tie

Estimate Report
DRAFT FOR COMMENT

TSS Provider

Edinburgh Tram

Sep 05

WED00000104_0001

Contents

Rev	Originator	Approved	Date
V1		DRAFT - UNCONTROLLED	30-SEP-05

1 Terms of Reference

1.1 Purpose of this report

The purpose of this report is to describe the basis and assumptions made for the Budget Estimate for Edinburgh Trams Line 1 and 2.

The TSS was instructed to produce a base estimate by the 30th September 2005. A workshop was held 7th September 2005 with tie to review the design information and review Turner & Townsend's Query Sheets 1 and 2. A CD Rom of the Preferred Route Corridor (Sheets) and the latest Draft Design Guide was provided.

Turner & Townsend presented their estimate structure which was based upon the detailed WBS included in the SDS documentation. It was agreed that there was insufficient design detail / time before the 30th of September to "populate" quantities, agree the specification and design for each item. tie issued a spreadsheet format to capture the costs for each element of the work and for each Tramstop. It was agreed that the TSS should propose an estimating methodology which suited the information and time available. The estimate method was proposed in the TSS Query Sheet dated 9 September 2005.

The Tramstops shown in the tie spreadsheet identified a start at Haymarket then running anticlockwise around Line 1. Line 2 has been measured commencing at the Roseburn junction then running west. The track has been measured from the end of the preceding Tramstop to and including the next Tramstop.

The full TSS team has not had the opportunity to comment on the estimate. It is proposed that this estimate report is used to generate comments from the TSS and tie team. Comments can then be incorporated and a report issued as a Final Approved Report. The estimate is therefore issued for comment and should not be viewed as a final piece of work as further checking and refinement is needed.

1.2 Base Cost and Risk

The estimate is represents "Base Costs" which excludes contingencies for known specific risks and also optimism bias.

A risk analysis will be undertaken in early October.

2 Basis of Estimate

2.1 Scope

The following drawings were used to develop the estimate

- Line 1 - Preferred Route Corridor Drawings 203011/EDIN/0501-0555/Rev P5
- Line 2 - Route Alignment Plans 30894/F101 – F112 Rev F

Track lengths were derived from the "chainages" shown on the preferred route corridor drawings and also cross checked against the Network Diagram. There are some anomalies in the lengths which require resolution.

2.2 Pricing

- To provide parity with the previous estimates the price level for the estimate was requested to be priced 2Q 2003.

- The rates used in the estimate have been derived from a number of projects including:
  - Nottingham (NET)
  - South Leeds Supertram
  - Sheffield Supertram
  - Sunderland Metro
  - London Cross River Tram benchmarking analysis
- It should be recognised that the design basis, engineering solutions and unit rate composition will vary between the projects. Also the application of tender price indices can provide inaccuracies. (Refer Section 6 Recommendations).

- The accuracy tolerance of this estimate can be verified following development of the risk estimates and also greater scope definition (Refer Section 6 Recommendations).

3 Assumptions

3.1 Civils

The general double track width of 7.5m assumes an additional 450mm strip either side where the existing road surface is taken up and re-instated.

- The exceptions to this are:

Tramstops	Assumption
Haymarket to Ocean Drive	Additional nominal 7.5m for re-surfacing, re-lining for cycleways, modifications to bus stops, drainage modifications, parking bays shown on the drawings. Exact scope, specifications to be determined.
Ocean Drive to Ocean Terminal	New road alignment needed part route
Newhaven Road to Granton Square	Additional nominal 7.5m for re-surfacing, drainage modifications, parking bays. (Note: width restriction acknowledged).
Crewe Toll to end of Roseburn Corridor	Landscaping - Strip taken either side of track for tree protection, new trees, planting and fencing etc. (Note – length to be adjusted). New cycleway / footway with lighting included.
Part Haymarket / Murrayfield to Newbridge North	Landscaping – nominal allowance, scope / specification to be established New cycleway / footway with lighting included.

- Re-surfacing up side streets has not been included
- It is assumed that the existing road geometry will not be improved to meet current regulations, sightings, gradients and road widths resulting from the track layout or positions of structures.
- New Street lighting has not been included.
- New fencing to private gardens or boundaries to businesses has not been included with the exception of the Roseburn Corridor.

- Vertical alignment and levels for tram – generally rates allow for excavation, track slab construction and re-surfacing as appropriate. Works to raise level or embankments, other than structures have not been included.

