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# EDINBURGH TRAMS: A CASE STUDY OF A COMPLEX PROJECT

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The Edinburgh Tram project has proved to be politically contentious, complex, and problematical since preparatory work on services diversion commenced in 2007. The proposed network has been reduced to a single 18.5 km line linking Newhaven to Edinburgh Airport via Leith, Princes Street, Haymarket, Edinburgh Park and the Gyle. The main contract was let on a fixed price design and build basis to a consortium of Bilfinger Berger (civil engineering) works, Siemens (electrical) and CAF (tramcars). Work commenced in summer 2008. An earlier contract for the preparatory works and services diversions was carried out by Carillion. It appears likely that the project will not be completed before 2012 rather than the original target of 2011 and the budget cost of £545 million as included in the final business case appears likely to be exceeded. The early stages of the project's life have been blighted by political disputes between the Scottish National Party on one side, who have opposed the project and the other political parties including Labour, Liberal Democrats, Conservatives and Green Party on the other who have generally backed the scheme. The SNP currently form a minority administration in the Scottish Government at Holyrood and are part of the ruling coalition with the Liberal Democrats on City of Edinburgh Council who are the sponsors of the project. Since the opposition parties at Holyrood forced the finance for the project through there have been a number of high profile contractual disputes between the arms' length project company, Transport Initiatives Edinburgh and Bilfinger Berger. The resolution of these disputes has caused several delays to key operations for the project. This paper will analyse implications of the political disputes and way that the project was let on the progress and cost of the project.

Keywords: project management, political issues, dispute resolution, game theory.

## INTRODUCTION

This paper is intended to illustrate the difficulties involved in project management on a highly politicised project. The network can be broken down into two distinct stages. The first is a largely on-road line starting at Newhaven in the north of the City and continuing via Ocean Terminal, Constitution Street and Leith Walk to St Andrews Square. It then proceeds along Princes Street and Shandwick Place to Haymarket. The second section is largely off-road and commences at Haymarket following the main line alignment to Edinburgh Park before going through to the Gyle Shopping Centre, under the A8 and across country to the airport.

The two sections present very different challenges. The on-road sector poses no real technical problems apart from the need to divert services from directly under the tram

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line or to provide side access manholes for services which cannot be diverted. The real issue is that of traffic management during the works and the disruption to local residents and businesses. In the case of the off-road section of the works the disruption faced is less of a problem. The challenge here is the construction of retaining walls, bridges, viaducts and a tunnel often with poor ground conditions. Working alongside a main line and constructing two bridges over the main Glasgow-Edinburgh main line involves dealing with Network Rail. They can impose restrictions on the hours worked. Some work may only be carried out overnight at weekends. It is fair to say that the on-road section faces logistical and political issues while the off-road section will have to deal with technical problems. The project has been bedevilled by contractual disputes between the Project Manager (TIE) and the main infrastructure contractor (BBS). This has led to the most of the working on the on-road sections being suspended because of the refusal of BBS to start work until unspecified issues were resolved. This led to the Client considering whether to remove the BBS from the project.

## **THE PROJECT**

### **Background**

Trams have been considered as the solution to Edinburgh's traffic problems since the 1980s. Edinburgh lost virtually all its suburban rail system in the 1960s. Only the line to North Berwick and the reinstated service to Bathgate remain. Edinburgh overcame this as car ownership was amongst the lowest in the UK and bus usage was very high. However over the last twenty years, car ownership has steadily increased towards the national average leading to increased traffic congestion. In a number of roads, such as Princes Street and also Leith Walk much of the congestion is created by large volume of well patronized bus traffic. The only substantial area of land available for housing to meet demands from the rapidly expanding City population was on the Leith waterfront. Building on the scale expected would put great strains on the bus service and increase the congestion along Leith Walk and Princes Street. Obviously things would be much worse if the newcomers opted for car travel. A full metro system was always going to be ruled out on the grounds of cost so trams emerged as the only viable solution. A consensus emerged on the City of Edinburgh Council (CEC) in favour of a tram network supported by all the parties represented. Labour were the majority party but the scheme was also supported by the Conservatives and Liberal Democrats. The CEC allocated the management of the project to their 'arms-length' company Transport Initiatives Edinburgh (TIE).

