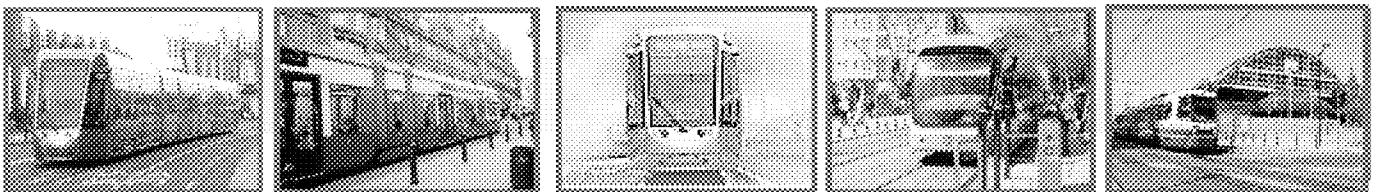
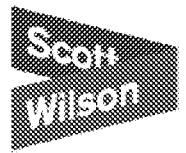


tie Limited
Edinburgh Tram

TSS – Structures Value Engineering Weekly Progress Report



28 July 2007



Workstream:	10 - Design Related Services: Structures	tie Workstream Lead:	Tony Glazebrook
TSS Progress Report Author:	Walter McQueen	TSS Workstream Lead:	Walter McQueen

Active Team Members:	Team Changes:
<ul style="list-style-type: none"> • Tony Glazebrook • Walter McQueen • Ken Mosley • Michael Terrance • Bruce Ennion • Lyndsay Murphy • SDS Designers 	<ul style="list-style-type: none"> • N/A

<p>Activities:</p> <ol style="list-style-type: none"> 1. Meeting with bidder Roley on Wednesday 27 June 2007 to discuss cost saving opportunities on the project in regard to structures. 2. Preparation and issue of report on Opportunities tabled by Roley as requested at above meeting. 3. Meeting with David Crawley and Bruce Ennion on Friday 13 July 2007. 4. Prepare and Issue Structures Value Engineering (VE) Schedule structure-by-structure review as requested at meeting of 13 July 2007 and confirmed in David Crawley's e-mail of the same date. 5. Respond to queries regarding Value Engineering Opportunities Register. Requested 17 July 2007. 6. Receipt of copy of Value Engineering Opportunities Register on Thursday 19 July 2007. 7. Meeting with bidder Scoop on Thursday 19 July 2007 to discuss cost saving opportunities on the project in regard to structures. 8. Preparation and issue of Notes of Meeting with Scoop by Bruce Ennion. 9. Prepare and issue Structures Opportunities Process as requested at meeting with David Crawley on Thursday 19 July 2007 subsequent to meeting with Roley. 10. Meeting with TSS – Commercial discipline Tuesday 25 July 2007 to discuss content and breakdown of bidders prices and way forward to identify areas of possible savings or apparent overpricing by the bidders. 11. Meeting with SDS designers for Design Review held on Wednesday 26 July 2007. 12. Preparation and issue of Weekly Report for W/E 28 July 2007.
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Deliverables:

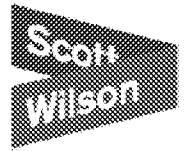
1. Report B137103/SWS/ST/REP/01 V2 on Opportunities tabled by Roley at meeting of 27 June 2007 issued Thursday 5 July 2007. (See Appendix A).
2. Response issued on Friday 20 July 2007 to queries received on 17 July 2007 regarding the Value Engineering Opportunities Register. (See Appendix B).
3. Draft Infraco Tender: Opportunities Process: Structures Report B137103/SWS/ST/REP/02 V1 issued Friday 20 July 2007 requested on 19 July 2007. No comments received as yet. (See Appendix C).
4. Notes on Opportunities meeting with Scoop issued Friday 20 July 2007. (See Appendix D).
5. Draft structure-by-structure review schedule file reference "Structures – VE 24July07 WMcQ" issued Tuesday 24 July 2007 requested 13 July 2007. (See Appendix E). Now includes items discussed at meeting with SDS structures designers 26 July 2007, which requires decisions to be made at a higher level.
6. Notes of meeting with SDS designers on 26 July 2007 currently being prepared.

Look Forward:

1. Agreement on the VE process and outline programme or key dates required from **tie** together with revised preliminary and detail design programme for VE initiatives being taken forward. This is likely to have an impact on the timescale for the detail design packages currently agreed.
2. A brief look at the costs for bill items on all of the structures to quickly identify any rogue items.
3. Look at say 5 of the most expensive structures in greater detail to ascertain if any costs can be saved.
4. Meet with bidders separately week ending Saturday 4 August 2007 to clarify their prices and identify any opportunities they wish to take forward to substantiate their VE initiatives.
5. A site visit to S16 Victoria Dock Entrance Bridge and S17 Tower Road Bridge has been suggested to assist in envisaging the various VE proposals for these structures and to revisit earlier cheaper alternatives that were ruled out.
6. Next Design Review meeting with SDS Designers Tuesday 7 August 2007.

Issues:

1. Preliminary design work on some of the structures has only recently recommenced as they were on hold for a number of reasons. The outcome of this may be the provision of more expensive structures than envisaged at present.
2. **tie**, SDS, the Tenderers and all other relevant parties will be required to buy into the procedure for addressing the VE initiatives to enable progress to be made.
3. Any revised designs will require agreement by **tie** and to gain approval from the various Stakeholders i.e. City of Edinburgh Council (CEC) Structures Department as Technical Approval Authority, CEC Planning Department, Network Rail, Scottish Rugby Union etc.
4. Some outstanding investigation work is required in the vicinity of the A8 retaining wall to finalise the current design and to ascertain the viability of any proposed revised design at this location due to the presence of fibre optic cables in the vicinity.
5. A decision is required regarding who will be responsible for taking forward the design changes suggested by those involved in the project other than the bidders.
6. A discussion with the designers is required to ascertain the current situation with the detail design and if this impinges on or supersedes the opportunities identified by the bidders.



Appendix A

Edinburgh Tram Network

Infraco Tender-BBS
Opportunities Report
Structures

Document Number: B137103/SWS/ST/REP/01

Version No: V2

Dated: 05 July 2007

Approvals	Name	Position	Signed	Date
Author	Walter McQueen	TSS - Structures		
Reviewer	Kenneth Mosley	TSS – Design Coordinator		
Approver				

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1 Introduction

This document is a short report on the structures items raised at the Opportunities Meeting held in the McAdam Room of Citypoint, Edinburgh at 08:00 on 27 June 2007. The meeting was attended by Gavin Murray of tie, Bruce Ennion, Andy Dixon and Alan Dolan (latter part of meeting only) of SDS and Andy Steel, Ken Mosley and Walter McQueen of TSS, together with Scott McFadzen and Ralf Honeck of the Bilfinger Berger – Siemens Consortium.

