November 2006 (**PBH00008126 & PBH00008206)** about concerns in the handling of planning drawings, I would like to say I raised concerns every day in my email correspondence on all sorts of issues. This was not serious; it was just an issue that required resolution.

207. Martin Rose was our Computer Aided Design (CAD) manager and he was seeking clarification on roles and responsibilities. This was not a major failing and did not cause a material delay for the scheme. It was an internal

discussion and request to resolve an issue to maintain design delivery momentum.

208. It was all part of the effort to keep the design moving and was not serious in it at all. I cannot remember how this was resolved but he was the CAD manager so whoever was producing the planning drawings for that particular element of the works - if it was a planning drawing being produced for structural work at Haymarket it would have been the structural designers' responsibility to produce the planning drawings - Mr Rose was stating that the structural designers have done the structural drawings but they are not doing the planning drawings. The second mail (**PBH00008206)** is about roads design. It is a bit heated, but Mr Rose was wanting to clarify who is responsible for this element of the work. There was no material delay as a result of this issue.

209. Regarding the spread sheet circulated by John McAloon of TSS **(CEC01810236, CEC01810237)** on 13th November 2006 suggesting SDS were going to be unable to produce Issued For Construction (IFC) drawings for utility works on time, well, SDS looked back at when the IFC dates were issued and the vast majority of the IFCs could not be issued by these dates because of all of the charrettes and the delay in the decision making process. Most of the utilities diversion work was required in the city centre and most of the charrettes issues – and not just the charrettes but the other change issues - were associated with the city centre. It would be impossible for SDS to issue the IFC drawings while we still had major potential change in locating the tram infrastructure. SDS would not be allowed to because we would not have approval and consent from CEC to issue the IFC drawings. The process was that SDS produced preliminary design; the preliminary design was approved; we developed the detailed design; that was reviewed and approved by TIE, CEC and TSS on their behalf, but the preliminary design was not approved until December 2006. Until we had detailed design approval we could not issue the IFCs so there was no chance of us issuing these to the MUDFA contractor.

210. If SDS had been instructed to proceed with detailed design we would have met the deliverable dates. Unfortunately, design progress we went backwards because of the charrettes and the failure to secure the detailed decisions around the requirements.

211. The email dated 14th November 2006 **(CEC01810621**) is just me advising that if we do all these things we can meet the dates. The comment *"In all areas affected by charrette changes timely decisions need to be given by TIE and the necessary instructions issued to SDS to allow for related disciplines to be considered in the requirements for utility diversions."*, I am stating that if we do not deviate from the route that was developed at the preliminary design stage, we can show what the exclusion zone required for the utilities from which others could develop the utilities diversion design. Then the rest of the bullet points are a subset of the first one i.e. if the first one was resolved, the rest of it can then follow on but without the first one, it is impossible.

212. Referring to the email dated 11th December 2006, from Andie Harper to Chuck Kohler (**PBH00008508**), which I am copied in to. Chuck Kohler became involved because Willie Gallagher flew to our CEO in America and told him of all his concerns associated with our performance on the project. Then our CEO contacted Steve Reynolds or me for an update. The PB CEO asked Chuck Kohler to come to the UK and get involved with the tram scheme to reassure him that we were performing as we should.

213. We were not advised by TIE that they were going to see our CEO - we generally just got the output from the meeting - which was obviously very uncomfortable for us and did not support the relationship between the project based teams. Because of the delay that was being expressed and the consequences of that delay, our costs were spiralling because we were providing support to TIE with a refusal to pay or accept change. Tie advised the PB CEO a very negative view of how we were performing, so the PB CEO asked Chuck Kohler to come to review.

214. That started before Steve Reynolds arrived and continued, for a time after Mr Reynolds had arrived, but then diminished. Chuck Kohler was a very senior person within Parsons Brinckerhoff. He was not the only person from Parsons Brinckerhoff who came across from the US to try to support; there were several during the course of this 12- or 24-month period, some before Steve Reynolds became involved and quite a few afterwards as well. This was very high on Parsons Brinckerhoff's agenda in terms of both costs and, more importantly, reputational standing so they really did try to support and get a very clear view of the issues.

215. I do think the email changed the scope of PBs role. Chuck Kohler came in and met with TIE, TIE told him what they thought SDS's responsibilities are through the contract, Chuck had meetings with the various different parties and undertook to provide TIE with what they asked for.

216. Looking at that email (**PBH00008508**) from Chuck Kohler, I would like to comment on the points he summarised because they just did not happen. Firstly, we were not responsible for providing the utilities services. This was the danger of communications going between very senior members of TIE and very senior members of the Parsons Brinckerhoff's organisation without a clear understanding of the details of the contract. I certainly did not attend that meeting because I would remember it. We had to remind TIE on numerous occasions that they had actually engaged with the utilities authorities themselves to develop routine designs. We provided the permanent-work design for the tram infrastructure but not for the utilities diversions. They had contracts in place for those. SDS were fully aware of that and our responsibility is to support TIE and to develop the critical design but not to develop all of the design. So, I disagree with the proposed action *"The SDS design will show estimated existing and final utilities layouts but will not show temporary utilities diversions or the measures or works required."*, that was not our responsibility to do that and that would have been based upon a view of what TIE thought should be in our contract rather than what was actually in the contract. We provided an exclusion zone; we provided the critical design where there were numerous interfaces between the various utilities. What

SDS were not contracted to do and I am confident that there would have been a clarification after this to say we were not going to do this unless issued with a change order.

217. Under Detailed Design and IFC Drawings, *"SDS will provide the permanent-work design for the utilities"* – These were provided to meet the SDS obligations relative to the delivery of the critical design where there were numerous interfaces between the various utilities. These were also provided for many other sections of the route due to TIE not using the contracts that they had in place with the SUCs to deliver the design for the relocation of their utilities.

218. *"This will include critical elevations and co-ordinates at the locations sufficient for all other layout data to be developed between these points by the contractor and that will be included on all drawings stating that all locations of levels and existing services and the infrastructure are subject to change after contractor field verification."* - Once again, these were provided to meet the SDS obligations relative to the delivery of the critical design where there were numerous interfaces between the various utilities. These were also provided for many other sections of the route due to TIE not using the contracts that they had in place with the SUCs to deliver the design for the relocation of their utilities.

219. *"Typical details will be provided. Sections will be provided showing the relational arrangements of utilities between utilities and other permanent infrastructure at critical locations."* - Again, these were provided to meet the SDS obligations relative to the delivery of the critical design where there were numerous interfaces between the various utilities. These were also provided for many other sections of the route due to TIE not using the contracts that they had in place with the SUCs to deliver the design for the relocation of their utilities.

220. *"The design and details presented will conform to applicable utilities"*. Yes, that was right.

221. Under Constructability *"The SDS design of the permanent works will be based on a constructible scheme that will take into account other known infrastructure and utilities"* - Where possible SDS left the infrastructure and the utilities where they were.

222. *"It also will take into account applicable working regulations"* - That is fine. Where the SDS scope of services starts and stops was important. For all of the stand-alone utilities works, TIE had specific contracts to manage those, the design and the implementation. We were contracted to support them with that. For the complex locations, we took that on and that was part of our scope of services. The section before it, the single sentence at the top *"SDS will provide the permanent works design for the utilities"* that is what we were not contracted to do. Chuck would have written that on the basis of the discussions that he had been party to the day before and further to that, we would have clarified exactly what we were and were not responsible for.

223. As far as working relationship between SDS and TIE and the Tram Project Directors, I would say there were three totally different styles between the TIE Project Directors. I should say that, although it may sound like a very adversarial contract, there was nothing personal or aggressive because of the personal relationships.

224. Ian Kendall had a very driven style and I think up to the point where he left the project he was managing the expectations of the third-party stakeholders very well. He was very clear with them what he was going to deliver for the scheme and what we collectively were going to deliver for the scheme. That made SDS's job a lot easier. He left sometime during the preliminary design. I cannot remember exactly when.

225. The relationship with Andie Harper was more difficult because he was the project director who was working on the scheme when all of the charrettes were taking place, when we were really struggling to get clear direction. There were a lot of conflicting requirements from the various different stakeholders. The SDS relationship with him was less clear.

226. Matthew Crosse made significant progress and I think he did try to get to a point where he got the contractor on board and got them delivering the scheme.

227. If there was any suggestion SDS was not very amenable reference should be made to the correspondence throughout the project. We always tried to be as professional as we could and it was very difficult at times because we were being pressured to deliver the output but did not yet have some of the basic building blocks to proceed with the design. There was a fundamental lack of understanding by TIE of the interfaces and the impact of the lack of key decisions. Our correspondence to TIE, our programmes indicate this as we tried to communicate the SDS concerns. I would not agree that SDS were difficult in that at all.

228. Now referring to an email from Bruce Ennion dated 12th December 2006 (**PBH00008555**) regarding design submission and Employers Requirements. The Employer's Requirements are the basic principles for the assumptions within the design. They describe the performance of the tram and the infrastructure when it is completed, built and in service. If anything is changed in that set of documents, it could have really significant impact on the design assumptions and that is what Bruce Ennion was trying to relay in his message. If things are being changed in those Requirements Definitions, it might make the design more onerous; it might make it less onerous. For example, the minimum radii for the curves on the track: because the tram bidders have said that the trams can negotiate a smaller-radius curve than we have assumed in our Requirements Definition, that might make some of the sections of the route - like the one at St Andrew Square that I mentioned earlier - easier for SDS to undertake and deliver the design. Changes to those Requirements were really important to the design development and SDS were concerned that those changes were being made without consultation with our organisation.

229. Mr Ennion was one of the people who focused on making sure we met the requirements of the scheme and the Employer's Requirements. He would have been constantly focussing on those issues. At the time that the INFRACO was being procured we were involved with and supporting that process. Any issues where we became aware that the Requirements Definition documents were being changed would have been very important to us so SDS would have been relaying that in all the usual forms of communication.

230. There were several changes in the Employer's Requirements, particularly at the stage when the INFRACO contractor was appointed. SDS had a verification and validation design-assurance process and the Requirements Definition formed the basis of that verification and validation. When we became aware of changes to

Employer's Requirements we revisited the verification and validation process and changed all the criteria that were impacted and made sure we still met the requirements. The content of those was very important. We were very concerned that the changes were made very late in the design

231. SDS had certain responsibilities regarding site investigations. Unfortunately, we could not get access to certain sections of the route at that time. A couple of examples: Princes Street, we could not get access to undertake site investigation at the preliminary design stage. Similarly, I think Network Rail, the Haymarket station; we could not get access to a particular plot of land there to undertake site investigation. There were several locations where we could not gain access to undertake that investigation at the time when we would have ideally liked to have done.

232. Under normal circumstances, if you need access, you just de-risk the project and do what is required, explaining whatever needs to done. However on this project, with the areas being such high profile parts of Edinburgh (Princes Street etc.) the plan was to keep the general disruption to a minimum. As a result there were some areas where site investigation was very limited.

233. Access was limited at Princes Street due to the existing traffic congestion on that road; this would have been exacerbated by lane closures for the purposes of site investigation. In order to clearly understand the conditions of the underlying layers of the road pavement numerous trial holes would have been required which was considered too disruptive by CEC.

234. SDS encountered many such difficulties and delays. We were trying to locate a substation at Picardy Place and there was a disused toilet block at Picardy Place and the intention was to site the substation in that toilet block but because of all the development issues that I mentioned earlier, we could not get access to that for quite a period of time. It was part of the development. We struggled to get access to check suitability.

235. There were also delays in producing infrastructure, Princes Street as an example. TIE wanted SDS to have a very shallow track form to minimise the amount of concrete to save on cost and to improve production. Because of the inability to get really good data around the condition of the underlying substructure under Princes

Street, it became a really big debate between TIE and SDS about what the track form should be. SDS was adamant that it needed to be a reinforced concrete slab with a track slab on top. We were concerned that the condition of the formation under Princes Street would not be suitable for a very shallow depth track form. TIE was very keen to have a very shallow depth track form to reduce cost. This disagreement continued for several years and it really impacted on the contractor's price because they assumed a very shallow depth track form (despite SDS advice to TIE).

236. When we actually got access to expose the formation on Princes Street during construction, it was in really poor condition and required the stage one concrete slab that SDS had always stated. I am confident that this issue would have been the basis for a significant claim from the contractor. I would be almost certain that would have been millions of pounds of additional cost to deliver the deeper, two stage, track form.

237. When the route has already been defined and the parliamentary process is complete, it limits the designer's ability to Value Engineer (VE) the solutions. But we did, through the development of the design, try where possible to introduce VE opportunities.

238. The structures were kept simple. SDS had simple structures which met the design requirements definition. We tried where possible to minimise the land take. So where possible we tried to minimise the formation width. We tried to minimise the changes to the existing road surface. So where we introduced the track where that interfaced with the road we did best to try and minimise the associated highway works.

239. If not very careful, the introduction of the tram can result in extensive remodelling of the roads on either side of that tram track work. So we had several iterations between the track and the roads designs teams to minimise those associated highway works to develop a very robust, vertical geometry design for the tram without the need to remodel the road pavement more than absolutely necessary.

240. SDS understood that the business case was financially challenged. We knew that we had to, where possible, offer VE opportunity to try and support TIE in delivering a scheme that was of good quality but was not at any cost. SDS tried to produce the most affordable design that we could without impacting on quality or performance of the system.

241. Certainly, the VE that we identified during our review workshops were realistic proposals.

242. VE does not really affect the design programme. We identified VE through the workshops as we progressed. We designed it where we could and we made it clear if a VE opportunity was identified that would significantly impact on programme delivery, A change management process was in place to enable TIE to make a decision whether they pursued that VE opportunity or not. But the real VE opportunities were around the procurement and the selection of trams and the tram infrastructure components. A good example is really expensive tram shelters. There are really attractive tram shelters that met the functional requirements and were not as expensive as some that are available on the market.

243. We worked with TIE to identify what the VE opportunities were available. What we did not want to do through development of the design was to predicate securing the approvals and consents on very expensive component options or engineering design solutions. It would be very easy for SDS to introduce expensive and decorative tram-stops and very ornate Overhead Line Equipment (OLE) columns into the design to secure approval and consent from the various stakeholders. However, that would have been totally unaffordable for the scheme. We were therefore trying to produce a design that met the Employer's Requirements and achieved reasonable approval and consent without it being unaffordable to the client.

244. I am not aware what VE works were actually achieved but PB will have a list or schedule of VE works, including costs and savings. It became very difficult to measure VE subsequent to the contractor coming on board and the first real issue encountered that the project faced (BSC and TIE) had was around VE.

245. As far as the design charrettes were concerned I would go as far as to say they almost contradicted the VE objectives. The design charrettes were about the aesthetic qualities and almost nothing to do with VE. They addressed the wants and desires for stakeholders involved in the scheme rather than what it was going to cost.

246. I recall almost all of the design for phase 1b (Haymarket to Granton) being completed before 1a because unlike phase 1a, which was so delayed due to the lack of clear

decision, phase 1b was not impacted so SDS were able to proceed with that with no real blockers to cause delay.

247. I note the TIE monthly progress report for February 2007 (**CEC01790790**) where, in response to Transport Scotland feedback on project funding, the Tram Project Board agreed to reprioritise work to phase 1a only. I can understand why they said it, but I do not think it happened. We actually proceeded with phase 1b because that was all that could be progressed due to the outstanding critical issues that were delaying 1a. It was not that we diverted resources from 1a to 1b and caused delay on 1a. It was more that clear decisions were required for phase 1a to progress the design so, to try and move the scheme along and fulfil our obligations under the contract, we focused our attention on 1b to keep the design progressing. We certainly never focused on phase 1b at the expense of phase 1a. We knew 1a was the priority.

248. Looking at the Scott Wilson Railway Preliminary Design Review Report (**PBH00026782**) from 6th December 2006, it substantiates what our view was in June 2006, which was that the preliminary design was robust and fit for purpose. It confirmed that the only section that was not as developed as it should have been was the drainage design which was designed for Roseburn Corridor in phase 1b. I concur with that, we had not completed that design.

249. There were some highly critical comments made of our preliminary design between submission and that December report which SDS did not understand. We were repeatedly advised that all would become clear when the report was issued but in reality we were not given any indication of what the negative issues were, just that there were some. When we received the report SDS were more confused regarding the reasons for the previous comments.

250. The criticism came from TIE and not TSS. It was more from TIE and I think that is the reference (**at PBH00026782 para 2.2**) to *"the review process was in somewhat disarray"* because the 20 days had long since come and gone and they were no nearer to giving us any feedback on that preliminary design despite the fact we were progressing with the detailed design and all of the charrettes.

251. It was always the intention that any unresolved matters identified during the preliminary design process would be addressed during the development of the

detailed design. The preliminary design phase ran for five months after which we produced a large volume of drawings which TIE did not seem to be ready to consider. It then took TIE and their engineering representatives until December to review those drawings.

252. In the case of Edinburgh Park Bridge, for example, during preliminary design the designers develop the form of the bridge, what it will look like and ensure that the design meets the Employer's Requirements through Parliamentary undertakings it had to be an open structure with concrete pillars and a concrete deck and derailment containment measure. The detailed design then expand on the detail of exact dimensions, foundation depths, concrete reinforcement and how the overhead line would be connected to the bridge for example.

253. That is entirely reasonable and typical. SDS could not understand the generic comments that were being made about the status of that preliminary design as it was typical of the level of detail that we would produce for a scheme of this type. This view was eventually confirmed by the Scott Wilson report validating the SDS Preliminary Design, with very few comments (but for the drainage design), it is what they would have expected. Taking nearly six months to provide SDS with the response to the SDS Preliminary Design submission reflected that the Client's review process was in total disarray.

254. If we review the preliminary design against what was built, the preliminary design is very close to what was eventually built despite all of the charrettes, and all of the subsequent comments. This confirms the view that it was a robust preliminary design.

255. I do not think there were unresolved issues in relation to the submitted preliminary design. At the time that SDS submitted the preliminary design we were not overly concerned about any element of it. I do not think at the point of submission of the Preliminary Design in June 2006 SDS thought there was going to be anything but a flow-through to the detailed design. There were lots of details to be resolved and the depot would have been the area that we knew had the most work to do. The detail of the depot design is what takes time to finalise with focus and a lot of attention. We were not overly concerned about anything we had done at the preliminary design

stage. The depot was the least developed and the drainage design on the Roseburn Corridor, but that was fairly simple to resolve.

256. I note the report refers to significant issues with roads design and traffic modelling but I do not think the roads design was of major concern to us. We were quite happy that the integration between the track and the roads was progressing very well. Traffic modelling was an on-going problem and that was because we were wanting to lock down the design and really progress with the traffic model, the approvals authority would not accept proposed junction layouts as they were trying to reserve a position to allow them to change later.

257. SDS could not freeze the traffic modelling and it was evident from a very early stage that there was a reluctance to the model and move on to the next level of detail.

258. Typically with tram projects the interface between the track and the road design is really problematic. SDS focused hard on that for the first several months of engagement with the project knowing that is typically where most of the problems originate and a lot of cost. I was particularly concerned that Halcrow were in charge of the roads design as our subcontractor and PB were delivering the track design. I was concerned those two teams would not work together. They did, however, work very well together.

259. The drawings and documents s submitted by SDS as the deliverable for Preliminary Design were actually far better than I have seen on some other projects. Our preliminary design was, I think, a real step forwards in the development of the scheme and I think it is typical, if not a lot better, than other schemes. After submitting the preliminary design, for it all to unravel and to go back almost to optioneering around the route and what the route should look like and how the tram should progress is very unusual.

260. PB embarked on the detailed designs without closing out the preliminary designs, yes, it was a conscious decision and it was made collectively with TIE. Theses' programmes are based on that assumption that there was no hold point and any issues that SDS were made aware of from the preliminary design would be addressed during the detailed design stage. It was a very conscious decision and

there is correspondence. This reflects how confident SDS were that it was a robust design.

261. TSS had some good people working on the scheme. Their commentary and their effort to move the design forward was very valuable. We had a very good working relationship with TSS. Unfortunately, TSS were in the same position that we were in, that although they could recommend things to be done they had no real power to do anything about it other than to give their comments. They were not in a position to instruct change or stakeholders, only to provide support and commentary, which was very useful and even the reviews that we undertook were very collaborative and they gave us some very valuable support, but they were not empowered to make decisions. They could make recommendations but they could not really force a decision.

262. Typically on Projects of this nature, the client employs a consultant such as SDS to produce a design, they also employ a similar consultant to check that design and ensure that it meets requirements. The client usually takes responsibility for making decisions advised by the designer and adviser on scheme development. The Council, (CEC in this case) are always responsible for reviewing and approving the design and ensuring that the design is suitable in the planning sense and meets their technical requirements i.e. does not result in unacceptable roads layouts. The client (TIE) would be expected to manage the entire process and be the Programme Manager, as in the case of Edinburgh Tram. Through the Tram Project Board I would have expected all parties to be responsible for progress, TIE, Transdev, CEC, etc. The leadership and decision making process is the responsibility of the Project Director and Project Board as collectively they have the influence required within the local authority, stakeholders etc. to drive the project. They also have the power to escalate issues for resolution. This was a failing on the tram scheme and many issues festered for months and years that should have been escalated and resolved at senior levels much earlier. This could have resulted in the completion of the design prior to appointment of the contractor potentially avoiding much of the conflict and dispute that followed.

263. TSS provided a very useful service to TIE because TIE had very few people that had any tram or light rail experience.

264. TIE had very little experience relating to trams and light rail. TIE relied heavily on TSS to provide that experience. I had worked with some of the TSS people before on Midland Metro and they had some really experienced tram operators and designers. TIE could have made more use of TSS advice and support which resulted in TSS disengaging.

265. TSS – Andy Steel and Gavin Murray. David Powell. Tie – I do not recall any of the TIE staff having any tram experience

Design Development - 2007

266. Referring to an email Kate Shudall sent to me on 5th January 2007 (**PBH00008743**) and a number of programme issues she highlighted, this refers again to certain responsibilities relative to approvals and consents to progress the design on with the third parties. We really did not have any powers over them (the third parties) to actually force the resolution. In the case of Edinburgh Park Viaduct, the original design intent document, or the brief, was that it needed to be an open structure with concrete pillars. By "open" I mean it could not just be a ramp with a small bridge opening to go over the network rail line; it had to be an open structure with columns supporting a bridge deck. The charrette process determined it should be a signature style structure as it was seen the opening to Edinburgh Gateway and a very important structure on the route. We were asked by the Charrette group, CEC TEL, TIE and the Edinburgh Design Champion Representative (Ricardo Marini) to draw up sketches for various different types of structures that deviated away from that original brief of an open structure with concrete columns. SDS developed these options as a result of that charrette. There were other examples, like developing signature type structures and retaining walls at Murrayfield. We had numerous meetings with SRU and the various different interested parties at Murrayfield. SDS struggled to get a resolution for the issues. We had no mechanism to try and force a decision so SDS produced design iterations around the various different options and reported those to TIE.

267. With the SRU the intention was to have a signed legal agreement with TIE which covered issues like the retaining walls, the pitches, the access and egress to the stadium. This was also to cover how the tram would interface at the tram-stop which services Murrayfield. This would have resolved, or at least guided the design solution

and how to complete the design to the satisfaction of SRU, but TIE had not secured that agreement by 2007, and this was one of many such examples of issues Kate Shudall was highlighting.

268. Balgreen Road Bridge, is linked to Baird Drive which is a development where the tram is in very close proximity to the local resident's properties. There were various options investigated during the parliamentary process but various residents at Baird Drive were campaigning to minimise the impact on their homes by the tram at the end of their gardens. There was a high and a low level option and despite the high level option being selected previously, TIE were still in negotiation with the residents. It was such a big difference (high level was several metres high and went over Balgreen Road and low level meant a low level crossing of the road) the impact of not securing a final decision on that, had a knock on affect to the adjacent structures at Water of Leith Bridge and the tram-stop at Balgreen Road itself.

269. Gogarburn tram-stop. RBS they wanted to get a signature style tram-stop for their employees to use to get on and off the tram. They were looking to negotiate a deal with TIE to pay extra for a tram stop with a higher specification than the rest of the tram-stops. That is what Kate Shudall is referring to; the RBS were looking to add their own requirements for the design and Kate Shudall was were trying to clarify what they wanted and get a decision so the design could be progressed.

270. All these things are symptomatic of SDS trying to do things to get approval and consent resolved and a guide on what needed to be done with the design. The third parties and various stakeholders requested more and more options.

271. All those examples were absolutely typical. There were probably another 20 or 30 of these of a similar nature; an interested party wanting to influence the design and having an idea about how they wanted things to look. Rather than a firm decision being made we were just left to optioneer, repeatedly.

Further examples;

Edinburgh Airport Tramstop Edinburgh Airport – Finishes to track and covered walkway

Edinburgh Gateway Tramstop - Interchange design
Edinburgh Park – Developer wanted Grass track instead of ballasted Track
RBS Tramstop – Finishes to Tramstop
Baird Drive Residents – high vs. low level option for bridge
Murrayfield SRU – finishes to tramstop, Gatehouse, training pitch layouts,
Haymarket Station 25 year plan – Network Rail – tramstop and associated civils works
Haymarket junction – CEC – junction layout to protect development land
Shandwick Place – Tramstop – CEC relocation of tram stop due to Charrette process
Princes Street – TEL, CEC – could not determine how many buses were to be routed on Princes Street causing significant traffic modelling delays
St Andrew Square – CEC Urban Realm Project – finishes to pavement/footpaths, attempts to route the tram around the perimeter of the square instead of both tracks on one side of the square as per the Parliamentary plans
Picardy Place – CEC and Developer – road layouts, track alignment, potential for hotel on land in middle of existing traffic roundabout
Forth Ports – Significant developer interests – Roads, potential residential, numerous developers led initiatives.

272. The effect they had was to grind progress to a halt. SDS knew, and TIE and CEC made it quite clear, that until we got to a solution that the various interested parties were happy with they would not grant the approval and consent. We produced a graph that tracked from the date an issue was identified through to its resolution and mark where we were along the route. It identified all the decisions we were looking for from TIE and CEC on these issues. TIE often made decisions and then change their instruction. The delays and time spent ground to a halt. They can be identified because there is a time from when these issues are identified through to when TIE would make all these decisions and tell us to just carry on. I do not have access to the data as I no longer work for PB.

