



# Report & Action Plan

from the  
**VE Workshop**  
**with Infraco Bidder BBS**  
on 01.06.07

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## **EXECUTIVE SUMMARY**

This report records discussion of potential capital cost saving opportunities on 01.06.07 at the VE workshop held between members of the **tie** team (including TEL and Transdev, plus TSS and **tie**'s designers SDS), with BBS, one of two Infraco Bidders.

The purpose was to work together to help identify means of reducing capital cost and so close the gap between estimated costs and available funding.

The report also includes agreed Action Plans – many of which require very rapid attention in order to report back findings at the second workshop to be held on Thursday afternoon, 7<sup>th</sup> June 2007.

Where possible, all those with actions are asked to bring indicative cost effects on 07.06.07, so that decisions can be made on any appropriate next steps, such as more detailed study into feasibility and cost benefit.

If this is not achievable in all cases in the few days available – please at least come ready to make a statement of intent, indicating progress in hand and when due complete.

Please also bring related information to show what changes in project specifications, assumptions and constraints must be made/accepted in order to enable these savings.

Siemens were unable to join the first workshop on 01.06.07, but some specific actions request input from Siemens for the 07.06.07 meeting please.

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## 1 Introduction

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A Value Engineering programme was initiated on the Edinburgh Tram Project in December 2006 generating many cost saving ideas during the first quarter of 2007. Some of these have been accepted as revised project assumptions, others are still under consideration.

After an initial tendering process, the bidders for the supply of trams (Tramco) have been reduced to two, similarly there are two Infraco bidders for the Infrastructure works. The two Infraco bidders had, alongside their bids, identified a number of opportunities for cost savings and improvements.

By May 2007 it was evident that forecast capital costs still exceeded available funding and further savings were required. A series of VE workshops have therefore been arranged with each of the Infraco bidders in the search for these savings to close the funding gap.

This first workshop was held on the morning of Friday 1<sup>st</sup> June 2007 with members of the preferred Infraco bidder team, BBS (Bilfinger Berger + Siemens Consortium).

## 2 The 1<sup>st</sup> June Workshop

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### 2.1 Time and Place:

The workshop was held from 08.30 until 13.15 on Friday 1<sup>st</sup> June 2007, in COSLA Centre, Rosebury House, 9 Haymarket Terrace.

### 2.2 Team Members who attended the workshop

Alan Dolan		SDS Design team (PB)
Tom Hickman	<u>a/</u>	<b>tie</b> Programme Planning
Roger Jones	<u>a/</u>	Transdev
Toby Kliskey	<u>a/</u>	TSS, PM Team
Scott McFadzen		BBS Team, Civils
Tom Murray		BBS Team, Civils
John Pantony		TSS, Cost Manager
David Powell	<u>a/</u>	<b>tie</b> Project Delivery + Procurement team
Alastair Richards	<u>a/</u>	TEL
Andy Steel		<b>tie</b> Project Delivery
Mike Jefferyes		VE Facilitator
	<u>a/</u>	<i>Attended for part of the workshop</i>

### 2.3 Workshop Agenda

The workshop agenda was structured to seek saving opportunities under the following three themes:

- A review of each of the identified BBS proposals
- A review with BBS of the Infraco-related proposals identified by the **tie** team,
- Any new ideas which arose from this shared review of the planned works.

The workshop concluded by agreeing an Action Plan for post workshop development of these opportunities – with a review of the findings of these actions in a second workshop to be held on 7<sup>th</sup> June, from 12.30 to 17.30 in the MacAdam Room, **tie** Citypoint offices.

### 3 BBS identified opportunities

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After an introduction to the purpose of the workshop and of team members to each other, the meeting undertook a review of the identified cost-saving opportunities as presented by the BBS team. Each item is recorded below, with a summary of the discussion and any agreed actions.

#### 1.6.1 Raise level of Depot (BBS Idea 7.03)

BBS were fully in support of this idea, reducing the dig, reducing spoil disposal and simplifying construction. It was explained that considerable effort had already been expended by the in-house team, as summarised below.

##### Background

Co-operation from BAA had been anticipated in the early stages, but more recently was shown to come at a significant price, outweighing the benefits to the Tram project. This idea had therefore been put on hold, if not rejected outright.

An accurate profile of the flight path had been obtained and effort made to reconfigure the Depot to minimise it's height in the critical areas. However, the flight path profile was so flat that very limited advantage could be gained by moving the higher elements (the main building) away from the runway.