- Traffic Management – specific allowances have not been included and are deemed to be included in the Preliminaries (%). Abnormal preliminaries requirements will need to be accounted for in the risk estimate.

- Demolitions – nominal allowances have been made for those structures identified on the route drawings only.

- Retaining walls have been measured where a note is shown on the drawings. The exact length, height and types are not defined.

- Drainage – allowances for minor modifications only, to drainage.

- Ratho to Newbridge – further work is required to validate the scope of modifications, minor structures, footways / cycleways, etc.

3.2 Structures

The estimates for the structures have been derived from the following:

- Assumption that structures will be concrete rather than steel

- A nominal width of 10.9m which includes space for walkway, parapet width etc. This requires further checking.

- The length has been determined by the clear span plus twice the height to cover for abutment structures, actual deck area etc

- The route drawings have been scaled in certain instances and the dimensions require checking

- A matrix has been developed to identify site specific factors which influence the cost. Examples include environment, complexity of construction, complexity of site access, adjoining structures etc

- The site specific factors have been used to determine the uplift factor on a base structure cost of £850/sqm. The uplift factor varies between 0.2 and 2.5 for the Hermiston Gait Rail Crossing. The actual uplift factor could vary between 1.5 to 2.5 and a detailed estimate would provide a more accurate cost. Further work is required to verify the engineering solution and scope for the complex larger structures generally.

- The base cost has been derived from recent projects.
- The elevated structure at Murrayfield has been included
- A single bridge structure at the Hermiston Gait rail crossing has been included. Alternative options include 2 square portal structures with retaining wall approach embankments

3.3 Utilities

tie advised that £50M be included for Lines 1 and 2. This has been split notionally, £30M for line 1 and £20M for Line 2.

The Utilities contractors will be procured separately for the main Infraco contractor. The Utilities contractor's preliminaries are deemed to be included in the costs above. A notional 3% for main Infraco contractor's prelims are included for co-ordination etc. (Refer Section Preliminaries)

3.4 Electrical / Signalling, Controls & Communications

Substations have been included where shown on the drawings. Costs have been benchmarked for the principal systems at this stage only in the absence of the point machines being identified. Supports for OHLE have not been differentiated between Building fixings and Poles.

Stop Equipment Rooms are shown on the drawings but it was clarified that some form of cabinet integrated with the Tramstop design would be adopted rather than separate structures.

3.5 Network Rail

tie advised that the previous estimate of £6.5M be included for works required by and for Network Rail.

3.6 Stops

Stops have been enumerated from the drawings and priced using comparable benchmarks for other projects. An additional allowance has been included for special finishes such as granite setts, enhanced stop design etc to the stops between Haymarket and Newhaven Road

A possible additional Track Run and Stop has been included at Ocean Terminal.

3.7 Depot

It is assumed that one depot is required. Retaining walls for the Line 2 Depot location are included in the Civils Costs.

Work Element	Assumption
Office / Staff area	1,000 m2 base building and fit-out. Furniture assumed to be included in OPEX
Depot area	4,000 m2
Hard standings / External Works	Site area of 21,208 m2 (note not measured)
Plant and Equipment	Notional £1M included. not verified from an equipment schedule
CCTV/ Security	Notional £0.5M included, not verified from drawings and specifications
Stabling and Circulation Trackwork	Notional £1M included not verified from layout drawings

The overall cost of the Depot has been benchmarked and is comparable with other projects.

3.8 Track

Track quantities have been derived from the chainages on the route drawings and adjusted where single track is shown or tracks are separated. The table below shows the exceptions to Track slab construction.

Tramstops	Track Type
Shandwick Place to Foot of the Walk, Newhaven Road to Lower Granton Road.	Trackslab construction but additional cost for enhanced surface finish
Lower Granton Road to part Roseburn / Haymarket	Grasstrack construction
Part Haymarket / Murrayfield to Edinburgh Park. The Gyle to Ingliston West	Ballasted Track

Adjustments have not been made yet for track on plinths to structures or infill to WEBS routes.

The following items have been derived from the Line 2 Estimate Report:

- Layovers- 1 Nr at Murrayfield
- Stabling – 160m at Murrayfield
- Crossovers – 9 Nr
- Turnbacks – 1 Nr
- Turnouts – 2 Nr on city – airport route, 8 Nr for Newbridge Shuttle

In the absence of information on Line 1, the following has been included:

- Layovers- 2 Nr
- Crossovers – 9 Nr
- Turnbacks – 1 Nr
- Turnouts – 2 Nr

3.9 Vehicles

- 14Nr for Line 1
- 13 Nr for Line 2

3.10 Prelims

The following table shows the prelims applied to each element of the work. The percentages have been benchmarked against other Tram and major Civils projects.