### **The parliamentary bill**

In order to progress the proposed tramway a Parliamentary Bill was required. This gained the approval of the ruling Labour and Liberal Democrat coalition as well as the opposition parties. Contrary to the popular misconception the project was initially backed by the Scottish National Party (SNP) with their then Transport spokesman Kenny MacAskill being particularly vociferous in support between 2000 and 2002. The Scottish Executive announced the approval of funding in 2002. The project had the support of all parties on CEC and most of the Scottish Parliament plus also the local Chamber of Commerce and the business sector. This consensus was broken by the SNP. According to the respected SNP member of the Scottish Parliament, Christopher Harvie, this about-turn was engineered by Kenny MacAskill who was standing for election in for Edinburgh East constituency in the upcoming 2007 election. Edinburgh East was the only seat not included in the proposed tram network. The SNP were not a force on CEC until 2005 when a Labour councillor and Deputy

Provost Steve Cardownie defected to the SNP forming initially a group of one. The Parliamentary approval was two lines. One was a loop linking the City Centre and the Leith waterfront while the second linked this to the airport with a branch to the Newbridge industrial estate. The first phase (1A) was prioritized. This involved a line from Newhaven to the airport. The remainder of the loop was labelled Phase 1B and Phase 2 while the Newbridge branch was to become Phase 3.

### **The network funded**

The Final Business Case was under preparation while the Scottish Executive voted funds to commence design of the network plus preparatory and investigative works. Before the final approval could be given the 2007 Scottish Parliamentary elections took place. This gave the SNP a one seat advantage over Labour although well short of an overall majority. The SNP signed a concordat with the two Green Party MSPs. This effectively precluded any coalition not involving the SNP other than the implausible Labour-Liberal Democrat-Conservative grand coalition. The outcome was a minority SNP administration with critical support from the Greens. Meanwhile a new Council was elected in Edinburgh. The new proportional representation system dramatically reduced the Labour representation and contributed to a big increase in SNP numbers. The Liberal Democrats became the largest party and the Greens gained representation. A Liberal Democrat-SNP coalition took control. The start of the project was delayed with some service diversion work put on hold by the incoming minority SNP Administration at Holyrood while they commissioned a report by Audit Scotland (2007). This gave the project a clean bill of health. The new First Minister Alex Salmond wanted to scrap the project. However a resolution backing the project was passed with the support of all opposition parties including the Greens and the former SNP Edinburgh Independent Margo MacDonald. After some delay, the SNP leadership agreed to give £500 million funding to the project, possibly with the threat of a motion of no confidence if the will of Parliament was frustrated. It was also necessary for the SNP to keep their Green allies on side. CEC pledged to contribute £45 million to the project. This was intended to be raised in part by charging for planning applications on or near to the proposed tramline.

### **Political issues**

The political dispute was far from over despite the project being given the funding. The fault-lines ran through the middle of the ruling coalition on CEC. The SNP councillors did not see themselves a bound to support the project even though they were part of the administration sponsoring it. Similarly the SNP Government ministers at Holyrood lost few opportunities in attacking the project even though they were the main funders. This continued after the Scottish Government cancelled the Edinburgh Airport Rail Link in favour of making the trams the means of linking the City Centre and the main line rail network to the airport. The Scottish Government were committed to building a new station on the Edinburgh-Fife/Aberdeen line at Gogar to link with the trams and the airport. As the disruption increased with the road closures for the MUDFA contract, resentment from the public increased. This was not helped by some inaccurate reporting in the local press and the comments by ‘rentaquote’ politicians. Public opinion was certainly in favour of the project before construction started and almost certainly will be once it is operational. However when the City Centre resembled ‘cone city’ with barriers in place and seemingly never-ending road works and street closures, it is understandable why many became antagonistic. There were also attempts made to further politicise the issue by branding the project as a Labour Party creation. In fact the Labour Party at Westminster was almost

ideologically opposed to light rail. Local MP Alastair Darling spent much of his period as Minister of Transport cancelling light rail projects throughout England. Ironically the one tram project that he could not cancel was Edinburgh as this was a devolved issue and outside his powers.