2 List of Opportunities for the Edinburgh Tram Network

The following proposals using the consortiums agenda numbering were discussed at the meeting:

- 7.01 - Raise Level of Depot
- 7.03 – Roseburn Street Viaduct
- 7.04 – Water of Leith Bridge
- 7.05 – Carrick Knowe Bridge
- 7.06 – Edinburgh Park Station Bridge
- 7.07 – A8 Underpass and Retaining Wall
- 7.08 – Russell Road Bridge
- 7.09 – Lime Stabilised Sub-formation
- 7.10 – Road Planings as CBGM Aggregate
- 7.11- Lime Stabilised RE Fill
- 7.12 – Lindsay Road Retaining Wall
- 7.13 – Design Programme

2.1 Details of Proposals

2.1.1 7.01: Raise Level of Depot:

- The Tenderer proposed that the level of the Depot could be raised by approximately 1.5m to reduce the quantity of excavation required within the footprint of the Depot.
- This would have a knock on effect on the nearby structures W16 the A8 Retaining Wall, S32 the Depot Access Bridge and S28 the A8 Underpass together with the Depot Building. As the track level at the two bridge structures could not be raised a similar amount due to the clearance required below the A8 and Gogar Roundabout this may increase the track gradient into the depot. It is understood that this is not likely to be a problem although it may affect the location of the proposed S&C at the western end and maybe also the internal layout of the depot itself.
- It was noted that a number of those present were meeting on 28 June 2007 to discuss this possibility and other outstanding issues regarding the Depot and it was agreed to revisit this proposal subsequent to that meeting.

2.1.2 7.03: S21A - Roseburn Street Viaduct:

- The Tenderer suggested that the depth of the structural steelwork could be reduced on this structure by utilising a propped construction for the installation of the reinforced concrete deck. This means that the structural steelwork does not need to carry the dead load of the wet concrete when it is poured as it is propped out using temporary works. The dead load from this concrete, the superimposed dead load from finishes etc and live loading on the structure are then carried by the composite action of the structural steelwork and reinforced concrete deck when the concrete has cured and the temporary works are removed. This allows the structural steelwork to be reduced.
- If this proposal were to be adopted there would be significant temporary works required in Roseburn Street, the access to Murrayfield Stadium and the access to Haymarket Depot which may prove unacceptable to the Roads Authority and other stakeholders (particularly SRU). In addition the AIP procedure for this structure has already been completed and planning consent is well in hand. This process would have to be repeated for the new structure.
- Further details of this would be required before agreement was reached on this.

2.1.3 7.04: S21E – Water of Leith Bridge:

- The Tenderer suggested that there might be some scope to reduce the tonnage of steel at this structure thus reducing the size of craneage required for the erection of the steelwork.
- After discussion it was agreed that any savings at this structure would not be guaranteed.

2.1.4 7.05: S23 – Carrick Knowe Underbridge:

- This structure is currently on hold due to an unresolved issue regarding the provision of a footway/cycleway on the structure and therefore the Tenderer was not suggesting an alternative at present.
- Also, the question of the required level of parapet containment (currently P6 provision) was to be reviewed by tie/CEC, as the tram form proposed at this location provides derailment restraint.

2.1.5 7.06: S27 – Edinburgh Park Station Bridge:

- The Tenderer suggested the provision of a steel bridge at this location in lieu of the prestressed concrete beam structure currently shown on the AIP drawings. He was of the opinion that this would be significantly cheaper than the proposed structure and would be able to be fabricated in a more smooth curved form than the currently proposed structure.
- The Tenderer also intimated that their proposal would eliminate the requirement for substantial temporary works to support the prestressed beams while the stitches and diaphragms were being constructed over the piers for the span over the railway which he felt would be onerous as they would be required to be designed for impact. It should be noted that SDS prepared drawing ULE90130-05-BRG-00467 to illustrate that the proposed temporary supports are outwith Network Rails Impact Zone.

- The signed off AIP intimates that the proposed structure was chosen for ease of construction and minimum disruption to the railway below and that the factory produced prestressed beams have low whole life maintenance costs. It also intimates that maintenance painting of a steel structure over the railway would require track possessions, resulting in a higher whole life costing than the proposed solution and that CEC stated that a concrete option would be preferred.
- The AIP procedure for this structure has already been completed and planning consent is well in hand. This process would have to be repeated for the new structure and may well find opposition from the stakeholders involved in developing the current structure (in particular CEC/NWR/Edinburgh Park).

2.1.6 7.07: S28 – A8 Underpass and W16 A8 Retaining Wall:

- The Tenderer proposed that the headroom of this structure be reduced from that shown in the present proposal by raising the track level and that the provision of only one walkway would enable the width of the structure to be reduced thus saving costs. It was also suggested that moving the tracks within the depot away from the retaining wall may facilitate constructing the wall in reinforced earth rather than the double anchored piled wall currently proposed.
- The possibility of reducing the headroom of this structure has already been mentioned during the preliminary design stage and the designers may already be pursuing this especially as it has already been mooted that the level of the depot may be raised (ref. 7.01)
- It should be noted that a bank of fibre optic cables encased in concrete is present in the verge of the A8 and slip road at this location although their exact location is unknown. The digging of trial pits at this location to ascertain the location and details of the protection to the cables has been outstanding for some time. This is likely to have a bearing on the installation of the upper levels of soil nails whereas the ground anchors are below this level. It is understood that the cables may have to be cast into the underpass structure. **The completion of the trial trench is thus key to the proposals in this area and requires to be concluded by tie/SDS without delay.**
- The AIP procedure for these two structures has already been completed and planning consent is well in hand. This process would have to be repeated for the new structures.
- It should be noted that alterations suggested would have an affect on structure S32 the Depot Access Bridge and moving the tracks would result in redesigning the Depot layout.

2.1.7 7.08: S20 – Russell Road Bridge:

- The Tenderer intimated that significant re-design was proposed for this structure although it was understood that there might be a utilities issue at this structure. The Tenderer intimated he was nervous about the temporary works required.
- The Designers Risk assessment accompanying the AIP indicates that the structure will be designed away from the existing services with provision for new services. SDS to clarify.
- The Tenderer intimated that further work was required to identify any possible savings.