273. Referring to the undated letter (**CEC00195976**) David Hutchison of PB sent in response to a letter from Ailsa McGregor, relating to charrette issues, the matters

discussed are typical. His letter reinforced my previous comments earlier about SDS having the power to make the decisions. If we had the power to make a decision we would have moved forwards but we did not.

274. When Steve Reynolds arrived on the project, he bridged the gap between the perceived truth of what was going on within SDS and the reported truth to the Tram Project Board. Steve Reynolds was invited to attend occasional Tram Project Board meetings so it meant that a lot of the reporting that was going to their then project director suddenly became questionable. A lot of the project board representatives were not expecting Steve to be at the first meeting he attended and their reports contained facts that were really quite questionable in their nature. That was the biggest difference that Steve made when he arrived on the project and he reported very plainly to Willie Gallagher exactly what was going on within the delivery of the scheme. I think that made a step change in Willie Gallagher's awareness of the actual status of the project and what SDS had been doing to progress the tram design.

275. Steve's perception of what was going on was quite right and although we did not really change what we were doing after Steve arrived, it definitely was not the case that Steve Reynolds arrived and SDS's performance was resolved. It was more that when Steve arrived it meant that there was a direct link into the very senior levels within the TIE and TEL organisations that allowed them then to get a full picture of what was actually causing the delays on the project. I do not think, up to that point, they had had that level of understanding.

276. In relation to internal reporting, and the documents referring to Tram Project Board Meetings, monthly reports etc. (**TIE00059601**, **TIE00074137** and **CEC01761606**) we had very clear internal reporting. The co-ordination of the work resource and management; SDS managed a design programme that we were trying our best to achieve and we had delivered the preliminary design exactly in accordance with the discussions that we had had around that. There was a general lack of appreciation from TIE's of what they were facing with the delays that were starting to build up with the lack of decision making and direction.

277. The Tram Project Monthly Progress Report (**CEC01803371**) for October 2006 by Andie Harper refers, at paragraph 3.2, to numerous meetings having been held with

SDS senior management in an attempt to address issues including progress of the design. He certainly did not have numerous meetings with me, one maybe two, and I was PB's most senior manager at the time. The same paragraph states these meetings were to address *"prioritisation of the design programme, quality of the product and resourcing"*. PB had all the resources available that we needed to deliver the design. It was more that we could not determine how we would move the design forwards with all of the optioneering and firm decision making. The design was not far below standards, as referred to by AMIS (also in that paragraph) because the report that was written by TSS concluded that the design was actually exactly where it needed to be, but for a very small number of issues that were easy to resolve during the detailed design.

278. The Tram Project Board monthly report for December 2006 (**CEC01360998**) at paragraph 3.2 refers to the first two tranches of detailed design for utilities being delivered late. I go back to the fact that we were not responsible for the utilities design and TIE had contracts in place for those utilities to be designed by the utilities providers themselves. We had to respond and remind TIE they had those contracts. They were expecting SDS to produce utility designs that were not in our scope and they had contracts in place with the SUC owners to deliver these. They were not late; it was not in the SDS contract to deliver them.

279. The minutes of the Design Procurement and Delivery (DPD) sub-committee dated 16th January 2007 (**CEC01766256**) at paragraph 2.4.2 notes concerns in relation to *"the complexity of the SDS internal set-up where information takes significant time to be updated"*. I think our management process, our structure and the way that we organised ourselves was very efficient and very effective. There was no complexity of our internal set-up that meant that we were in any way suffering or late in delivering the design. It was actually one of the successes for SDS, the way that we managed to deliver on time when we had the clear direction on what was required. This can be evidenced by the rate of production of the design once the decisions that we had been waiting for from TIE and CEC were finally made. SDS concluded the design in very short timescales with the same core team, same structure and same resources.

280. The email of 19 January from Willie Gallagher to Tom O'Neill (**CEC01826306**) notes concerns about *"missed deadlines and communication issues at all levels"* and the need for a new full time director for the project. This was a very typical

correspondence. Willie Gallagher was not being briefed about the real issues on the scheme and the fact that the design was suffering from delays due to charrettes and all sorts of optioneering and preferential engineering. These were the real causes of the lack of progress. He contacted our CEO on numerous occasions and went to see him on a few occasions to report these but my understanding was that Willie Gallagher was not being given a very clear understanding of what was causing the delays. When Steve Reynolds got involved there was a major step forward because he advised Willie Gallagher of progress and what the issues were that were causing delay.

281. The email Steve Reynolds sent on 1 February 2007 (**PBH00020993**) noted *"the project management structure is confused, commercial control is inadequate and in simple terms, the overall management of the project has been poor"*. That is almost immediately on the day he became involved with the tram in February 2007, so I am not surprised he made that comment. I do not think he is talking about PB's project management. I actually think he is talking about the overall project management and Steve, at any time, could have changed the PB structure. Being on the board of PB he could have changed me, Alan Dolan or anybody else out of that senior management structure at a moment's notice and also the structure I which we were operating. He did not; in fact once he was aware of the issues he supported the team and structure with both PB at CEO level and TIE.

282. I think Steve Reynolds reference (email dated 4th February 2007 – **PBH00021050**) to the need for a *"rescue"* process is absolutely right and Steve and I spoke at length about the need for a rescue process. He led discussions with CEC and TIE to push through the importance about the need for that rescue process. Steve also made it absolutely clear that if we carried on in the same vein that we were operating at that time, Willie Gallagher and the rest of TIE would not achieve what they were looking for which was a tram to be introduced into Edinburgh.

283. The email, again from Steve Reynolds, dated 28th February 2007 (**PBH00021622**) notes there had been *"a failure to face up to the facts"*. I think, for a period of time up to the point of the submission of the preliminary design (2006), we actually thought that we were in a very good position that things were going very well. What Steve's referring to here is after that submission of the preliminary design progress was not very good. What Steve is articulating here to Greg Ayres is that we could have taken a much harder line earlier in that process when things started to go wrong and force

the meeting potentially with Willie Gallagher and senior levels of CEC to express that view.

284. All of the meetings that we were having at project level, up to project director level and the reports that we were giving, the programmes that we were giving, the responses to our preliminary design were all in full view of TIE. Steve was expressing a view here, internally, that his predecessor should potentially have raised this issue at a higher level both internally within PB and potentially to higher levels within CEC. That may or may not have changed anything because even after Steve's involvement with the project in a very frank exchange of issues and views and a very open discussion and dialogue with Willie Gallagher, it did not result in a noticeable change for a considerable period of time afterwards.

285. Matthew Crosse gave an assessment of design in the Tram Project Board minutes of 23 January 2007 (**CEC00689788** paragraph 3.1.1 to 3.1.5). He states most of the issues are typical of a project this size. This is not my experience on a project like this. By this stage most of the high level issues have been resolved and the project team should be resolving the detail, whereas this project unwound in terms of the freezing of design principles. At times I was concerned that we were actually starting to go against what had been agreed at the parliamentary stage of the project Edinburgh Park Bridge for example. SDS had to do regular checks that we actually had the powers to do what we were actually being asked to by TIE, CEC and the approvals bodies.

286. This was 23rd January, so the same team was working on the detail design as the preliminary design, which had progressed well. The key concerns relate to the delivery programme and the quality of the design that has been talked about. SDS were struggling to make any design progress due to the amount of change and the amount of frustration trying to secure final decisions. I think Matthew was absolutely right though to say that the key to resolving them was to share a close working relationship with SDS and all the stakeholders, which we were doing. We were working hand closely with the stakeholders but we did not have any powers to get them to make a final decision. Working with the stakeholders did not drive the solution; it resulted in SDS providing more options and delay to progress. We continued to do so without securing approval.

287. SDS were perfect. Prior to Steve Reynolds arrival I would say I really do not think anything that PB had done up until that point led to the problems we were experiencing at that time. The consequences of the problems were huge delays as a result of the failure to manage the stakeholders, who had a significant influence, and that cost the project time and money.

288. Referring now to Steve Reynolds and Matthew Crosse's presentation to the DPD subcommittee on 13 February 2007 (**PBH00021285**) on plans for improving design matters and the changed approach to engineering and associated minutes for that meeting (**CEC01790790**). What Steve had asked for was a more a collaborative approach to resolving the outstanding design decisions and for TIE and SDS to work on closer. He was asking for TIE to become more involved and lead with the resolution of the design issues.

289. Now referring to letter dated 16 February 2007 from Halcrow to PB (**PBH00009588**) regarding failure by the Statutory Utility Companies (SUCs) to respond to design submissions within 20 days. TIE did not use the contractual arrangements they had in place with the SUCs and we had to remind them on numerous occasions of the obligations that the SUCs had entered into when they signed the contracts. So the failure to approve the critical designs within 20 days was symptomatic of that failure to use those contracts in the way that they were or in the manner that they were established for.

290. Yes, it did delay. It might have been avoided by TIE engaging with the SUCs on the basis of the contracts that had been established. I think there were seven contracts in place with each of the SUCs and none of them really were used in a positive way to get their support in developing the scheme.

291. I saw limited engagement with SUCs by TIE instead TIE continued to ask SDS to deliver the designs on their behalf. Then we did not get the responses from the SUCs against those designs as submitted.

292. I was at the daylong meeting on 22 February 2007 (reference made to **CEC01793690** and **PBH00021554**) on programme reprioritisation for the tram project. It was intended to establish priorities moving forward, what needed to be done to achieve the requirements and how we were going to get from where we were

at that particular time to achieve that outcome. It was a 'brainstorming' session that was chaired by David Crawley on behalf of TIE. SDS viewed the meeting as 'surreal' because we were at a stage of a project with so much work having been done and so much development in such a high-profile circumstance, to have a client brainstorming session to identify what the key issues were unusual at that particular point in time.

293. The issues were written on post-it notes, put them on the wall and then attempting to derive a collective solution to move the project forwards, it was highly unusual in my experience to have such a meeting at that stage of a contract.

294. Looking at the email dated 23rd February 2007 (**PBH00009610**) regarding Alan Lee being asked to review the PB systems engineering and assurance budgets and comments within that email and an email dated 6th March 2007 by Keith Hawksworth (**PBH00021708**) relating to costs. It was not just about PB cutting costs. We were doing design assurance, but we were trying to apply a design assurance process in the way we would for a normal scheme.

The design assurance process was a very thorough check to ensure that the design that was being delivered met standards and specifications, some that were project specific and others that were industry and local authority standards. These included Employer's Requirements, HMRI guidelines for trams, roads standards and specifications, and other key technical requirements that were identified during the delivery of the design. The designers listed these for checking and validation. Interdisciplinary design checks were undertaken where all design leads reviewed the design to check that there were no conflicts. This was a formal process and resulted in signed documents being produced.

295. Unfortunately, the basis of the design had unravelled because of all the charrettes and the various outstanding issues with stakeholders, CEC and TIE, so the design assurance team were trying to ensure the verification and validation process was moving. Unfortunately whatever steps were put in place for that verification and validation exercise, they were being undermined by the fundamental changes to the scheme.

296. This situation deteriorated so much that SDS paused with the design assurance process during the detailed design stage or limited it to things that could still change

because the design assurance was just costing a significant amount of money without making progress.

297. SDS had stopped doing tasks for design assurance where the design was not certain because there little point because as we were developing the verification model the design was being constantly changed so the verification also had to be constantly revisited. Design assurance was the process that checked, for example, the particular location what issues we needed to ensure that the installation of that tram-stop did not cause an operational problem, tram stops needs to be on straight track, accessible for disabled access, meet HMRI requirements for its back fall and issues of that nature. The track also had to be at a certain level relative to the platform to ensure that the tram doors would open and there would not be a large step onto the trams.

298. The problem was if that tram-stop was moved to a different location, the set of criteria around whether that tram-stop was functional or not could be totally different. It could mean that it was on a traffic junction, as in the case of the one at the bottom of Lothian Road, the set of verification and validation criteria might be different. That was true of lots of the charrette style issues, and SDS had to postpone design assurance until we had a better understanding of some of the critical design issues that were causing delays.

299. At no point did SDS stop doing things that were material to maintaining critical path progress. Much of the design was being repeated several times. So the decision was made to pause with design assurance and then to re start once we got some clarity over what the real solutions were going to be. This is what happened.

300. SDS would never have stopped anything that was critical path activity. Anything that was safety-related would always be paramount and no matter where we were contractually or commercially SDS always have met our obligations in terms of safety and performance.

301. A transferable task could be the track design, where in terms of the verification and validation it was managed by Angus Parkes but in terms of the day-to-day work to establish it was fit for purpose and technically competent, that was being managed by the discipline heads for the various different disciplines. What SDS did was transfer

the tasks making sure everyone understood their responsibilities. The verification and validation was the main process though. Because the design was changing so much that we could not keep up with the verification and validation updates, each design variant often had a different set of assurance issues.

302. The cost cutting and reorganisation was discussed with TIE, we certainly made them aware that Angus (Parkes) was not going to be as involved as he had been, but once we got secure decisions we brought him back complete the validation exercise.

303. PB had to ensure all the right steps were taken to ensure that the design was suitable technically. Interdisciplinary design checks were undertaken to check that the design met the performance requirements. What Angus (Parkes) did was look through all the requirements definitions and put a set of criteria next to each one. SDS had to demonstrate that we had verified and validated that requirement. If SDS had not done that, something could be missed resulting in performance or safety issues. SDS delayed the conclusion of the Design Assurance process until we got absolute clarity over what needed to be done to complete the design, at which time we would complete the verification and validation.

304. The cost cutting and reorganisation did not affect SDS services. We completed the verification and validation exercise so we satisfied ourselves that we had met our obligations and the performance was as it should be.

305. Referring now to Steve Reynolds email of 28th February 2007 (**CEC01794102**) regarding a proposed revision in the approach to change control meetings and his reference to £1.2 million of change requests outstanding for more than eight months. As mentioned previously, TIE did not perceive that anything that was associated with design was a change to scope, so SDS could be asked to do whatever was required by them or third parties at no additional cost to the scheme and with no extension of time., even if the design had previously been reviewed and accepted by them, or even the solution requested by them. So if TIE wanted SDS to do something and we did it, and then a third party stakeholder asked us to change this, TIE's view was even though they had asked for it the fact that a third party said they wanted it doing it was up to us to do it and it was not a change.

306. It was dealt with by a rejection from TIE. They just did not accept the change, so SDS put change control letters in place every time we had a change and TIE would reject them all. The impact was extremely negative. TIE's view was that they were paying a lump sum fixed fee for the design, and that nothing was a change, but that encouraged them to allow third parties to make changes to the design as they perceived that to be free to them, rather, they had paid for it so it was our responsibility to do whatever it took. The actual result was to delay the scheme, because there was no real support there to enforce a decision-making process. Eventually this cost a huge amount of time and money.

307. In relation to Halcrow, and my email dated 7 March 2007 (**PBH00009854**) regarding the reasons given for their failure to submit the design as being spurious at best, on such a complex project there are always going to be difficulties. Their performance was no worse than I would typically expect in the circumstances that we were facing on the scheme. Some of their contribution was absolutely outstanding. Some of their structural design especially was very good. I do not that their performance was poor. They did suffer because of the frustration to design progress in the same ways as PB did, and I think the that if we had continued from preliminary design into detailed design, they would have come out very positively on the project. All of the frustration around the change uncertainty caused a lot of frustration and that manifested itself in some of this correspondence between parties. PB were trying to maintain the urgency and trying to get design complete, but it was incredibly difficult to do that with the lack of decision making and clear leadership from the client's perspective.

308. The Halcrow team were demoralised in the same way as the PB team was, and it put a huge strain on relationships because we were being instructed by TIE to continue. We were passing the instruction on to our sub consultant and we were having problems encouraging them to do things when they were not getting paid for their changes also. We were struggling to get change approved and decisions made by TIE and that was impacting on Halcrow also.

309. Once we had clarity over what was required and once the client (TIE) informed us of their decisions, Halcrow's engaged and their performance was good. There are sometimes areas where things do not go as you might have hoped and this was a complex and challenging scheme, but in reality I think Halcrow would have come out of it quite positively.

310. I really do not think that anything that Halcrow or SDS in any material way contributed to the delay on the scheme, and I would be very robust in that view. Halcrow did not cause the delay and overrun of the scheme. They were as frustrated as PB were with the lack of clear decision making that enabled them to complete their obligations under the contract, so I do not think their performance is what caused a detrimental and significant impact on the scheme.

311. Managing resources was very, very difficult, because we wanted to complete the design and move on. PB had other projects to work on, and so did Halcrow, instead of progressing with the detail of the design through the stages of the project it became more and more uncertain. Trying to manage the resources and the utilisation of those resources with so much uncertainty and conflicting interests and indecision was very difficult. I assume that Halcrow suffered with that in exactly the same way as Parsons Brinckerhoff did.

312. I would not say that any Halcrow failings caused material delays or costs, they were keen to progress the design. The failings in the performance that were commented upon latterly in the project were more due to being able to maintain the same level of enthusiasm and drive when we were clearly suffering with the lack of decisions to enable the team to achieve this. These decisions were required from TIE, CEC and Transdev. Collectively there were decisions outstanding in all of those areas that could have significantly improved the delivery of the scheme.

313. The matters raised in Ailsa McGregor's letter of 22nd March 2007 (**PBH00010056**) concerning the scope of PB's contractual obligations, reinforces my views stated earlier. TIE's view was that it was SDS were best placed to produce utilities designs despite the fact that contracts were in place with the various different utilities companies to develop that design. The SUCs maintain their own records and understand and manage their assets, so we were not in a better place to design required modifications to the SUC infrastructure, especially when there are contracts in place with those SUCs to do exactly what TIE were asking us to do. So I do not agree the matters were within the scope of the SDS contract.

314. Disagreement over the SUCs did cause delays because TIE failed to use the SUC contracts to secure the services from the SUCs to deliver the works. They would ask SDS to deliver it and then to get SUC approval. SDS supported TIE to prepare those

contracts with the SUCs, so we supported TIE in the preparation of the contracts to be used with the SUCs, but TIE did not use them with the SUCs.

315. Referring to critical design and a number of documents, including critical issue logs of 27th February 2007 (**PBH00021607**) and 20th April 2007 (**PBH00010566** & **PBH00010567**) and my paper on Critical Issue Progress (**CEC01790790**) we had no technical problem with addressing the critical design issues. That was not what was causing the delay with the services, though. It was the run of the mill, the standard design, and eventually TIE actually asked us to put people on to site to support them in dealing with the SUCs, which SDS did and we were paid us to do that, so I think there is generally a recognition that the SUCs were best-placed to resolve the issues, but tie asked us to put somebody on site to help them with that engagement with the SUCs to support them.

316. SDS had a design team in place that resolved the critical issues and the critical interfaces between the various different SUCs. We had dedicated people looking after it.

317. SDS had an on-going process of design review, so the location of the services was always being considered and informed by the main design, so we would review the design and the status of the utilities as we progressed the tram infrastructure design.

318. Quite often the more complex utility relocation were parked and where they were not for SDS to resolve, the MUDFA contractor did not move the utilities and left them for resolution at a later date. So when MUDFA completed their works there was a huge number of utilities still in the ground that needed to be moved before the principal contractor could undertake their work. SDS and TIE were aware of that. So the MUDFA contractor quite often moved the simple utilities only, leaving the ones that required more complex design solutions.

319. The email (**PBH00010188**) dated 29 March 2007 from Andrew Fox of PB regarding overspends by PB shows SDS were suffering commercially on the project and I think that really reflects PB's dedication to try to resolve the outstanding issues. The fact that we did not just stop work or try to stop spending money, which would have been the temptation under most contracts. We continued to try to resolve the issues at SDS expense. At the time this project was really high on the agenda of PB's CEO

and this is a reflection of just how professional PB were at the time to continue to try to resolve the issues, despite the fact we were significantly behind financially because of that failure to recognise change on the scheme and to pay SDS for it.

320. SDS tried to resolve issues by raising them with TIE to force a decision to be made on all of the issues hindering the design development. So where we needed decisions about Picardy Place and Princes Street and tram-stops and charrette issues we tried to get a decision from TIE which was the main objective of Steve Reynolds in his role on the scheme.

321. I note the email (**CEC01628233**) dated 23 March 2007 from David Crawley with a list attached (**CEC01628234**) of outstanding major critical issues to be discussed at a meeting on 29 March 2007. Present at the meeting were TIE, Matthew Crosse, Susan Clarke, Geoff Gilbert and Trudi Craggs who was their lawyer. David Crawley worked for TIE as did Ailsa McGregor, was and Tony Glazebrook. Steve Reynolds PB, myself PB, Roger Jones was Transdev, Jim Harris Transdev and Duncan Fraser was CEC.

322. We discussed that we needed resolution of those critical issues in order to move forward and delivering the detailed design. The meeting was just a record of status of all the decisions that needed to be made, the letter is stating the output from that meeting, and it does not provide the answers. It just poses the questions and records the decision to hold a workshop for each issue to attempt to resolve. TIE decided to make an interim decision, one that could be undone later once TIE, CEC, TEL and the third parties had resolved the desired outcome. This is what happened. In several of the instances SDS were made aware of decisions relating to the critical issues and instructions given by TIE. We were also aware that the decision was not final and that TIE might change their minds later which meant that there was significant risk of future change. SDS could progress the design, but there was always that uncertainty that sooner or later it might have to be repeated. This meant that there was reluctance for CEC to approve the design, as they knew it was likely to change.

323. In relation to the email and letter (**PBH00010340** & **PBH00010341**) dated 2nd April 2007 from Architecture and Design Scotland whereby they offered the view that the project lacked design vision etc. SDS were very capable of producing signature-type structures and it is not always the case that signature-type structures cost more

money. So it was not that we were unable or we were tied by costs to produce a particularly imaginative structure.

324. The challenge was, taking Edinburgh Park Bridge as an example, the requirements definition and the parliamentary process had dictated already that it was going to be an open structure with concrete pillars and it is difficult, therefore, to produce something that is particularly a signature-type structure when it is predetermined what it is going to look like. We were keen that the design was as aesthetically pleasing, but we had some constraints. The designers could select the finishes to the structure. Some elements of the structure such as the location of the overhead poles, although it had already been clarified as part of the parliamentary process what the style of the poles was going to be, so we could not amend this. There is not much that can be done with the rest of the overhead line, it is largely supported cabling, it is the structure and finishes which could be varied, but there was not much flexibility due to the decisions made during previous phases of the scheme.

325. Delays might have been avoided by careful management of the expectations of those third party stakeholders. We would expect very clear leadership of the engagement from the client because ultimately the client has got the financial control of the scheme funds, so if an organisation, a stakeholder, wants something that the scheme cannot afford or that the scheme does not want to pay for you would expect the client as the organisation who has the financial responsibility to take a lead in those discussions. SDS did not have visibility of this level of management and direction from the client.

326. Referring to the report (**CEC01565482**) to CEC's Internal Planning Group (IPG) on 17 April 2007 and prior approval submissions, discussions were taking place at that time to force the decision-making process. So rather than develop design and then have an approval period, a statutory approval period, we introduced a prior approval to give visibility to CEC and TIE of the design as it was being developed. So very early, before the design was submitted for formal approval, we presented to CEC, this provided them with the opportunity to view the design that SDS were going to be submitting and if they then required us to make any tweaks to that design we would try and do that ahead of the formal consultation period. The intention was that when we submitted for formal consultation it would be passed quickly and first time.

327. Prior approval could be based on enhanced Preliminary or Detailed Design and what we had hoped was there had been enough discussion around the design and the intent of that design not to require a prior approval. In an effort to mitigate any further delay SDS presented the prior approvals. If the preliminary design had been signed off the prior approval would not have been required as the detailed design would have reflected the preliminary design concepts but in more detail. We would not have envisaged the requirement for doing a prior approval on a preliminary design.

328. SDS would not have proposed something that we did not think was appropriate and/or achievable; we were hoping that it would force some decisions to be made. of the prior approvals submissions were reviewed by CEC, It was the larger issues that caused the delays, rather than the detail around the smaller approvals and consents. It was the delays such as charrettes, interfaces with major stakeholders and traffic modelling etc. that SDS struggled to resolve.

329. I note that same report (CEC01565482) to the IPG on 17 April 2007 also referred to delays SDS were having in obtaining consents from various utility companies, I think it is more about if the statutory utility companies had produced their own designs they could have approved them themselves. Having the approval process in there at all should only really have been relevant to the complex or critical designs around the utilities. So it should be fairly straightforward in securing the utility company consents. So it was the management of the utility diversions that caused the problem rather than any failure to obtain any consents, and once again we should have had minimal involvement with that process anyway, because SDS were not responsible for the delivery of the vast majority of the design.

330. In relation to what the nature and cause of the delay was with the utility companies' consents I really cannot remember.

331. Referring to the minutes (**CEC01015822**) of the TPB on 19 April 2007 and the reference to surveys and unexpected utilities causing delay in progressing or approving utility designs, I cannot remember what the delay would have been.

332. The surveys cannot be expected to pick up every single utility that was present. Particularly in the city centre there are numerous layers of utilities that have been installed over periods of tens of years and no matter how well a survey is performed

to track them, where many layers of utilities exist on top of each other and crossing it is actually very difficult to predict accurately exactly what they are going to be. Historic records from utility companies are notoriously poor for establishing exactly where a utility might be and what the voltage might be, and sometimes the higher voltage utilities mask the lower voltage ones, because the detection is so strong on those higher ones.

333. The best way to obtain prior knowledge as to the whereabouts of utilities is through SUCs themselves, the best documented information available is on historic SUC data records. Some of the SUCs will have people with local knowledge built up over years that would support the identification of services routes because they have been in post for many years and have the knowledge of the area.

334. Looking at letter (**CEC01664017**) dated 1 May 2007 by Alan Dolan, regarding TIE's concerns in relation to delay in the initiation of the utility diversion work programme in section 1A, and all the associated correspondence it is difficult to explain the issue. If this relates to the SDS section 1Awhich I think it does at the time Forth Ports, the developer, had got numerous interests in section 1A and they were looking to change the alignment, change the speed of the tram, the traffic and many other issues. I believe that what had happened was we were put on hold for the development of the design subject to resolution of the issues within section 1A. What they were looking for was confirmation of the exact tram alignment through that section so that they could divert the utilities out of that swept envelope. TIE had put us on hold because they had not got confirmation from Forth Ports as to what their final requirements were. So it is a good example where the design was completely frustrated by third party stakeholder issues that were completely out of SDS powers to resolve.