### **Contractual arrangements**

There were four distinct contracts let for the project:

1. System Design Services (SDS)
2. The Multi Utilities Diversion Framework Agreement (MUDFA)
3. The Tram Infrastructure and Maintenance Contract (INFRACO)
4. Vehicle Supply and Maintenance Contract (TRAMCO)

The SDS contract was let to Parsons Brinkerhoff in September 2005.

The MUDFA contract was awarded to Alfred McAlpine (AMIS) in October 2006. AMIS was subsequently taken over by Carillion. In addition parts of the service diversions were carried out by Farrans and Clancy Docwra to take some pressure off Carillion. The INFRACO contract went to BBS a consortium of Bilfinger-Berger carrying out the civil engineering works and Siemens responsible for the electrical side in May 2008. The TRAMCO contract was won by the Spanish firm CAF in November 2007. Subsequently the SDS and the TRAMCO contracts were novated to the INFRACO consortium. This was intended to avoid any claims arising from design issues and also from any conflicts between the tram specifications and the infrastructure. The MUDFA contract was deliberately kept separate to avoid delays in the service diversions being used to justify claims for extension of time and consequent loss and expense on the subsequent infrastructure contract. It was intended that the MUDFA works would be substantially completed prior to BBS taking possession of the section of works. There was provision for some situations where BBS would work alongside the MUDFA operations although BBS are currently rejecting this. In the final outcome, the MUDFA works ran over time this was a cause of many of the subsequent disputes. The cost of the project including contingencies was around £512 million. This left some headroom with a £545 million funding envelope. The fall in Sterling against the Euro posed a risk of cost escalation. However currency hedging limited this increase to around £10 million.

## **PROGRESS**

### **Project commenced**

After some preparatory and investigative work the MUDFA contract commenced in July 2007 and was due to be completed by November 2008. The work was delayed by prevarication by First Minister Alex Salmond in 2007 before the funds were allocated. A further issue was the decision of the Scottish Government to fund a new station at Gogar as a partial replacement for the Edinburgh Airport Rail Link project. This necessitated a redesign of the tram track layout near to the depot at Gogar and the construction of a new tram stop to facilitate the interchange.

### **Service diversions**

The MUDFA works were running behind schedule from the start. One major issue was at the Tram Depot site at Gogar. This was on the airport flight path and consequently had to be constructed below existing ground level. A major water main was found crossing the site that was not apparent on the drawings. This resulted in a major delay of at least a year while the main was diverted by Carillion before Barr Construction could gain access to the site to start the work package let to them by

BBS. Further delays were experienced by Carillion elsewhere due to the inadequate nature of the drawings for the existing services. Many of the services dated back to the Victorian era and were not documented. Several archaeological sites were discovered including large number of human skeletons near the site of a former leprosy hospital on Leith Walk. An unexploded bomb from the Second World War was also found near to the airport. There were also delays caused by traffic management issues with work on Princes Street being halted after the diversions caused gridlock in the City Centre. The framework agreement was let on the basis of remeasurable approximate quantities. In the final outcome the quantity of services diverted was close to double the initial estimate. However with around 98% complete, the cost has only gone up from the initial £42 million to a projected £50 million final cost. It became clear that Carillion were struggling to complete the additional work and two further contractors were brought in. Farrans came in to carry out works at the airport while Clancy Docwra was appointed to work at the other end of the line around Ocean Terminal. Subsequently a weary Carillion withdrew from the final stages of the framework agreement and Clancy Docwra took over to complete the works at Haymarket and York Place. As things stand with the MUDFA works should be substantially complete by May 2010. This is around 18 months behind schedule.