2.1.8 7.09: Lime Stabilised Sub-formation:

- The Tenderer asked if it would be permissible to treat some of the existing sub-standard material at various locations on the project with lime to provide the requisite CBR of 10% for the tram sub-formation. This technique is permitted in the Design Manual for Roads and Bridges (DMRB) to bring sub-standard material up to a CBR of 15% for road construction. In this case however the Contractor would like to avoid some of the requirements of the DMRB specification he feels are not necessary as the sub-formation is carrying lighter loads i.e. the trams and the CBR required of 10% is less onerous. He intimated that the final result of the treatment would be subject to insitu testing in any case. The Tenderer explained that the method involves treating approximately 600mm depth of material. This would be done by removing and storing the top 300mm of material, treating the next 300mm layer using the lime stabilisation process as this is the maximum depth that can be treated and then replacing the top 300mm and treating it. It is understood that modern machinery and techniques have improved this method of ground stabilisation and that it has proved very successful.
- The proposal has green credentials.
- Although this sounds at face value an acceptable request, details of what parts of the DMRB Specification they would not be complying with would be required before this could be considered further. The Tenderer will also be required to provide a methodology for identifying and treating the differing materials at the locations where this is proposed together with details of how this weather dependent often messy and dusty operation will be carried out particularly in built up areas. It may also be necessary to include the addition of cement if silty soils are proposed for treatment.
- It may therefore be that this proposal is only deemed appropriate for off-street sections, where full Highway Loading is not required.

2.1.9 7.10: Road Planings as CBGM Aggregate:

- The Contractor has put forward the proposal that the road planings from the numerous areas of roadworks on the project be used as aggregate in areas where Cement Bound Granular Material (CBGM) is required.
- The proposal has green credentials.
- This material although rendered granular in the planing operation would of course be coated in bitumen and further evidence is required that this is suitable material for CBGM before accepting this proposition. It is felt that if the bitumen were not removed from the recovered aggregate there would be a lack of bond between this and the cement.
- The Highway Authority (CEC) would also have to accept this proposal.
- There will also be a greater need for supervision and quality control measures because of the variable nature of the road material. It may only be appropriate for off-street use.

2.1.10 7.11: Lime Stabilised RE Fill:

- This request is similar to that in 2.1.8 above, but in this case the treated material would be used as fill in areas where Reinforced Earth (RE) is to be employed.

The treatment for this sub-standard material would be to the full DMRB specification and would provide fill material of Class 9 in lieu of Class 6, which is specified.

- The proposal has green credentials.
- The Tenderer would be required to supply further information in regard to the sub-class of the Class 6 material that is to be replaced and that of the Class 9 proposed.
- It is understood the use of lime-stabilised material is unusual for this type of work and there may be some compatibility issues between the lime and the reinforcing material used in the RE, making the medium to long term suitability of this proposal uncertain.
- The Tenderers methodology would have to deal with the method of control to be adopted to cater for the moisture content variations encountered using this weather and moisture dependent proposal.
- There is the possibility that this material would be susceptible to water ingress if used at the top of the filled area and through water percolation gathering at the bottom of the filled area and it may require special consideration in the design to negate these potential problems.
- One of the concerns voiced at the meeting in regard to using this material was residual settlement, although it was felt that this would occur within the 15 years that the Contractor was responsible for the maintenance of the project and would be dealt with by the normal maintenance regime.
- The question over settlement beyond 15 years means there may be the need to utilise transition slabs and/or geotextiles, which would reduce the saving of this proposal.

2.1.11 7.12: W01 – Lindsay Road Retaining Wall:

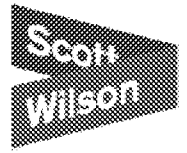
- The SDS designers have intimated that this structure is on hold at present pending resolution of issues with Fort Ports Authority, but that there is the possibility of designing the requirement for it out. Therefore no savings in regard to alterations to this would accrue.

2.1.12 7.13: Design Programme:

- The Tenderer suggested that given the delay in the award of the Contract and to the commencement of the Works there was an opportunity to get approval for those items which require to go through the AIP approval and planning procedures again.

3 Conclusion

- While recognising that a number of the above proposals have merit, these would have to be discussed individually in more detail before a final decision as to whether to adopt them or not could be made.
- In regard to the alternative proposals for structures, these are not without their problems as they may delay the project given that it might be necessary to repeat the lengthy approval process already completed for these structures.



Appendix B

Walter McQueen

From: Walter McQueen
Sent: 20 July 2007 15:54
To: David Crawley
Cc: Andy.Steel@tie.ltd.uk
Subject: RE: ETN: Structures Opportunities: Update

David

Further to your e-mail below and receipt of a copy of the Value Engineering Opportunities Register from Bruce yesterday, I would respond on the list below as follows:

- 52 and 53 state "Taken to Phase 1b" with none of the other columns populated therefore there is no indication as to what these two opportunities are and I am therefore unable to comment further.
- 54 states "Value Engineering developed for the final designs for all of the structures, particularly substructures and foundations". As the Ground Investigation work had not been completed at the time Preliminary Design (PD) was carried out there may be potential savings in this regard if the PD was conservative, but conversely if unexpectedly poor ground conditions exist at particular structures then this aspect of construction may be more costly.
- 55 Edinburgh Park Viaduct. There is definitely an opportunity to reduce costs at this structure and others with the same type of construction if the stakeholders with whom the PD was discussed in great detail accept this alternative proposal and the savings can be demonstrated to be on Whole Life Costs. Network Rail may be difficult to move on this and any other structures crossing the railway.
- 56 Carrick Knowe Bridge parapet. As this structure crosses the railway Network Rail would have to agree to the alteration provided the potential impact on the parapet was mitigated by some other method of derailment protection eg the trackform at this location which is what I believe is being proposed.
- 57 A8 Underpass. There is potential to reduce costs for this structure by reducing the headroom required from that shown on the PD drawings although it is understood that this was being pursued by SDS.
- 58 Eastburn Avenue Works. I am unsure as to what is referred to by this. Can this be amended to refer to a structure.
- 59 Reduce thickness by 25mm. This seems an odd suggestion I'm sure if this is possible it will be incorporated into the detail design, but it cannot be adopted for blanket coverage. Perhaps this refers to the trackform.
- 60 EARL Structure S33. If this can be deleted from the structures schedule then not only the cost of the structure would be saved, but the cost of the approach embankments would be greatly reduced. This would require a new vertical alignment of the tram to be produced at this location
- 61 Gyle Stop Retaining Wall. As stated in the Comments column if this structure remains it is unlikely to realise any great savings to the project by altering it.
- 131 Holiday Inn access bridge. I agree that savings can be made at this structure by reducing the work to the bare minimum as stated, but I have raised the matter before regarding having a sub-standard height parapet at this location. Should something untoward happen in the future and someone is electrocuted or falls from the bridge and the parapets are found to be sub-standard in height the paperwork will require to be watertight to confirm why this was so. Although it has been stated that very few pedestrians use the bridge at present the introduction of the tram may encourage an increase in this usage.
- 132 Compensatory flood water storage at Gogarburn. I have little knowledge of this matter other than the fact that a sump shown on the drawings of one of the three culverts at this location was being removed in agreement with CEC and that this would reduce costs for that structure.

