"4 Infraco Default" (a)(ii/iii) On-Street Trackform Design and Integration – Failure to timeously produce and submit for review an integrated trackform design

1.1 System Integration

1.1.1 Clause 8 of the Infraco Contract and Section 37 of the Employer's Requirements (Schedule Part 2) sets out the Infraco's specific obligations in respect of system integration. In particular at Section 37.1 of the ER's, the following is noted:

> tie shall be provided by the Infraco with a totally integrated Edinburgh Tram Network with all systems, subsystems and interfaces working efficiently and harmoniously together as one and able to be operated and maintained in full compliance with the requirements of the Edinburgh Tram Network and appropriate Consents. To achieve this, the Infraco shall be responsible for successfully undertaking comprehensive co-ordination and system integration roles within the Infraco Works. The system integration responsibility shall exist throughout all phases of the Infraco Works.[1]

1.1.2 That the Infraco is responsible for system integration is not in dispute. Rather it is the timing and effectiveness of that integration process which appears to have caused delays to progress and concerns as to fitness for purpose of the on-street trackform design.

1.2 Failure to Submit

1.2.1 Section 3.5 of the Employer's Requirements *"summarises the Deliverables that shall be provided by the Infraco"*:

> **3.5 Summary of Deliverables**
>
> This section summarises the Deliverables that shall be provided by the Infraco. The Deliverables shall be provided in accordance with the requirements of the Agreement and shall be reviewed in accordance with the Review Procedure.

1.2.2 The above referenced Deliverables include *"System Integration – including System Integration Plan"*.

1.2.3 As previously noted (see separate detail produced in relation to "Key Topic Area 4(i)"), Clauses 10.5, and 10.6 provide for the Infraco to (i) programme *"the manner and timing of each phase of the development and production of the Deliverables, [and] ... **the order in which each Deliverable is to be submitted for review**"* (ii) submit the Deliverables in accordance with the Programme for that Deliverable.

1.2.4 It is apparent that the Infraco has not complied with its obligations pursuant to Clause 10.5 and 10.6 in respect of the system integration of the 'On-Street' trackform design. The Programme does not provide for the submission of the integrated design to tie for review and to date an integrated

[1] Schedule Part 2 Sheet 591

design has not been submitted to tie. **Crucially tie does not know *when* it will be provided with the integrated design or at what stage that design is currently at.**

1.2.5 It is relevant to note that the Infraco has submitted certain Design Assurance Statement (in relation to SDS trackform designs). Those submissions are summarised in the "BSC *Submission Review Tracker*". We have been provided with a copy of same 'as at 21 January 2009' (shown as v29). This tracker shows that Infraco submitted "*Draft*"[2] SDS Design Assurance Statements "*For Information*" for, among other things, Sections 1A, 1B, 1C & 1D, on 9 August 2010[3] (**Doc01**).

1.2.6 Those DAS's were explained by the Infraco in its covering letter as being 'interim' and would be followed with Integrated (BSC) DAS for each geographical section. Of particular note is that the DAS's were submitted as 'interim', 'draft' and 'for information'. They were not expressly or necessarily submitted for review under Schedule Part 14. The Infraco also confirmed that the DAS's highlighted "*... the outstanding requirements that need to be resolved prior to completion of the final assured and integrated design for each geographical section and issuance to tie of the final DASs*".

1.2.7 It is clear that the Infraco has not produced a fully integrated design, nor has it provided same for tie review. The main question to address is whether tie can refuse permission to commence as a result. We have been unable to locate an express contractual provision stating that this is a pre-requisite to PTCW (tie personnel have also similarly been unable to direct us to such a provision).

1.2.8 It is likely that the Infraco will seek to rely on the provisions of Clause 10.10 as sufficient grounds for not issuing an integrated design to date. However, it is suggested that Clause 10.10 be read such that the relevant Deliverables are provided for **tie**'s review sufficiently in advance of construction to afford **tie** and other third parties, incl. CEC, the opportunity to comment on those designs. The 'Grounds for Objection' set out within Schedule Part 14 Part A clause 6, again indicate a clear intention that such review is required in advance of construction. There is no doubt however that the Infraco will have a counter-argument (possibly that proceeding without tie's review is simply an Infraco risk but permissible under the Contract).