### **Infrastructure works**

The INFRACO contract was finally signed in May 2008 with a start on site expected by September 2008 and completion by January 2011. It was intended that passenger carrying operations would start in July 2011. BBS are operating as a management contractor letting out packages to firms such as Barr, Graham, Raynesway, Bam Rail, Laing O'Rourke, MacKenzie, Crummock, Farrans and McKean corresponding to the sections of the works. The first dispute came to light in March 2009 when BBS refused to start on the track laying on Princes Street. The whole of the main thoroughfare was closed to allow for the diversion of services near to the Mound towards the middle of the street while two contractors, MacKenzie and Crummock were to start laying tracks from either end. It was envisaged that by the time they would meet at the Mound the MUDFA works by Carillion would be complete. There were suggestions in the press that BBS were demanding that a claim of an extra £80 million was agreed before they would commence track laying. This was not confirmed by BBS but they did cite a large number of outstanding unresolved issues. This resulted in a month long stalemate before it was eventually agreed that works would start. This agreement came hours before the automatic dispute resolution procedure was due to kick-in. The works were completed by the November 2009 deadline. The disputes continued into 2010. BBS were due to commence work on Leith Walk, Shandwick Place and return to Princes Street to link the tracks laid to St Andrews Square, and York Place. To date they are standing firm on this. However work is proceeding on the off-road sections of the tramway. Work has also started on one on road section of work in the north of the City. This involves the widening and strengthening of the existing Tower Place Bridge near to Ocean Terminal. This package is being carried out by McKean & Company.

### **Tramcar construction**

This part of the works is proceeding smoothly. The first two tram cars built underwent trials at Siemens test track in Wildenrath, Germany. One has now been delivered and is on display in Princes Street. The remaining 26 trams cars will be delivered over the coming months.

## **DISPUTES**

### **Formal change notices and disputes**

BBS claim that to date they have submitted 550 formal change notices of which 135 have been withdrawn and 131 resolved by negotiation. 14 of these have ended in formal disputes of which 4 have now been resolved (Henderson 2010a). The first dispute to be resolved was a claim for £90,000 for work next to the Hilton Hotel near the airport. This was resolved in favour of TIE. However the second dispute of £1.8 million over ground conditions for a retaining wall between Russell Road and Roseburn Street resulted in an 80% of the claim being awarded to BBS. It appears that BBS were also successful in a similar claim at the Carrick Knowe railway bridge. TIE were unhappy with the outcome of some of the adjudication decisions but were uncertain as to the point of taking the issues to court. The funding envelope of £545 million now looks somewhat inadequate with £600 million appearing to be closer to the mark. According to one estimate BBS have won £16.2 million of £26.7 million claimed for the disputes resolved either by direct negotiation or using the dispute resolution procedure (Dalton 2010). BBS originally appeared to be claiming an extra £80 million although some suggestions are that they are now looking for an additional £100 million plus. This is surprising for a design and build fixed price contract. The civil engineering component of the INFRACO contract was originally valued at around £165 million.

### **Time overruns**

The INFRACO works have run behind schedule from day one thanks to delays imposed by the attempts by the SNP led Scottish Government to cancel the network in mid-2007 plus the impact of further delays in the MUDFA work (Millet 2009). This has led TIE to revise the completion date to June 2012 to reflect this. BBS were claiming earlier this year that the work cannot be completed before early 2014. This suggests that they are looking for another four years to complete the project on top of the 18 months that they have already been working. This on a project originally scheduled to take some 3½ years! This hyperbole is consistent with press articles claiming that the project is two years behind schedule (Henderson 2010b) despite the fact the BBS contract was only signed two years ago and was not due to start on site until around 18 months previously.