A check should be carried out to ascertain what the final PD drawings comprised in relation to those submitted to the bidders as some of the opportunities mentioned were actively being pursued by SDS. In addition a significant number of the structures are in the detail design stage and again a number of these opportunities may have been developed further.

27/07/2007

I trust the above comments are useful.

Regards,

Walter McQueen
Principal Engineer (Structures)
Scott Wilson Scotland Ltd
Citypoint 2
25 Tyndrum Street
Glasgow
G4 0JY
UK

Tel: 0141 354 5600
Fax: 0141 354 5601
E-Mail: walter.mcqueen@scottwilson.com

-----Original Message-----

From: David Crawley [mailto:David.Crawley@tie.ltd.uk]
Sent: 17 July 2007 20:07
To: Walter McQueen
Cc: ennionb@pbworld.com; Andy Steel - TSS
Subject: FW: Update

Walter,

Please update the list as defined below and let me/Tony know if there are any difficulties.

Many thanks

David

From: Jim McEwan
Sent: Tue 17/07/2007 14:54
To: David Crawley
Cc: Andy Steel - TSS; John Pantony - TSS
Subject: Update

David,

Notwithstanding the update given earlier in the week, can you review items :52-61 and 131 + 132 and do the following :

- (1) Determine which are dead and mark accordingly
- (2) Assess, class (easy, medium, hard) and quantify (anticipated loot) the live.*

*if info unavailable please give a timeframe for same.

Please copy assessment to Andy Steel + John Pantony.

We would like to get a new clean copy of register for early next week.

Many thanks
j

27/07/2007

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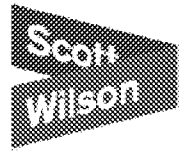
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27/07/2007

CEC01681550_0015



Appendix C

Edinburgh Tram Network

Infraco Tender
Opportunities Process
Structures

Document Number: B137103/SWS/ST/REP/02

Version No: V1

Status: Draft

Dated: 19 July 2007

Approvals	Name	Position	Signed	Date
Author	Walter McQueen	TSS - Structures		
Reviewer				
Approver				

Contents

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3	Conclusions.....	3

1 Introduction

As requested by David Crawley this document has been prepared to outline the process to be followed during the tender review period in regard to realising the opportunities for cost savings put forward for the structures elements of the project by the bidders in their tenders and by internal disciplines.

2 Opportunities Process - Structures

The following process is recommended:

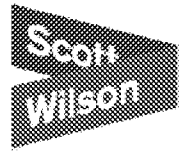
- 2.1 Identify and list the opportunities for cost savings being put forward and their owner.
- 2.2 Remove those opportunities from the list that it is agreed will not be feasible or result in significant savings and prepare a short-list of the viable opportunities. Any of the viable opportunities that require an adjustment to the Limit of Deviation (LOD) and structure footprint should be clearly identified against each opportunity. 27 July 2007.
- 2.3 Align each opportunity with the relevant part of the tender document, the content and the sum entered by 27 July 2007.
- 2.4 Identify potential cost savings to be made ensuring those identified are for Whole Life Costs and not just for capital expenditure. Ensure that no double counting occurs for any opportunities on the shortlist and that saving totals are identified separately for each bidders proposal by 27 July 2007.
- 2.5 Decide who will take forward the viable proposals not put forward by the bidders.
- 2.6 Discuss the proposals with the SDS designers. 1 August 2007.
- 2.7 Meet with the bidders to discuss their proposals cross referencing them back to the bid offer and content to ensure that comparisons are on a like with like basis and agree whether the proposals are deliverable. Mid August 2007.
- 2.8 Instruct the bidders to develop their proposals further sufficient to confirm the cost savings for each opportunity ensuring that other stakeholders are in agreement with the proposals to prevent delays later on in the process. Mid September.
- 2.9 Meet with those taking forward the opportunities not raised by the bidders to discuss their proposals and agree whether the proposals are deliverable. Mid August 2007.
- 2.10 Instruct those allocated opportunities not put forward by the bidders to develop these proposals further sufficient to confirm the cost savings for each opportunity ensuring that other stakeholders are in agreement with the proposals to prevent delays later on in the process. Mid September.
- 2.11 Collate and present the savings that will accrue from the structures proposals. Mid September

3 Notes

- Subsequent to the acceptance of any structures opportunity it will be necessary to prepare and submit a revised AIP and preliminary design

drawings to the Technical Approval Authority (TAA) in this instance City of Edinburgh Council (CEC) and where necessary Network Rail. As there is unlikely to be sufficient time to complete this process prior to acceptance of a particular bid and it's associated cost savings the owner should ensure that the relevant stakeholders are agreeable to the proposed alterations. This may be particular relevant to those structures involving Network Rail and the Scottish Rugby Union (SRU).

- It should be noted that savings intimated by a particular bidder would only be realised were they appointed to the Contract.
- Given the revised date for the award of Contract and commencement of the Works, there may be an opportunity to get approval for those items that require to go through the AIP approval and planning procedures again, provided the relevant stakeholders buy into the proposals at the stages indicated above.



Appendix D

NOT FOR GENERAL DISTRIBUTION.

Date: 19th July 2007

Venue: tie offices

Contract title: Infraco Tender – Structures VE meeting

Purpose: To enable the bidder to identify possible VE opportunities

Present:	David Crawley	tie - Engineering Director
	Campbell Skinner	tie - Commercial
	Roger Jones	Transdev
	Bruce Ennion	SDS - Parsons Brinckerhoff
	Ian Fell	Project Director – Laing O’Rourke
	Colin Neil	Regional Director – Grant Rail
	John Pearson	Construction Manager - Grant Rail
	Graham Spencer	Pricing Manager - Laing O’Rourke

1.0 APOLOGISE FOR ABSENCE

Walter McQueen- Scott Wilson - VE Structures

Mr Alan Dolan - SDS

2.0 Project Update

Mr Crawley advised the meeting that he had initiated a Value Engineering review of all ‘Structures’ forming the ETN.