1.3 Timeous production of integrated design

1.3.1 The Infraco Rev.1 Construction Programme shows that the Infraco planned to Issue Construction Drawings for trackwork and roadworks in Princes Street to Shandwick Place by **4 July 2008** (Section 1D). As a consequence, the integration and tie review process should have been

[2] Refer to BB Document Transmittal sheet No. 4625 dated 9 August 2010. The "Status" column refers to all submissions as "Draft"; the "Reason for Issue" column is shown as "5" ("For information")

[3] Infraco letter ref 21.1.201/IB/6388 (**Doc01**) refers. Earlier advanced copies for Sections 1B and 1D were submitted for "tie's information" on 15 June 2009 under cover of the Infraco's letter ref. 25.1.201/RH/2861 (This has not been attached - 100 pages. It can be provided if required)

(substantially/materially) completed by that date. In the event however, as at February 2011 (**138 weeks later**) a satisfactory fully integrated design has yet to be provided by the Infraco either for review or construction.

1.3.2 The lack of an integrated design solution demonstrating how all of the elements which interface with the track are incorporated or accommodated by the trackform design has been a key concern for **tie** since at least as early as 2009. **tie**'s comments in its Record of Review (RoR) dated 30/01/2009 (**Doc02**) are of particular note:-

> ***"As with the earlier Trackwork subsystem submission this documentation is written entirely from the Trackwork supplier's perspective and fails to provide an integrated design solution. This should be rectified prior to resubmission of a complete, integrated package outline the Trackwork subsystem design*** [sic]. *The following comments are provided to assist BSC in their completion of their integrated design submission."*[4]

1.3.3 From our discussions with **tie** it is apparent that the concern noted in the extract above still exists.

1.3.4 We note that this is also a concern which is held by CEC in terms of its approval process. This is demonstrated by the comments in its recent letter (**Doc03**: dated 1 February 2011), included below for ease of reference:-

> The Council's approval of the Track Form was discussed at this meeting on the 2 December 2010 and it was acknowledged that it was the integration of this track system into the road construction which needed to be approved. A fundamental part of this integration would be the interface between the rails and the adjacent road and the compaction of materials between the rails.

1.3.5 It is clear from the requirements of the Infraco Contract (see separate detail produced in relation to "Key Topic Area 4(iv)" that third party approvals are an express requirement of the PTCW process.

1.3.6 In this respect, tie is correct to refuse relevant PTCW's absent the necessary third party approvals owing to the Infraco's failure to demonstrate the integration of the trackform. As noted above those approvals remain outstanding.

1.3.7 Clearly the defects which have manifested themselves in Princes Street have exacerbated both tie and CEC's reservations in respect of this issue.

1.3.8 **Ground Improvement layer (INTC588):** it is relevant to note that the ground improvement layer is an area that the Infraco may attempt to rely upon as an issue delaying finalisation of design and integration. The Infraco position is that this requires instruction from **tie**. **tie** consider that the

[4] tie Record of Review, Submission No.: SPM-TRW-GEN-0106/BAL-0101/RHC-0101/RHD-0101, dated 30/01/2009 (**Doc02**).

current SDS design is subject to objection on the grounds of, among other things, being unapproved, the subject of an Infraco Change in any event and being inefficient as to expenditure of resource/cost; would prevent efficient construction; and would prevent a Certificate of Service Commencement being achieved by any of the Planned Service Commencement Dates[5]

[5] Schedule Part 14 Part A section 6 causes 6.1.3, 6.1.14 and 6.1.15

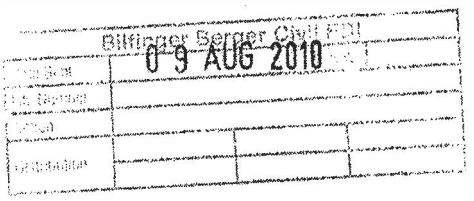
BILFINGER BERGER Civil

SIEMENS

CAF

Our ref: **25.1.201/IB/6388**
Your ref:

09 August 2010



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For the attention of Steven Bell – Tram Project Director

Dear Sirs,

Edinburgh Tram Network Infraco
Design Assurance Statements

Further to the meetings held on the 26th July and 4th August 2010, it was agreed that BSC would provide tie with Interim DASs for the Civils (SDS) and System (Siemens) packages of designs with the Integrated (BSC) DAS to follow for each geographical section.

BSC has produced an assured and integrated design in so much as the attached DASs per packages of design follow the Infraco IDC and DAS process as described in the Infraco Design Management Plan and IDC and DAS Plan. However, it needs to be recognised and acknowledged that each DAS is produced to a point in time (End July 2010) and highlights the outstanding requirements that need to be resolved prior to the completion of the final assured and integrated design for each geographical section and issuance to tie of the final DASs.