	Prelims	Prelims
Line 1	**%**	**%**
Civils	25%	
Utilities	3%	
Electrical	25%	
Network Rail	3%	
Stops	25%	
Depot	15%	
Track	20%	
Vehicles	0%	
		15.93%

	Prelims	Prelims
Line 2	**%**	**%**
Civils	25%	
Utilities	3%	
Electrical	25%	
Network Rail	3%	
Stops	25%	
Depot	15%	
Track	20%	
Vehicles	0%	
		16.03%

TOTAL		**15.98%**

Separate provision for clearance and accommodation works has not been made. This cost on other project has represented 1.2% of Works Costs on other projects. It is suggested that abnormal prelims for example, lack of working space is included in the risk estimate.

3.11 Land

Land costs are not within the scope of this study.

3.12 Project Costs

Promoter's costs are not within the scope of this study

3.13 Design & Consents

Design and consents costs are not within the scope of this study

4 Exclusions

4.1 General Exclusions

- VAT and other Taxes
- Finance Charges
- Land and Way leave Costs
- Compensation costs to 3rd parties
- Promoter Costs, Client in-house direct costs and overheads
- Legal Fees
- Design, Surveys and Investigation
- Consents and Statutory Fees
- Business Rates
- Specified or known risks, unknown risks and Optimism Bias
- Works resulting from CEC Traffic Regulation Orders restricting parking and regulating traffic
- Ground conditions – excavating in rock, ground remediation, removal of contaminated materials off-site and abnormal ground conditions have not been specifically accounted for. It is proposed that these factors are reviewed separately and either added to the base estimate or included in the risk estimate.
- Accommodation Works to 3rd party properties
- Other temporary traffic management beyond the route areas
- Work outside the Limits of Deviation
- Off – system or Off – route ticketing
- Telephones at Tramstops
- Phasing and / or uneconomic sequencing
- Operating and Maintenance Costs

4.2 Specific Exclusions

- Agreements resulting from comments / removal of objections, e.g. property entrances, fences, specific landscaping proposals
- Cycle Racks at Tramstops unless specifically noted on the drawing
- 11KVa Primary feeders
- Re-surfacing up side streets has not been included
- Trackslab drainage has not been included, setting out to enable slopes
- Stabilisation of existing dock wall at Starbank road, to be included in risk estimate.
- Potential area for stabling and / or layover facilities drawing 0513
- Interfaces to "Improved transport interchange facility at Haymarket
- Revised parking arrangements by others at the Gyle
- Reconfiguration of Airport Public Transport Interchange by others?
- Revised Parking arrangement by others?

There may be other items which would require further discussions.

5 Estimate Summary

5.1 Grand Summary

A Tramstop summary is provided at Appendix A and a summary for each work element is provided below.

	Line 1	Line 2	Total
Civils / Structures	26.45	37.20	63.64
Utilities	30.00	20.00	50.00
E&P / SCC	29.36	21.11	50.47
Network Rail	-	6.50	6.50
Stops	5.46	3.11	8.57
Depot	-	12.96	12.96
Track	43.53	33.06	76.59
Vehicles	21.70	20.15	41.85
Prelims	24.92	24.70	49.63
Total	**181.42**	**178.78**	**360.20**

6 Recommendations

6.1 Sensitivity Analysis

The main areas of uncertainty include:

- The constraints on structures and impact on cost
- Additional road re-surfacing beyond the narrow strip approach (with some exceptions)
- The extent of landscaping to the Roseburn Corridor
- OHLE and fixings

The cost estimate can be used to model differing assumptions and cost scenarios for scope risk and / or pricing risk. This will facilitate greater accuracy for the risk estimate.

6.2 Accuracy Tolerance / Estimate Confidence

The estimate has been derived from benchmarking costs from past projects. The positive factor from this approach is that the costs reflect a wide range of actual conditions. The disadvantage is that differences in risk transfer, contract structure, and local conditions are hidden in the detail of the rates.

A technique to avoid these factors influencing the estimate is to undertake a "Should Cost Estimate" which is based upon the proposed procurement strategy for Edinburgh Trams and proposed Construction Methodology. A detailed estimate for say 2 to 3 representative sections can be developed using rates from Market Testing rather than composite rates from past projects. The following sections would enable the current estimate to be tested.