This exercise was to address two particular issues which are to relate to the Whole Life costs of each element.

1 – The form of construction i.e. Steel not Concrete bearing in mind the maintenance implications of such a form and

2 – Preliminary Design Information (PDI) and the subsequent changes/enhancements resulting from ‘planning’ and ‘aesthetics’.

The political decisions made during the recent Transport parliamentary debate has resulted in CEC being responsible for holding the project purse strings and the funding of any project overspend.

The Tram Project Board consists of a representative sample of major project stakeholders and CEC now have to address the question of affordability when reviewing designs and project requirements.

It is currently scheduled that this process will be completed by mid August. All to note

EARL - **tie** advised that their current thinking is that reference and

accommodation for EARL should be deleted and project should proceed as though EARL never existed HOWEVER this is yet to be ratified All to note

3.0 GENERAL DISCUSSION

Tramlines (TL) confirmed that they had responded to the Infraco ITN in as much as they have felt obliged to make a number of assumptions in their bid and have in fact subsequently broken down their bid into three headings

- Original BoQ
- Additions and variations to the BoQ
- Additional items/costs considered necessary to complete the Works.

All to note

In many cases Tramlines have made major assumptions and it is of concern to them that none of these have been challenged by **tie**.

Trackform – tie advised that a separate VE work stream had commenced under the leadership of Stephen Bell who was being assisted by David Bateman (Interfleet)

This work stream is to address the issues emerging from Manchester Metrolink, Croydon and other operational systems.

All to note

Tramlines reviewed a number of Structures which they believe need addressing as follows

Victoria Bridge – wider – construction considered to be expensive – insufficient detail to determine extent of the works – marine environment – proposed a ‘floating footbridge’ c/w public viewing areas – not confident accurate price.

Gogar Burn Retaining Walls – insufficient information – made a judgement – took a view.

Edinburgh Park Viaduct – TL did explore a steel structure however **tie** advised must be concrete – difficult and expensive to build – obtained price from for moulds in Ireland however concern re availability – massive temporary works - TL are of the opinion a steel solution would provide financial and elegant slim solution with the added benefit of saving in construction time

Lindsay Road Retaining Wall – not considered buildable – existing wall anchored in some 10 years ago – consider need to break anchors to accommodate new – **tie** advised there is an implication with Forth Ports and this issue is being addressed.

Tower Place Bridge – TL have allowed for a Single span next to line

up with Victoria Dock Bridge.

Haymarket Viaduct – tie explained that this was the result of a highway capacity issue.

Haymarket Depot Retaining Walls – Little known – appears expensive – consider reinforced earth mound more practical and cost effective – concern re adjacent properties – may not need to take some properties – possible ‘bath tub’ alignment at this location to minimise retaining walls.

Russell Road Bridge - Buildability issues – design to reflect adjacent structure – suggesting piled structure – concern re network rail – minimum interference.

Murrayfield Retaining Walls – ongoing debate

Water of Leith Bridge – Design to avoid gas main – sympathetic with adjacent three arches.

U Beams – In a general statement and to emphasise their comments about the Edinburgh Park Viaduct TL said they were of the opinion the proposed use of Concrete U Beams was an un-necessarily expensive solution

Saughton Road Bridge – not understand the design and substructure requirements.

A8 Underpass – TL did consider a bridge at one stage however they recognise the implications of the close proximity of the airport and the visual impact on one of the major approach roads – present proposals are considered a difficult and expensive to construct – believe could construct with a single major traffic diversion around the roundabout – their temporary works department have looked at this possibility – sizing could be slimmed down – significant reduction in risk & time

Depot Retaining Walls – various options considered to reduce complexity.

Depot – various options considered to reduce complexity – TL acknowledge levels have been improved however are not officially aware –

Gogar Burn – Best guess only.

Phase 1b – Money allocated for Retaining walls but no information

Presently priced on concept in BoQ illustrating various types of construction that could be used and assuming costs can be determined when design available.

Single track solution option proposed – possible additional tram required but considered cheaper – Coltbridge Viaduct would not require significant works – minimal work under existing bridges – Passing

Points could be accommodated in the event Phase 1a/1b link

Concern re Crewe Gardens Bridge and retaining walls. constructed -

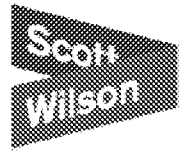
4.0 TRAMLINES CONCERNS

Indications of 'disconnect' between **tie** Commercial and Technical

Wish to ensure level playing field

Highways information recently provided by **tie** will not allow bidders to be any more positive than they have been.

DISTRIBUTION (20.07.07) **David Crawley**
Campbell Skinner
Roger Jones
Bruce Ennion
Geoff Gilbert
Andy Steel



Appendix E

Structures – Value Engineering (Version 16.07.07)