335. I would not know how they were addressed without doing a detailed review of that particular issue. They would have contributed to a delay in utility works, but I cannot remember exactly what did happen but putting us on hold with the design development for the main infrastructure works meant that we could not confirm the swept path to MUDFA who in turn then would not have been able to get the SUCs to confirm what utilities diversions were required in that area to clear that swept path.

336. Regarding the PB email chain (**PBH00010947**) dated 8 to 11 May 2007 and my email to senior management (**PBH00010902),** relating to stretched resources and bids for

another job, this was fairly typical correspondence. I was doing my job as the project manager on a major project and making it quite clear to managers of other parts of the business that these resources were required on the project and could not be reallocated, as the project was at a critical point. The last thing that I wanted, as the project manager, was for TIE or any other involved party to be able to say we did not deliver because we, in any way, demobilised resource to focus on another project. This was despite being millions of pounds in debt on the scheme and not having any decisions resolved, so it really does reflect how determined SDS were to try to provide a professional service. It did not have much impact upon the quality and timeliness of the services provided by PB in relation to the Edinburgh Tram Project.

337. I note the comments by Ailsa McGregor of TIE, in a TIE internal email (**CEC01626391**) from 10th May 2007 and absolutely do not agree with them but it is quite representative of the view. Firstly she said *"an internal email analysed SDS's hours worked and observed: SDS under resourced the project from the start and during the RDP stage and needed to increase resources during PD stage".* I cannot comment about the requirements' definition phase but we succeeded in delivering the preliminary design in the June, as was agreed.

338. She goes on to say *"By the start of the detail design stage, at the end of October 2006, SDS had equalled the total hours planned for the whole SDS contract".* That reflects the amount of optioneering going that we went through due to the lack of firm decisions on many of the critical issues that were delaying the design. It is quite clear that by the time that we got to October 2006 we had a huge amount of work still to do and we had done so much optioneering that we had used a lot of hours. But that is not because we, in any way, got our estimating wrong. We just did not predict and we could not have predicted that the scheme would unravel so much and interested parties would be allowed so much flexibility to influence the design as they did.

339. She then refers to the surveys that were undertaken in March 2006 and were on-going until March 2007, clearly it was because the amount of change that was happening on the scheme, it was very difficult to try and confirm and conclude the surveys. Confirming survey requirements for Balgreen Road Bridge, for example, was difficult if we were still potentially changing the vertical alignment to a level crossing rather than an elevated structure. So there were many different reasons why there were surveys on-going in 2007, but it was not because of any failure on SDS's

part to estimate or to plan the works. It was because of the on-going change that was being required and requested.

340. In relation to the discrepancy between the planned and the actual hours spent on the project that was straightforward optioneering and repeated engineering effort.

341. The cost of survey on the scheme really was low in the context of the overall cost of SDS's commission. So undertaking additional survey to assist in completing the design would not have been a major concern. We were behind budget by millions of pounds by this point. If more survey would have concluded the design, we absolutely would have done it without question. So that is not in any way an indicator of why we were struggling to complete the design.

342. Looking at the email exchange (**PBH00024190**) within PB in May 2007 regarding a problem in sourcing a water engineer. The absence of a water engineer had minimal impact on overall project progress.

343. We have not got resource full time on the project in all instances. Some of it was full time; some of it is part time. And where it is particularly specialist, such as the water engineering, the environmental surveys, ecology, people get involved and then return back to the business as we needed them. So the fact that the project was on-going and so prolonged meant that management of resources was very difficult because some staff had other commitments that they were working on as well. TIE expected all resources to be instantly available to work on Edinburgh Tram, which most of the time we achieved. It was very disruptive to PB as a company.

344. What I would say about Brian Thompson's comments on the MUDFA contract ("*a weakness in the contract and an expectation for a contractor to have taken responsibility*") is that the SUC should have been doing that design themselves.

345. There were no tensions within PB. We had a board member heavily involved with the scheme, Steve Reynolds. I was a Senior Project Manager within PB and I had the support of the CEO, as did Steve. If we were short of resources we could have called upon that from anywhere in the world without a problem, and we did. We had a member of PB from the United States, Placemakers, come to the UK to support with the Urban Realm development, for example.

346. Referring to my email (**PBH00011675)** dated 29th May 2007 regarding interface specifications; this was the interface between the various different disciplines that we were trying progress. We knew at the time that there was an on-going dialogue between the contractor and TIE about removal of interface management, TIE were questioning whether they wanted Siemens to manage interfaces as part of their scope. I was very conscious that we needed to make sure that we had managed the interfaces in our design and demonstrated that we had managed the interfaces between the various different disciplines. So we wrote specifications to manage the interfaces between the various different disciplines. We wanted to make sure that all of the people that were developing the designs had input into those interface specifications.

347. An interface specification literally details the process for managing interfaces during the scheme development. Maps all of the various different interfaces between the disciplines are developed to ensure that the design that is developed suits all of the disciplines. In producing a design for a duct bank, for example, to carry the power supply ducts, the interface specification would make reference to ensure the bending radii for the duct in the duct bank alignment conforms with the bending radii for the power supplies cables. It would also confirm that there was sufficient depth in the track form to accommodate the duct block. The specification is a list of all of the various different interfaces to ensure that when the design is developed the designs of the different elements consider all of the requirements of the design. As the design is completed the interface register is reviewed and checks made to confirm that the interfaces are acceptable.

348. The level of detail has to be suitable, if not the register can become overloaded with thousands of interfaces relating to very minor issues. The aim is to identify the interfaces, and then as the design develops to check that they have been considered and then sign them off. It is part of the risk management process.

349. The design team did progress interface specification and registers but I was not happy at that time that we were progressing with the detailed design but we had not finalised the interface specifications. I was asking for it to be done because SDS were going to be asked for it by the client, hence the comment relating to Mathew Crosse. Matthew is an expert on interface management and I was fully expecting him to ask us for a copy of our interface management specification.

350. Referring to the email (**PBH00011289**) in which Gordon Callander refers to lack of budget, the various different owners of the disciplines were stating they did not have a budget for various things, my response was that it did not matter whether there was a budget or not. We should get on with the design and complete it.

351. This did not inhibit the production of the design. It was about the timing and making sure that we have used the interface specification to control the design rather than waiting until after completion and checking post completion. Designers manage the interfaces as they are progressing, but we wanted to document them and ensure that we knew what all of the interfaces were and we had listed them and we had managed them as part of the process.

352. In relation to the email (**PBH00011630**) Pauline Benn of PB sent to me and Alan Dolan about drawing issues, when she had stated things were currently a complete shambles and had been badly managed from the start, I should explain that Pauline was the document controller and she was absolutely meticulous in the control of documents and drawings. What she was not happy about were other people outside of her control creating and/or allocating document numbers that were in her control. She was stating she was responsible and she will resolve/issue them. Rather than people generating their own numbers she would create dummy numbers so at least she knew where all the documents were stored. It would not have impacted on our quality. It was just her being absolutely meticulous about the way the drawing and documents were created and logged.

353. It did not give me concern, if anything, the opposite. She was recognising something that could go wrong and wanting to own this absolutely so she could control it. Martin Conroy was our Quality Manager so that is why she was addressing it to Alan, Martin and I, to tell us she was going resolve the issue. Pauline and the team were superb with their document management, document control. Quite often the clients, both TIE and BSC, would ask Pauline for documents rather than their own document management team.

354. I note the report (**CEC01528966**) by David Crawley and Tony Glazebrook which was presented at the DPD subcommittee meeting on 7 June 2007 and comments surrounding outstanding critical issues. They were resolved on an individual basis. The problem was, if we refer back to the previous question, the number had dropped from 80 to 15 but some of those that had been described as resolved were not

actually resolved. SDS had been given an answer by TIE, but on the understanding they had the right change it if they wanted/needed to. They had unlocked the critical issues to the point where we could progress with the design but they could still change their minds if they wanted to alter it. TIE made efforts to get decisions made at this point about a lot of critical issues but many of the ones that were left were the really important ones that were causing the delay on the project. They were also the ones that required resolution with third party stakeholders who had been allowed too much flexibility by this point.

355. Issues were resolved one at a time. There was an initial release, the easy ones of the 80, there were many that just required a one-hour discussion to resolve them and make a decision. These had been frustrating SDS for a long time so within an hour or two, or a few meetings, a lot of those were resolved and we could progress the design. Then it came down to the ones that were really causing problems that TIE struggled to provide direction on. I do not know when the last one was resolved but they were resolved. Some of the critical issues disappeared off our tracker and then some of them came back on again. Picardy Place, the SRU, Gogarburn and the airport tram-stop are all examples of critical issues that went back and forward several times.

356. Referring to the email and comparisons (**PBH00011528** & **PBH00011529**) of versions 9 and 15 of the SDS design programme that Tom Hickman produced on 30 May 2007 and the slippage between the two, I do not accept this was accurately stated. A cold review of the two programmes might suggest the conclusions that TIE's planner drew at the time but there were many reasons why the programme had slipped between the two versions, and it was definitely not because of SDS's performance. It was because of all of the critical issues and resulting delays. I responded very strongly and I was deeply unhappy about the intimation or the statement that we were responsible for the slippage and we, in some way, had not performed because it was totally exaggerated.

357. We wanted to re-baseline the programme because much of the design issued previously, had been affected in some way by the charrettes. For example, if the design of Picardy Place was originally scheduled between August and November 2006 and we had completed that design between August and November 2006, that would then be shown as complete. Then the charrettes might have required SDS to

completely redevelop Picardy Place and do something completely different. Although activity on the original programme had been completed SDS had to effectively repeat all of the work done to date. This was not because the SDS design was deficient; it was because of a requirement to make provision for a new development that had not been finalised. That happened on numerous occasions and locations. It was not anything to do with SDS failure and we needed the re-baseline programmes to take cognisance of all of these different issues that had really destroyed our ability to complete the scheme design. SDS needed to ensure that TIE and CEC understood the impact of the delay to the design programme.

358. I described the email as spurious and misleading because it just was. It was written as though it was a third party who did not understand what was actually going on with the scheme.

Detailed Design (July 2007 to May 2008)

359. Detailed Design started from July 2007 and SDS delivered a significant number of design packages but I would be guessing to put a figure on that or to provide a percentage of completed packages at any given time. I understand Steve Reynolds was asked this and he would be in a better position to provide an accurate answer. I know it could be done, but I could not answer that here and now, I would be guessing.

360. Looking at David Crawley's email (**PBH00010843**) dated 26th April 2007, a TIE Design Management Plan (**CEC01511907**) from 2007 and a PB style Design Assurance Statement (**CEC15111908**) and making comment on why the changes were made and what we did. We produced packages of design, and a Design Assurance Statement with each one, which would confirm the design was in line with requirements definition and the various different requirements that were placed on us from the Parliamentary Process. It would list any deviations away from those and clearly state what they were so that the approvals bodies could review the design assurance statement and know that the rest of the design would be in line with what the previous expectations might have been. The design assurance statement that was created was intended to demonstrate self-assurance from SDS rather than relying on the local authority, or CEC reviewing everything that we have done looking for any issues that were non-compliant or deviated away from standards or specifications.

CEC15111908 should be CEC01511908

361. The changes were made because it was intended to make the design approval faster and more efficient, so that the local authority was not expected to review every detail of the design. Also, so that we became more responsible for underwriting the design requirements as previously provided. SDS were quite happy with that, because it is how we would typically work on schemes of this nature. If we were producing a design for a different organisation, we would normally apply to them for derogations or deviations from standards if we needed them, but otherwise it is pretty much self-assurance. We do not always have third parties technically reviewing and approving the SDS design.

362. I do not remember how many design packages were to be delivered by SDS by the end of January 2008. It would be very easy to identify from the programme. Looking at my email (**CEC01643087**) dated 19th September 2007 which states 174 out of 200 planned deliverables (to date) had been issued (some issues out with SDS control) that would be correct.

363. I think from memory all of the phase 1a detailed design, I do not think there are any exclusions. I cannot remember any exclusions.

364. The difficulties experienced between July 2007 and January 2008 in producing the design packages, related to an outstanding set of critical issues that required resolution, and ultimately securing the approval of the higher level documents, such as the traffic modelling, were predicated on resolving all of the issues. The tram performance was measured on the time taken to cover the distance between one end of the route to the other and back, and there were performance requirements in the contract that had to be achieved. Not being able to resolve some of their permanent works issues and the junction modelling meant that that was particularly difficult to model the tram performance confidently. There were still critical issues that were not being resolved and that may impact on the tram model.

365. Referring to minutes (**PBH00027525**) of the DPD meeting on 5th July 2007 and progress report (**CEC01528966**) that was included at the meeting and the comments made by Willie Gallagher, Geoff Gilbert and Steve Reynolds surrounding whether or not the programme was deliverable, I do not think we ever wrote a programme that was unrealistic, or submitted one knowing in doing so that it was unachievable or undeliverable. We would have been prepared to say, based upon the new way of

working and the decision making, we would have met the SDS programme. Our understanding of the due diligence of the INFRACO bidder on the design, was that we had no problem with the INFRACO bidder undertaking due diligence of what we had done and working with them to achieve the best outcome from that procurement process. SDS were told that the INFRACO bidder would be given information drops of the design, so data drops were planned at suitable timescales within that programme to support the procurement process.

366. My view on PB email (**PBH00011816**) dated 5 July 2007 from Mungo Stacy, in relation to a possible overspends with Planning Drawings, relates to the extensive work in trying to overcome the various different issues, far more than typical for the type of scheme and far more than we ever assumed in our bid. Most of the failure to progress the design was associated with planning issues rather than technical issues. Rarely did we have a technical issue that we could not overcome in the development of the design. The vast majority, as I have already mentioned, was associated with the way that the tram system was going to look rather than any technical performance issues. I am confident that that information is correct. We would have spent 75 per cent, because we had done things four, five or six times as opposed to the once or twice that we would have initially expected to do.

367. Scott Ney's email (**TIE00044022**) dated 6 July 2007 in relation to road design and the different opinions expressed by the stakeholders contributing to problems, is correct, it is, pretty much, in line with what had been in discussion up until that date. His observations were absolutely right. We were optioneering and optioneering with no clear conclusion in many cases.

368. TIE were ultimately responsible for consulting with, and obtaining the agreement from, the different stakeholders in relation to roads design. CEC were the roads authority, but TIE's responsibility was to deliver the tram scheme so it was their responsibility to manage the scheme and pull all of the various parties together to develop a tram system that met expectations.

369. TIE and CEC had the power and influence to drive what they wanted to achieve, and to achieve the desired solution.

370. I note my email (**PBH00011931**) of 6 July 2007 and my comment that the Scottish Parliament's decision for the tram project to proceed had '*resulted in a step change in the client and CEC decision making process*'. There were several points along the tram scheme where it looked like the tram system might stall. When the decision was made to continue, then there was a new emphasis on trying to make progress, so we were getting a bit more momentum.

371. Political uncertainty did affect the progress within the project; inevitably, if it looked like the project was going to stall it would be very demoralising. But when the scheme passed the various stage gates there would generally be a sudden energy from all parties, particularly TIE and CEC to move forwards, to progress and deliver the scheme. That happened a few times, and it is fairly common on schemes such as these.

372. The business case would go into Parliament, and then once it was approved we would there would be a sudden drive to get the scheme delivered.

373. I am really struggling to remember anything to do with the letters (**PBH00026672** and **PBH00026673)** PB sent to Halcrow and TIE in July 2011 relating to an apparent failure by Halcrow to deliver utility drawings of sufficient quality for Section 1A. Likewise with the emails **PBH00027273, PBH00027328** and **CEC01678587** relating to the delay in the delivery of the Section 1B utility drawings and replies from Steve Reynolds and Ian Clark respectively. It all seems to relate to section 1B, but I cannot remember the exact detail around it.

374. I'm not sure how and when these problems were resolved, I know that the Scottish Water representative changed, and SDS struggled to engage at this time, but I am cannot remember the detail. When a date is missed there are usually a lot contributory factors. But I do not know what the detail of that was.

375. The delay would only have been a matter of a small period of time, and not material to the overall delivery of the scheme.

376. There would have been no consequences with Section 1B at all because we did not build it.

377. In relation to the email (**CEC01626383**) dated 12 July 2007 from Geoff Gilbert and the attached Tender Query Form (**CEC01626384**) from BSC regarding insufficiency of information on marked up drawings, SDS were of the understanding that we had met the obligations that were expected of us to provide those information drops. I cannot be sure that these had been provided on the day that they were expected, there were no significant delays that would have impacted on the procurement process. For the vast majority of the sections, even where we had outstanding critical issues, we put in special measures to try to give the contractors a design to price. That was difficult, because for a long time where we were waiting for a decision on how to proceed with certain issues, and then we got a decision from TIE or CEC, and we were expected to produce design for the contractors to base their price upon.

378. Looking now at the minutes (**CEC01530449**) of the DPD Meeting on 2 August 2007 where David Crawley referred to *'just in time'* delivery and *'there is no margin for error'* and the progress report (**PBH00027525**) presented at that DPD meeting noting there was only one remaining high level critical issue and one low level critical issue and the work required by SDS to produce the 18 'self-assured' design packages, I can say there was a lot of work. Suddenly SDS went from being in delay for several months and waiting for decisions to having, within a very short period of time, instruction and guidance on what we were to do for those issues. There was a huge amount of work that needed to be done to achieve the dates for issue to the contractors. There were a huge number of drawings, along with all of the self-assurance statements.

379. Describing the consultation exercise, and referring to the Design Management Plan (**CEC01511907**) and the PB Project Management Plan - Detailed Design Phase (**PBH00017914**), it was nothing that we had not done before. It was just engaging with the various different third-party approvals, TIE, TSS, CEC, with the packages. If we prepared a submission we would engage with CEC roads, consulting them on the proposed design, presenting what had been done, and advised them of what any outstanding issues were, anything they should have concerns with, and if they had any comments, to try to address them. The drawings were annotated during the discussions so that when we took them away SDS could amend them and send them for formal approval. It was a very proactive process aimed to secure that approval and consent.

380. In relation to providing an overview of the work that TIE, TSS and CEC would be required to do in reviewing these design packages I just would not be able to do that. I do not know how much it would be by package. But it is documented. I am sure it would be simple to work out how many there were.

381. Version 17 of the design programme was realistic and achievable; we did not submit a programme that we did not think was achievable, with the commitment from all the parties engaged. SDS and Parsons Brinckerhoff were fully committed to that process. We wanted to get the design completed and move forwards, but that requires the same level of engagement from all of the approvals and consents parties, from TIE, from Transdev and TEL, so that if anything was identified that could potentially cause a problem it needed speedy resolution.

382. Email (**PBH00012105**) dated 13th July 2007 by David Crawley refers to structural design elements being given a lower priority than other elements because of the time taken to carry out a Value Engineering (VE) exercises in relation to structures. This is highly likely; we knew that there would be a proposal made to change the structural design for several of the structures by the contractors. I think it would be entirely likely that that was instructed by TIE and that we should not focus too much on the structures because there are likely VE opportunities that they were going to pursue with the contractors.

383. He (David Crawley) also asks *'is there an option to draw back from features added subsequently to PD1 to improve the aesthetics?'* The charrettes materially changed very little but cost a lot of money and significant delay to the scheme. Many things were proposed, reviewed, options developed, thought through, and then shelved. In the case of the structures, the most obvious one would have been Edinburgh Park Bridge. The structure that was eventually built was exactly the same as the one that was proposed at the preliminary design stage, albeit in more detail. I do not believe any value engineering opportunities were identified during the charrettes. I am unaware of any of the proposals that were discussed during the charrettes being built.

384. I note email (**CEC01627050**) dated 19 July 2007 from David Crawley which sought PB views on design work still on-going in Section 3 and I can confirm design work was still being carried out on phase 1b at that time because TIE wanted to have a

design available should it become required for construction at a future date. It was part of SDS's obligations, and the client also wanted it.

385. I do not believe structures were removed from the design deliverables packages. SDS continued with the development of the design, and I do not remember them being removed from the approvals packages

386. Staff numbers around that time (July 2007) were flexible. If SDS had a requirement to increase the staff I am sure that we would have done. It certainly was not doubled, It would be difficult to double the amount of staff as it would be totally inefficient to do that, this would result in multiple people working on the same drawing or design simultaneously. The design needs to be developed in a logical manner and most of the time one of the disciplines has to lead; the track design had to be passed to the roads team to review the impact on the roads alignment for example.

387. In most cases it is not possible to treble the number or double the number of resources and accelerate the design as a result. A SDS at times did increase the number of people in to work on the scheme and stand them down again if they had no work to do again. If we suddenly received a decision about a particular part of the infrastructure we might mobilise more people or got previous team members working again on the project. I would not be able to say whether we suddenly increased the team at that point. We never significantly reduced the number of people working on the project, when not progressing the design we were developing options.

388. Moving on to the email chain (**CEC01627048 and CEC01675827**) from Andy Conway dated 19th and 20th July 2007, relating to incomplete design packages, CEC were refusing to accept the roads design until they had had the traffic modelling completed, because they knew that the junction modelling dictated was impacted by the junction layouts. If the junction layout is amended, because the junction model predicts that the traffic will become congested, amendments would have to be made to change the junction layout. What we concluded was that the junction layouts had been optimised, so there was nothing really more that we could do with the junction layouts. Further amendments might be made to change the lane markings to give different priorities to the traffic, but in terms of the layouts of the junctions there was nothing more that SDS could do. We could not increase the number of lanes at Haymarket Station, for example, because there was not physically room to do so.

There was opportunity to change the road markings and give different prioritisation to the traffic with the traffic signalling, but our opinion was that the civil design and what Bilfinger Berger and Siemens needed to price was optimised. The price of changing the configuration of the traffic lights or the lane markings is not significant and would not impact on the construction price. We would assure the design on that basis.

389. What Mr Conway was saying is that if we do not get the traffic modelling to work you cannot assure the design. If the traffic does not flow then something on the wider area model and traffic configuration would need to change to take the traffic in a different direction. The road layouts can be optimised as far as is reasonably practical without knocking adjacent buildings down.

390. SDS were prepared to proceed on that basis as this was the best that we could achieve. This was fundamentally one of the biggest problems that SDS had, CEC were reserving the right to change the roads layouts and the roads design until the traffic modelling was concluded to their satisfaction. Traffic modelling is very subjective. It is a model, and when the scheme is implemented, for all sorts of different reasons the traffic might not behave in the way that the model has predicted. Local changes to traffic signalling are required post implementation to optimise traffic movement. People can change their driving habits for all sorts of reasons, and although the model is a good indicator of potential issues, it is not perfect. SDS were very frustrated by the stance taken that they would not accept the roads design until the modelling had been completed, because the fine tuning of the model could continue for many months.

391. There is only so much you can do with the road layout, the widths of the junctions and the position of the curb lines. In order to price the works, the contractor wanted to know how much junction remodelling needed to be done, and then the white lining element could change and it would not have a significant impact on the overall price of the scheme.

392. Looking at internal PB email (**PBH00012299**) dated 27 July 2007 by Alan Dolan, which noted a problem between the SDS Divisions (rail versus road) as I mentioned right at the start, rail and roads, firstly PB were not designing the roads. It was Halcrow. This was not a serious issue and would not have materially delayed the scheme delivery.

393. The letter (**CEC01628923**) dated 7 August 2007 by Ailsa McGregor, regarding the withdrawal of key SDS staff did not materially impact on scheme delivery by SDS. Staff left for various reasons. Kim Dorrington moved on to a new project because fundamentally he was no longer required. The sections managers that had been working on the scheme had been doing so for years, so they knew their sections incredibly well, and they knew all of the issues associated with those sections, and really Kim's role was no longer required.

394. Jonathan Bloe, we moved on because he was the project controls person that was referenced in the other emails, and he was not adding the value that we wanted, so he left and was replaced by Kate Shudall.

395. Jes Hansen had moved on to a new project, but once again it was deemed that he really was no longer required.

396. Paul Wilson was the project manager for section 1B that was not being constructed, and his assistant, Gavin Clement, was a very capable person, so he managed the completion of that section. It was not being built, so it was not fundamentally required.

397. Colin McDonald was the construction manager that I mentioned earlier. Of course by this point the contractors were very much involved and Colin was no longer required.

398. Bob Clarke was the approvals manager; all of our existing staff knew all of the approvals and consents issues, and outstanding issues. The process was all in place, so Bob was released.

399. Martin Hassett was our report writer, and once again, he was not adding as much value as he had done previously and we could manage without him. Simon McCarroll I cannot even remember, so I do not know what he was doing for Halcrow's.

400. It was just a general letter from Ailsa, asking us to confirm what we were doing; she was just making a point. Ailsa knew who they all were, and what they were doing, and why there were no longer required on the scheme. There were more than

sufficient SDS personnel available to complete the scheme and people could have been called back or new people brought in if required.

401. I note the progress report (**CEC01565001**) by David Crawley for the TPB on 9 August 2007, relating to packages being delivered rather late. We were trying to go from having no decisions, or lots of outstanding decisions, to delivering fully assured packages to the contractor, and then requested to accelerate those submissions. I do not know if that was discussed with the bidders, but it would have been incredibly tough to deliver.

402. I cannot give any views on the email (**PBH00028336**) of 20th August 2007 from Steven Bell to David Watters of Halcrow, relating to Halcrow's underperformance on utilities design; I was not a recipient and have no recollection. I am not even sure I was aware at the time.

403. In relation to Halcrow underperformance, I am not entirely sure. Steve Reynolds may have a better recollection.

404. Looking now at the report (CEC01566861) from 30th August 2007 to CEC's IPG and the comment about potentially reviewing as many as 16,000 drawings and 600 reports, I think that was an over estimate, as my reaction at the time indicates.

405. The review by CEC was on-going for a considerable period before this. They had seen all of the proposals previously during the preliminary design stage. It was not as onerous as suggested by that statement.

406. I cannot remember if a revised Prior Approvals programme had been prepared by TIE/SDS with an extension until June 2008.

407. The risk that Detailed Design might have to change for all approvals and consents to be obtained was a significant issue. SDS were producing a design that was suitable. One issue with design is it is possible to continue in a cycle of optioneering. Different Engineers will have different potential solutions for a design. Often the comments received on the design were preferential engineering comments rather than errors relating to the design. Preferences were stated rather than requirements or corrections.