### **The stoppage**

It was argued by the CEC that BBS took a view that they would not proceed with any section of the works until all outstanding issues were resolved rather than allowing the dispute resolution procedures to run their course while the work continued. The obvious conclusion that can be drawn is that BBS are not so confident of winning the disputes as they have made out and are indulging in brinkmanship to try and force TIE to agree terms. According to the former Leader of the CEC, Ewan Aitken, this tactic has been used by BBS before. Firstly before the contract was signed in 2008, a late claim of £12-£15 million was put in for 'increased steel costs'. The CEC faced them down and a much lower sum was agreed (Aitken 2009). Secondly the previous impasse on Princes Street in early 2009 was similarly resolved with little extra cash being paid. The frustration faced by TIE and CEC at the lack of progress has led them to consider the nuclear option of removing Bilfinger Berger from the project. The idea was to try and persuade Siemens to take over as lead contractor and carry on with the work packages to local contractors already let. The litigious Bilfinger Berger have no intention of going quietly and have indicated that they would take legal action not only for breach of contract but would seek a court order to prevent other contractors

working on the project. Bilfinger Berger has resorted to legal action after a similar stand-off situation in Vancouver (Gilbert 2008). TIE spent some time spent trying to coax the contractor back to work, However CEC lost patience in mid-June and issued a deadline to BBS with the threat of ending the contract.

## **ANALYSIS**

### **On-road and off-road sections**

It may be significant that the packages that BBS are initially refusing to work on are all fairly straightforward on-road sections. The complex packages are mostly in the off-road sections and involve the construction of several bridges and viaducts across roads, railways, and rivers not to mention a number of retaining walls and a tunnel under the A8. These sections are all proceeding. Interestingly the only complex task for the on-road section is related to the Tower Place bridge works in Leith has been let to McKean and works are proceeding. Once the issues are resolved or either of the parties backs down there is nothing to stop the on-road tram construction proceeding quickly. This was certainly the case on Princes Street in 2009. No doubt this is with one eye on the £1 million per month liquidated damages that TIE are threatening to claim if the project is not finished by the revised completion date in 2012. Thus it appears that BBS are attempting to exert pressure on TIE and CEC by not working on the 'visible' section of the works. This was particularly the case with the 2009 stoppage on Princes Street. The whole of the main shopping street of Edinburgh was closed yet nothing was happening save the completion of the MUDFA works. This was already certain to run on through the Festival but seemed likely at one stage to impinge on the Christmas and Hogmanay celebrations. In the end it was completed on time. This strategy could have been aimed at the vulnerability of the CEC ruling coalition. The SNP junior partners, in particular deputy leader Steve Cardownie, have been publically sniping at the project at every opportunity. The logical inference is that the stand-off was intended to use public pressure to force CEC to instruct TIE to resolve the dispute. The off road sections were largely out of sight and out of mind so there would be little mileage in stopping work on these sections.

### **The response from TIE**

Having rejected the idea of removing Bilfinger Berger, TIE has reacted to the impasse by digging in for a prolonged dispute. As the final sections of the MUDFA contract are completed it was proposed to remove the traffic diversions and barriers from the streets to give the city centre a feeling of normality. This will reduce the political pressure on CEC and TIE and buy some time. Meanwhile it is hoped that the progress on the off-road sections will mean that a partial opening of the tram network from Haymarket to the airport may be possible by late 2011 or early 2012. The next elections to the Scottish Parliament are in 2011 while CEC elections are due in 2012. The Haymarket-airport section was not being held up by any formal dispute. The idea is to push the pressure back to BBS as they would still face the risk of being stung for the liquidated damages if they lose out on the disputes in question.