Section	ID	Structure	tie Budget allowance £	Scoop		Roley		Comments	Mean	Rank
				Tender £'s	Possible VE saving £	Tender £'s	Possible VE saving £			
		General						Design Review Meeting - It was noted that should it be permissible to provide 1 walkway at the structures these could be made narrower. Emergency evacuation would be possible provided other trams were stopped by control.		
2A	S19	Haymarket Station Viaduct	289,618	1,223,228	tbc	1,015,023	tbc	It is currently proposed to construct a 5-span R.C. deck and pier integral bridge to carry the tram and part of Haymarket Stop at this location. The fairly simplistic design means that any cost savings are liable to be minimum. The requirement for this structure is based on a highway capacity issue.	1,119,125	14
1D	S18	Leith Walk Railway Bridge	#N/A	277,500	tbc	-	tbc	The existing 2-span masonry arch bridge is to be assessed to ascertain if it is suitable to carry the proposed tram. If suitable only minor works would be required to refurbish the structures and install the tram trackform on the bridge.	138,750	36
3A	S1	Roseburn Terrace Bridge	221,900	692,395	tbc	530,105	tbc	Proposed new prestressed beam and slab superstructure with piled substructure constructed to the rear of the existing. Existing facade to be retained on new structure. Possible saving if this was not required.	611,250	24
3A	S2	Coaltbridge Viaduct	411,888	1,033,885	tbc	981,390	tbc	R.C. slab over existing 3-span arch structure. Steel cantilever to carry walkway/cycleway. Steel cantilever likely to be just as economic as R.C. alternative as extensive shuttering would be required. Savings would accrue if cycleway/walkway was not required or was reduced. Scoop - Have proposed a single track over viaduct to minimise work required on the structure although this may require the provision of an additional tram, the additional running costs and maintenance of which, it should be noted, would be in perpetuity. The decision on this issue is outwith the remit of the structures discipline.	1,007,638	15
3A	S3	St Georges School Access Bridge	99,769	216,243	tbc	235,028	tbc	Proposed R.C. U-frame to obtain required headroom beneath the existing single span masonry arch bridge for the tram and work on bridge deck. Due to the well defined work required at this structure it is unlikely that any significant savings would accrue from any proposed alternatives	225,635	28
3A	S4	St Georges School Footbridge	8,815	15,083	tbc	17,220	tbc	Proposed R.C. U-frame to obtain required headroom beneath the existing single span masonry arch bridge for the tram and work on bridge deck. Due to the well defined work required at this structure it is unlikely that any significant savings would accrue from any proposed alternatives.	16,152	44
3A	S5	Ravelston Dykes Bridge	27,694	66,243	tbc	63,958	tbc	Partial infill to suit tram alignment at this location and some work on road above. Minimal work no significant saving envisaged.	65,101	39
3A	S6	Craigleith Drive Bridge	36,576	245,937	tbc	138,831	tbc	R.C. approach beams and slab over single span masonry arch bridge. R.C. cantilever to accommodate cycleway/walkway. No significant savings envisaged.	192,384	32
3A	S7	Holiday Inn Access Bridge	#N/A	34,937	tbc	331,753	tbc	Proposed R.C. U-frame beneath the existing bridge for the tram and work on bridge deck. Due to the well defined work required at this structure it is unlikely that any significant savings would accrue from any proposed alternatives.	183,345	33
3A	S8	Queensferry Road Bridge	68,695	204,189	tbc	196,865	tbc	Proposed R.C. U-frame to obtain required headroom beneath the existing single span masonry arch bridge for the tram and work on bridge deck. Due to the well defined work required at this structure it is unlikely that any significant savings would accrue from any proposed alternatives	200,527	29
3A	S9	Groathill Road South Bridge	50,803	228,896	tbc	159,228	tbc	R.C. approach beams and slab over single span masonry arch bridge. R.C. cantilever to accommodate cycleway/walkway. Cost savings on this structures are liable to be minimal.	194,062	31
3A	S10	Telford Road Bridge	18,368	196,537	tbc	138,530	tbc	Proposed R.C. U-frame to obtain required headroom beneath the existing single span R.C. slab bridge for the tram and work on bridge deck. Due to the well defined work required at this structure it is unlikely that any significant savings would accrue from any proposed alternatives	167,533	34
3B	S12	Crewe Road Gardens Bridge	937,658	3,117,782	tbc	1,308,087	tbc	Additional span constructed behind the west abutment of the existing single span R.C. concrete integral bridge to cater for the tram. Existing bridge constructed with this provision in mind. New construction to match existing little scope for cost savings. Scoop - have indicated their concerns regarding this structure and the retaining wall, but further information is required regarding this.	2,212,934	7
2A	S20	Russell Road Bridge	414,879	1,283,461	tbc	1,185,158	tbc	It is currently proposed to construct an integral single span R.C. deck portal frame bridge with piled abutments. The structure carries Roseburn West Junction making the deck and abutment configuration asymmetric. It is difficult to see how cost savings could be made at this structure unless the piling could be eliminated, but this is liable to result in a larger excavated footprint for the structure and a longer period of disturbance to the residents. Although it should be noted that piling is required for the adjacent retaining walls. Roley - Proposed significant re-design at this structure but further work is required to identify any possible savings. See report B137103/SWS/ST/REP/01 V2 for further details. Scoop - Concerned about the Buildability of this structure and have concerns regarding Network Rail.	1,234,310	13
5A	W3&W4	Russell Road Retaining Wall One	1,090,986	2,845,717	tbc	2,013,153	tbc	The proposed structural form at this location comprises 600mm diameter CFA piles and R.C. pile cap supporting a R.C. retaining wall. As far as TSS - Structures is aware neither of the bidders have suggested savings could be made on this structure.	2,429,435	6
5A		Russell Road Retaining Wall Two								
5A	W18	Murrayfield Tramstop Retaining Wall	#N/A	797,326	tbc	1,056,507	tbc	The proposed structure at this location comprises reinforced earth with modular concrete blocks. The wall is surmounted by a L-shaped R.C. wall to the rear of the platform with a similar wall to the rear of the platform opposite. The latter walls are subject to a separate AIP submission. As far as TSS - Structures is aware neither of the bidders have suggested savings could be made on this structure.	926,916	19
5A	S21A	Roseburn Street Bridge	1,652,116	2,660,139	tbc	3,167,205	tbc	The currently proposed 5-span structure comprises reinforced earth abutments and R.C. piers on piled foundations carrying braced twin steel girders with a R.C. deck. The latter being constructed utilising precast R.C. planks as permanent shuttering. It has been mooted that savings could be made in regard to the structural steelwork if a propped construction was adopted. This would entail significant temporary works being located under the structure in Roseburn Street, the access to Murrayfield and Haymarket Depot. Roley - Proposed a propped construction for this structure thus reducing the structural steelwork required. See report B137103/SWS/ST/REP/01 V2 for further details.	2,913,672	
5A	S21B	Murrayfield Stadium Retaining Wall	721,337	1,547,975	tbc	1,471,667	tbc	The currently proposed structure comprises a vertical reinforced earth retaining wall with modular block facing to support the trams. It may be difficult to achieve any significant savings on this fairly simple construction technique unless additional land was available which would permit the construction of the cheaper solution used for structure S21D. Scoop - intimated they were still discussing this structure.	1,509,821	11
5A	S21C	Murrayfield Stadium Underpass	111,697	200,826	tbc	189,675	tbc	The proposed structure comprises a R.C. Box extension to the existing underpass. As far as TSS - Structures is aware neither of the bidders have suggested savings could be made on this structure.	195,251	30
5A	S21D	Murrayfield Training Pitches Retaining Wall	406,248	708,152	tbc	711,943	tbc	The currently proposed structure comprises a battered reinforced earth retaining wall to support the trams. The batter varies from 50° to 70°. It may be difficult to achieve any significant savings on this fairly simple construction technique.	710,048	22