408. There was risk associated with the INFRACO bidder completing a design due diligence exercise, and providing a fixed price, before design had been completed and all prior approvals and consents had been obtained. Based on the progress to date and the history of the project to date, there were opportunities for third-party stakeholders to change their minds on what they wanted the final design to be. This might have material impact on the design solution. The approval and consent was always SDS's biggest concern, and there was a chance, with the structures, for example, for there to be a material change from the design as it stood at the time of the supply of the information to the INFRACO bidder, for the technical approval authority to request a significant change to the structure design, for example.

409. On 4 September 2007 I raised concern that traffic modelling delays (arising from a lack of CEC decision on the design of Picardy Place) were critical path items, as referred to in emails **PBH00012897**, **PBH00012997** and **PBH00014235** from around that time. It was associated with the developer and the inability to freeze what was required at Picardy Place, particularly what the alignment should be. That particular junction had further impacts on numerous other junctions and the wider area model also. It formed the link to Leith, also one of the access points into the city.

410. It had a significant impact on the project, mainly associated with the tram and traffic modelling. The impact would have been less onerous if it had been an isolated junction. It would not have had an impact at all as it transpired later, because it has still not been built. But the modelling had to consider the impact of the final design at Picardy Place was a big problem and SDS needed guidance on the available space and developer requirements.

411. Referring to the report (**CEC01561544**) to CEC's IPG on 27 September 2007 relating to the Detailed Design Review Process and serious gaps in the quality of information being brought forward, SDS disagreed with that. There were not serious gaps in the information being issued. There were minor issues, of which they commented upon extensively, which would typically be dealt with as in discussion as the construction proceeded. . They were all cleared very quickly and it was done in a matter of weeks, two or three weeks maximum.

412. I cannot recall if PB agreed to a revised Prior Approvals Programme

413. I note the email (**CEC01454003**) dated 29 October 2007 from Susan Clark of TIE regarding a number of technical topics that BBS wished to discuss in relation to design due diligence and further correspondence (**PBH00017164** and **PBH00030679**) of a similar nature from Steve Reynolds. I also note Bruce Ennion expressed certain concerns in an email (**PBH00030235**) of the same date. I discussed this with Steve Reynolds in detail. SDS were deeply concerned about entering into discussions with the bidders on a one-to-one basis without rehearsing what our client would and would not have wanted us to say at the time. We were being asked to field very technical people in commercial negotiations and typically we would have expected those questions to be put forward as tender-clarifications questions in writing, that we would then seek the advice from our technical specialists and respond to them accordingly, with a very obviously controlled response, such that it did not put the client in a position that they did not want. We did not want to communicate messages to a bidder that could be misinterpreted or confuse the bidding process. Our design team were not aware of the detail of the commercial discussions that were on-going so I was worried about attending meetings such as these.

414. We were particularly concerned about fielding such technical people into a commercial negotiation. It seemed very unusual to do that, particularly at such an early stage of the negotiation and we feared that it would actually cause more concern to the bidders. That was not because we did not have technical experts, we had, but these were commercial negotiations and we thought it was too much of an ad-hoc way to address bidder issues.

415. The concerns were not addressed as such, the meetings were held and we fielded the people and they definitely said some things that would later cause problems. Not because they were factually incorrect, they were absolutely correct. But they were asked to give the contractors advice, for example, on what they thought the technical complications might be going forwards and that is the sort of question that we definitely would not answer in that sort of environment without consulting with the client first because, effectively, what you are asking a technical expert to do is provide a view on project risk, based on opinion, the most likely outcome and the best case scenario.

I am uncertain what the impact of these discussions would have been on the bidder's price, but it is highly likely that they increased their risk provision due to the meetings or their exclusions in their offer.

416. I note the email exchange (**PBH00013741**) highlighting Forth Ports delays associated with their management in October 2007. Forth Ports were still developing their proposals for what they wanted to use their land for. They are particularly high profile within the area and they had not finalised exactly what they were planning to use the land for. SDS were, as a result, frustrated in completing the design, so even the speed of the traffic on some of the roads was uncertain, and as the basic premise of the tram design was that the speed limit of the tram would match the road traffic, we could not finalise the tram speed profile and journey time. The roads' layouts at Forth Ports, i.e. what the land was to be developed for, was not resolved, so it was very difficult to finalise that design through that particular section.

417. This was 28 October 2007, so the preliminary design was finished in June 2006 and the intention was to have completed the preliminary design for that section in June 2006. In October 2007 SDS were still trying to establish what the general layouts were going to be in the Forth Ports area. It is a new alignment; it actually references the potential to adopt a new alignment.

418. It was addressed through on-going dialogue with Forth Ports. This was not new in October 2007. This was an on-going discussion aiming to resolve what they wanted.

419. Looking at internal PB emails (**PBH00013984**) dated 1st and 2nd November 2007 regarding slippage on structure deliverables. This highlights that we had anticipated we would be much further along in the design. Employees joining and leaving moving projects is something we just had to manage as a company. . As the design became so protracted the impact of staff moving off the project, even leaving the company to pursue different careers, increased. This was an inevitable consequence of the protraction of the project

420. The management of staff and resourcing the scheme did not materially delay the delivery of the design. When positive decisions were made that resolved critical issues mobilising the resources immediately was problematic. We brought in more resource as required to try to mitigate delay. There is always an element of

inefficiency in asking a new person to progress a design that has been started by others. Adding resource is quite difficult because there is always a learning curve on a scheme and it takes a bit of time for them to become familiar with all of the issues. But this was something that had to be managed.

421. PB resourcing did not contribute materially to the slippage of the scheme. We had these issues periodically, and again where we had to focus on mitigating these when people are moving around the company and moving on. But, on the whole, that is part of the day-to-day management of a consulting team.

422. We could deal with slippage, and this particular one, but we had it on several occasions and SDS would just use additional resources from different parts of the business. These emails are routine and not serious.

423. I could not say the structures deliverables were definitely issued within the agreed timescales but there was no significant delay with the structural design delivery. I cannot remember if they were done to the day but they were not significantly late.

424. The delay in the delivery of structures design would not have had an impact on the scope for reducing costs through Value Engineering (VE), this would have been a minor issue that was resolved and did not result in a significant delay or the VE.

425. In relation to the November 2007 emails (**PBH00031284**) that David Crawley noted problems in, relating to TIE access to design documents and drawings (**TIE00038114**) this was just regarding making sure that TIE understood for a design deliverable package what that package constituted, which drawings belonged to which packages. At the time the TIE document controllers were trying to collate the packages I think to issue to the INFRACO bidders, and they wanted to ensure that they understood what belonged to each package. This was just a point of detail about how SDS packaged the drawings.

426. The TIE/PB emails (**PBH00032057**) dated November 2007 reporting concerns from BSC about not receiving sufficient design information to enable them to fix their price, I think, are very minor. We overcame it by giving them all of the information on CDs or DVDs, rather than a drop-box approach. We gave them all of the information. SDS Provided a drawing register and a set of DVDs.

427. SDS supplied all of the data to the bidders. We supported TIE with those tranches of information.

428. Looking at the CEC report (**CEC01398241**) of 15th November 2007 which refers to the Detailed Design Review Process and further delays CEC stated that it is SDS's problem to resolve these issues, rather than a collective project delivery to all work together to get this project delivered. CEC wanted to see the design in overall context. SDS had issued all of the elements of the design, the roads details, the tram stop drawings, the track alignment, the structures etc. for approval but CEC required SDS to submit a whole package again to them to gain approval for the entire section.

429. When the design packages were complete, SDS adopted a slightly different approach, which was meeting with CEC and going through the issues with them collaboratively and agreeing what changes they required and then making the changes and submitting them for overall approval.

430. If any of the technical reviews identified a significant change to the infrastructure design provided to the contractor for pricing purposes, there could be either a risk of additional cost to the project or TIE could be paying them for something that the contractor did not actually deliver. A typical example, if a foundation on a bridge at the detailed-design stage showed a pad foundation and then it turned out later that through the technical approval that it changed it to a pile foundation, there would be a material change in cost in that foundation.

431. In late 2007 discussions took place between PB and the INFRACO bidder, BSC and between PB and TIE in relation to design and novation of the SDS contract. I took part in those discussions, along with Steve Reynolds and Chris Atkins, who was our commercial and contractual representative from PB.

432. The main issue with novation for PB, was that up to this point we contractually reported to TIE. We had lots of outstanding commercial and contractual issues that we needed to resolve, including a significant amount of change that we wanted to be paid for by TIE. But, as of the point of novation, our client would be the contractor, so we wanted to get those financial and commercial issues resolved and also ensure that we had secured all of the decisions from TIE and CEC that we needed to progress with the design.

433. We were concerned that we might be in a worse position to try and resolve any outstanding issues post-novation as we were not dealing directly with the body responsible for making the decisions that could resolve the planning and technical approvals. SDS wanted to be absolutely clear what the solution needed to be for the design that was incomplete. The principle of the novation had changed as we were now facing novation without having completed the design and securing approvals. Post-novation, we were really supposed to be there just in a supporting role to INFRACO, supporting them with securing their approvals and consents associated with their component selection. But, in reality, we had more to do than that and the design still had to be completed. More importantly, the approvals and consents had yet to be achieved for the entire scheme.

434. Employer's Requirements within the Novation Plan (**PBH00014967**) detailed exactly what was intended at the start of the scheme for what the scheme should look like and its performance. The offer made by the INFRACO bidders, was non-compliant with the Employer's Requirements in some areas. TIE took a view where Employer's Requirements were material or not and decided to change some of them to enable that offer from the various bidders to be acceptable.

435. I am aware of Steve Reynolds email and proposal (**PBH00033339** and **PBH00033340**). It seemed the most sensible thing to do, to absolutely understand what the impact was going to be of SDS being novated to the contractor. As the design was incomplete it would put all parties in a very difficult position because we would still be completing design on behalf of TIE but working for the contractor. What that meant was our new client would be wanting us to produce a design that was potentially different again to save cost or programme time or to make it bespoke to their preferred solution or their preferred methods of construction. We were really concerned that that would start to instigate yet further change and hence put at risk the approvals and consents already secured with CEC and TIE and the rest of the approvals bodies.

436. As I stated I was aware of the email (CEC00033339 as above) Steve Reynolds sent on 7th January 2008 regarding delaying novation and, yes, we spoke to them (TIE) about it but they rejected it on the basis that they wanted to progress the procurement process and commence construction.

437. Referring now to emails (**PBH00014454** and **PBH00031360)** of November 2007 relating to an apparent hold up in BBS obtaining access to drawings and the *'Frustration Central'* emails. Under normal circumstances information is provided to a contractor and a price requested. What was starting to happen, as I mentioned previously, was that SDS had started to engage in conversation, in dialogue, with the contractor, which we were really uncomfortable about at the technical level prior to their appointment. Then they started asking SDS for information on the design development that had happened previously. What we were all concerned about was they were looking at alternative design solutions to those presented to them to price. Some solutions had been discounted for numerous reasons, ground conditions, third-party consents etc. But we had started to get drawn into providing data to support that optioneering they were obviously doing in the VE discussions that were going on between them and TIE that SDS were not party to.

438. This was against a backdrop of having years of discussions to try to secure the approval and consent for the designs. We had developed many options and ruled them out or had them ruled out by approvals bodies such as CEC, for lots of different reasons, some of them technical, some of them approvals-related, some of them statutory undertakings, some of them CEC preferences, some of them Historic Scotland, for all sorts of reasons SDS had honed in on in the design that was presented to BSC at bid stage.

439. During the bid process the contractor was looking to change the basis of the design that had been developed to make the construction price cheaper for them. TIE asked for access to our document-management system so that the contractor could start reviewing it and looking at what we had done over the various iterations of design and why we had discounted options. We were very cautious about this approach.

440. Under normal circumstances TIE would issue a design for the INFRACO to price and if they have then got technical queries or VE opportunities they would present them in a formal way for us to then review and comment. But, this was not the case and the process adopted involved engagement in the design process. We were trying to provide them with the tranches of data.

441. It was not really resolved. We provided them with numerous drops of information but we were concerned about the engagement between the contractor and TIE and the procurement process.

442. Referring now to several emails from November 2007, from Damian Sharp (**CEC01481849** and **CEC01482817**) and David Crawley (**PBH00014500**, **PBH00031752**, **PBH00031753** and **PBH00031754)** which relate to the state of design and prior approvals. The issue was SDS had a lot of decisions outstanding for a long time and we were advised by TIE how to overcome those issues or at least temporarily overcome those issues. We were finalising lots of small details on the job at this point and the design was progressing. The council at the time were undertaking a really thorough review of into that detail and identifying lots of small issues that they wanted SDS to resolve to gain approvals. These could have been resolved during construction.

443. What we were all being encouraged to do and what David Crawley, quite rightly, was calling for on his email referenced in that attachment was to work together. SDS went from a sort of standing start where we had no decisions for a long time to one where we received instruction on how to proceed. That enabled SDS to focus on resolving small details and to work with CEC to achieve that. SDS engineers met with CEC Engineers to review the drawings in detail and make amendments on the drawings and then changing them electronically.

444. We were pleased with the proposal to collaborate, to have a strategy where Engineers sit with their roads designer, for example, or the person giving us comments on the roads; get the comments there and then, and then go and make the changes. There was a significant amount of detail that was required by CEC to satisfy them that the design was absolutely complete. But we had gone from a position of standing to having to produce the design to very compressed timescales at this point because we wanted to get the construction drawings out for the contractor to price and to give his final estimates. It would have been a waste of time spending arguing backwards and forwards about what the dates are and what they should have been at this point. SDS wanted to concentrate on getting the design completed.

445. The main items outstanding were the final sign-off from the roads authority for the detailed design. This impacted on the traffic modelling work. SDS had to complete both of in order to satisfy the wider area model. We then had to complete the detailed design and assemble the prior approval submissions. We had planning issues outstanding as well so we had to finish the planning drawings. There was a huge amount of detailed work to be done and SDS were trying to get it done as quickly as possible. It was split into very small sections, and, as can be seen from the programme and the deliverables schedule, there was a lot of detail.

446. I am not sure if the construction programme was ever re-aligned. I think by this point they were taking advice from or looking at the contractor to produce and deliver the construction programme. I am not sure if we updated the construction programme.

447. As of 25 November 2007, from looking at the attachment (**PBH00031753** and **PBH00031753** as above) from the reference prior, it says version 22. We did monthly updates so that would be quite easy to find. I do not think we ever missed a month update on our programme.

PBH00031753 should be PBH00031754

448. In relation to Detailed Design, approvals and consents and utility design completion percentages, I will really struggle to give even approximate percentages. I understand that Steve Reynolds has been asked or has perhaps taken away all these different elements to go and have a look and provide some answers looking at the documents that I no longer have access to. I would really struggle but what I will say is the detail of what percentage complete was the design is a very valid question. It is important to understand what SDS had to go through to actually secure that approval and consent, there was a huge amount of detail and questioning that came out of the roads authority in particular to satisfy them. We went into far more detail than we normally would do for a similar roads design. Far more detailed than I have ever experienced on any other project.

449. Looking at the minutes (**CEC01526422**) of the TPB from 7th December 2007 and the Progress Report (**CEC01387400**) presented to the meeting in relation to comments on slow design delivery and low percentages of completion, I would not agree that it was the fault of SDS. The reason for that is that the completion of the design had been on hold. It alludes to that, particularly with the reference to '*slow design delivery*'; it was not slow design delivery at all due to SDS performance. The design

had been hold for such a considerable period of time due to the critical issues that we were actually working incredibly hard to deliver the design to meet the aspirations of TIE to appoint the contractor and to engage in the process of selection of those contractors. We were literally going from pretty much a standing start to working incredibly hard trying to get these designs complete, and trying to work against a backdrop of a particularly onerous approvals consents set of requirements from the local authority.

450. This alludes to that TIE had to put pressure on Tom O'Neill to force us into action, which could not have been further from the truth. We were working very hard. The pressure that was put onto PB at very senior levels did not help, if anything it made things slightly worse for us because we then had to report up to board level what progress and delay issues, which Steve Reynolds took ownership of. SDS we were working incredibly hard and I making good progress to achieve the targets. It was a very demoralising.

451. I could not remember precisely where we were in terms of completion at this point but we had done much of the design once, twice, three or four times already. SDS were trying to get to where TIE wanted to be as fast as we possibly could. It was not a fair representation of the amount of work that was going on, or the effort that was being put in to achieve TIE's aspirations, or the support that we gave at the time.

452. The SDS design process was discussed with Tom O'Neill because TIE were trying to increase the pressure on us which was not required, helpful or justified. This had been done several times during the project, particularly at early stages. For the SDS team it was incredibly frustrating for TIE to repeatedly do this. We had all the access to resources that we needed on the project and I do not think it made any difference to the speed of our delivery at all.

453. They did discuss issues with Mr O'Neill, but I do not think we knew all of the times that TIE spoke to him. On several occasions people within the TIE organisation, who worked with us very closely and knew how hard we were working, started to inform us that senior members of TIE were going to be reporting to our CEO because they were so sympathetic to the fact of how hard we were working.

454. I am aware of the report (**CEC00309294**) PB produced on 7th December 2007 on the consequences of a phase 1A/1B separation. There were two main reasons; one of them being the critical issues meant that phase 1A was on hold for long periods of time. 1B was almost the only thing we could work on for numerous phases of the job. The other reason is that TIE wanted to have phase 1B complete so that if they ever got to the point where they had funding for it they could commence the construction works. I think there was always an aspiration to try and secure more funding and appoint the contractor to continue with the phase 1B works. The report on separation detailed the work required to complete Line 1A as a standalone route. This included the structure at which the two routes joined, the OLE, the track alignment, signalling, ductworks and the earthworks design. TIE wanted to understand the additional work to separate and then make the connection at a later date.

455. Regarding the report (**CEC01398245**) presented to CEC's IPG on 11th December 2007 regarding concern over planning prior approvals, the issue here is that we had the critical issues along the route and the various hold points along the route. Even though decisions were made on those, the design has to be reviewed holistically, so in the development of the final technical solutions and the final planning solutions we not only had to complete the design of those critical elements we had to put them into context of the rest of the design. The decisions made about the various different hold points meant that we could continue and complete the design for those but then we had to review the whole sections to make sure that the design was consistent.

456. There was always a lack of understanding from the client's perspective as to how much detail there was to be reviewed to make sure that the whole design worked across all of the disciplines, and that is what the complexity of completing the prior approvals and the technical approvals was all about. Ensure that all of the details actually, across all of those numerous disciplines, worked together. The comments received as a result of those approvals, did not just affect one discipline it affected numerous disciplines so we had to reflect the comments across a raft of drawings. Changes to the technical drawings had to be reflected on the planning approvals drawings also. There was a huge amount of very detailed work going on at this time to complete the design.

457. The exchange by email (**CEC01397774**) dated 14 December 2007 between Duncan Fraser of CEC and Geoff Gilbert of TIE, surrounding Quantified Risk Allowance and

whether the scope was fixed or was likely to change as a result of the outstanding design, approvals and consents is important. It really does highlight the stances of the various different organisations involved. CEC, the approvals body, still wanted to be able to change the design that had been developing in the detailed design by this point for nearly two years the detail of the design, the concept, had all been done. SDS were working on the very small details by this point. So, we felt we had done enough work by this point to get the design approvals and consents resolved.

458. CEC maintained this position of wanting to be able to continue to change the design and even the concept of that design all of the way through the detailed design. TIE, by this point, were trying to procure a contractor based upon the design. Although SDS had been instructed on what to do with many of the critical issues, that instruction was still possibly going to change and the final decision around several of the critical issues was still pending confirmation with the third party, such as Forth Ports, SRU, and BAA etc.

459. The approvals body were stating not to procure a contractor because the detail might change or provide warning to INFRACO that the detail might change but TIE were progressing to procure a contractor on a design that indeed might change. It is a very good insight into the position that SDS were involved in, with TIE pushing us to issue For Construction and approved packages, and CEC reserving a position to comment and change that detail, even the concept of that design, to the point where we had had somebody very senior in the council advising TIE that they might still want to change the heart of some of the key design assumptions and that might come out during the approvals and consents.

460. I have read the TIE SDS PM's monthly report (**CEC01526606**) for July 2007, the minutes (**CEC01565001**) of the TPB meeting on 12th July 2007, the minutes of the DPD meeting (**CEC01530449**) on 2nd August 2007, the progress report (**PBH00027525**) to the DPD on 2 August 2007, the DPD minutes (**CEC01644467**) for 30 August 2007, the paper (**CEC01632267**) on the SDS Commercial Issues Resolution, email (**CEC01566988**) dated 11th September 2007 from Steve Reynolds, email (**CEC01667338**) and letter (**CEC01643235**) dated 26th September 2007 from Willie Gallagher, email (**CEC01714281**) dated 28th September 2007 from Steve Reynolds, Greg Ayres' letter (**PBH00029050**) dated 4th October 2007, Willie Gallagher's' letter (**PBH00029051**) dated 4th October 2007, letter (**PBH00015241**)

CEC01566988 should be CEC01566987

dated 22nd November 2007 from Damian Sharp, emails (**PBH00015240**) dated 19th December 2007, (**PBH00015335**) dated 20th December 2007 and (**PBH00015426**) dated 22nd December 2007 regarding concerns in relation to Electro-Magnetic Compatibility and internal email (**PBH00019090**) dated 9th May 2008 from David Gullick. In relation to whether or not I consider these items of correspondence to be failings on the part of SDS during 2007 I would have to say no.

461. As I have already referred, we were working incredibly hard to try and finalise the design despite changing requirements and very fine detail reviews from CEC, and also an on-going lack of certainty of some of the final solutions that would be required from the third party stakeholders. I think the comments made within the correspondence, demonstrates the real lack of understanding of detail that is required to produce a design for such a complex piece of infrastructure in an environment such as Edinburgh City centre where we have to be very careful and sympathetic to the existing infrastructure.

462. A huge amount of work went into introducing the tram into the city streets and the environment in which those streets run. All of the comments here are a very bland overview of the work that was being undertaken without reflecting what was going on in detail. So, the constant performance questioning really was not around the detail. We were working incredibly hard to try and refine the very fine details associated with completion of the works. We had been on hold for such a long period of time, there was an awful lot of work that needed to be done just to finalise the design in short timescales. At this point this was the peak of our resource involvement so we were up to, 157 staff working and delivering that design, securing the approvals and consents.

463. SDS were working incredibly hard and yet we received constant criticism from TIE about their disappointment. It was a very blunt approach at trying to secure the completion of a very complex project. It was demoralising for the designers and the team.

464. Regarding the reference to Tom O'Neill; Steve Reynolds is a board member for Parsons Brinckerhoff so we actually had somebody giving almost 24 hour a day attention to this scheme so there was no need to go to Tom O'Neill. Steve could call on any resource that he wanted at any time, as could I.

465. It was more about how can we work together to achieve what we wanted to achieve. The only issue was trying to achieve a large volume of work in a short space of time and support the TIE effort to procure a contractor when some key decisions were being made so late. At the latter stages of procuring the contractor the design was still incomplete. Had been all complete to everybody's satisfaction and the contractor had had priced that design and been procured against that design, I think then the extent to which the contractor and the client disagreed going forwards would have been significantly reduced. If SDS had received the decisions around critical issues earlier, or the decision made not to undertake charrettes and optioneering to allow the design to be completed and priced by the contractor, the contractor would not have had grounds to really object about subsequent design changes and interpretation of that design.

466. In relation to what caused the delay and increased the cost of the tram project, it was the delayed resolution of changes, impacting on design, leading to the sudden acceleration immediately prior to the time it was presented.

2008

467. Referring now to the TIE SDS project manager's report (**CEC01529677**) for January 2008 and comments made on slippage of the SDS programme and the volume of work still required from SDS, I can say it reflects the amount of technical issues that still required to be resolved. There was still a lot of on-going iterations of design between us, as the designer, and TIE and CEC. Mainly CEC from a technical and planning approvals position. So finalisation of what they wanted the tram system and infrastructure to look like, what the finishes needed to be, how they wanted the tram to tie into the existing infrastructure with road, pavements, the street pavements, and the finalisation of those details took an significant length of time. The completion of the design would impact on the construction programme. SDS were still being asked to undertake optioneering and do whatever it took to complete the design to the satisfaction of the approval body. It had not, at this point, reached the stage where everybody was pushing together to complete the design.

468. In Bruce Ennion's email (**PBH00015491**) to Steve Reynolds and me (dated 6th January 2008) his summary of the problems arising from the misalignment was very accurate. SDS were deeply concerned that, having developed the employer's

requirements early in our involvement in the scheme, they had been changed during the INFRACO procurement process by TIE, without our knowledge or involvement. Our concern was that we had developed the design to a very detailed stage, and sought the technical and planning approvals from CEC on the basis of the development of that detailed design. The ERs were the cornerstone of the assumptions that were used in the design development i.e. what the performance of that tram system should be when it was finished and in service, had been changed without our involvement.

469. At this point we were not sure what the status of those employer's requirements was; all we knew was that they had been revised and a new version had been developed without our involvement, and we were deeply concerned. That is what Mr Ennion is expressing here, concern that our design may no longer meet the employer's requirements that were just about to be issued to the INFRACO.

470. When we were issued the ERs, some of the requirements were no longer as onerous as they had originally been prescribed, which allowed for different technical solutions for the bidders to supply equipment to a performance level that was not as demanding as we had originally described through the employer's requirements.

471. What this effectively meant was that we were concerned that the quality and the performance of the system was not going to be as robust as had originally been intended through the first iterations of the employer's requirements. It also meant that the window of opportunity was wider for the contractors to supply a system that was not as technically superior as it would have been if they had been asked to meet the original set of employer's requirements.

472. Looking now at Alan Dolans email dated 9th January 2008 and attachment (**PBH00015639** and **PBH00015640**) relating to an extension of time claim relating to utilities, and where he also described TIE's utility strategy as, *'Flawed'* and *'Not workable'*, it is actually not quite as described. TIE's utility strategy was not particularly flawed in that sense because the SUCs were responsible for relocating their services based upon the tram design, it is just that with the utilities companies, TIE had never used the agreements that they had in place with the SUCs to do that. So what Alan was proposing here was that the SUCs not only did the design as they

had been contracted to do. The SUCs could have moved their own utilities away from the swept envelope of the tram.

473. What had been done in this project is the MUDFA contract had been procured to move the utilities, but the SUCs developed the design for that move. Often the SUCs did not provide that design or it was very late before they started doing so. We were asked to produce that design and the SUCs were never as engaged with the project as they could be. So the *'buy-in'*, as Alan calls it, to the whole tram philosophy was they were always distant from the scheme, rather than being involved, as was originally intended with the contracts.