Greatest opportunity was shown to come from any reductions to the height of the Depot Building and attention focussed here. Potential height savings identified by the project's VE team included the following – all explored by the SDS designers.

- Reduce the crane from 12 to 6.3 tonnes (*max anticipated lift = 5 t bogey*)  
This proposal, also assumed by the 2 Infraco bidders, is adopted and enables a shallower structure height above the trams in the depot building.
- Reduce the roof pitch. SDS is making useful height savings here.
- Reduce the OLE height within the shed.  
*Removal of OLE over the critical roads in the shed was not thought acceptable to Depot Operations, despite availability of a shunter.*
- Delete (or reduce) the clearance allowed between building roof and flightpath. SDS were reluctant to reduce construction tolerances or to leave little room for roof penetrations (vents/lights/lighting conductors, etc) - or for future roof maintenance (*although such occasional infringement of the flight path may not be as firmly banned as permanent structures*).
- Raise all other areas of the depot (e.g. sidings), just leaving the building at the required deeper level to clear the flight path. (*not popular for fear of trams rolling down slopes in the Depot*)

##### Interim Conclusions.

Subject to detailed design confirmation of the height build-up, SDS indicated that height savings would allow the depot to rise by around 1.4 metres.

It had already been reported by SDS that the maximum allowable rise would be 1.5 metres, limited by the slope of the approaching roads into the depot, climbing from the A8 underpass.

It should also be noted that raising the depot may present a Planning issue, but this was accepted as a hurdle to jump.

### New News.

Andy Steel said the Depot might only be raised by around 1.3m now. Unfortunately Alan Dolan (SDS) was not yet at the meeting to comment on this.

**Action 1.6.1a** *Andy Steel agreed to investigate with SDS this suggested reduction in Depot lift, and any reasons for it.* **Action: AS / SDS for 07.06.07**

**Action 1.6.1b** *Alan Dolan arrived, agreed to BBS's request and will pass to them the drawings which show the flight path profile and the building height build-up. These two sets of information determine the Depot level.* **Action: SDS on 04.06.07 please**

**Action 1.6.1c** *BBS to consider any other means to reduce the building height and raise the depot level.* **Action: BBS – initial thoughts for 07.06.07**

### New Ideas from the 1.6.07 Workshop

#### 1.6.2 Move the pair of through-tracks at the southern edge of the site 1 metre north, away from the site boundary.

This, assuming that the Depot can be raised by around 1.4 metres, will avoid the need for the high cost, bored piled retaining wall along this boundary, enabling the cheaper solution of Soil Nailing.

**Feasibility?** First sight indications suggest that sufficient reconfiguration of the Depot Layout may be possible to enable this saving, but may need to take advantage of one or more of the following:

1. Removal of one of the planned sidings. Note that this was already planned anyway, since it is thought that 40 tram stabling will not be required. However, it remains to be shown that the sidings will accommodate four of the longer trams end to end.
2. Pushing close to the Depot Approach road at the north west end of the site may necessitate a new retaining wall. However, this will be smaller and much less cost than the one saved along the southern boundary.
3. Reconfiguration of the site will move the depot building north, but must still accommodate the tram delivery road/track.
4. Some eastwards expansion of the site may be needed. See the ideas below.

**Action 1.6.2a** *BBS to give an initial indication of savings achieved in the southern boundary retaining wall, assuming that the through-roads are moved 1 metre north (and the depot level is raised 1.4 metres).* **Action: BBS for 07.06.07**

**Action 1.6.2b** *tie & SDS and BBS to conduct an initial layout review to assess the likelihood of achieving this 1 metre northwards movement of the through-tracks. Note that this first sight review and BBS indicated savings will be assessed at the 07.06.07 workshop in order to decide whether to pursue this investigation more thoroughly after 07.06.07* **Action: tie & SDS – and BBS – for 07.06.07**

#### 1.6.3 Increase the available Depot footprint towards the east, by increasing the track gradient up from the A8 underpass to the maximum acceptable, based on experience elsewhere (maybe increase from 6° to 7.5° ?).

David Powell, Roger Jones and Andy Steel agreed that 7.5° is the correct, safe maximum, based on proven acceptability of 8° by another UK tram operation.

Note that clearance below the Depot Approach road as it leaves the roundabout above these tracks must be confirmed acceptable.

See related ideas 1.6.4 & 1.6.5 below which could help extend the depot east.

**1.6.4 Raise the track level in the A8 underpass by use of a solid conductor rail (not a wire) above the trams at the minimum height above the trams (i.e. minimum pantograph extension).**

This, plus increased track gradient (idea 1.6.3), may permit the flat level of the Depot to extend towards the east.