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Section	ID	Structure	tie Budget allowance £	Scoop		Roley		Comments	Mean	Rank
				Tender £'s	Possible VE saving £	Tender £'s	Possible VE saving £			
5A	S21E	Water of Leith Bridge	720,096	1,548,576	tbc	1,414,219	tbc	The currently proposed asymmetric 2-span structure comprises reinforced earth abutments surmounted by bankseats, a R.C. pier on piled foundations carrying two twin braced steel girders with R.C. deck. The latter being constructed utilising precast R.C. planks as permanent shuttering. The current configuration of unequal spans has been chosen to avoid the large gas main located in the westbank footway. Roley - Suggested there might be some scope to reduce the tonnage of steel at this location. See report B137103/SWS/ST/REP/01 V2 for further details. Scoop - It was mentioned at the meeting that the structure was sympathetic to the adjacent 3-span arch bridge, but it should be noted that the girder depth is now constant along the structure to comply with CEC Planning Department wishes.	1,481,397	12
5B	S23	Carrick Knowe Underbridge	604,362	1,089,610	tbc	838,039	tbc	The currently proposed single span structure comprises R.C. abutments on spread footings supporting precast prestressed concrete U-beams with R.C. deck carrying the tram route over the railway. As with Edinburgh Park Station Bridge there may be some reduction in cost if a steel bridge was adopted although this would have to be approved by the various stakeholders including Network Rail. Roley - See report B137103/SWS/ST/REP/01 V2 for further details.	963,825	18
5B		Existing Saughton Road Bridge	#N/A	#N/A	tbc	#N/A	tbc	Minor work required to existing structure to enable it to carry the trams. Scoop - Intimated they do not understand the design and substructure requirements.		
5B		Existing Broomhouse Road Bridge	#N/A	#N/A	tbc	#N/A	tbc	Minor work required to existing structure to enable it to carry the trams.		
5B	S26	South Gyle Access Road Bridge	433,021	1,124,786	tbc	825,402	tbc	The currently proposed single span integral structure comprises piled abutments with a curtain wall between supporting a R.C. diaphragm supporting precast prestressed U-beams and R.C. deck to carry the tram over the South Gyle Access. As with Edinburgh Park Station Bridge there may be some reduction in cost if a steel bridge was adopted although this would have to be approved by the various stakeholders.	975,094	17
5B	W11	Bankhead Drive Retaining Wall	38,652	98,019	tbc	58,277	tbc	The proposed structure at this location comprises reinforced earth with modular concrete blocks. As far as TSS - Structures is aware neither of the bidders have suggested savings could be made on this structure.	78,148	38
5B	S27	Edinburgh Park Station Bridge	2,176,830	6,554,369	tbc	5,308,838	tbc	The currently proposed 9-span curved structure comprises R.C. piers on spread footings supporting precast prestressed U-beams and R.C. deck carrying the tram over an existing road and the Edinburgh to Glasgow Main Railway Line. It has been mooted that savings can be made by reverting to a steel superstructure already considered by SDS, but this alteration would require the approval of all of the Stakeholders through whose hands the current design passed and has been accepted by CEC structures department as TAA. Roley - Have suggested a steel option for this structure. See report B137103/SWS/ST/REP/01 V2 for further details. Scoop - Have suggested a steel option for this structure. Intimated that there would require to be massive temporary works and that U-beams proposed are unnecessarily expensive. Design Review Meeting - The following was discussed. The provision of one walkway only which would facilitate a narrower structure. The use of Corten steel which would reduce the maintenance issue should a steel beam and R.C. deck structure replace the currently proposed prestressed beam and R.C. deck structure which has been deemed more costly by the bidders.	5,931,604	
								The repositioning of the OLE supports from the centre to the parapet upstands. This would also allow the structure to be narrower provided the visual impact of the additional supports was made acceptable. The provision of a simpler parapet rather than the currently proposed more costly bespoke one subject to the visual impact issue being made acceptable.		
5C	S28	A8 Underpass	1,593,502	6,615,149	tbc	3,364,869	tbc	The currently proposed structure comprises 2 abutments each consisting of a row of R.C. secant piles, R.C. capping beam with integral R.C. Deck. The associated wingwalls/retaining walls comprise R.C. secant piles with R.C. capping beams. The current headroom shown of 5000mm could be reduced and the width narrowed if only one walkway was provided. This could provide cost savings if these alterations were agreeable to the stakeholders. Although it is understood that these proposals may have been developed during the details design phase. The bidders may conceive further cost savings depending on the traffic management scheme adopted. Roley - Suggested several options regarding this structure and the retaining wall. See report B137103/SWS/ST/REP/01 V2 for further details. Scoop - Intimated that the present proposal was difficult and expensive. They believe it may be possible to construct with one major traffic diversion around the roundabout. Design Review Meeting - The following was discussed. Replace the piled structure with a R.C. box structure. This would require a large excavation which would require the provision approval of a workable traffic diversion for a period of between 6 and 12 months.	4,990,009	
								The reduction of the headroom to the minimum of 4.4m although it is understood that the revised preliminary design drawing showing this had been provided to the bidders.		
5C	W16	A8 Retaining Wall	1,965,591	5,813,881	tbc	3,482,157	tbc	The structure proposed at this location comprises a tied back secant bored pile wall. The wall is supported by one or two rows of permanent ground anchors depending on its height. The wall abuts the south west and south east corners of the Depot Access Bridge structure S32. The scope of this wall maybe reduced if the Depot level is raised. Roley - See structure S28 above. Design Review Meeting - This structure could be largely or completely eliminated if it proves possible to move the Depot approximately 7 metres northwards.	4,648,019	
5C	W19	Gyle Stop Retaining Wall	#N/A	297,470	tbc	173,972	tbc	The structure proposed at this location comprises a R.C. L-shaped retaining wall with shear key downstand. As far as TSS - Structures is aware neither of the bidders have suggested savings could be made on this structure.	235,721	27
5C	S32	Depot Access Bridge	1,029,599	2,728,082	tbc	1,696,697	tbc	It is currently proposed to construct an semi-integral 2-span R.C. deck bridge with piled abutments. The central leaf pier is supported on a piled foundation. Due to the proximity of the roundabout one of the abutments is tied by two rows of permanent ground anchors. The structure carries the access road into the depot from the Gogarburn Roundabout over the tramway. The road geometry at this location makes the deck and abutment configuration asymmetric. Due to the requirement to deliver to trams to the depot by road the structure requires to be revised. There may be some savings if the level of the Depot is raised although the governing factors will be the level of the roundabout and the minimum headroom to be provided below the structure for the trams.	2,212,389	8