474. So what Alan was intimating or stating in the email is if the SUCs had been responsible for moving the utilities, rather than just designing them and commenting upon the design, then there would have been a much better chance of them doing it in time. I am not sure I necessarily agree with the view. Using the MUDFA contractor could have been a successful way of delivering those utilities diversions but another option was the SUCs and they had been producing the design and on the site assisting with the planning and the moving of the utilities, and supporting the resolution of the details around the complex junctions.

475. What was originally intended was the SUCs would do the straightforward design. Where it became complex, we would support and do the spatial planning design, and then the MUDFA contractor would take those designs and move the utilities. What actually happened was the SUCs were on the side-lines not integrated into the scheme, as was originally intended when the various contracts were drawn up. We did not produce the design; it was not in our scope. TIE did not really use the subcontracts that they had with the SUCs to produce the design. So it all became very messy and delayed, and that was the impact.

476. Quite often the complex solutions that we needed the SUCs to give advice on were left in abeyance; they were left for the INFRACO contractor to resolve because the SUCs had not been asked for, or failed to provide, their advice on what needed to be done to resolve those particular issues, of which there were many.

477. The outcome of the MUDFA process may have been more successful if the SUCs had greater involvement and , if TIE had used the contracts that they had in place with the SUCs to bring them into the scheme

478. The reason for the slippage referred to in the email (**PBH00015670**) dated 10th January 2008 from Andy Conway and the email (**PBH00015671**) dated 11th January 2008, relates further to CEC going into great detail and providing some valid comments on the technical details of the design, but also a large number morass of very detailed comments, that really were not required. So there were constant iterations between the roads designer and CEC to try and achieve successful technical approval.

479. Now we had decisions on major issues, mainly around the in-street sections, where most of the issues related to.

480. The time taken to secure the approvals was very onerous and yet we were trying to deliver the designs to meet TIE's procurement strategy with INFRACO and deliver the IFC version. There was a huge amount of work done to try and achieve a set of drawings would meet CEC expectations. These were more onerous than I have ever experienced anywhere else on a similar project.

481. For a tram-stop example, the client would determine the tram-stop locations and the designer then produce the levels, the geometry of the tram-stop. A layout for what the tram-stop should look like in terms of where the shelter should be, where the litter bins might be, where the seating should be and the help point should be. But then what would typically happen is a group of people who really know the functionality of the tram, the operator, the designer and somebody from the planning authority and the technical authority, would literally go to the tram-stop position and decide where the various pieces of infrastructure will go, agree it. Now, you can do that in advance of the construction and that will become the technical and the prior approval but, actually, on a lot of schemes, what you will do is during the construction, you will go and visit the site and as the job is being built you will actually just go and physically decide there and then, between the four or five interested parties, exactly where the best position is going to be. On Edinburgh Tram we were moving parts of the infrastructure repeatedly with all interested parties having different opinions and requirements.

482. Everything that was done had a knock-on, the impact of moving things around, so there was a suite of drawings, for example, for a tram-stop that also interfaces with the roads drawings, so any small change on the tram-stop drawings impacts on the roads drawing. So there is a constant knock-on impact. For this technical approval the bar was set so incredibly high against a backdrop of trying to get everything done for the INFRACO, that it was almost a mutually exclusive set of requirements or wishes. CEC wanted a very detailed design, which was impossible to achieve in the timescales TIE wanted to procure the contractor.

483. Referring now to an email (**PBH00015934**) Steve Reynolds sent me on 21st January 2008 setting out certain concerns in relation to the project, there were two real issues that Steve was referring to here. One was the Employers Requirements (ERs) and one was the critical issues. With the critical issues, we had been instructed on how to proceed to get several to resolution, but we were constantly reminded they were not actually resolved and that any of them could be changed at any time. So there was an on-going series of meetings on the critical issues. What actually had happened was they were parked and we were instructed to proceed on a basis, but those critical issues could have become unlocked, and we were still working with the various different stakeholders to try and resolve those critical issues. So we had been instructed to proceed but we were still aware that the critical issues could fundamentally change the design once they were actually resolved, rather than the decision that had been reached.

484. TIE had real problems in locking down and agreeing a solution with those third-party stakeholders. We had no power to do it, so the likes of Forth Ports, Scottish Rugby Union (SRU) and Edinburgh Airport. SDS supported and we did our best to try and offer solutions but the critical issues were still of concern and they had not been resolved to the satisfaction of those third-party stakeholders, and very influential third-party stakeholders with significant interests in the land that the tram was crossing. We were very much aware that things could easily change from the assumptions that we had taken to date and that is why Steve is saying things were being allowed to drift. He was very aware of the likely impact on the final construction details that INFRACO were basing their price on and he knew that TIE and CEC had not really resolved those.

485. The second issue was the ERs. As I mentioned earlier, we were really struggling to understand what had been changed with the ERs. We were very concerned that the design that we were finalising might not have met the employer's requirements that TIE had changed. The answer that I gave earlier covers that and this is just the on-going dialogue surrounding what was being procured and whether or not the design conforms to those ERs. So we were getting pressured to produce the design, but with real uncertainty of resolution of outstanding issues with the third parties, and also these ERs that we had not seen and the very detailed review that the authorities were requiring as well as very detailed drawings.

486. We did a review of the ERs and that is when we identified that, rather than our design not conforming to the ERs, we actually concluded that what we had delivered met the revised set of employer's requirements. The previous ERs were far more onerous in terms of the performance requirements to achieve the solution. So we felt that the ERs had been relaxed; the employer's requirements were not as onerous as they previously were. This opened the opportunity for bidders to provide different solutions that otherwise may not have been acceptable under the previous set of employer's requirements.

487. Looking at the minutes (**CEC01246826**) of the joint meeting of the TPB and TIE board and TEL board on 23 January 2008 and Willie Gallagher's comments about consents causing tension for the SDS novation I think we have already gone through most of that. I think the detail that was required to achieve the technical approval was very onerous. Any small changes on the technical drawings had to be reflected on the planning drawings, and the planning drawings had to match those technical solutions. This meant that the whole raft of drawings were going through iterations and frustrating our ability to obtain those consents. The bar was set so high that it was very, very difficult to achieve the approvals and consents through exchanges of emails and schedules. Ultimately these were resolved through face to face meetings with CEC.

488. Looking at email and attachment (**PBH00016254** and **PBH00016255**) dated 23 January 2008 relating to the Interdisciplinary Design Checks (IDCs) table, the table actually provides a very good insight into the status of the project at the time. You can understand the level of uncertainty around the finalisation of the design, even at that late stage. There are still references to third-party agreements being required to

finalise the design, the ADM Milling Agreement, and there are agreements or third-party changes that were modifying the design, CEC, the Forth Ports agreement on concept of Ocean Terminal. TIE still had not closed out the Forth Ports agreement as of 30 January 2008, so there is a huge number in here of issues that required completion. This can be seen on a section-by-section basis, where all the issues were and the sort of issues that were still fairly major that SDS were trying to overcome to try to achieve the approvals and consents.

489. The owner of the issues in the vast majority of cases was TIE and particularly CEC. Against this backdrop of outstanding issues and details to be confirmed, that were fairly significant and impacted on large sections of the route, we were trying to finalise the technical designs, secure the technical approvals and the prior approvals to issue Issued For Construction (IFC) drawings or packages of data which TIE were using to procure a major construction contact. This provides a really good summary of what we were struggling to overcome and we were supporting with each of them. There were meetings going on, there were letters being written, there were concept designs or sketches going backwards and forwards to try to resolve these issues. So, even where the owner was TIE, they relied on us totally to provide the technical commentary and solutions to overcome these issues and to attend the meetings and so on to try to finalise them.

490. It reflects how the finalisation of the various different details impacts on the delivery of the design and scheme. Once the design was complete for each of the disciplines SDS had to undertake a holistic review of all of the relevant details and check that there were no clashes between the various different design documents and drawings. Those IDCs involved all of the designers, CEC and TIE, and the design was finished from a technical perspective. We were far through the process but the problem was the issues that are in the boxes on the right-hand side, you can see referenced (referring to document PBH00016255 on screen) could undo those IDCs and the technical and prior approvals at any time. We were aware that all these were still incomplete and that the third-party stakeholders had not accepted the proposals that had been put forward by TIE, and any of them could change. Some of them went on to change, and SDS had to modify the design several times, Forth Ports being one example.

491. In relation to the design packages that were required to be delivered by January 2008 (documents **PBH00035497**, **PBH00035498**, **PBH00016853**, **PBH00016854** and **PBH000116312** all refer) to be honest, I have looked at these documents but I am unable to provide comments.

PBH000116312 should be PBH00016312

492. Referring now to the PB Weekly Reports (**PBH00034458** and **PBH00034982**) dated 1st and 15th February 2008 where concerns are expressed on the status of the SDS Design and the Employers Requirements. Regarding the employer's requirements, we were very concerned, as I mentioned earlier, about the status of the employer's requirements because these are just so important, and we were deeply concerned that changes to the employer's requirements would significantly impact on the performance of the scheme upon completion. We had, at this point, reviewed the employer's requirements and were having meetings with TIE, and feeding back. But our conclusion was that the employer's requirements actually were less onerous than they were previously.

493. In relation to the slippage referred to in the TIE SDS project manager report (**CEC01521306**) for February 2008 this is just another reflection of exactly responses to earlier questions. The resolution of those third-party issues had not been achieved at this point so changes were still likely to be made to the design that was being developed to IFC level and gaining those technical and prior approvals. So, it reflects the state of flux even at this late stage of the project.

494. I cannot remember if the meeting referred to in the TIE SDS PM's report took place.

495. My view on the email exchange (**CEC01489736**) of 6th February 2008 about reviewing the impact of the current design status of the INFRACO construction programme was that the design programme could be achieved. Steven Sharp at this point was requesting the look-ahead, the design programme that had been produced. He was providing a commentary on experience to date, which was entirely reasonable. What he was stating in his email is based upon the experience over the last almost two years in trying to resolve some of these issues. What is going to change that means that we will be able achieve this design programme now? It really does reflect the problem that we faced over a long period of time, which was we knew the design programme was achievable, and we were prepared to put in the effort to achieve that programme.

496. Quite rightly Steve Sharp in this case is pointing out that experience to date has not meant there has been a step change in approach that enables SDS to meet this design programme. It is not that we did not have the designers or the capability or the capacity to deliver the design, it was just all of the other issues, the critical issues, the detailing of the approvals and consents that we were facing. What he was reflecting upon was how we were expected to meet this really onerous design programme given the experience to date. I agree with that. Unless there was a step change or a total change in approach from all parties, we were not going to achieve that programme. I think that is an entirely reasonable set of comments from the planner.

497. I note the comments from the minutes (**CEC01246825**) of the joint meeting of the TPB and the TEL Board on 13th February 2008, where Steven Bell confirmed that the final design packages would be expected in late 2008. I think it is a bit subjective for me to comment. The issue is really about the contractor and procuring the contractor, we knew that there were likely changes due to the agreements with third parties, and the critical issues were not all firmly actually resolved. A position had just been taken by TIE to progress the design. So, we were concerned that design changes would result that would change the design after the INFRACO were procured. That was highly likely. There was a risk relating to the INFRACO pricing the designs at the time.

498. The final design packages were not expected until late 2008 that is correct. They would be reviewing a design on the drawings that they received that was potentially going to change, and BSC might not know that, or what was likely to change and how significant those changes were. The due diligence would be based on something that was going to be superseded and their price would be based on something that was going to change. BSC were not actually going to build what they were reviewing during the due diligence process. Critical issues still had to be resolved with stakeholders. We were never sure whether that was expressed to BSC or not.

499. I was sent the latest version of the change order tracker (**PBH00016747** and **PBH00016748**) on 14 February 2008. It was an internal PB document summarising the status of changes under the SDS contract and their value to that date. I believe these would be from a change control register but I would not have access to those documents now but, yes, we developed a final version. We had all of the detail of the breakdown of costs, and in a lot of detail.

500. In relation to the Design Due Diligence Summary Report (**DLA00006338**) produced by BSC on 18th February 2008 and PB Weekly Report (**PBH00031681**) for 23rd November 2007 based on the provision of design information, the information that we provided was provided through TIE. So, we did not provide anything out with that document transfer route. We did provide two or three drops of information. I cannot remember exactly how many. It was all of the completed drawings for structures, roads, track that we had done to date. It was as much as we had completed at the time that we issued to TIE for onward transmission to BSC.

501. I do not believe we saw the BBS reports. I do not think we were ever given the documents and that were issued to TIE by BBS. So in relation to Ground Investigation Reports from that Design Due Diligence Summary Report I do not think we received a design due diligence report at SDS for our comment. That would have been issued directly to TIE. I certainly do not recall ever commenting on that.

502. However, I would agree, from the content of that report, that there was a risk that the lack of availability of Site Investigation (SI) and Ground Investigation (GI) at that stage may have impacted.

503. Likewise with Assumed Approval Timescales, that is true that *'the latest available SDS programme, version 23, is based on optimistic approval periods for which no contractual reference could be found',* yes that is correct.

504. Similarly with Design Prioritisation, design priorities did not correspond to the construction, that was correct, and that was because phase 1B was not on hold so we had designed 1B and that was not even being built, but that was because of all the historic critical issues and third party stakeholder issues through section 1A.

505. Value Engineering and reference to any redesign due to value engineering leading to further delays that too, is correct. We subsequently became aware that the contractor was undertaking a VE exercise, particularly around the structures, and we had not been involved with discussions on that at that point, with TIE. SDS had not made any allowances for changes to the design to meet the VE expectations of the contractor, so we were delivering our own design as per our original contract.

506. Although I would not be able to comment as to whether the design had been passed to BBS, obviously a huge amount of work had been done on the design to that point, so I would not be able to say whether it had been issued to them or not, and I would have to check what we issued via those data drops. But certainly a huge amount of work had been done, so they could have had reference to the progress at that time if it had been deemed required.

507. Looking at the INFRACO Contract (**USB00000032**) I do not know and would not be able to comment on why BBS took account of design information received up to 14 December 2007 yet the base date for the design priced by BBS in the INFRACO contract was 25 November 2007. I do not know why there were two different dates.

508. The main issue that arose from the supply to BSC of incomplete design packages was the change between the design that was issued to BSC in their pricing, or BSC in their pricing, and change to what was actually finally approved by CC technical and approval authorities. There was a potential for differences between the two.

509. I note PB Weekly Report (**PBH00035854**) dated 29th February 2008 and reference to progress being made in relation to misalignment between the Employer's Requirements, the SDS Design and the BBS Offer. Agreement would have been through an instruction from TIE but I have not got access to that.

510. It was agreed that our design was not expected to meet the blanket changes to the employer's requirements. So TIE accepted that they should not expect the SDS design to meet their revised set of Employer's Requirements that they developed without our consultation, and that the design changes required would be paid for. Those changes were carried out post novation, not pre novation, as we were striving to try to get the design completed prior to novation. So the design changes, to meet any updates in the Employer's Requirements, were carried forward into the post novation.

511. TIE generally took the position on all matters that it was part of our contract to do whatever it took to deliver the design for the tram to achieve approvals and consents and that anything that was required to get to that position was an SDS contractual requirement. So, yes, the vast majority of the time TIE refused to accept the changes that SDS applied for.

512. My views on the TIE SDS's project manager's report (**CEC01526381**) for March 2008 in relation to slippage, production of critical design deliverables and changes due to alignment of the BBS offer and SDS design are that our concern was escalating on the potential for the final resolution of the critical issues and the design deliverables associated with those on the construction programme. As I have mentioned, the design was being produced at a pace and the final design was being submitted for approval and consent, both for the technical and prior approvals. But we were very conscious that there was still a huge raft of critical issues that were not concluded that could change that design, and that the construction programme would be impacted and the contractors price.

513. We were also concerned that the tempo of the approvals and consents was not what it needed to be due to the very onerous level of detail the CEC were insisting upon to achieve those consents. We also had the traffic modelling that was outstanding, which CEC had always labelled a showstopper. We were aware that that was one of the potential showstoppers to the scheme; it was firmly the gift of CEC and that obtaining that final approval of the traffic modelling was something that could cause residual problems later.

514. There was a conflict between the construction programme and the procurement of BSC and their timescales for commencement of onsite works, versus the actual status of the completion of the design and all of the associated approvals and consents, which we raised on numerous occasions.

515. I cannot remember the exact discussion but we were constantly working on the programme, focussing on trying to pull deliverables and get them completed. We had numerous discussions on the programme with TIE at the time. The problem lay in the detail behind those programmes and the resolution of those details to meet the timescales. So there was significant emphasis on the programming element of the works and trying to get the technical drawings produced, but what was undermining that was a potential that the design was going to change.

516. I really cannot recall the *'detailed meeting'* held week commencing 3rd March 2008.

517. Regarding the email and attachment (**CEC01492877** and **CEC01492878**) dated 3 March 2008 from Tom Hickman, TIE's Programme Manager which showed the

version 27 design programme clashed with the BSC construction programme, TIE were the overall owners of the master programme. We provided information to support that programme. I am not sure that they successfully addressed the slippage between the two and I know that subsequently the construction contract was based upon an old version of the design programme. SDS we were at a version significantly further on than the one that was bound into the contract, and there had been further design slippage even at the time of award to BSC. This email at the time set the scene for future problems, which was a misalignment between the design programme as it stood and the version that BSC were reviewing in the context of their commencement of construction activities. That continued and an old version of the design programme was bound into the construction contract.

518. I am not sure that it was ever really was addressed. I think the BSC were always looking at old versions of the design programme, which were constantly slipping due to the close out of detailed design issues and third party agreements. We were preparing design programmes to achieve the best output for the project, but against that there were design issues that were still not resolved but we were battling with and that required resolution to achieve what we were trying to do.

519. Looking at email (**CEC01488279**) dated 6th March 2008 where Steve Reynolds advised Damian Sharp of his views in respect of the issue of the misalignment of the Employer's Requirements; I would say the emails refer to one example of potential non-compliance. The track alignment criteria that was included within the ERs, it is really important that the track alignment criteria, which basically gives the guidance to the designer of what the minimum curve radii are, what the minimum changes in cant and cant deficiency, all of the limits of the design for the track alignment, the track alignment criteria spells those out in great detail. The reason why that is so important is the vehicle manufacturer uses that data to ensure compliance between the tram vehicle and the track.

520. If at this stage of the development of the scheme the Employer's Requirements changes that track alignment criteria, there is a significant risk that the tram vehicles that are being procured do not actually meet the requirements of the geometry of the track. The opposite can also be true. In designing the track alignment criteria what we try and do is future proof the project or the scheme so that in future tram vehicles could be procured fairly readily from numerous suppliers that could replace any aging

or poorly performing rolling stock. So the track alignment criteria is particularly important because it not only sets the criteria for the initial procurement of tram vehicles but also any subsequent procurement at a later date.

521. What SDS were concerned about is the track as designed for the scheme in this particular case, in 2006, 2007 and 2008, had been designed against a set of ERs with track alignment criteria dictated within them that had been changed in further versions of the ERs in 2008. What we were concerned about is the procurement of the vehicle at this time may be impacted by those changes, so a non-compliant vehicle may be selected or that in future a tram vehicle could only be procured from the supplier that had been identified during this procurement process. So the possibility of going to a different supplier in future may actually be in jeopardy. Potentially resulting in the operator being locked into the procurement of all tram vehicles from this one particular supplier because they were the only ones that could achieve the Employer's requirements criteria that TIE had subsequently changed.

522. So we were concerned that the changes to the ERs were being made relevant to the supply of the vehicles that TIE had identified at this point, rather than a more generic set of criteria that met industry standards. That is just one example and there are numerous similar examples through the changes to the ERs that we were concerned about.

523. TIE decided to stick with the Employer's Requirements as they had written them and instruct us to modify the design, if required, as a further stage of design development post novation. So we did iterations of a review of the ERs and then we were to pick up any changes post novation.

524. My view of the comments in the progress report (**CEC01246825**) provided to the TPB on 12th March 2008 regarding the timings of SDS submissions to CEC for their approvals are that structural designs were progressed by this point although the structural design was still being finalised for numerous structures. There was a push to try and finalise the designs as quickly as possible to meet the aspirations of the procurement strategy. But there was so much work that was left to the end because of the various problems that we had had along the way that it was becoming increasingly difficult to complete the designs ahead of the final procurement of the

contractor and to supply them with the final technical and planning approved drawings for all of the structures along the route.

525. The steps we took to try and resolve the problems were basically numerous meetings and a really big SDS effort to complete the designs.

526. In relation to the email (**PBH00017475**) dated 13th March 2008 from Carla Jones, and the attachment, a draft of a design construction programme tracker (**PBH00017476**), I can tell you that what the tracker does for each of the design packages is list any risks associated with the provision of the design at this stage. So, for example, for Russell Road Bridge; we were to provide the design for the substructure, the superstructure and the tracker was to try and provide these by certain dates reducing timescales where we could. For Issue for Construction as early as possible certain steps were taken in the programme, to reduce the comments period for TIE and CEC and also the update to comments. We would get comments from TIE, from CEC and we took various measures on the next issue of the programme to try and pull forward the early issue of the issue for construction drawings. So, the comments on the right-hand side give a short commentary as to what the potential impact of taking this course of action was.

527. For example, on that Russell Road bridge example, TIE risk is that the IFC is to be issued prior to the prior approval being granted by CEC. So, issuing For Construction drawings before we have got the approvals for the planning from CEC, there is a risk there that any planning changes impact on that IFC and also even the technical submission. What we did was take a view on what the risks were associated with each one of these. Some of them were higher risk than others, for example at Haymarket Station viaduct we had to do road safety audits. Road safety audits are part of the completion of the road's design was to undertake road safety audits to consider the safety of the revised junction layouts, lane configuration and vehicle and pedestrian interfaces. During the design stage, a review was undertaken to make sure that the constructed design would be safe and these road safety audits were part of that. Some of the design was being issued before the road safety audits had been completed and that would also be a risk.

528. This table is trying to achieve earliest possible dates and listing behind it all of the risks associated with taking the steps as identified in this proposal.

We were doing things like splitting the prior approvals for some elements of work. The depot, for example, the prior approval for the earthworks was being secured ahead of the approval of the overall depot itself. The risk there was if the depot itself required a change it may impact on the earthwork.

529. It was not something we were very happy about doing because it put significant risk on the project by bringing forward these IFC dates without completing all of the associated approvals, consents, checks, Interdisciplinary Design Checks (IDCs) and the road's safety audits.

530. Looking now at the email and Schedule 4 attachment (**PBH00017765** and **PBH00017766**) from Bruce Ennion dated 27th March 2008 and his comments expressing concerns, I can firstly say that PB needed to see Schedule 4 before agreeing the novation agreement because we were aware that the offer had been based on a set of drawings that were actually in many cases likely to be superseded, so we wanted to see what the obligations under Schedule 4 and novation were.

531. We wanted to see what was detailed within Schedule 4 because obviously we were being novated from TIE into the INFRACO contractor organisation and we needed to see what the implications of that could be for us, given that we knew that the design was incomplete and our experience to date on the project and all of the prolongation associated with completion of the detailed design. We were concerned about the Employer's Requirements, we were concerned that some of the drawings potentially had changed from the time that BSC had seen them to the point at which we were to be novated into their organisation, and we knew that there were critical issues that still could impact on that design. We knew to understand what the implications of being novated into that contractor were going to be, given that at the time we had originally agreed to enter into a contract which involved novation at a point, we had expected that we would have completed the design, it would all have been approved by that point, and it was only going to be the introduction of the contractor's preferred equipment supply that would change that design.

532. The civils elements should really have been completed, the roads, the structures, the rail design, up to the point of component selection. What we were doing after novation originally we had understood to be the finalisation, selection of the tram shelters, the specific ones that the contractor was procuring, and replacing those with

our generic shelter, details that we had previously identified. That was what we had expected to be doing after novation. In reality there was going to be a lot of additional design to be completed or finalised due to the delay with the approvals and consents. The critical issues were still potentially unresolved so we needed to understand what the impact on us and the contractor was going to be after novation.

533. The concern around Schedule 4 was that we suspected there was a lot of design still to be done, and Schedule 4 was still written as though the design was complete and that the construction could proceed using that design. We were immediately concerned, as you can see from Mr Ennion's comments, that there was a potential for disagreement and for change to be resulting from the circumstances at the time of the contracts being signed, and we knew that, we could see that and we advised TIE on that as well.

534. We did have concerns when we saw Schedule 4, and this is a commentary made by Mr Ennion on an initial review of Schedule 4, and he has made notes next to each of the points and a lot of them allude to potential change, delays, and things of that nature. I agree with many of the points that he made in his comments and many of them actually turned into real issues post signing of the contract.

535. We did advise TIE of the concerns we had in relation to Schedule 4. Our proposal to them was actually to delay the signing of the contract and/or delay of the novation of SDS into the contractor's organisation until such time as the design was actually complete. They rejected that proposal.

536. Referring to the email (**PBH00019148**) and attached PB Commentary on the BBS Civils Offer (**PBH00019149**) that Steve Reynolds sent on 27th March 2008, the main comment about this is that we produced a design for the tram system and our understanding through our contract was that that design would be used and populated with the contractor's final design and would be tweaked to introduce their final design. For example, we produced a track design based upon a generic solution and our understanding was that the contractor would then select their final track form design and introduce that and replace our generic design with that specific one.

537. What concerned us was the wording of the INFRACO proposals suggested that the design was going to be changed to include what had been offered from the

contractor, rather than the other way around. We assumed that the generic design would be used and then the contractor would populate with their components. What was becoming evident was that the design would be modified to suit their components. A good example is the track form, BBS had put forward an offer of a shallow depth track form, yet SDS had always maintained that the track form could not be a shallow track form because we thought that the track formation condition through Princes Street, for example, was not going to be robust enough to support a shallow depth track form. We also had the view that final track form design was to be the responsibility of the INFRACO contractor. We were concerned that it was going to become our responsibility to secure the approvals and consents and ultimately to take responsibility for their design of that track form. That was symptomatic of several issues through this document. It should have been that our obligation ended at the completion of the generic design, and they (the INFRACO contractor) completed the design with their componentry, with us providing support in that process.