**Action 1.6.4a** *SDS to establish how much the tracks in the underpass can be raise by this means. (see also action 1.6.5a below)* **Action: SDS for 07.06.07**

**1.6.5 Reduce the structure size of the A8 underpass. Note that this duplicates VE team idea 24.1.32, but now identifies specific proposals, as follows:-**

- a. General reduction in structure size (wall thickness etc)  
See also BBS cost reduction proposal 7.07 – item 1.6.12 below.
- b. More precise alignment, once the locations of the BT Fibre-optic ducts are known. The long awaited survey data is now expected within 2 weeks.
- c. Reduce the internal section of the underpass by deleting one walkway (retain only one, adequately sized walkway).
- d. Reduce the internal section by re-examination of the correct kinematic envelopes, without excess clearance between and around the two tracks.
- e. Raise the base (track level) in the underpass by moving the tracks (or whole structure) east within the LOD, rising up the A8 gradient above it – if nothing else, by simply deleting the eastern walkway and moving the tracks across.

This rise and movement eastwards, although small effects, both improve the track gradient up into the depot or the possibility to extend the depot east.

**Action 1.6.5a** *SDS, in conjunction with ideas 1.6.3 & 1.6.4, to establish how much further east the tracks in the depot can reach the depot level (assume 1.4 above initial plan), based on:-*

*1.6.3: steeper gradient,*

*1.6.4: higher starting point in the underpass,*

*1.6.5e: Starting point in the underpass higher and further east.*

**Action: First sight indication – SDS for 07.06.07**

**Action 1.6.5b** *Longer-term, once the BT duct location is known, design optimisation can proceed, taking into account initial conclusions from actions 1.6.3, 4 & 5 above and also from 1.6.!!!! below.* **Action: SDS, longer-term, subject to initial findings**

**1.6.6 Reduce or delete the sidings at the north east end of the site to reduce the extent of excavation, slope stabilisation and construction.**

**Action 1.6.6a** *BBS to assess the approx potential saving.* **Action: BBS for 07.06.07**

**Action 1.6.6b** *Transdev to assess the acceptability of loss of these sidings.*

**Action: Transdev for 07.06.07**

**1.6.7 Use the north area of the site, beyond our dig, for spoil disposal. Landscaping may even help Planning.**

*Note: This will not represent a saving, because BBS bid allows only 90k tonnes of off-site spoil disposal, as the Environmental Statement. BBS assume that any further spoil will be disposed on site or re-used elsewhere in the project construction (but may need temporary storage).*

*See also later ideas 1.6.15/ 16/ 17 for other soil utilisation ideas.*

### **1.6.8 Roseburn Viaduct Structure (BBS Idea 7.03)**

BBS consider the steel section larger than needed. They also propose a revised construction methodology, using pre-cast rather than in-situ concrete which, beside cost savings, will give appearance benefits.

There is a potential short-term disadvantage in the need to prop the structure during the curing of the concrete deck. It was felt, given other local road restrictions, that this will be manageable.

**Action 1.6.8a** *BBS to establish the likely saving if this proposal is adopted. (If this appears worthwhile, implications will then be explored)* **Action: BBS for 07.06.07**

### **1.6.9 Water of Leith Bridge Structure (BBS Idea 7.04)**

BBS propose to design the deck with pre-cast cantilever edge beams and to revise the piling arrangements – making the bridge quicker and easier to build.

**Action 1.6.9a** *BBS to establish the likely saving available. (If this appears worthwhile, the changes will then be assessed by tie/SDS)* **Action: BBS for 07.06.07**

**1.6.10 Carrick Knowe Bridge (BBS Idea 7.05)** This idea abandoned. The Council now insist on addition of a cycleway to this bridge. Redesign is therefore in progress.

### **1.6.11 Edinburgh Park Station Viaduct (BBS Idea 7.06)**

VE team idea 24.1.31 considered savings to this viaduct. However, this is politically very sensitive and a major Planning risk. SDS has held several discussions with the Planners, but has not been confident to propose savings here by changing to a steel structure.

BBS consider that a steel viaduct could be made to appeal to the Planners and to generate savings and construction benefits.

Alastair Richards urged that any capital savings should take increased operational costs (maintenance) into account. This was however judged to be a minor issue with the durability of modern paint finishes – and this must be demonstrated.

SDS expressed willingness to approach the Planners again if BBS could present a good case for the benefits of a steel viaduct.