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Section	ID	Structure	tie Budget allowance £	Scoop		Roley		Comments	Mean	Rank
				Tender £'s	Possible VE saving £	Tender £'s	Possible VE saving £			
7A	S29	Gogar Burn Bridge	406,011	847,367	tbc	866,100	tbc	The currently proposed single span integral structure comprises piled abutments with an R.C. pile cap. On this sits 4 square R.C. columns with a reinforced earth modular block wall constructed between. The columns support a R.C. concrete capping beam on which sit precast prestressed TY-beams and R.C. deck to carry the tram over the Gogar Burn. The wingwalls are constructed from reinforced earth with modular concrete blocks. The wingwalls have stepped footings. Scoop - Intimate they have priced this on a best guess only although it is not clear from the notes of the meeting if this is the structure being referred to.	856,733	21
7A	S33	EARL Underbridge	562,806	938,559	tbc	846,825	tbc	If this can be deleted from the structures schedule then not only the cost of the structure would be saved, but the cost of the approach embankments would be greatly reduced. This would require a new vertical alignment of the tram to be produced at this location. Although this was mentioned to Scoop to ensure equity the other bidder Roley should be informed of this possibility if they have not already.	892,692	20
7A	W14	Gogar Burn Retaining Wall One	#N/A	977,259	tbc	383,212	tbc	The proposed structure at this location comprises a reinforced earth slope over part of the length and R.C. retaining wall over the remainder. At the location of the reinforced earth slope the level of the existing embankment is to be maintained for flood defence. Scoop - Intimated that there was insufficient information regarding this structure. This requires clarification.	680,236	23
7A		Gogar Burn Retaining Wall Two	#N/A	#N/A	tbc	#N/A	tbc	See structure W14 above		
1D	S17	Tower Place Bridge	310,520	2,108,802	tbc	1,937,179	tbc	Existing 4-span prestressed beam and slab bridge to be widened and have the present camber adjusted to cater for the proposed tram alignment. The current proposal to widen the bridge in a similar form of construction to the existing would appear to be the most cost effective option at present. Scoop - Have allowed for a single span to line up with their proposal at Victoria Dock Entrance bridge. This would have to be constructed within the LOD. Further details of this will be required to ascertain how this will be achieved. Design Review Meeting - The elimination of the footways was discussed as there is a suitable bridge adjacent. This had originally been put forward for use as pedestrian access but had been rejected. The retention of the negative cant at the structure was also discussed, but the effect on the linespeed would require to be checked.	2,022,990	9
1D	S16	Victoria Dock Entrance Bridge	2,751	448,688	tbc	680,839	tbc	Existing single span prestressed beam and slab bridge to be widened and have the present camber adjusted to cater for the proposed tram alignment. The current proposal to widen the bridge in a similar form of construction to the existing would appear to be the most cost effective option at present. Scoop - Have intimated that construction work to widen the bridge would be expensive and propose a floating footbridge. This would require be constructed within the LOD. Further details of this will be required. Design Review Meeting - The elimination of the second footway was discussed as one already exists at the structure. The retention of the negative cant at the structure was also discussed, but the effect on the linespeed would require to be checked.	564,764	25
1D	W1	Lindsay Road Retaining Wall	626,617	1,658,731	tbc	1,468,331	tbc	The retaining wall at this location is affected by a nearby development and may not be required. This would mean a significant saving for the project. Roley - See report B137103/SWS/ST/REP/01 V2 for further details. Scoop - Intimated this structure is not considered buildable. Requirement to break the existing anchors to accommodate the new structure. Further details of this are required to ascertain their concerns.	1,563,531	10
7A	S30	Gogar Culvert One	21,500	53,364	tbc	37,946	tbc	The proposed structure comprises a 2100 x 1200mm R.C. Box culvert. As far as TSS - Structures is aware neither of the bidders have suggested savings could be made on this structure.	45,655	41
7A	S31	Gogar Culvert Two	21,500	53,364	tbc	38,015	tbc	The proposed structure comprises a 2100 x 1200mm R.C. Box culvert. As far as TSS - Structures is aware neither of the bidders have suggested savings could be made on this structure.	45,689	40
7A	S34	Gogar Culvert Three	37,625	103,030	tbc	83,376	tbc	The proposed structure comprises a 2100 x 1200mm R.C. Box culvert. A weir and groundwater retention sump is shown at the downstream end. As far as TSS - Structures is aware neither of the bidders have suggested savings could be made on this structure.	93,203	37
7A	W8	Baird Drive Retaining Wall	427,405	926,507	tbc	1,036,745	tbc	The preliminary design and AIP are currently being prepared for a new structure at this location after recent agreement with Network Rail regarding access in this vicinity.	981,626	16
5A	S22	Balgreen Road Bridge	4,337	21,401	tbc	15,874	tbc	The preliminary design and AIP are currently being prepared for a new structure at this location after recent agreement with Network Rail regarding access in this vicinity. The costs for this structure are liable to be considerably greater than those shown.	18,638	43
5A/B	W9	Balgreen Road Retaining Wall One	24,230	54,160	tbc	247,879	tbc	The preliminary design and AIP are currently being prepared for a new structure at this location after recent agreement with Network Rail regarding access in this vicinity.	151,019	35
3	Roseburn Corridor	Roseburn Retaining Wall B	2,823,928	7,008,445	tbc	1,771,544	tbc	The proposed retaining walls in the Roseburn Corridor comprise several different structural forms. These are a modular block gravity wall, a modular block retaining wall with soil nailed face and a reinforced concrete trough. The current design requires to be revisited as the HMRI have requested 500mm clearance at this location. Design Review Meeting - The removal of the wall masking the soil nailed slope, the associated backfill and planting was discussed.	4,389,995	
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		Totals	20,399,932	58,666,071		41,487,659				
		Modified Existing Structure								
		New Structure								

W2	Ferry Road Retaining Wall	245,004	611,862		214,096
S11	Drylaw Drive	7,053	53,041		14,783
	Revised Total	20,651,989	59,330,974		41,716,539

SDS have had discussions regarding the revised LOD at this location with CEC. This may result in a greatly reduced scope for the retaining walls required and hence cost savings.	412,979	26
To be demolished	33,912	42