538. Another good example, and this is a really important point, is the formation. Although Site Investigation (SI) and Ground Investigation (GI) had been undertaken through the route, sufficient to undertake the design and produce a design, what we had advocated all along was as the groundworks progressed by the contractor, an on-going rolling programme of SI and GI would be undertaken, SDS produced a table of ground modifications. So as the excavation progressed our intention was that SI and GI would be undertaken and then, depending on the results for the particular piece of ground, that from the table of the suite of modifications a solution for the modification and strengthening of the ground would be made. But what was being advocated here was that a standard approach would be adopted deviating from the SDS assumptions and plan. So there was clear misalignment between what we were advocating and what was actually being priced by the contractor.

539. Regarding any relationship between the Commentary on the BBS Civils Offer document (**PBH00019149)** and Appendix Part 7C of the SDS novation contract **(CEC01370880)** I would have to do a detailed comparison between the two, but I think our assumptions have been carried through into 7C of the novation agreement. SDS were pretty consistent in our responses to the approach to the completion of the design. There was almost a lack of understanding of the extent and the status of the design, which is evident from several of the comments. For example the Civils state under 'Scope of Work, *"Revise alignment where possible and where programme*

permits to minimise roads work scope. Revise generally raise vertical alignment of the track." SDS had already optimised this interface to minimise the associated highway works and I think there was a general lack of awareness of how much work had been done to achieve that. There was an over optimistic view that VE might identify a cost saving.

540. Both sets of comments really reflect that there is misunderstanding or a misalignment in other's view of where SDS were and our knowledge of where we were. It was not our view; it was our knowledge of where we were compared to what was being included in the contract between TIE and BSC. So, for example, another issue that really alarmed us was the BSC assumptions relating to the roads pavement design, the BBS Civils comments that have been put forward *"Pavement design is to be revised to a plane and resurface (new regulating and surface course only) when survey information is available and where it confirms the feasibility of this design solution. Note, this activity is an alternative to vertical alignment activity above."* We could see very little opportunity to plane off the existing road, introduce the track, and reinstate the road. This to us was not possible. What actually happened was what we had planned, the roads were excavated, the track form was installed, and then any associated highway works were done after as part of that process. So an assumption of just planing off the running surface of the road and reinstating just at a local level was one that we did not agree with and, given our detailed knowledge of the design to that point, we knew that was not possible.

541. I note the key issues in the TIE SDS's project manager report (**CEC01523027**) from March 2008 regarding slippage, delivery of completed packages and changes due to alignment of BBS offer and SDS design and my understanding of these matters is that it is the same issue we have spoken about, further on in time. The completion of the technical and prior approvals was on-going, with trying to iron out all of the on-going technical issues at minutiae level, which was causing further delay. Then the changes to alignment with the BBS offer and the SDS design, what they were trying to do was understand how our design could be changed to reflect the offer that was being put forward by BBS, so we were trying to understand what changes would be required to a design that was not complete. Referring to earlier comments, the ideal would have been to have a completed design, obtain all approvals and consents, and then BSC would have introduced their componentry into that design.

542. What was happening was the design was incomplete, we were going through the process of trying to finalise that design and get the approvals and consents. BSC had become involved, and in some instances, proposed designs that did not follow the assumptions that we had delivered. TIE were trying to understand what would have to change with for the SDS design to achieve BSC's offer. There was going to be a whole raft of further technical and prior approvals that would have been required if we were to update the design to reflect BSC's proposals.

543. I would not have recollection of any meeting that was held on 28th March 2008 relating to the slippage between v26 and v28 of the SDS programme.

544. I can give my views on the letters sent to Willie Gallagher by David Leslie on 31 March 2008 (**CEC01493318**) and by Duncan Fraser on 3rd April 2008 (**CEC01493639**) setting out concerns in relation to technical approvals. The main issue was the volume of design that had been on hold due to the various different critical issues suddenly being unlocked meant that SDS had a large amount of work to complete. As mentioned previously, the level of detail that was expected on the drawings was far in excess of what would normally be expected to achieve the approval and consent. So the bar was set incredibly high and that was not just my opinion, our design team were used to working with numerous authorities and the level of detail and check that was being undertaken. But it appeared in the form of rafts of notes rather than constructive dialogue. It was portrayed as a failure in some way of SDS's performance when in actual fact SDS were being put in an incredibly difficult position trying to manage and produce design meeting very high expectations and conflicting requirements, and provide design in great depth and detail and yet in many areas there were high level principles that delayed the scheme for a very long time. The close out of all the comments was achieved in a very short space of time. Once we had the very positive dialogue with CEC and the collective collaborative decision was made to close them out, this was achieved in a matter of weeks. The SDS team were aware these were really small details that could be closed out and with a collaborative approach with TIE and CEC to get them resolved that is ultimately what happened.

545. The TIE/SDS project manager's report (**CEC01293923**) for April 2008 refers to the issues surrounding approvals, the Design Mitigation Plan and the conclusion of Schedule 14 of the Design Review and Design Management Plan. This report

reflects the critical issues that were still on-going. The design package had been completed but we still had critical high impact issues that were unresolved. Agreement with SRU was still on-going, standing issues with Forth Ports were still on-going, we were still were struggling with that Frederick Street due to client and third party issues. The same was true at Haymarket due to the road's alignment and the development opportunity. So the report really reflects the on-going nature of critical issues and delays to conclude the technical and planning approvals on the scheme. It also shows the changes that were being processed and SDS were issuing change orders and notification of change but there was a significant number of changes that were outstanding. There was a huge number of changes on-going constantly throughout the period and that is what was needed to conclude the design.

546. Referring to the email (**PBH00037087**) dated 1 April 2008 from Bruce Ennion relating to Employer's Requirements being *'diluted and open to interpretation'*; this is what I mentioned earlier. Our original concern was that our design would no longer meet the ERs. What actually transpired was the ERs had been, Bruce has used the words *'diluted and open to interpretation'*, I think the word *'relaxed'* is probably more suitable. It made it more open for the bidders to provide equipment and performance levels that were not as onerous as had been included within the original ERs. That was something we were concerned about because we endeavoured to produce and deliver a scheme that was of a high specification with particularly good performance, maintenance and operational characteristics.

547. The ERs had been changed by TIE. In the first instance they had been developed collaboratively between SDS and TIE, but at the time that they were changed in this particular case it was more to open an opportunity for alternative bids from the INFRACO contractors. That was our understanding at the time, to allow more potential for alternative proposals from the contractors and allow more opportunity for VE to enable them to reduce their price.

548. My explanation of the email (**PBH00017943**) and attachment (**PBH00017944**) sent by Bruce Ennion on 3rd April 2008 which commented that design would have to progress in parallel with construction, pending design and the need for early release of information, is that TIE were issuing BBS design that was not approved. It had not been through the approval and consent process, or was going through the approval and consent process, and there were numerous tweaks to that design that were

required to achieve that approval and consent. The concern here is that changes in that design would not be picked up through the bidding process and that BBS would be pricing work that when they actually came to construct the design solution would have changed. So there was a concern there that basing the BBS price on an unapproved design that was incomplete was a significant risk to the scheme.

549. In relation to email (**PBH00018003**) and attached draft disclosure statement (**PBH00018014**) sent to me from Steve Reynolds on 4th April 2008 the first thing is that the disclosure statement relates to the issue that we were being novated into the contractor. It was to provide a summary of the position of the design at the time, so what design was complete, what was outstanding, what planning was complete, the planning approvals. So to gain a detailed statement of where we were and also any particular issues, any issues where we had breached the limits of deviation, for example, and to provide a schedule of those. Because of the changes in the alignment that were driven by Forth Ports, in some places we were actually now outside of the limits of deviation that had been secured, so it was reliant then separate detailed agreements between Forth Ports and CEC as the local authority. The Disclosure Statement detailed issues that were material and could impact on the ability of a contractor to engage, commence works and subsequently complete the construction. It was a detailed understanding of what the contractor were going to be inheriting when we were novated into their organisation.

550. Steve Reynolds made reference to the key issue relating to the PB (SDS) response to the requirements for integration of the Siemens design components. What we were really concerned about, was we became aware that BSC had priced and, through negotiation with TIE, had removed the systems integration element of their offer which ensured that the BBS systems design worked with the SDS design. So typically we designed the civils infrastructure to a point and then Siemens in particular were responsible for introducing their detailed components/selection. Their systems for the control of the tram, the power supplies, and the detailed fit out of the depot control room, and things of that nature that were wholly driven by their systems. What concerned us was the systems integration that you would normally do, and that the contractors were responsible for, had been eliminated from their scope and that £9 million (from memory) had been reduced from their fee that was associated with systems integration. We were concerned now that we were going to

be expected to undertake that work on their behalf, which was a significant undertaking.

551. I am aware of Alan Henderson (CEC) writing the letter (**PBH00018590**) to Steven bell of TIE on 10 April 2008 to suggest a way of ensuring that the designs for the tram project fit with the council's wider aspirations for public realm and that it be based on the Tram Public Realm Design Workbook. What I was concerned about was that this strategy was going to further undermine our ability to secure our prior approvals and consents. But the City of Edinburgh obviously was undertaking works all the time around the city and this strategy, I was concerned, would drive further change into our already substantially complete prior approvals submissions.

552. It was a strategy that CEC were developing and, as the tram had not been built, we were concerned that we might have included within the design some elements that did not comply with that strategy. An example could be the overhead line poles, a lot of work had been done to select the pole, the shape of the pole, the colour of the pole, and if in that strategy there was a preference to a particular type of lighting column, there was a potential then that a further review of the overhead line masts would have been required so that they were sympathetic to CEC's new lighting column. It was issues of that sort of nature that SDS was concerned about.

553. I cannot recall there being any direct impact from that strategy. It was more about the timing of it and the potential for the officers who were reviewing our design to require further change and delay approvals, pending the issue of the new strategy document.

554. I note the CEC IPG report (**CEC01246992**) of 16th April 2008 and comments made relating to Planning Prior Approvals and Technical Approvals. These reflect the status of the prior and technical approval packages that were on-going. As mentioned previously, the technical approvals were delayed due to the very detailed nature of the comments that we were receiving which were very detailed and also the concern that both the technical and prior approvals that were on-going would impact on the design and cause a change to what had been priced by the INFRACO during the bid stage of the project.

555. There was a continuous dialogue on-going with CEC and the other approvals bodies to secure the approvals consent but the concern was that these changes to achieve

the approvals consents might impact on the design and also the price submitted by the contractor.

556. The email (**PBH00018646**) dated 25 April 2008 from Ian Brown gave an update of various works, the email gives some fairly detailed examples of the efforts to try to secure the approvals and consents and the issues that were hindering us, hindering the design generally to achieve completion. It details the depot, substations, the tram-stops and then the boundary works and the IDCs. Ian Brown was the lead SDS architect and he was responsible for the delivery of the architectural input into all of those elements of the works.

557. At the depot Ian was referring to the issues associated with splitting the depot into four deliverables packages rather than a single application as he clearly thought that was not a good proposal. He was anticipating further change in accommodation arrangements which would be difficult. There are outfall consents that had not been achieved at that time with Scottish Water that were potentially causing a delay to the scheme and also the builders works details at the depot had been requested by BBS that had not been completed at that time.

558. The tram-stops were subject to numerous changes which were still on-going at various stops; Shandwick Place, Haymarket tram-stop, West Pilton tram-stop, Craig Leith tram-stop, Balgreen Road, Roseburn stop and Picardy Place tram-stop. There were outstanding works at novation, Forth Ports, the Ocean Terminal tram-stop was in delay due to consultation with Forth Ports. The airport tram-stop was also under review due to delays with BAA in consultation with them. SRU; previous comments that the SRU legal agreement was signed incredibly late and that was predicated on certain works being undertaken as part of the tram project and we were awaiting instructions from TIE about how to proceed. There was a significant number of outstanding issues.

559. The approvals were on-going but the project was running late for all of the issues, the issues that I have just mentioned and lots of others. There was quite a lot still to do to secure the final approvals and consents. The changes in the technical detail impacted on the planning and prior approvals. This prevented securing approval for the look of something and how it was going to interact with the rest of the landscaping and the aesthetics, the finishes, the location of any furniture on tram-

stops and things of that nature when the technical detail was still changing. A change in the kerb alignment or a change in the road alignment would impact on the look and the finishes of that road junction or tram-stop or the depot, there was constant iteration due to a lack of firm decision making as we proceeded with the design.

560. Referring to the email (**TIE00359836**) from Damian Sharp of TIE to Dennis Murray dated 25th April 2008, and the inference, following my claim for changes to the value of £390,000, that PB may have seen novation as an opportunity to improve its commercial position, I have already stated that we had advocated the delay of the novation of SDS to the contractor's organisation. If we were aiming to improve our commercial position, that is the opposite of what we would do, we would have encouraged novation. We could have tried to novate earlier, rather than later, to improve our commercial position and that would commercially have been the best position for SDS. Our request to delay novation actually disclosed our genuine attempt to do what is right for the project. We remained professional throughout. I cannot recall what happened with that claim. I think most of the claims were resolved at the point of novation.

561. I note the email chain (**PBH00018764**) dated 3rd April 2008 where Steve Reynolds advised Steven Bell that he is *"concerned with initial feedback from meetings yesterday that there may be an expectation that PB should rework at its cost designs which have already been submitted and paid for in order to meet new BBS requirements. This comes back to achieving clarity of scope and I need to discuss this development with you"* We had always anticipated and expected that the design that we had delivered would be populated with the components that BSC selected and not a complete revisit of that design, but with the change of the employer's requirements and discussions on-going around VE between TIE and BSC, SDS were concerned that because our design was incomplete or because the approval's process was incomplete, that we would be asked to start redesigning what we had already done and secured approvals for, or were in the process of securing approvals for to meet the aspirations of TIE and BSC to incorporate their offer. We saw potential significant changes to the design coming as opposed to just BSC introducing their elements of componentry such as their preferred tram shelter for example. Our understanding was that the generic tram shelter would be replaced with the INFRACOs proposed manufacturer's shelter along with the other proposed tram stop furniture. Instead of that we were expecting potentially to have to start

3rd April 2008 should be 30th April 2008

moving the tram-stops or redesigning the tram-stops in accordance with BSC's preferences or what they had offered through the bid stage.

562. In discussion with BBS and TIE I think it became generally recognised that our involvement post-novation was incredibly valuable to the project and that it was likely that that would necessitate a higher level of involvement post-novation than we had anticipated at the time of signing the original contract. We started to look about how we could support TIE and BSC in more detail going forwards.

563. We did discuss the matter with Steven Bell and others; there was quite a protracted series of discussions about what SDS would do and what our responsibilities would be post-novation. It became part of the novation documentation, our revised role. We amended the proposal to include additional support to BSC post-novation so we would take a far more active role in supporting them with the delivery of design.

564. I am aware of emails (**PBH00018831** and **PBH00018832)** from Stephen Reynolds to Scott Ney, May 2008 in which he referred to preferential engineering. Preferential engineering is where one engineer has got a preference for a particular solution whereas another engineer might have a different view. It is quite common amongst engineering solutions for different parties to have different solutions. Some have got pros and cons and it is not always immediately obvious which solution is the best. Some solutions are equal, some are better on safety grounds, some are cheaper and some are easier for a contractor to install. Engineers should take a balanced view about what the best solution is for a particular problem but even then it is not always obvious. What can quite often happen is we will be asked to change a design by an engineer who has got a different view of what that best solution might be even though the original solution is perfectly adequate, safe and cost efficient.

565. SDS needed to protect against it because if we produced a series of designs and then the approvals body, BSC, TIE or other stakeholders who had influence over our ability to secure the approval and consent, took a different view, could result in redesigning several times with no added value The alternative design may be no better technically or aesthetically only different.

566. In relation to the TIE SDS project manager report (**CEC01365690**) from May 2008 and the figures surrounding design packages, I really cannot remember in that level

of detail. If the same question has been asked of Steve Reynolds, I am sure he would have the ability to secure that level of knowledge.

567. Referring now to the minutes (**CEC00080738**) of TPB on 7th May 2008 and the comments by David Mackay and Andrew Fitchie surrounding BBS's signing of the contract and nervousness about the design, I would say we shared the view that it was a high risk strategy to enter into an agreement based on a design that was incomplete. Hence the reason for suggesting that novation was delayed until such time as the design had been completed and, more importantly, approved. We were very confident that we had produced sufficient technical detail and the design was robust. We were still very uncomfortable at the level of detail for the conclusion of the approvals and consents and, more importantly, the resolution of outstanding critical issues with those third party stakeholders. We could see that that alone could cause considerable impact on the solutions for the completion of the design.

568. SDS were also not aware of the status of the design that BSC had actually priced. We were aware from the drops of information that we had given them that the design in many cases had moved on between that time and the completion of the approvals and consents and the IDC process and the assurance processes and also the various stakeholder discussions that had been on-going since that time, so we were concerned.

569. Regarding the email (**PBH00019085**) from Firas Bakir on 9th May 2008 in which I referred to poor communication within PB, I can say we had really competent design managers involved with the scheme. This is more of a reflection of the frustration that was on-going with the extent of the change, in particular associated with the roads design and the completion of that. Firas Bakir was in charge of the traffic modelling and not just the co-ordination with our designers but also with the other third parties. There was the Joint Review Committee (JRC) and CEC that Firas was having to co-ordinate with and that co-ordination took a lot of management because CEC and JRC were producing the wider area model separately to the traffic modelling that we were responsible for. It was the co-ordination, the finalisation of the detailed design for the roads layout that was causing problems. This was taking a considerable amount of management and focus.

570. PB never struggled technically, it was a highly complex project with lots of interfaces to manage but we had a team of very good people involved with access to more if required. We did not have a competence problem in the management or the design delivery. It was more about the nature in which the programme and the project had progressed rather than any internal technical competence or management problems that we had.

Novation 14th May 2008

571. In relation to the SDS contract (**CEC00839054** – previously mentioned) and the actual SDS Novation Contract (**CEC01370880** – previously mentioned) as executed on 14th May 2008, I was involved in many of the SDS meetings with BSC and TIE.

572. The novation contract became more detailed as a direct consequence of the design being incomplete and the consents not having been obtained as well as the misalignment of the design with the employer's requirements as set out in the INFRACO contract. As well as those three issues there was the on-going third party interfaces such as SRU, Forth Ports, Picardy Place development, which were still causing SDS and TIE concern.

573. PB entered into the SDS novation contract with TIE and INFRACO on 14th May 2008, which referenced version 31 of the SDS Design Programme. In relation to Version 31 (**USB00000087**) we did not take the decision lightly to base the conclusion of the design on the programme. We thought that it was possible to achieve but would require a huge effort from, not just ourselves, but all interested parties especially CEC and TIE to resolve all the outstanding issues and to secure the approvals and consents. We still thought it was entirely possible to achieve.

574. The summary provided is accurate I am sure, but I do not know percentages. Steve Reynolds will know and was probably asked, I know that we did an awful lot of it but I would not know what the percentage was.

575. To address the misalignment of the SDS design and INFRACO employer's requirement and INFRACO proposals, workshops took place with a view to producing a report identifying changes which were needed. There was an intention for those

workshops to take place within the first eight weeks of novation. That did not happen which was important.

576. I was first aware of the misalignment between the SDS design, the employer's requirements and the BSC offer was prior to novation hence our concern that we would be expected to revisit our design and to align it with BSC's offer or the employer's requirements or both. The problem was that TIE had modified the employer's requirements which no longer reflected the employer's requirements to which we had referred to in the development of the design. BSC had made offers in their submission that did not reflect our design as it currently stood and we were not sure if BSC's offer was compliant with our design or the employer's requirements. There were lots of potential variables between our designs, the employer's requirements as they stood post-novation, and BSC's offer and we were not sure how to what extent the design would need to be changed in order to make it compliant.

577. The misalignment varied. The structural design was significantly different. Bilfinger Berger had assumed that for several of the structures value engineering savings could be delivered which involved significant changes to the SDS design. The track form was different, significantly different, in the BSC offer and they had assumed that they could eliminate the Stage 1 concrete which SDS totally disagreed with. This had a significant impact on the cost of the in-street track.
The power supplies and telecoms assumptions in the ERs were different or the specification in ERs was different so I think our outline design or preliminary design as it stood did not accord, with the detailed offer from BSC. There were several areas where there were major deviations but lots of minor ones as well, but the structural design and the track form ones were the largest of the deviations.

578. There were not really any steps taken prior to novation of the SDS contract to address the misalignment. We were proceeding with the completion of the design at the time, without any reference to the changed ERs or the BSC offer. We entered into outline discussions around some of those opportunities but the alignment of the design had not taken place prior to novation.

579. I am aware of the Workshop Reports (**CEC00999080**, **CEC00771984** & **CEC00971086**) which were all produced to try and resolve all the misalignments. We had understood that these workshops would be held in the eight weeks after the novation and we were to take part in those workshops and to try and reach a conclusion. What actually happened was, taking the structural design as an example, BSC agreed at the workshop that they would build what was shown on the SDS design as opposed to the value engineered options included in their bid. That concluded what the approach was going to be and we proceeded with the designs but we could not understand how this impacted contractually between TIE and BSC.

580. We knew that the VE opportunity had not been realised and had not even been reviewed through those workshops. It was closed-out. We did not know if the decision was going to cost TIE or BSC more money.

581. There were lots of steps taken to address the misalignment but there were also many disagreements and disputes over what those steps should be and what the impact financially and commercially was that was associated with those steps.

582. In relation to costs incurred trying to address misalignment, I am not sure I am in a position to comment as to what the impact was from the contractor because we were not party to that financial information. We were expected to complete the design but obviously by this point we were working for the contractor so our commercial agreement then was with them.

583. I think that the misalignment is where the relationship between the contractor and TIE started to deteriorate. There was significant impact due to that misalignment. Even the misalignment between the programmes, there was also a misalignment between our SDS programme that was bound into our contract and the SDS programme that was bound into the contractor's contract. We had version 31, I think, bound into the SDS novation agreement whereas the contractor had based all of their prices on a version from several months earlier and their construction programme was based on version that older version. Not only was the status of the design progress misaligned but also the programmes and that really was the start of the deterioration of the relationship between the contractor and TIE as the client.

584. As far as incentive payments are concerned the £1M that was paid to PB was not an incentive payment to novate. It was actually a pain and gain mechanism to

incentivise us to complete the delivery of the outstanding design. By this point we had made it clear and there was a general recognition that the failure to complete the design was not the responsibility of SDS. It was a project issue that needed to be resolved. The £1 million sum was an incentive mechanism. If SDS delivered all of the outstanding designs that were defined on time we would receive the £1 million as a performance type incentive and if we failed every single one, we would have had a £1 million reduction in our fee. It was an incentive to perform.

585. There were 112 deliverables still outstanding and if SDS achieved all of them we got the £1 million. For every one we failed to achieve, a 112th of the £1 million was reduced. So, we got £1 million if we achieved all the deliverables which was reduced by 112th for each deliverable we did not achieve. I am not sure there was ever a payment. I cannot remember.

586. Looking at Clause 8.8 of the SDS Novation Contract (**CEC01370880**) and a revision to clause 27.7 of the SDS Contract (**CEC00839054**) I can see there was payment. So, there was payment to the client, being INFRACO. The obscure thing is we were now novated into the contractor i.e. BSC but the incentive payment was payable by TIE, so the unusual arrangement here is that we are being incentivised by TIE to achieve a set of dates where our client is actually the contractor which was unusual. So we were being incentivised by TIE but our new client was BSC so it is a really unusual set of circumstances. The packages were identified that we had to try and submit and we got £8,928.57 each time and that was because there were the 112 deliverable packages so it was just a straightforward calculation of 1 million divided by the 112.

587. The intention was that we would submit a package of work again to BSC rather than to TIE and then TIE would pay us the incentive payments it if was met on time. If it was not met on time, we would be penalised by the £8,928.

588. I cannot remember exactly how much was paid but we achieved a reasonable number of payments. The challenge was to SDS was that no matter how hard SDS worked, the delivery of those incentive payments was reliant on third parties and the turnaround of the design packages by CEC, for example. They worked hard to achieve the dates but inevitably if a design change was received when we were in the process of delivering those design deliverables, it was very difficult and the result

was a protracted discussion about why we had not made the dates and why were we still entitled to the incentive payment, especially if a third party had changed something that meant we could not make the original date. TIE treated us fairly in this assessment.

589. Prior to novation the biggest issue was prolongation. We had originally assumed duration for the project and that duration became incredibly prolonged due to our inability to secure the approvals and consents and for the decisions to be made around the critical issues, for example. We had a huge team working on the scheme and even the critical issues alone meant that the delays in securing those decisions we were totally powerless to resolve. This meant that we were working on the scheme for considerably longer than we could ever have anticipated at the bid stage of the scheme.

590. Even the amount of people and the amount of time spent during that prolonged time was significantly higher than we had anticipated at the time that the original contract was signed for reasons that were substantially outside of our control. Our only option was to keep offering design solutions and trying to mitigate delay caused by preferential engineering and third party stakeholder requirements. The biggest issue was the critical issues, the delay in securing clear decisions on what was to be done and to bring the design to a conclusion

591. In relation to TIE threatening a counterclaim against PB, I think you should rely more heavily on Steve Reynolds information for that because I would be trying to remember something that I have not got access to at the present time but Steve would have the data around that. A counterclaim was mentioned and there were some references to it but I do not think we were ever really concerned that that was going to be a material risk for SDS. We had overwhelming data on the reasons that MUDFA and the whole scheme had been delayed that I do not think we were ever very worried that that counterclaim would be a serious threat.

592. The main issue with the Novation Contract, for us, was that our client now was BSC rather than TIE. We were now co-located with BSC and all of our reporting was directly to them rather than TIE, as had been the case prior to that point. One of our concerns was that we had lost direct access to the approvals body in the form of CEC. We were also concerned that reporting into TIE might make that process even

more onerous than we had experienced previously because we had another party involved.

593. We had not seen the detailed offer that BSC had proposed at bid stage, the track form, for example, we were not entirely sure what their proposal was, what the detail of it was and how that was going to impact on the close out of the rest of the design and the construction of the scheme. This was a period of uncertainty for us but we were just looking forward to completing the design and supporting BSC with their construction.