**Action 1.6.11a** *BBS to develop proposals for a revised structure, showing the cost and construction benefits, maintenance effects and impact on appearance (demonstrate by examples). First sight indicated savings are around £ ¼ million, including saved Possession costs (there will be corresponding soft benefits from saved possessions). If this appears worthwhile, then a new approach to the Planners will be prepared.*

**Action: BBS initial statement and plan for 07.06.07**

**1.6.12 A8 Underpass Structure (BBS Idea 7.07)** See also item 1.6.5

Proposals call for a costly substructure of secant, re-enforced male & female piles – specified to cater for a high water table. BBS advise that:

- 1) two independent reports suggest there is no significant water table problem here,
- 2) BBS learnt from the contractor who built the A8 roadway cutting which crosses the tram route that that structure is contiguous piles and concrete walls and has shown no evidence of water ingress.
- 3) A local pump installed to cater for the 100 year storm has not been triggered by any excesses of groundwater.

BBS recommend a simpler structure for the tram underpass structure – either delete re-enforcement in at least the female piles or use contiguous piles and concrete wall.



**Action 1.6.12a** BBS to indicate savings available from a simplified structure.

BBS - please feel free to indicate the further saving by reducing the structure section by deletion of one walkway (Idea 1.6.5.c). **Action: BBS for 07.06.07**

If these savings appear worthwhile – then tie must accept the revised water table assumptions before instructing SDS to progress the redesigns.

#### **1.6.13 Wing walls on A8 Underpass (New BBS Idea)**

BBS advise that the wing-walls at the ends of the underpass would be easier to construct ( more simple temporary works) and cheaper if they were straight, not set at 90°.

**Action 1.6.13a** BBS to indicate savings with straight wing walls **Action: BBS for 7.6.07**

#### **1.6.14 Russell Road structure (BBS Idea 7.08)**

Current proposals use very deep excavations beside the railway embankment and require major cost for temporary works. Some difficulties with Network Rail are likely.

BBS propose to combine temporary and permanent works and to use contiguous piles, with a 3 metre high piling platform built up on the road, which will be closed for the duration of the works. This will reduce Network Rail impact and help Buildability.

**Action 1.6.14a** BBS to confirm saving/ benefit (~ £100k?) **Action: BBS for 07.06.07**

**Action 1.6.14b** tie/SDS must accept this alternative design and construction method **Action: tie/ SDS statement for 07.06.07**

#### **1.6.15 Lime Stabilisation (BBS Idea 7.09)**

BBS indicated around £250k to £300k saving achievable if a safe means can be demonstrated to treat the excavated soil for re-use as a sub form – rather than disposing of this material and bringing new material to site. This also scores very useful “green points.”

Not all excavated material can be so treated and used.

Note that BBS presented papers by Con-Form on soil treatment for use in construction, including dustless systems (essential in the use of lime).

**Action 1.6.15a** BBS to confirm approximate savings (£250-300k) and to identify the necessary conditions/assumptions regarding material condition/ handling/ treatment.

**Action: BBS for 07.06.07**

#### **1.6.16 Site won CBGM Aggregates (Cement Bound Granular Materials) (BBS # 7.10)**

This also avoids bringing in all new aggregate to lay under the tracks, gaining further “green points.”

In general this material has not been popular with the Highways authorities, but in our case, laid under the tracks, it may prove acceptable.

**Action 1.6.16a** BBS to quantify the likely savings. **Action: BBS for 07.06.07**

If worthwhile, then an approach to the Highways for approval must be planned.

#### **1.6.17 Lime Stabilised Refill – for re-enforced earth. (BBS Idea 7.11)**

This may be an important “green” contribution to achieving the Environmental Statement’s commitment of limited spoil disposal, by converting class 7 spoil into class 9 material for re-use. One logistical problem is that the best material for this conversion is the top soil first excavated, which may incur the costs of storage and preservation before re-use. The costs of material conversion roughly balance purchase of new equivalent fill – savings come from reduced spoil disposal.

**Action 1.6.17a** BBS to indicate approx. savings. **Action: BBS for 07.06.07**

#### **1.6.18 Lindsay Road Wall (BBS Idea 7.12)**

BBS consider that the proposed structure is unnecessarily costly with its contiguous bored pile wall. Simplified slope geometry and soil nailing, or a modified version of a king post wall, should be achievable, offering around £200k-300k saving.

**Action 1.6.18a** *BBS & SDS to review feasibility of such a change and make a statement on 7.6.07 (if not full answer) – what possibilities, constraints, savings.*

**Action: BBS/SDS for 07.06.07**

It was noted that some change may be needed here for political reasons.