### **Recent events**

The situation continued with BBS refusing to start work on the on road sections – notably Leith Walk, York Place and Shandwick Place – of the work while continuing on the off road section beyond Haymarket. However the progress on the off-road sections remains very patchy with no evidence of activity over many sections. The most challenging elements including the tunnel under the A8 and the two bridges over



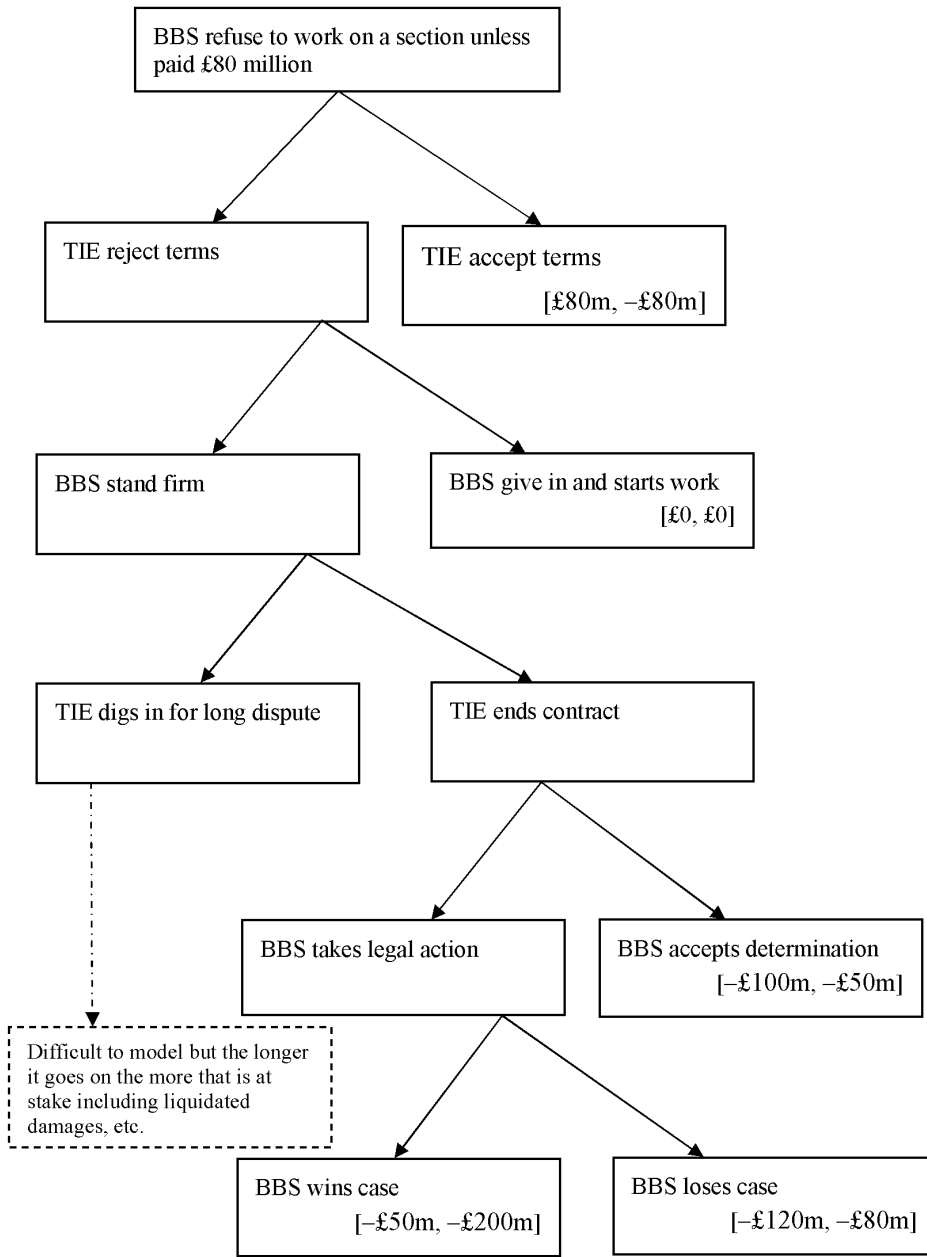


Figure 1: Representation of dispute as a sequential Chicken Game

the main railway line and the Haymarket viaduct appear to be proceeding. In addition there is some works being carried out near the airport and around Edinburgh Park but most of the remaining sections appear to be at, or near to, a standstill. While no formal refusal to work on these sections has been communicated it appears that the project is starting to grind to a halt. This may be an indication that BBS are escalating the dispute by stealth.