594. Looking at email and attachment (**PBH00035961** & **PBH00035962**) from Damien Sharp on 4th March 2008 regarding a direct contract between TIE and PB around the time of novation, I am struggling to remember if we actually entered into the agreement or not. I think it was just to complete the outstanding utilities diversions. We provided the technical support to achieve that. The MUDFA works had been prolonged as well and TIE wanted to retain the support. MUDFA was obviously not part of the BSC works and yet TIE still had to complete those services. As we were no longer a part of TIE or reporting into TIE, they had to retain a mechanism for delivering those outstanding utilities diversions and this agreement was the framework to support them with that but it was pretty much a supporting arrangement for the completion of those services. I would revert Steve's evidence if that is the case, but PB did not enter into any other agreements around that time as part of novation and the INFRACO contract closing.

595. Referring now to the INFRACO Contract AND Pricing Schedule (**USB00000032**) it was certainly unclear to us at the time that we started working with BSC, or unclear to me, as to which party were bearing a risk of the alignment with the employer's requirements. We knew that it was a lump sum fixed fee for the BSC works. What I was unclear about was what was happening if misalignment was identified, in particular with reference to the SDS design, the design programme and the employer's requirements.

596. My understanding is that BSC could not claim additional costs where small changes were made to the SDS design beyond the point at which they were issued to INFRACO for pricing, and this was considered "normal development and completion of design". Where more material changes were made BSC were entitled to change.

My understanding was that it was BSC that carried an element of risk.

597. I have mentioned that the baseline dates for the programme that was bound into the SDS novation agreement was a different version to the baseline programme that was bound into the INFRACO contract which was several versions earlier. Immediately there were a number of weeks of delay that were bound into both contracts that were misaligned so there is a misalignment between BSC's understanding of the status of the design that was bound into the contract versus our understanding of what was bound in. There was an immediate requirement to understand what the impact of any slippage was between the two project programmes for the design.

598. I cannot recall the circumstances in which design related notified departures were likely to arise, I would have to re-read the contract.

599. To refer to the Pricing Assumptions included in Schedule 4, we knew that there was a significant risk between 3.4.1.1, 3.4.1.2 and 3.4.1.3 because we knew that some of the designs had moved on from when the base date design information had been issued to the contractor. Some of that was driven by stakeholder issues, changes to the design requested by third party stakeholders or by the council in the closeout of the approvals and consents process. We knew that there was a time delay between the development of the design that was issued to the contractors for them to base their prices upon and the status of the design at the point of novation. We also knew that some of the third party agreements were still not finalised, and some of them had changed the design after the point that they had been priced by BSC. There were additional civils and infrastructure works as a result of that, for example, and also the requirements of the approvals bodies quite often meant that design changes were made. Most of those were smaller in nature but there were many. Even the structural design may have changed in order to secure the technical approvals. The phrase *"normal development and completion of designs"* was emotive. That term became the crux of the disagreement between Bilfinger Berger, Siemens, CAF and TIE and it became the basis of the various claims and disputes that followed. My understanding of it was had the design at construction stage changed materially from the design that had been provided to Bilfinger Berger Siemens and CAF for bidding purposes.

600. To us, *"normal development and completion of the designs"* (as referred to in the pricing assumption 1 in paragraph 3.4 of the schedule 4 to Infraco) would have been

altering the dimensions of the piles or the dimensions of the bridge, but not a fundamental change from a concrete deck to a steel deck, for example It would require a different solution, a different construction method, a different material.

601. As I mentioned, minor changes to the dimensions of a structure might be one example of design evolution but changing the type of foundations would be something else. If a foundation went from being a simple pad to being a pile foundation, that would be a significant change and would cost significantly more to deliver by the contractor.

602. After 25 November, we were just completing the design. We provided the drops of the information to the contractor but there were no obligations on us to do anything but to continue to report to TIE, deliver the packages to TIE and proceed with the delivery of the design. After novation, once again, we continued to deliver the design, but this time the design would be delivered via BSC. So, BSC were expecting us to issue the design to them under normal circumstances, as you would do typically for a client.

603. In respect of design-related Notified Departures, although we were responsible for the delivery of the design, the issue of identification of what was considered to be a departure and what was not became a debate between TIE and BSC. We were not initially involved in that. We became involved when asked by BSC to supply them with information for claims purposes, but we were not responsible for the identification and the labelling of what was deemed to be a deviation and what was not. The departures were identified by BSC. We delivered the design to them as we completed it and they were then responsible for looking and identifying any issues they had between their pricing and what was delivered finally.

604. Immediately after contract close we continued to deliver the design. Thereafter, as further design work was undertaken, we delivered that to BSC. We obviously started engaging with BSC, and issuing them with design and briefing them on progress. We supported misalignment workshops as required.

605. There should not have been any difficulties in identifying the design information drawings comprising the BDDI because we had been very clear in the information drops. We provided them on CDs with very clear schedules of what that BDDI

information was, it should not have been a problem for TIE to have included that as a list

606. The BDDI was fixed to 25 November 2007 because there was an on-going bid process and I the decision was made to freeze the design, in order for them to conclude the negotiations with the potential contractors. We could have provided information subsequent to that that, and it would have provided more detail, but that would potentially have caused problems for the bid process and procurement. We could have provided information up to the point of award of the contract.

607. *"PB had a change instruction from TIE to produce further design to "cure" the misalignments notes between SDS design and the Employer's Requirements."* The workshops that were held to assess the impact of that misalignment were held primarily between BSC and TIE and for each of the core disciplines that are listed in the INFRACO contract, so the misalignment was to be assessed following the signing of the contractor's engagement and TIE had every power to approve or reject the proposed changes and to suggest that they went back to the original design. TIE were very much involved with that and were responsible for the approach. SDS were paid to make changes to the design that had been developed previously in order to align with the outputs of the alignment workshops.

608. As far as the assessment *"any change to design that exists between 25 November 2007 was potentially a Notified Departure"* yes it was, as far as I am aware, and TIE should have been fully aware of that as the client, because they managed the design after that up to the point of Novation.

609. However, the assessment *"TIE had little or no control over the design change as a result of the novation of the SDS contract to BSC"* I would disagree with that because, ultimately, any proposed change had to be agreed with TIE, as part of BSC's agreement with TIE. We had not got a free rein to change the design. It had to be approved and it also had to go through CEC as the Technical Approval's Body. Due to the level of involvement on the scheme, CEC obviously were very aware of what was expected by TIE and to say that we could just change things incorrect.

610. Up to the point of novation, we clearly communicated the fact that the design was incomplete, the approval and consents were incomplete and we felt that the novation

took place too early. SDS also stated our view that the novation should have been delayed. We could have completed the detailed design and sought and achieved the approvals and consent from CEC and the third party stakeholders. We were also concerned that a lot of the third party agreements were still outstanding and that we had another party involved in the form of BSC with their own priorities and design issues. The close out of the design, we were concerned, would be even more difficult when there was another party involved. No longer were we only working with TIE to try and secure these approvals and consents, we had BSC working with us as well.

611. We were not concerned that ethically the process had been manipulated by any party to make more money. That really was not something that we were concerned about and, had that happened, we would have raised this. BSC were our client, but we would never behave unethically to manipulate the design to the advantage BSC to the detriment of the scheme. VE was a major concern. If Bilfinger Berger and Siemens had identified VE opportunities that required design change, we were concerned about the mechanism of actually instructing that, because we could see that was likely to change a considerable amount of the design that had been developed over years to the point. We were not entirely sure of the mechanism for change and how this was going to be implemented. After significant effort in achieving approvals and consents, SDS were concerned that change would produce a significant setback to the construction progress.

612. We always tried to produce a cost-effective design before and after Novation. There was a reason why the solutions were developed in the way that they were and the difference between the information provided to BSC at the time of pricing, i.e. the November of the year before, and where we stood at the time of the point of novation was that we had developed the design further and the detail of that design was more extensive.

613. We were always very conscious of the cost of construction. We were not actually predicating the design on what BSC were offering, we were offering the most cost-effective design that we could. We did not try and produce a design after novation that was aligned with BSC's interests. We were virtually complete at the point of novation; it really was around the approvals and consents, rather than an emerging design. The vast majority of the design and certainly all of the concepts had been completed by that point for the vast majority of the route. It was only where we had

late instructions around those third party stakeholders, in particular, where the design was still being developed. The programmes at the time reflect that most of the outstanding items were about the approvals and consents rather than the detailed design development. BSC had to familiarise themselves where we had actually got to with the design so they became aware of the developments between the final drop of design data during the bid process and where we were at the time of the novation.

614. SDS did not have influence on whether or not a design fell within a pricing assumption; most of the design that had been priced was already completed by this point. We did not have the opportunity to manipulate the design to BSC's advantage, even if we wanted to, because most of the design was being finalised by the time that we novated into the BSC consortium, certainly the concepts of the design that could have materially impacted on the price or rate of construction.

615. BSC would not be able influence design to depart from the pricing assumption. TIE and CEC were very familiar with our designs. They were very hands on in the review and the development of the design and TSS, their consultant, were also very familiar with what we had done. I think it would have been very, very difficult for them to influence us without it being transparent. TIE had been involved with the design development all the way through.

616. We were co-located with TIE so face to face design review meetings were held weekly. The novation agreement included a statement regarding design status for all of the designs, so it was clear what was left to complete.

617. BSC knew the design but we were working with TIE all of the way through from the preliminary design stage through to the detailed design delivery and the approval and consents, we were meeting with TIE, and there were regular design review meetings. Taking a particular structure, for example Edinburgh Park Bridge, we had been to many meetings regarding progress of the technical solution, what the bridge looked like, the materials, SDS had presented it to CEC, to Historic Scotland, many other approvers and stakeholders. To change the design to suit BSC's interests so that the foundations were cheaper alternative for example, would have been very obvious to TIE because they were so familiar with what we had done to date.

618. We did not engage too heavily with BSC on the pricing assumption, outside of the on-going discussions with TIE. Some of the workshops took place, some of them went on for a long time but we provided the information to BSC so that they could do an analysis of what was in the pricing assumption and what was not, they did that without much involvement from SDS. We supplied the information and their quantity surveyors went through it just to check to see what the impact was, but we did not really get much more involved than that.

Design After Novation (May 2008 to April 2011)

619. After novation the SDS role in the project did change. We still had the role of securing the final approvals and consents and concluding our design obligations to produce a technical design but we also got involved with supporting BSC with the finalisation of the design associated with their components selection. SDS also supported with the discharge of outstanding conditions for the CEC approvals. Where CEC had given a planning approval for the tram-stops, for example, up to the point of Novation, these indicated generic tram-stop furniture, post novation we commenced the process of including the equipment for the particular manufacturers selected by BSC. The SDS staff working on the project did not substantially change. People came and went as it would be typical with a project like this, but we did not significantly downsize the team. I stayed on as project manager. Steve Reynolds stayed on as project director for quite some time after novation. We were still committed to ensuring that the project was successful.

620. I refer to and agree with the email (**PBH00018332**) dated 19th April 2008 from Steve Reynolds regarding the five work streams PB engaged in post-novation. These are all accurate and correct. That is

- *"completion of the outstanding design and approval activators under the current Phase III of the SDS contract"*
- *"Engineering of changes required to address the misalignment between BBS offer and the SDS design"*
- *"Delivery of the technical support services required under phase 4 of the SDS contract"*
- *"a new scope of work delivered detailed construction support services to BBS, as per the arrangement*

- and *"a new scope of work to deliver management services to BBS with a supervision of Siemens's designs through the CEC approvals process"*

621. Until novation design SDS had been solely responsible for the development of design, but after that time some of the design was completed by Bilfinger Berger and Siemens, particularly Siemens with the systems selection. No longer were we acting on our own in development and design. We worked with Siemens as well. A typical example would be the systems and coms and the work at the depot to ensure that the Siemens solution worked. This was the same with the poles and overhead line equipment. The tram-stop furniture, another good example, BSC selected particular tram-stop furniture, we were then involved with supporting them in discharging the outstanding conditions against those particular items.

622. After novation there was completion of the Phase III works, so any outstanding technical design that was required, the discharging of any of the outstanding planning approvals. The modification of the designs to incorporate the component selection by BSC and the work associated with the alignment of the employer's requirements, the BSC offer and the existing SDS design.

623. I cannot provide percentages for design work carried out, that would take some detailed analysis. The analysis could quite easily be done; we had a very good schedule of what was required.

624. I am aware that after May 2008, a dispute arose between TIE and BSC in relation to interpretation of the INFRACO.I am aware it was regarding what BSC had priced at the time of the bid and what they eventually built, including the gap between the design that they received at the time that they were issued it as part of those INFRACO drops of information, and what they inherited at the time of novation and the signing of the contract. It was what the difference between TIE's view and BSC's view as to what constituted normal design development. What was normal for BSC to conclude in terms of that normal design development, the introduction of the BSC solutions within their component selection. Also the outstanding design, subject to change and variation from those third parties, so what had changed in the time between SDS completing the design and then BSC receiving it at the point of the

tender process. My understanding was that it was largely associated with those issues.

625. It was caused by the timing. The fact the design was not finished at the time BSC signed the contract, the information they had received at the time. It became complex because we still had designs that were not complete. We now had a client who was not part of CEC so we were concerned that would deteriorate or diminish our opportunity to get that design approved and consents achieved.

626. Because the approvals had not been concluded, we started re-engineering the design to incorporate BSC's component selection before we had actually achieved all of the detailed design approvals and consents.
Effectively what it meant was we started introducing further design detail which then became subject to a further design approval consideration. The process got even more complicated, and the time pressure, because we were under extreme time pressure to get BSC the IFC versions of drawings and documentation to enable them to build the infrastructure.

627. We provided information to Bilfinger Berger. They were our client at this point. BSC had access to everything we had already issued to them prior to the appointment of Bilfinger Berger Siemens and CAF, so we were then working for BSC as our client which was a complete change.

May 2008 Onwards: Matters Reported in the SDS Monthly Progress Reports

628. Referring to the SDS monthly reports specifically **(BFB00004346, BFB00004350** and **BFB00004352)** that refer to varying values of change, instruction having been unlocked during the month to which they relate. The problem for SDS was convincing the various parties involved that the changes were legitimate and not a failing on SDS's part to actually deliver a design that was buildable in the first instance. There are many historic issues on the project even going back as far as the critical issues that had been identified 18 months to two years prior. But those on-going issues were new to BSC so once again it became a case of demonstrating to BSC why there

were changes still being made to the design after such a considerable period of time of SDS being involved on the project.

629. BSC inherited SDS and they inherited a design at a point of completion. The inclusion of the BSC design components changed the design. We also received instructions from TIE and changes from TIE. There were changes required to the design as a result of third party issues which had to be explained to BSC, including the reasons why these issues had arisen. It was quite a complex process.

630. The contractual dispute between TIE and BSC arose essentially because TIE refused to accept that development of the design constituted a change and because of historic indecision and lack of finalisation of the design earlier in the project. It was resolved on an issue-by-issue basis, explaining the circumstances behind each of the changes, and demonstrating what the design changes were. We would only price our design element of the works, not the BSC element.

631. The impact the lockup had on the time taken for, and cost of completing detailed design and the project overall was significant. It was not just the design that became frozen, the whole project became locked up during this period, and BSC were our client at this point. We had to obtain approval from BSC for design changes that they did not have the background knowledge to understand and they had not experienced that detail first hand in the design development. Provisions were made in the contact for a schedule of rates as part of that novation for us to supply them with additional services and what we had to do then was enter into a change process to demonstrate to them why the change was required and for what reasons it actually was a change that SDS were entitled to be paid for.

632. I note the November 2008 report (BFB00004346) records that *"a change in respect of pedestrian crossing times was considered by TIE to be a change to PB as the designer but not necessarily a change to BSC."* Now, I would not be really comfortable in giving a rationale. I was not that familiar with the BSC contract, so I would not be able to comment as to whether we had changed to them or not really. I was not that involved with BSC's contract but obviously quite a few things changed for PB. The change in crossing times might impact on us but not them. But I would not be really able to comment as to why one and not the other because I was not familiar with the detail of BSC's contract.

633. I would not really know if there were other instances of TIE taking a similar view in respect of changes. We were not always aware when BSC were awarded change or not. We were not always aware of what had been accepted and what had been rejected. Sometimes we knew the changes, sometimes we did not.

634. Forth Ports were in the process of developing their land so they were very protective of the future development opportunities they had. They had not concluded their plans for those. We saw some of the construction taking place but we knew that they had not finalised what some of the land was to be used for. So they were making sure that they did not lock the design down to the extent that it impacted on their potential future to develop that site.

635. Their (Forth Ports) section of the route was not actually built so it became difficult in terms of the completion of the tram design. But that element of the route was not built, so in terms of the construction I would say that it did not delay the progress of the project overall. However, a significant amount of time was spent trying to resolve the issues associated with Forth Ports.

636. As far as knowing if the issues with Forth Ports ever fully resolved and the design completed for their area, I would have to say I do not know. I left the project before they were fully resolved.

637. With regards to roads design and traffic modelling I am aware of SDS Progress Reports **(BFB00004652, BFB00004624** and **BFB00004592)** relating to, amongst other things, delays in completion of the design. There were issues and we did not sign off the traffic modelling until very late in the project development. Certainly at the time of the mediation discussion the traffic modelling was a major issue and still under discussion with CEC. And at the time that I left the project it still had not been signed off, but I think we got to the point where the layout of the junctions themselves had been concluded and there was no further optimisation that could be done with the layouts themselves. But the white lining and the signals at those junctions could still be amended. We got to the point where the construction works for the junctions could be progressed, but there was still a reluctance to sign off the traffic modelling until a very late stage of the project. There was always a recognition that even after the system became operational and the trams or the operational running had commenced, or the trial run had commenced, that the tweaks would be required to

the signalling systems. This was always planned to be an iterative process, but it was the approval of the model that was outstanding and that took a huge amount of effort to resolve to the satisfaction of CEC.

638. The design and overall project were both affected because of the reluctance to sign off the traffic modelling. It meant that it was difficult to conclude the roads design until that traffic modelling had been accepted. CEC always maintained that they would only give that final sign off for roads designs once the traffic modelling had been signed off and approved because until it had been redesign the road junctions may be required. I think we got to the point where, from an SDS perspective, the layout of those junctions had been optimised so there was nothing further we could do with the physical size and shape of the junctions. It was more about how the traffic signalling and how the laying markings would be finally concluded.

639. A more collaborative approach earlier in the project could have resolved that, and a general recognition that it was a model and not a precise tool. As several of the junctions were delayed because of issues like such as developer interests, like at Haymarket and Picardy Place, those issues often themselves caused a major delay in finalising the traffic model. Small changes in the available land could have very significant issues in the roads layouts and the resulting traffic model output. Earlier decisions on these show stopping junctions would have helped to finalise the model much earlier.

640. Referring now to November 2008 SDS Progress Report (**BFB00004346**) and the comments by the CEC technical approval department necessitating amendments to designs which had already been approved by the CEC planning department, thus creating the need to seek a renewed planning consent. This was a significant issue. The technical approval of the roads, as mentioned previously, went into significant detail. The planning drawings were a statutory requirement, with a statutory determined timescale for completion. If minor amendments were made to the technical drawings these had to be reflected in the planning drawings. If we knew of changes to those planning drawings due to the comments received from the Technical Roads Authority, then it necessitated a change to the planning drawings and a resubmission.

641. We were not sure to what extent we could change the technical drawings without them requiring a further review from the planning department. Minor changes we wanted to make these without resubmitting for planning approvals, but we wanted to make sure that we did not submit or build something based on a planning approval knowing that there were minor changes to kerb lines and the like due to the technical approval from the Roads Authority.

642. The vast majority of the technical issues were resolved in a very short space of time once all parties worked together. They were actually resolved very, very quickly despite the fact that we had hundreds of them for each of the roads packages. I think if we could have had a more collaborative approach to resolving those issues earlier, we could have resolved them a lot quicker, and that would have meant that the planning approval submissions would have been more straightforward. We would only have to go for those planning approvals once rather than having to apply for amendments.

643. More effective collaboration would have avoided those difficulties. There was lots of work on-going to mitigate the issues but it was not progressing as it needed to.

644. Referring further to SDS Progress Report (**BFB00004346**, 3.2 and **BFB00004678**) from November 2008 and 2012 and the long term difficulties in securing the approval of Scottish Water to utility diversion designs. It was more the connections for Scottish Water. It was the infrastructure that was important for the new connections to their infrastructure from the tram structures, from the track itself at certain locations, so it was those connections that we were seeking approval for from Scottish Water.

645. The approvals that were required from Scottish Water were the diversions themselves, TIE had contracts with all of those utilities companies to provide their support in securing the diversions. That had not been managed in the way that it could have been to secure that earlier, but I think the approvals from all of the other utilities in terms of the diversions we managed to resolve. The big issue with Scottish Water was our ability to discharge and make connections from the new infrastructure into their existing infrastructure e.g. the new structures such as Haymarket viaduct.

646. It took so long, I think, because it was just about their engagement with us and the difficulties associated with engaging with them, and knowing what they wanted to see

in order to secure that approval. Changes in personnel that was another issue that we had with SW. It was just one of many things; I do not think that was singularly something that you could say was a direct impact on the overall duration of the project or the complexity or the cost of the project. It was just one of the issues that has to be resolved and not one that caused a significant delay.

647. It might have been avoided, I think TIE had the opportunity to use the contracts they had in place to manage the infrastructure, and with the relationship with those different SUCs. I do not think they quite used them in the way that they could have done to secure that engagement.

648. The SDS Progress Report (**BFB00004678**) includes reference to *"numerous CEC/T&T changes"* which were driven by utility conflicts. This was typical for the scheme. The difficulty or the challenge was that some of the more difficult utility issues were left for the INFRACO to resolve or the INFRACO with support of SDS and TIE to resolve. There was a lot of utilities still in the ground that needed to be moved at the time that the INFRACO became involved on the contract and took possession of the various different route sections. Unfortunately, quite often it was the more difficult issues that had been left behind so they needed to be resolved in order for the INFRACO to install the tram infrastructure.

649. Due to the difficulty a greater involvement from the SUCs was required to resolve the issues and in some places the design and the mitigation measures were quite complex. Ultimately there was a delay to the start of the construction because BSC had not got a clear path for the tram infrastructure to be built. One of the things that BSC were expecting was a clear route for them to install their infrastructure, and what they found was that there was quite a lot of utilities works still to be done that had been left behind from the MUDFA works. This included the design. We were still trying to understand the impact on the tram infrastructure design for the residual works to be done by MUDFA such as the location of the tram overhead line electrification poles, for example. We were finalising the design for those and at the time and we still were not sure where the utilities diversions should be located to avoid conflict with the OLE pole locations.

650. These issues might have been avoided by using the SUCs earlier in the scheme, using those contracts that were in place with the SUCs to design the relocation of the utilities would have significantly improved the situation.

651. Referring now to the note (**TIE00689425**) prepared by Alastair Maclean for internal consideration by CEC on 20 August 2011, and his comments on the number of utilities conflicts. I would not be able to agree with the detail but I was certainly aware that there were a lot of utilities that were still present in the footprint for the tram infrastructure that needed to be moved before the INFRACO could undertake their works.

652. The SDS Progress Report for November 2010 (**BFB00004349**) does refer to the need for 'freezes', in relation to Forth Ports design, it was because we had been trying to conclude the design for Forth Ports for a long period of time, and clearly the Forth Ports development was still in progress and the Forth Ports designs and their aspirations were still emerging. A freeze was required in order to conclude the SDS design as far as possible, subject to confirmation of any change at a later date.

653. In relation to the October SDS monthly progress report (**BFB00004346**) and the note that Section 3 (Phase 1b - Roseburn to Granton) had been *"deprioritised"* but that the design was very far advanced, that is correct. I have already mentioned that at times phase 1a in several locations was on hold, and there were lots of hold points around 1a which hindered the development of phase 1a and the conclusion of the design. Phase 1b, being an abandoned or disused railway corridor, meant that the interfaces were significantly less, so it was a far more straightforward section of the route. Certainly up to the Forth Ports area and Crewe Toll locations, but even then the formation was fairly free of interfaces and largely free of development interfaces as well. It was a much more straightforward section of the route and something that could be developed pretty much to a reasonable conclusion without a lot of outstanding issues. I do think the design for Section 3 (Roseburn to Granton) was pretty much complete and that was in line with TIE's aspirations for that section of the route.

654. I was no longer on the project when the entire design was completed; I had left the project by that point so I would not be able to give a final date for it. I would suggest that Steve Reynolds is probably more in a position to answer that.

655. I was not around for the conclusion at that period of time, but then to my knowledge and certainly up into the point where I left the project; we did not make an application for an extension of time because we had a schedule within the novation contract for our schedule of rates associated with any additional time.
We were able to agree on a regular basis what resource level was required by BSC and what they wanted from us to conclude the design work we were doing, certainly on their behalf. I do not believe there was any extension of time claim.

656. I do not think there were any claims after novation either, with respect to extension of time. There were payments made by BSC for our time but they were always agreed ahead of the period. We produced an organisation structure; we priced it and then they accepted or rejected it or challenged certain elements of it. At certain times they asked us to bring in additional resource to support them and at certain other times we agreed that we release people. It was quite a well-structured arrangement with BSC based on a schedule of rates.

May 2008 to March 2011 – Particular Matters

657. In relation to the email (**CEC01305068**) from Jim McEwan dated 7th July 2008 which suggests BSC had instructed SDS not to issue IFC drawings to TIE. I am not really sure that was the case. As part of our novation agreement we were obviously trying to secure the incentive payments. Most of the time we were issuing, I think all of the time we were issuing the IFC packages to TIE and BSC at the same time. BSC may have asked us in the interests of proper contract management to issue the design to them and then for them issue it to TIE as their client, but I think we were issuing the design simultaneously to both. Even if we were not, we would have been notifying TIE of our completion of the design in order to meet the incentive schedule.

658. The BSC/SDS Design Assurance meeting of PB, CEC, SDS and BSC representatives on 16th September 2008 (**TIE00500425**) took place "to enable TIE/CEC to understand how SDS will issue complete, coherent, assured design which will be acceptable". The main issue was that high volume of CEC comments that had to be addressed before we could complete the Interdisciplinary Design Checks (IDCs) and the design assurance statement process. We worked with CEC

and addressed the comments. These were subsequently resolved in a very short space of time. That high number of CEC comments was as a result of a very detailed review from CEC on the drawings and a very high expectation of detail. The level of detail to which CEC reviewed the drawings was far greater than the roads design team had ever experienced.