#### **1.6.19 Development of Detailed Designs (BBS Idea 7.13)**

BBS initial list of opportunities included this item (7.13) saying:

*"The current timescale for the finalisation of detailed design, has extended the tendering schedule and will compress the delivery programme. Design information also lacks input from the systems and track designers and this may result in abortive design works. Early involvement of the suppliers' designers would advance the detailed design and give surety of programme."*

On 1.6.07, BBS added that timescales now allow better design refinement and optimisation, better pricing. However, in some cases (e.g. structures) BBS have too much information, in other cases insufficient (e.g. Highways works).

Advantage could be gained by agreeing priorities with SDS for the supply of required information – e.g. Street lighting design, noise barriers. Street dig data is needed in order to give a lump sum for this work.

**Action 1.6.19a** *tie to review these potential benefits with BBS and then consider what changes may be required in SDS priorities.*

**Action: tie statement for 07.06.07**

## **4 BBS identified opportunities Not Reviewed**

BBS had identified four further cost saving opportunities with their tender submission, but, with no Siemens representatives present, these could not usefully be discussed.

It was requested that BBS/ Siemens come prepared to review these items on 07.06.07.

These four items are:-

#### **1.6.20 Tram detection & control system rationalisation (BBS Idea 7.14)**

Siemens consider the design unnecessarily complex, with savings available through a design review and rationalisation.

#### **1.6.21 CCTV rationalisation (BBS Idea 7.15)**

Siemens suggest that a design review of the 139 CCTV cameras and their purpose may lead to rationalisation and savings.

#### **1.6.22 UPS provision (BBS Idea 7.16)**

Siemens believe savings can be made by challenging the UPS strategy.

#### **1.6.23 Traffic Signals (BBS Idea 7.17)**

BBS pricing is based on limited data. Siemens believe savings can be made, given firmer data – and recommend adding their expertise to the design process.

**Action 1.6.23a** *BBS (Siemens) - please come prepared to review these items at the 7.6.07 workshop.*

**Action: BBS / Siemens for 07.06.07**

## 5 tie VE team identified opportunities

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The list of “live” ideas from the tie VE team’s work were now reviewed with BBS – after deletion from that list of items not directly related to the Infraco works.

This list is reproduced in Appendix 1. It was explained that a number of these ideas have already been accepted by the project, although not communicated to the bidders, other ideas remain under investigation or are held pending client/political debate.

Specific ideas from that list which generated actions from this 01.06.07 workshop are:

### **1.6.24 Risk (tie VE idea list item 51)**

It was explained that tie had undertaken an extensive review of project risks, as a result of which a number of project changes and actions had been undertaken. The remaining defined risks and levels of provision were accepted as correct.

The primary reason for raising this item with BBS were to initiate the following action

**Action 1.6.24a** *BBS to identify any items within their tender submission which have been increased significantly in cost as the result of perceived risk.*

*Identification of such issues will open the possibility of the tie team working with BBS to remove or reduce the factors causing these risks – and thereby reduce costs.*

**Action: BBS for 07.06.07**

### **1.6.25 Shorten Project Delivery period (tie VE idea list item 84)**

This remains an open idea, system-wide, aimed at streamlining project delivery to reduce overheads. A number of individual ideas also target this goal.

**Action 1.6.25a** *BBS to identify any elements of their anticipated project delivery programme where, if constraints were lifted, useful programme savings and resulting cost reductions could be made. Please identify both the approximate saving (in time and cost) and also the changes to enable it.*

**Action: BBS for 07.06.07**

### **1.6.26 Challenge the Employer’s Requirements (tie VE idea list item 89)**

This is another open idea, searching for any Employer’s Requirement which might be placing unnecessary burden on the project implementation budget.

**Action 1.6.26a** *BBS to identify any elements of their design or delivery where, if Employer’s Requirements could be revised, useful savings could be made. Please identify both the approximate saving (time &/or cost) and also what changes in Employer’s Requirements would be needed.*

**Action: BBS initial status for 07.06.07**

### **1.6.27 Thinner track Slab (tie VE idea list item 97)**

BBS have already priced for what they judge to offer best value, being a shallower depth than the initial design assumptions.

The key opportunity here is for tie to decide and commit to such a depth sufficiently early, that these assumptions can be built into the MUDFA instructions, reducing the depth to which they must undertake service diversions. The resulting MUDFA savings will not be realised without an early tie commitment to thinner track slab.