- Shandwick Place to Princes Street
- Balfour Street to Foot of the Walk
- Murrayfield to Balgreen Road
- Ratho Station to Newbridge South

APPENDIX A – TRAMSTOP SUMMARY

Line 1		Civils	Utilities	Electrical SCC	Networ k Rail	Stops	Depot	Track	Vehicles	Prelims	Totals
From	To										
Haymarket	Shandwick Place	0.77		1.39		0.20		1.50			**3.87**
Shandwick Place	Princes Street	0.66		2.15		0.24		2.13			**5.18**
Princes Street	St Andrew Sq	0.60		1.40		0.34		3.69			**6.02**
St Andrew Sq	Picardy Place	0.78		2.42		0.20		2.80			**6.20**
Picardy Place	McDonald Rd	0.52		0.98		0.20		2.08			**3.78**
McDonald Rd	Balfour St	0.46		0.87		0.20		2.20			**3.73**
Balfour St	Foot of the Walk	0.47		1.57		0.20		2.50			**4.75**
Foot of the Walk	Constitution St	0.37		1.56		0.34		2.25			**4.51**
Constitution St	Ocean Drive	0.65		1.70		0.24		1.95			**4.53**
Ocean Drive	Ocean Terminal	0.74		0.91		0.37		2.37			**4.39**
Ocean Terminal	Newhaven Rd	1.28		1.89		0.37		3.00			**6.53**
Newhaven Rd	Lower Granton Rd	4.40		1.30		0.20		3.38			**9.28**
Lower Granton Rd	Granton Sq	1.12		1.74		0.22		1.98			**5.06**
Granton Sq	Granton W'front	0.91		0.96		0.22		1.37			**3.46**
Granton W'front	Caroline Park	0.39		0.72		0.22		0.72			**2.05**
Caroline Park	West Granton	1.55		0.65		0.22		1.08			**3.50**
West Granton	Crewe Toll	0.84		1.11		0.22		1.30			**3.47**
Crewe Toll	Telford Rd	1.22		1.55		0.22		1.30			**4.29**
Telford Rd	Craigleith	0.59		0.43		0.22		0.86			**2.10**
Craigleith	Revelston Dykes	3.36		0.76		0.32		1.58			**6.03**
Revelston Dykes	Roseburn	1.40		0.55		0.22		1.13			**3.31**
Roseburn	Haymarket	3.39		2.75		0.24		2.39			**8.77**
Sub-Total (Line 1)		**26.45**	**30.00**	**29.36**	**-**	**5.46**	**-**	**43.53**	**21.70**	**24.92**	**181.42**

Line 2											
Haymarket	Murrayfield	3.16		1.45		0.22		2.78			**7.62**
Murrayfield	Balgreen Road	9.94		1.81		0.22		4.04			**16.01**
Balgreen Road	Saughton Road North	1.21		1.72		0.22		2.57			**5.72**
Saughton Road North	South Gyle Access	0.52		2.05		0.22		1.87			**4.66**
South Gyle Access	Edinburgh Park Station	0.19		0.80		0.22		1.26			**2.47**
Edinburgh Park Station	Edinburgh Park	13.12		0.79		0.23		1.25			**15.38**
Edinburgh Park	The Gyle	3.87		1.08		0.23		2.26			**7.44**
The Gyle	Gogarburn	0.88		1.40		0.23		1.71			**4.22**
Gogarburn	Ingliston Park & Ride	0.28		1.86		0.18		2.76			**5.08**
Ingliston Park & Ride	Airport	0.90		2.07		0.24		1.88			**5.08**
Ingliston Park & Ride	Ingliston West	0.15		0.67		0.22		0.96			**2.01**
Ingliston West	Ratho Station	0.73		1.90		0.22		4.38			**7.23**
Ratho Station	Newbridge South	1.66		2.55		0.22		3.06			**7.50**
Newbridge South	Newbridge North	0.58		0.95		0.22		2.29			**4.04**
Sub-Total (Line 2)		**37.20**	**20.00**	**21.11**	**6.50**	**3.11**	**12.96**	**33.06**	**20.15**	**24.70**	**178.78**

Lines 1 and 2	**Total**	**63.64**	**50.00**	**50.47**	**6.50**	**8.57**	**12.96**	**76.59**	**41.85**	**49.63**	**360.20**