659. It was largely as a result of the CEC comments, particularly around the roads submissions that resulted in the continued programme slippage and that, in itself, led to the IFC design proceeding with full IDC and design assurance processes. SDS were trying to proceed with the IFC, and most of the design had been through IDC and design assurance statement processes several times already. We had consulted regarding most of this design now on numerous occasions including an IDC and there were numerous iterations of IDC that followed as a result of the detailed comments that we received from the approvals body. The main challenge was that the design was being assessed in great detail whilst some of the higher level principles and requirements had been in delay or had been subject to change that was outside the control of the designers. Picardy Place was typical of this and designs were reviewed in great detail without the finalisation of the concept design for the very important road junction.

TIE02488531 should be TIE00248531

660. I can comment on the email (**TIE02488531**) dated 11th December 2008, from Damian Sharp of TIE proposing various forums for a resolution of the design that was issued. The traction behind securing the approvals was not anywhere near as good as we would have liked and the resolution of those outstanding, very minor issues in most instances required a level of attention that we thought was far more significant than it needed to be. We were being asked to produce a perfect design, which, whilst we had not got a problem producing a high quality design and something that is suitable for construction, we were being asked to produce a technically perfect design whilst many issues that could impact on that design were still changing. The taskforce was intended to resolve the issues that were not so straightforward. There were not too many that actually fell into that category. The vast majority of them were just points of minor detail. We did not need additional monitoring. What we needed was just a more pragmatic approach to the completion of the approvals and consents process. I do not think, necessarily, more monitoring was required; it was more action that was required. The approvals taskforce was created and I still think that the vast majority of

the resolution of the design came as a result of a few weeks of concerted effort between the SDS designers and CEC to resolve the issues.

661. The recommendations were adopted and forums held by the approvals taskforce.

662. I am not aware of the concerns raised (**BFB00058190**) by David Bell of McKenzie Construction Limited on 15th May 2009 over the quality, timing and presentation of design information, however, I am struggling to understand which section of the route he is particularly talking about. McKenzie's were obviously constructing a particular element of the route or section of the route. I am not quite sure where or what structure it is, he is referring to here. I would be guessing what the issue is about without having further information. I have never seen this correspondence before so I really do not know.

663. I note the presentation document (**BFB00095827**) by Halcrow on their road design delay and disruption claim from 25th November 2009 against Bilfinger, but I'm not sure about that claim or if it was resolved in the time that I was actually on the project.

664. Halcrow did have some very good points in this claim because the level of detail and the process for the approval, and the technical approval that CEC had implemented was extremely detailed. I think Halcrow had some very good points and the design team were trying deliver very detailed drawings to secure approvals, whilst they were subject to changing requirements that impacted on the concept of the designs.

665. My comments on the assertions made in the Halcrow presentation are that I certainly agree that Halcrow produced confident designs in accordance with their obligations and that the designs were then subjected to unnecessary detailed technical audit by CEC officers, which resulted in a large number of requirements for design modification.

666. The CEC roads team maintained a very high standard for the design. It was not that the design team could not deliver that expectation but it was extremely difficult to finalise the design with so many changes and delays that could not be determined by the design team.

667. I do think the technical approvals, of which there were so many going on, were handled by officers who were unaware of some of the prior discussions. However it was very, very difficult for all of the same people to attend all of the same meetings. It was almost inevitable that some of the officers that were handling the detailed reviews could not be at all of the meetings.

668. There were definitely a lot of changes after the charrettes and they were on-going for a considerable period of time. I do not think the road design had been agreed prior to the charrettes but I think the principles of it had been agreed.

669. Roads department officers did seek third party advice or third party within CEC advice and solicit planning comments which we thought was above and beyond what would normally be expected in these circumstances.

670. The CEC comments on technical approval came down to the absolute minutiae of detail and requesting really high level or low level detail on the design, we would not normally expect that level of detail, comment or question, or reassurance. It was not that we made mistakes, they were just looking for reassurance a lot of the time that we understood and that we had considered various issues.

671. In relation to the road's disruption claim (**BFB00095828**) this just gives an example of some of the issues that were being identified. Pre-cast concrete flagstones, thickness specified is 50 millimetre marshals however our drawing states 65 millimetre thick flags and 63 millimetres as specified by CEC standard details. There is a significant amount of detail, for example the words on signs should be *'no loading 6.00 am to midnight'*, as the terms 12.00 am or 12.00 pm are never used on signs. They are just specifications that are required, that we were asked to supply.

672. Referring now to document (**CEC00142766**) produced by TIE in March 2010, entitled Project Pitchfork. I note there are several criticisms of PB and BSC's management of them post-novation and would prefer to comment individually on these criticisms.

673. I am being asked to comment on the failings of others here, I think, but this is not aimed at PB, I think this is aimed at others. The causes of the delays of the utility programme did include slow delivery of the design. Like I say, we were only responsible for the critical design. To quote *"increasing scope of utilities to be diverted from 27,000 metres to 48,000 metres mainly as a result of poor quality*

provided by the utilities companies on which the design was based" that would not have been Parsons Brinckerhoff, it must have been an estimate produced by TIE previously. I would not know what the final number was. The 48,000, I really just would not know. What I would say is that estimating that is always difficult because it is difficult to estimate what is under the ground until you start excavating. Scope of utilities diverted as a result of encountering underground obstructions and congestion of existing utilities. That is fairly typical of an inner city street. Congestion of existing utilities is almost inevitable.

674. There is mention of poor performance by Carillion but I do not want to comment on Carillion's performance.

675. In relation to the suggestion that BSC had increased the base scope of the design without explaining why and the suggestion this was because BSC design was being incorporated into the overall design that was always the intention, post novation. Even when we signed our original contract, it was always anticipated that the contractor's component selection would be incorporated into the design that was delivered by SDS. What it might be inferring is that they started to unpick some of the design that had already been constructed but the workshops that were set up post novation were to address that misalignment between the BSC offer, the SDS design as it stood at that time and the employer's requirements modifications. This was clearly set out at the point of novation, to incorporate their (BSC) elements of component selection, the electric systems, the power supplies, the tram-stops, the track form etc. It was always intended that they would do that post signing of the contract.

676. I am struggling to understand why it says that the reasons have not been communicated to TIE by BSC. There was constant on-going dialogue at that point around the design development and the changes required. I do not know why it is being suggested that the changes have not been communicated by BSC to TIE because it was an on-going dialogue at the time. A key component of the action plan including the approach to ensure Parsons Brinckerhoff, now a BSC subcontractor and owned by Balfour Beatty, are brought fully to account. We were actually working very closely with CEC, BSC and TIE to try and resolve the outstanding design issues so there is no issue in terms of bringing us fully to account. We were working open book at this point and all the way through the project to try and resolve the issues. I

do not think there was a threat of bringing us fully to account; we would have had nothing to be secret about or to report and to account for.

677. As I said it was always the intention that BSC design was being incorporated into the overall design. We could not complete the design because BSC were always expected determine which tram shelter would be used, what the track form was finally going to be, what power supply system would be. They were always to complete the design for those elements of the infrastructure.

678. I think the criticisms labelled in the Project Pitchfork report were unreasonable and SDS made every effort to try and resolve those issues.

679. Moving on now to numerous letters and emails – I note letter (**CEC00298078**) of 4th June 2010 from Anthony Rush to Nick Flew, MD of PB Europe, advising that the design was still incomplete, letter (**CEC00337893**) of 5th August 2010 that DLA wrote to PB expressing concern over the programme and cost implications, DLA letters (**CEC00098276**) of 18th August 2010 and (**CEC00220025**) of 2nd September 2010 and Steve Bells email (**CEC00098294**) response dated 3rd September 2010. In response to the letter sent to Nick Flew, I do not believe I have ever seen this letter but it is a letter written by Anthony Rush and signed by Steven Bell, and the subject of the letter is the delay in completing the design. In particular, reference to the on street track form. Parsons Brinckerhoff were not responsible for the completion of the track form. We were responsible for the development of a generic design and ensuring that the track alignment was functional and that the tram could be procured and the route could be secured to achieve the operational running of the tram. The final design of the track form was dependent on BSC component selection and they were always responsible for the completion of that element of the design.

Steve Bells should read Steve Reynolds

680. This is a very good example of TIE going to very senior members of Parson Brinckerhoff and trying to corral them to undertake design that is not in Parsons Brinckerhoff scope. Then using that intervention at a very senior level, to drive something which Mr Flew would not have known by virtue of the nature of his sort of arm's length involvement with the project, he would not know that that was not in our scope and what the letter then obviously goes on to do is threaten that they will terminate the contract with the consortium. It basically reads that PB would surely not want TIE to consider terminating the contract so we should resolve the issue.

681. PB was not responsible for delivering the track form design and this was an approach that had been used throughout the course of events on the project, and this is as late as June 2010. It really did not help, it caused confusion. It was actually Siemens who were responsible for the delivery of that element of the design, we could have developed that design but it was not in our scope to do so and also it was entirely dependent on the component selection.

682. The letter of 5th August (CEC00337893), I really do not know what the agreement is there that I am referring to. It is obviously addressed to Steve Reynolds. I would ask to leave it for Steve's response to this question. The remaining correspondence has also been responded to by Steve Reynolds, so, once again please refer to his answers to those. I would have been away from the project by then and cannot assist.

683. I note email exchange (**TIE00370895**) from August 2010 between Malcolm Butchert and myself and my letter (**CEC00146907**) of 5th November 2010 all regarding non-payment of utilities work. We were asked to provide resources to support the outstanding MUDFA works, an onsite resource to support them on a daily basis with design related and progress related issues. We did that and TIE agreed that they would pay for that service and subsequently they did not pay for a considerable period of time.

684. We (SDS) proceeded anyway, we did not withdraw the service, and we just continued to provide that service. I do not think there was a negative impact. It was a very positive act to provide that level of support. I think it helped with the completion of the MUDFA works to the extent that MUDFA did complete the works but I do not think there was anything negative SDS approach, we certainly did not stop providing that resource. I think it was resolved and I think we did receive payment eventually from TIE.

685. Referring to mediation discussions now and the dispute between TIE and BSC which took place at Mar Hall in March 2011. I supplied information (**BFB00095823** to **BFB00095830**) by email to Kevin Russell of Bilfinger on 8 March 2011 which had been requested at the mediation. Once again, I think that is probably best answered by Steve (Reynolds). I just cannot remember the detail of what sums we asked for, or more to the point what we actually received in total. I was involved with the mediation

discussions but I was not there for the conclusion of events, so my involvement faded on the scheme before it was concluded.

686. PB were involved and responded to questions associated with the design and the development of the design both pre and post novation. The main issue for us during mediation was actually trying to draw the design to a conclusion. Trying to hone in on securing the final approvals and consents, the traffic modelling and securing payment for the outstanding delivery of design in support of BSC. It was very much that the project was locked up by this point and we were there trying to support with resolution. Not just to secure BSCs interest but in a holistic way and trying to support in unlocking the scheme as a whole.

687. I am aware of the attachments (BFB00095823 to BFB00095830) and can refer to individual documents, for example **BFB00095824** is the Mandatory TIE Changes necessary to reverse the design misalignment which had arisen by the INFRACO. It is a comprehensive list that we put together, showing a definitive summary of costs. It shows the description of the design change requests, the description of the work required and then the value of the various change requests as we saw them at the time. These are the ones that were outstanding.

688. The document **BFB00095825** we also put together and it shows Authority to Recruit additional construction and design support (ACRs) to BSC, to retain staff based upon that schedule of rates to support with the close out of additional design services post novation. I think this is the summary of the distribution of those ATRs across the various different on-going design issues to close them out. We made applications ahead of spending the money to BSC for all of the additional work that we were involved with, and this is a summary of that at a point in time.

689. Document **BFB00095826** shows a list of all the design change requests, a brief title, some of it is the value engineering but it is additional design works that we undertook on behalf of BSC and hence TIE to complete the design services, which was additional to that which was part of our original scope, and within this it details the value of each change. Change number, the scope, the title and how much was originally requested and how much was remaining. Along with the status at that time.

690. I can confirm documents **BFB00095829** and **BFB00095830** are the PB claims for their incentive payment under the SDS novation agreement.

691. We did receive payment of £973,000 out of a possible £1 million for the deliverables, we did a review of each deliverables in turn and had them approved or rejected by TIE. It was a strange arrangement because we were delivering designs to BSC but the decision, the payment of incentive, was made by TIE. So it was a slightly unusual arrangement.

692. My email (**BFB00095823**) of 8th March 2011 to Kevin Russell of Bilfinger, cited, the difficulties in completing tram-stop design, as an example of disruption to completing the design. Tram-stops are not really that complex. There is not a great deal of design that should be required. Some of the tram-stops we developed and redesigned on many, many occasions, moving the furniture around from one location to another, and this was as a result of the numerous iterations of design and comments that came back from CEC Planning and Technical. Something that was fairly simple in its finished form required repeated design on many occasions, moving the vending machine, moving the tram-stop shelter, moving the fixed equipment, the benches, the litter bins etc. The design of the alignment of the tram-stops was fairly straightforward and that did not substantially change in most of the cases, it was the preferential engineering around where the various parts of the furniture would be sited that was subject to change on many, many occasions. That was the frustration and this was fairly typical for this scheme.

693. It was fairly typical of something that should have been simple. As I have mentioned earlier, we would normally decide what amount of furniture and what the size of the tram shelter would be, but quite often on similar schemes a party of the relevant stakeholders would actually take a walk through the site and determine exactly where the infrastructure would be placed and then, if there were any tweaks to that, they could be done fairly late on in the installation process. However, on this particular scheme, we were expected to go to really extensive lengths to optimise the positioning of each part of the furniture in turn. It was a matter of opinion ultimately and numerous people had an opinion, so we just kept on revising the design and submitting it for approval.

April 2011 to Completion

694. Following the discussions at Mar Hall in March 2011 there was a far more focused view and an effort to try and close out the remainder of the design from all sides. BSC were very keen already, but we suddenly had a mechanism with and a drive from CEC to get the design approvals and consents closed. It was a far more proactive approach that was adopted after the mediation discussions. PB did continue to complete the design during that period and under instruction from BSC.

695. There were difficulties, but there was a far more focused view, so the likes of the closeout of the roads comments, that was done in literally a few weeks, whereas previously we had taken months, if not years, to close out the comments. In fact we closed out very few of the comments prior to the mediation discussions and then after that there was a very clear view to try and approach, from CEC in particular, to close them out.

696. Referring to my email (**TIE00686402**) dated 29th March 2011 to Steven Bell which noted issues between TIE and SDS relating to MUDFA and a later email (**BFB00097800**) dated 7th September 2011 from Graeme Lang of PB also suggesting issues with MUDFA SDS had not been paid for the MUDFA support work that we had provided to TIE or received our incentive payments, so this is a communication to Steven Bell from myself requesting a meeting or some confirmation that we were going to receive our payments.

697. These outstanding payments went back to 20 October 2010. The email was written 29th March 2011, so we had continued to provide the services but we had not been paid for six months for those services. I was trying to raise the profile of this. I start off in the email by saying obviously that the issues with BSC and the mediation had taken precedence, I understood that, but we could not continue to work without receiving any payment for the services that we were providing. We continued to work and we were still continuing to work but we were not being paid, I was asking Steven Bell for a meeting to discuss why we were not being paid and how we were going to resolve those issues.

698. I cannot recall if the refusal to issue the MUDFA drawings caused any delay, but this would have been highly unusual for us to take this course of action, to refuse to

provide completed drawings. What I am conscious of is we should have been providing the drawings I think to TIE, who should have issued them to BSC. Unusually in this case, because we were providing the services to TIE to deliver these drawings, it should have been BSC approaching TIE for the drawings that we provided. But it would be highly unusual for us on this project to withhold deliverables due to lack of payment, as you can tell from the fact that we were still working in March of that year despite the fact we had not been paid since August of the previous year. I cannot recall if these drawings were issued or not.

699. I cannot remember an instruction to redesign to avoid a utility conflict between Haymarket and York Place. I cannot remember that level of detail.

700. I note the emails (**BFB00097314** and **BFB00098756**) dated 18th July 2011 and 21st December 2011, respectively, from Simon Nesbitt of BB noting difficulties with version 72 of the design programme. At this time our planner had left the project and we were seeking additional planning support, so this was a fair criticism of something that was causing us a problem at the time, which is the on-going update of the programme. We did struggle to do that but it was just one of those unfortunate issues where we were trying to get some additional planning support, so that was fact.

701. The difficulties PB encountered with the design programme were just a lack of resource, as I explained (in the reply email) we needed additional resource and we were trying to secure that. We resolved it by finding another planner who worked for Balfour Beatty and he came in and updated the programmes for us. It did not have a noticeable impact on the project as a whole, but it frustrated Bilfinger Berger and they obviously lost visibility of our progress and our ability to furnish them with the completed design. But it was a fairly short-term issue that we overcame fairly quickly.

702. In relation to email (**BFB00097924**) dated 13 September 2011 from Simon Nesbitt concerning slippage to design one of the main issues that was on-going was the track form. The track form was actually a Siemens design, and in order to complete the design entirely we needed to get the track form design from Siemens and incorporate it within the detailed design for the various structures and the interface with the roads and also I think there were some planning approvals that needed to be finalised. We had not received the completed technical design from Siemens, so that was causing some delay. The same issue existed with the finalisation of the planning

submissions; we had to show how the road pavement would interface with the track and the rail in particular.

703. The difficulties were resolved, we worked with Siemens to finalise the track form design. We supported with that and Bilfinger Berger and Siemens asked us to produce some of the design for that, the road sections in particular, which we did.

Project Management and Governance

704. I think that if the collaboration that we experienced towards the very latter end of the project had been experienced throughout the project, and the effort to try and resolve the issues, I think the resolution of a lot of the problems that dogged the project could have been achieved far earlier in the scheme.

705. In terms of the governance, from a PB perspective, for large portions of the project we were expected to deliver an approved design and undertake all of the design work associated with that without having the power to secure the approval or the consent for the third-party stakeholders for which we were being asked to achieve. It was a very difficult task for us and it was almost out of our control. What we ended up doing was producing iteration upon iteration of the design; I think we could have achieved a far better outcome on the project if the same collaborative approach from TIE, CEC, TEL, etc. had been adopted at the start of the project as at the end. The drive to resolve the issues was significantly intensified after the mediation settlement at Mar Hall.

706. In terms of the delivery of the scheme, we had a really good team to deliver the scheme as Parsons Brinckerhoff. There were very capable people on the project management on all sides, but I think it would have helped significantly if there had been more light rail and tram experience on the client (TIE and CEC) side, I think that would have helped them to understand the difficulties that we were experiencing. More value could have been obtained from the client's engineer as they had some very experienced staff.

707. In relation to the various bodies and senior personnel within these bodies I think the main issue that caused the delay on the scheme was the lack of positive decision making and leadership, and it was very late in the project when a lot of the key

decisions were made. Some of those were directly in the hands of TEL and CEC. TIE were there to try and implement the scheme and to deliver it, but I think a lot of the decisions that were made were made very late and some of those decisions were critical to the progression of the project.

708. There were a lot of very capable people within all of the organisations that were involved and a lot of people who really wanted the scheme to be a success. Some of the decisions were not made quickly enough. In terms of the stakeholder management, broader than the organisations referenced there, TIE, TEL and CEC, the stakeholder management needed to be much more robust and there was far too much opportunity for people in organisations to influence the outcome of the scheme than we would have liked.

Final Observations

Tony Glazebrook Comments on Design Assurance

709. Referring to the draft note (**CEC00307573**) and comments made by Tony Glazebrook of TIE, in May 2010 on SDS's performance I completely disagree with that. We produced an enormous amount of design assurance information and design integration across all disciplines. I will refer back to a comment that I made earlier that, in terms of the design integration and the design assurance and the quality of the design, we made a significant amount of progress at the preliminary design stage on the scheme and what was actually built was very close to what was developed in 2006.

710. The subsequent four or five years' worth of iteration really was not as a result of our ability to produce design or assure it or ensure that integration was achieved, it was in the minutiae of the number of comments and preferential engineering that was undertaken. I disagree with the comments, we produced design assurance statements, we produced IFC, IDCs, all of the usual stages of design we produced, and we reproduced them a number of times, so I disagree with that statement and would like to provide comment on each of the highlighted comments he made.

711. Regarding his comment "*Early design reviews, of supposedly complete and integrated design within 'draft' DAS (Design Assurance Statements) Packs, revealed a multitude of areas where SDS design was unsatisfactory as far as TIE and CEC were concerned, somewhere TSS expert scrutiny required more explanation and some ... where the Operator was concerned about safety. There were always many issues concerning non-integration due to ineffective co-ordination of the various disparate design teams within SDS.*" Once again I completely disagree. The fundamental point with the development of the design was the inability to actually lock down that design and to concentrate and develop it to an IFC status through all the normal mechanisms that you would normally use. We were continuously changing the design because of the various different outstanding decisions that were required to be made and they were outside of our gift. I think the efforts that were put in to try and accommodate those and to go around the design loop several times; it was astonishing really just how much additional design work was undertaken and how that prolonged the scheme.

712. Regarding his comment *"Design packages were not issued on schedule, key reasons for this, the massive volume of CEC comments on offered design, resulting in a continual hiatus within SDS design sections in attempting to determine whether the comments were valid and, if they were, to address them – these SDS processes being invisible, but obviously very slow"*. The number of comments received was astonishing, some of them running to thousands of comments, which was far more onerous than I would have expected on a design, and suggested that it was absolutely of poor quality, which in fact it was not. These comments, although there were thousands of them, were resolved in a matter of days, if not weeks and they were very minor in their nature. The suggestion that in some way the design was faulty or of poor quality was incorrect, and yet that was not what was portrayed by the number of comments.

713. Regarding his comment *"Dates for the submission to TIE of completed design assurance packs continually slipped"*. That was because we could not lock down the design. It was very difficult to assure a design pack when there were outstanding decisions associated with critical issues such as Forth Ports, SRU and Picardy Place, there were numerous major issues that we had no ability to lock down ourselves, they needed resolution by TIE as obviously the organisation that had influence with these third-party stakeholders, and this was very difficult.

714. He (Tony Glazebrook) then goes on to *say "In SDS's view this was principally due to their continuing and seemingly endless dialogue with CEC as part of the progress to closure of CEC Technical and Prior Approval issues. This is graphically illustrated in the following embedded spread sheet"* and that spread sheet shows exactly how many thousands of comments there were that we were trying to tackle and the design between V17 and V33.

715. That is exactly what was happening, any small changes to the technical authority drawings had to be reflected in the planning authority drawings, so there is almost an endless round of design development that was based on preferential engineering in a lot of instances from the CEC technical and prior approvals and our frustration was the endless loop that we were going through.

716. With the critical issues there were really substantial issues with the third-party stakeholders and that needed to be resolved. That was a real problem for SDS. I think the points that were made really indicate what we were faced with as an organisation trying to conclude the design rather than a failure on our part to actually achieve that. It was more of a lack of a collective understanding of what needed to be done to close the design out and to procure the contractor based upon that finalised design.

717. The impact of those issues was huge, the design did not really significantly move on between the preliminary design and two years post, and yet we had completed a huge volume of design and a number of iterations by then, but the actual principles of the design in many cases had not moved on. The issues that existed at the preliminary design phase with the blockers to progress that existed along the route still existed two years later; it was just that we had done iteration upon iteration of design after that. We also produced the design for phase 1B that was never built, and that decision was not made by PB.

718. I am also now aware that Mr Glazebrook also referred to the difference between BDDI and issued for construction packages, and said *"currently, TIE has limited information from BSC relating to the reasons for changes"* TIE, through the acceptance of the BSC offer and the subsequent workshops that were taking place to review the BDDI, knew of the differences that were present. I do not think there was anything that TIE should not have known about in terms of that design development

and the changes required. BSC had obviously offered them a system, so I do not think that necessarily anything was being kept a secret, and they were party and they led the workshops with BSC and us to try and understand what those changes looked like. I am surprised by that and I think there was just so much going on I am just not sure that Mr Glazebrook had visibility of everything that was actually taking place and all of the information and knowledge that TIE had.

719. I did move on to a different project at the end of 2011, but I still supported this project for a considerable period of time after I left. I was making visits to the project once, if not twice, a week for several months after my full-time involvement ended, hence reference to my SDS Progress Report in September 2011 (**BFB00004592**) and others then writing them (**BFB00004618**) from January 2012 onwards. I just moved on to a different project but I did support and I was visible and I was really keen to see the project succeed. I was still on email and still sending regular updates and monitoring progress. There was not a formal final date as such.

Project Programme Information

720. The SDS Design Programme was updated monthly. We had a short period where we were short of a planner, but that was a very limited period, but for several years we updated it meticulously every month. I think it is part and parcel of undertaking the design and delivering the design, updating the programme and progressing the progress. That is what we did and it was normal to update at this rate.

721. We would have every programme update for the entire duration of the project on file. Steve Reynolds would how to make these available.

722. A detailed analysis could be undertaken of the programmes to understand the extent of the change. We have a baseline original programme and then I think we produced in excess of 100 programmes over the course of the project, so, yes, some forensic planning analysis could easily be undertaken on the programme. The programme files do hold a vast amount of data and it could be interrogated in different ways, I am sure it would still exist and could easily be made available from PB. The records could also demonstrate the state of the programme on particular dates and the differences between them. I'm sure that work could be done.

723. In relation to there always being factors which were going to have to be confronted and resolved for a tram line to be constructed in Edinburgh, I would say, yes there were. It is the manner in which you tackle the issues that is important. It is how you do it, the manner in which you do that.

724. The time taken to resolve issues could definitely have been reduced. I still think that the proposal we advocated at the time, to delay SDS novation to the contractor, was very valid. If we had paused with that procurement and completed the design then provided it to the contractor for them to finalise their pricing and then mobilise, I think that would have saved considerable time. A lot of the delay to construction was because of the contractual issues between TIE and the contractor, rather than because of any particular issues that were delaying them from a technical perspective.

Final Comments

725. My final comments are that I have worked on numerous highly-complex projects and I do think, in this particular case, that a lot of people on all sides put in a significant amount of effort.

726. We had a fantastic team working on the scheme. The biggest challenge to SDS was obtaining decisions from third parties who were clearly not operating to the same timescales that this project required, the result of the attempts was significant optioneering on design without often without reaching a conclusion.

I confirm that the facts to which I attest in this witness statement, consisting of this and the preceding 176 pages are within my direct knowledge and are true. Where they are based on information provided to me by others, I confirm that they are true to the best of my knowledge, information and belief.

Witness signature [redacted]

Date of signing.....17/5/17.....