There remains a risk of surprises found in the ground by the Infraco, regardless of depth of MUDFA activity and track slab. tie will retain this risk and handle as found.

**Action 1.6.27a** *A MUDFA saving opportunity available if tie can make an early commitment.*

**Action: tie initial statement for 07.06.07**

**1.6.28 11Kv Traction Power feeds to sub stations (12 nr). (tie VE ideas 103 & 104)**

This is an open issue, yet to be negotiated with the DNO. Key issues and risks which raise the potential cost here are:

- 1) negotiation effectively with a monopoly,
- 2) the risk of paying not just for our base requirements, but for additional capacity of supply, required as general power network re-enforcement.

Who is best placed to handle this negotiation – tie? CEC? Or the Infraco?

**Action 1.6.28a** BBS are welcome to comment.

**Action: BBS for 07.06.07?**

**1.6.29 Reduce size pre-packaged Traction Power Units. (tie VE idea list item 106)**

Another open issue. Redundancy and ability to continue operations with one substation out of use is a key consideration.

**Action 1.6.29a** Again BBS are welcome to comment.

**Action: BBS for 07.06.07?**

**1.6.30 Combine TPDS and SCADA (tie VE idea list item 128)**

This may offer savings and will be investigated during development of the full signalling and control system.

**Action 1.6.30a** BBS ( Siemens) are invited to consider what savings could be offered here in relation to their bid, and what changes in the systems specified in the ITT documents would be required to achieve this – what impact on operations.

**Action: BBS (Siemens) initial statement for 07.06.07**

**Another New Idea from the 01.06.07 Workshop**

**1.6.31 Delete the Stray Current Mat**

Stray current problems represent what is thought a small risk – unlikely to occur, but of potentially major consequence if it did. Consequently, SDS is very reluctant to take the risk of deleting the stray current mat.

Anecdotal evidence of continental experience without such stray current protection and of TfL investigations for the West London tram suggests that this item of capital expense can be eliminated.

**Action 1.6.31a** BBS to identify the cost savings if the stray current mat is deleted.

**Action: BBS for 07.06.07**

**Action 1.6.31b** If savings prove worthwhile, then tie & SDS must satisfy themselves regarding the residual risk of stray current problems in operation – and must accept these risks.

**Action: tie / SDS, dependent on 07.06.07 conclusions.**

**APPENDIX 1**

**The list of Infraco-related ideas remaining in the tie VE team’s list,  
 as reviewed with BBS on 01.06.07**

<b>EDINBURGH TRAM PROJECT - PHASE 1A</b>			
			<b>REVISION 13+</b>
<b>VE INFRACO OPPORTUNITIES REVIEWED WITH BBS 01.06.07</b>			
<b>Item</b>	<b>Opportunity</b>	<b>Proposal Origin</b>	<b>Comments</b>
	<b>BUILDINGS</b>		
	<b>DEPOT</b>		
<b>5</b>	Depot construction levels. <b>May impact on ability to obtain prior approvals from planning authority</b>  <b>Impacts Advance Works</b>  <b>ACCEPTED</b>	Project 9.1.1 - see also ideas 26-32 below	
<b>8</b>	Delete depot pumping station/storm tanks by utilising existing gravity system which has been confirmed to be at a suitable level where diversion is not required.  <b>ACCEPTED</b>		Further impact on operating costs to be investigated
<b>9</b>	Depot - Build part now with provision to expand in the future/reduce size of car park facilities  ACCEPTED	Project - 9.1.3 (see also item 10)	Revisit estimate for full dig for 35 tram fleet (8 sidings) but infrastructure installed for 27 tram fleet (6 sidings) or 31 tram fleet (7 sidings) AR - AGREED
<b>10</b>	Depot - Reduce numbers accommodated in Depot, Buildings & Car Park - to enable reduced floor area  ACCEPTED	Project - 24.1.21 (see also item 9)	Staff numbers to be accommodated in the depot and commensurate with fleet size to be finalised and confirmed ASAP to SDS. AR issued sheet with max 400 staff souls to be accommodated
<b>11</b>	Depot Building - reduce cost of depot building. Perception that current estimate too high	Project - 24.1.33	<b>Reduce size of the accommodation. Need to be clear what the occupancy figures are based on – accepted by tie?</b>
<b>12</b>	Depot equipment - lease rather than purchase  POSTPONE	Project - 24.1.22	Pending scope development  <b>Excluding shunter</b>

Note that ideas highlight pink all relate to Depot Height.