**Game theory**

The stand-off between TIE and BBS is beginning to look like a textbook example from Game Theory. In this case it resembles a ‘Chicken’ game (Osborne & Rubenstein 1994) where the two parties are staring and each other and the first one to

back off will lose. The real disaster will happen if neither party backs-off. Many 'Chicken' games, such as the one played out in the film 'Rebel without a cause', work on the assumption that that moves will be simultaneous by the two parties. In this case the moves are sequential with each party responding to an action by the other. A simplified model of the dispute is presented in Figure 1. In cases where the game terminates (for example if one party or the other concedes) the hypothetical outcomes are given thus: [£80m, -£80m]. The first figure is the financial outcome for the contractor and the second figure is for that for the client. This illustrates that the longer the dispute goes on the higher the stakes become. If the nuclear option of terminating the contract is used and the contractor takes this issue to court the chances are that both parties could lose out. The losses incurred from a prolonged stand-off will be less dramatic. However the potential losses in the form of liquidated damages for the contractor or loss and expense payments for the client will rise the longer the dispute continues. There is a degree of logic that dictates that the dispute will have to be settled or both parties will lose out. This applied on the 2009 dispute on Princes Street. The question is when will this point arise for the current dispute?

The problem with the Chicken game is, unlike the Prisoners' Dilemma, that there is no pure strategy equilibrium solution. Consequently a mixed strategy is required so as to keep your opponent guessing. It pays to be unpredictable. It may seem illogical to take the dispute so far that both parties will lose out. However if your opponent thinks you may be mad enough to do just that this may persuade them to settle. If client knows that the contractor is going to cave in at a particular point they may use this to their advantage. There has been some speculation that a compromise deal is being examined. This would lead to BBS being removed from some sections of the project, possibly that from York Place to Newhaven. However they would be allowed to finish the section the remaining sections including Haymarket to the airport and the link to the already completed Princes Street section. This would mean that CEC would have to re-let the contract for the Leith section of the project. It would almost certainly involve a phased opening for the network over the coming years.

## **CONCLUSIONS**

This illustrates how a complex project that was always likely to be disruptive to the public can get into real difficulties if it becomes politicised. Any perceived fault lines between the project stakeholders can potentially be exploited by the contractor. Such disruption is the case with most infrastructure projects. This has been the case since the Victorian era when the first sewers were constructed and also when the first lines of the London Underground were started.

Disputes can obviously occur with any project. However the evidence from the trams network is that the contractor appears to be trying to exploit public dissatisfaction with the traffic diversions and delays in order to progress their claim.

There have been continual calls from politicians, not all from the SNP, for the project to be cancelled long after the point where it will cost more not to have a tram system than to have one. This would apply because of the cost of materials, components and equipment ordered, the loss of profit to the contractor, and the remedial works needed along the length of the line.

There is little that can be done to avoid politicisation of projects save giving virtually any political party or interest group an effective veto of choice of projects.

Politicised projects are all too common in Scotland at the moment. The Scottish Parliament building led the way and narrowly avoided being cancelled half way through the construction process. Subsequently the Edinburgh Airport Rail Link and the Glasgow Airport Rail Link have both been scrapped by the current Scottish Government after millions of pounds had been spent on consultants' fees for design and abortive work.

The proposed Forth Replacement Crossing could be another casualty in the event of a change of power at Holyrood after the 2011 elections as there is no real political consensus for that project.

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