Item	Opportunity	Origin	Comments
19	Depot - downgrade 12 tonne gantry crane to 6.3 tonne (max lift 5 tonne bogies)	Project - 7.2.1	Change agreed and SDS instructed to accommodate within the design. BOTH BIDS ALLOW FOR A 7T CAPACITY CRANE. NOTE - SIGNIFICANT SAVING AVAILABLE IN THE REDUCED STEEL SECTION SIZE REQUIRED TO SUPPORT THE CRANE
20	Depot – deletion of one pavement (inner). <i>Does this allow longer sidings?</i>  <i>ACCEPT, subject to CEC</i>	Project - 7.2.2	May not be realised as a saving due to requirement to feed water main under footway
24	Depot - delete requirement for concrete apron to security fence	SDS	
26	Depot - Lower the roof sufficiently to allow the depot to rise 1.5 metres from the current level.  <i>ACCEPT as part of Depot Height</i>	Project - 7.2.8	Saving of 200mm indicated
27	Depot - if general OLE height lowered from 7m to 6 or 6.5m - what savings can be made to depot height?  <i>ACCEPT as part of Depot Height</i>	Project - 21.2.2	Initial indications for Items 19 & 27 indicate a total of 500mm can be saved
28	Depot - remove OLE from critical roads in the tram shed (i.e. under crane) - move trams in/out by alternative power (shunter, Shore power, on board battery power)  <i>Not Popular</i>	Project - 21.2.3	Designers NOT IN FAVOUR
31	Depot - if height is determined at the boundary closest to the runway, and the runway approach path must be a sloping plane, and the depot building is some distance back from the boundary - how much extra height is the depot roof allowed to rise? ACTUAL PROFILES CONFIRMED & USED But need to retain some margin	Project - 21.2.6	Bringing the roof right up to the flight path clearance plane, with no extra clearance needed, indicates possible 300mm lift 295mm lift.
32	Depot - ensure that the highest point of the roof is away from the airport end of the building  <i>NOT CRITICAL</i>	Project - 21.2.7	Re examination of the flight path suggests we can lift Depot 500mm with no runway change. Commitment from BAA sought by WG for the maximum available depot space on the sloping flight path, recognising that the highest point, the depot building roof, is some way back from the depot boundary and off-set sideways from the runway centre line - NOTE

			allowance required for roof penetrations (lightning protection and ventilation) <b>BAA NO LONGER CRITICAL TO THIS OPPORTUNITY</b>
<b>129</b>	Depot - delete compressed air system, utilise 1 or 2 local compressors  ACCEPTED	Project - 16.3.2	
	<b>HIGHWAYS</b>		
<b>36</b>	Material recovery and reprocessing <b>FP have a reprocessing facility - you may want to discuss with SC</b>		Who owns the granite blocks within the road construction? What is CEC position and has INFRACO bids taken disposal of high value items such as this within their respective bids?
<b>37</b>	Reduction in extent of road reinstatement. Max 25%, Min 10%. <b>Need also to consider type of reinstatement - don't know what has been priced?</b>	Project	AR -Very difficult to support!! Maybe after MUDFA but then fully reinstate by INFRACO
	<b>LAND &amp; PROPERTY</b>		
	<b>NETWORK RAIL</b>		
<b>42</b>	NR Immunisation - ETN only to pay for Direct Current immunisation	Project - 7.2.4	
	<b>OLE</b>		
<b>45</b>	OLE - reduce height of Overhead Power Line reduces cost of pantograph	Project - 31.1.7	
<b>46</b>	OLE - reduce height of Overhead Power Line reduced cost of support poles etc? <b>Depends if poles are also to be street lights. Needs more consideration</b>	Project - 31.1.7	Reduction in height under investigation. <b>Need to consider views of the TDWG as pre application stage of re prior approvals. May lead to more poles albeit shorter</b>

Item	Opportunity	Origin	Comments
47	OLE - reduce height of Overhead Power Line may allow depot to be raised further out of the ground?	Project - 21.2.2	Initial indication for 7.2.1 and 21.2.2 is total 500mm excavation can be saved
50	OLE - advance purchase of cabling to avoid future cost escalation	Project - 14.2.1	
	<b>RISK</b>		
51	System Wide - review risk allocation and mitigations  Reviewed, reduced, incorporated, and closed.	Project - AH11	Nina reports that Risk Reviews & Risk Expiry has reduced the Risk Allowance and no further reduction is advisable.
	<b>STRUCTURES</b>		
54	Value Engineering developed for the final designs for all structures, <b><u>particularly substructures and foundations</u></b>	Both Bidders & Project - 14.2.9	Initial bids based on Prelim Design. Both bidders have stated that they anticipate savings will be generated through co-operative detailed design. <b>There has already been co-operative design</b>
55	Edinburgh Park Viaduct - utilise steel beams in lieu of concrete Appearance considered critical to neighbours/Planners. Steel Beams no longer being considered. - Closed ???	Project & both bidders	Higher initial construction cost but through use of weathering steel can achieve lifetime savings in not maintaining paint system. Cost estimated as part of item 15 above. <b>But may not retain looks! STEEL NO LONGER BEING CONSIDERED???</b>
56	Structures – Carrick Knowe Bridge Parapet - down grade from P6 / P5 to N2 (reduced cost of parapet plus knock on effect on deck design/cost)	Project - 7.2.3	Requirement for N2 protection - bids to be checked to establish if P6/P5 costed
57	Structures - A8 Underpass - over sized?  Key issue is precise location and depth of a bank of ducts containing fibre optic cables	Project - 24.1.32	Key issue is precise location and depth of a bank of ducts containing fibre optic cables
58	Structures - Eastburn Ave Works - flood defence works - ensure no over scoping, betterment or over funding	Project - AH13	
59	Structures - reduce structure thickness by 25mm	Project - AH115	Redesign costs will impact on any potential savings
60	Structures - EARL Structure S33 - remove from estimate	Project - 14.2.6	tie to confirm which budget is to carry cost of S33



Item	Opportunity	Origin	Comments
<b>NEW!</b> <b>131</b> <b>1b</b>	Structures - minimise alteration work to Holiday Inn Access Bridge to bare minimum proposed in HMRI Design Substantiation Report "Roseburn Corridor: Holiday Inn Access Bridge" Doc Number ULE90130-03-REP-00206 i.e. provide compressible board and joint sealant to joint gaps in existing parapet		
<b>NEW!</b> <b>132</b> <b>see</b> <b>58</b>	Structures - delete requirement for compensatory floodwater storage at Gogarburn in line with proposal contained in report "Compensatory Floodwater Storage Assessment" Doc` ` Number ULE90130-07-REP-00029 V1		
<b>SUPERVISORY &amp; COMMS</b>			
<b>SYSTEM WIDE</b>			
<b>77</b>	Optimise the work site lengths wherever practical to ensure efficient construction outputs	Project - 5.1.1 ??	
<b>80</b>	Accept more disruption over shorter period to maximise efficiency of construction operations	Project - 5.1.1	
<b>81</b>	Aligning SDS and the Employer's Requirements - make best use of the design already completed. Accept that there are scope miss-matches between SDS & Infraco	Project - 5.1.7	Has already increased project costs - not VE!
<b>83</b>	System Wide - reprogrammed to reduce impact from inflation	Project - AH4	
<b>84</b>	System Wide - review delivery programme - complete earlier reducing OH's	Project - AH12	
<b>85</b>	System Wide - Review KPIs - relax requirements	Project - AH101	
<b>86</b>	System Wide - reduce cost of approvals - reduce OH's and <b>tie</b> organisation costs	Project - AH107	
<b>89</b>	System Wide - challenge Employer's Requirements	Project - 5.1.7	
<b>THIRD PARTY</b>			
<b>TRACK FORM</b>			
<b>96</b>	Omit OCT to Newhaven section, create turn back facilities at OCT <b>Politically a non-starter - see CEC report January 2006??</b>  <b>Impact on MUDFA</b>	Project	Potentially add back as part of future phase to link Granton to OCT. <b>Need to understand impact on business case</b>
<b>97</b>	Thinner track slab impact on MUDFA (linked to 4 above)	Project - 24.1.26	Allow 10% to 15% reduction in required diversions. <b>Depends on when a decision is made</b>



Item	Opportunity	Origin	Comments
<b>TRAM STOPS</b>			
110	Delete 2 tram stops (Ocean Drive & South Gyle) leaving provision for adding stops back in the future. <b>This is unlikely to be acceptable politically. Plus 2 x Phase 1b stops</b>  <b>On Hold</b>	Project - 31.1.13	Await <b>tie</b> /TEL decision. <b>Allocate between 1a &amp; 1b</b>
112	Prefab drop-in tram stops and other items. <b>It has been agreed that substations will be package substations</b>  <b>On Hold</b>	Project - 24.1.30	Perceived wrong image
113	Tram stops - finishes to be minimum standard throughout  On Hold	Project - 5.1.24	Perceived wrong image
<b>TRAMS</b>			
128	Combine TPDS & SCADA	Project - SDS11	