We note that the Siemens DASs have been provided under cover of letters:

ETN(BSC)TIE=PAC&ABC#052243
ETN(BSC)TIE=D&ABC#052244
ETN(BSC)TIE=S&ABC#052245
ETN(BSC)TIE=T&ABC#052246
ETN(BSC)TIE=PAB&ABC#052247
ETN(BSC)TIE=PB&ABC#052248
ETN(BSC)TIE=K&ABC#052249

Privileged and confidential – prepared in contemplation of mediation
FOISA exempt

Yours faithfully,

[redacted]

M Foerder
Project Director
Bilfinger Berger Siemens CAF Consortium

cc:EKi, MFo, KRr, BOc, SRo, SNe, MWi, MBe, DSt

[redacted]

BILFINGER BERGER Civil SIEMENS CAF

Attachments:

SDS DAS Section 1A: ULE90130-01-FOR-00020 V3
SDS DAS Section 1B: ULE90130-01-FOR-00021 V4
SDS DAS Section 1C: ULE90130-01-FOR-00022 V3
SDS DAS Section 1D: ULE90130-01-FOR-00023 V3
SDS DAS Section 2A: ULE90130-02-FOR-00003 V3
SDS DAS Section 5A: ULE90130-05-FOR-00041 V3
SDS DAS Section 5B: ULE90130-05-FOR-00042 V3
SDS DAS Section 5C: ULE90130-05-FOR-00043 V3
SDS DAS Section 6A: ULE90130-06-FOR-00004 V4
SDS DAS Section 7A: ULE90130-07-FOR-00009 V3

BILFINGER BERGER UK Limited	**Document Transmittal**	Form : F25-6 Rev : A Page : 1 of 1

Project: Edinburgh Tram Network Infraco	**Transmittal No: 4625** **09.08.2010**

Addressee: **ATTN: LINDA MELVILLE, ELAINE ROSS, ROXANNE NICOL, HAZEL KENNEDY, INFRACO@TIE.LTD.UK, TONY GLAZEBROOK**

Dear Sir / Madam,
Please find attached the documents listed below which are forwarded to you for your action /information as appropriate.
Please confirm receipt of the documents indicated by signing and returning a copy of this transmittal to the sender.

Transmittal Issued by:
Ian Brazenall
[redacted]
Signature: *I. Brazenall*

Originators Drawing/Document No.	Rev/ Date	Status	Document Title	Copies	Reason for Issue	Response Required by
ULE90130-01-FOR-00020	3	Draft	SDS DAS Section 1A	On CD	5	
ULE90130-01-FOR-00021	4	Draft	SDS DAS Section 1B	On CD	5	
ULE90130-01-FOR-00022	3	Draft	SDS DAS Section 1C	On CD	5	
ULE90130-01-FOR-00023	3	Draft	SDS DAS Section 1D	On CD	5	
ULE90130-02-FOR-00003	3	Draft	SDS DAS Section 2A	On CD	5	
ULE90130-05-FOR-00041	3	Draft	SDS DAS Section 5A	On CD	5	
ULE90130-05-FOR-00042	3	Draft	SDS DAS Section 5B	On CD	5	
ULE90130-05-FOR-00043	3	Draft	SDS DAS Section 5C	On CD	5	
ULE90130-06-FOR-00004	4	Draft	SDS DAS Section 6A	On CD	5	
ULE90130-07-FOR-00009	3	Draft	SDS DAS Section 7A	On CD	5	

Note: Failure to respond by the date stated will be construed as meaning "no comments "or drawing approved" as appropriate, unless otherwise stated in writing.

Reason for Issue Codes

Drawing Status Codes
A - Approved
B - Approved Subject to Comments
C - Not Approved
D – Issued
F - No Comment

Action Codes
1 - For Construction
2 - For Comment
3 - For Approval
4 - For Design
5 - For Information
6 - Revise And Resubmit
7 - Refer To Covering Letter
8 - Return To Originator
9 - As Built

Acknowledgement of Receipt

Name:	
Title :	
Signature :	
Date :	

Privileged and confidential – prepared in contemplation of mediation
FOISA exempt

·EDINBVRGH·
THE CITY OF EDINBURGH COUNCIL

Martin Foerder
Project Director
BSC
9 Lochside Avenue
Edinburgh Park
EDINBURGH
EH12 9DJ

Date 01 February 2011

Your ref ETN(BSC)CEC=TD&ABC#058025

Our ref SS1.40/AR

Dear Martin

EDINBURGH TRAM NETWORK
INFRACO CONTRACT TECHNICAL INFORMATIVE 6 TRACK DETAILS

I refer to our letter of the 15 December 2010 (SS1.40/AR), your presentation of the 2 December and subsequent letter dated the 3 December 2010 enclosing details to close the Track Form Informative.

The Council's approval of the Track Form was discussed at this meeting on the 2 December 2010 and it was acknowledged that it was the integration of this track system into the road construction which needed to be approved. A fundamental part of this integration would be the interface between the rails and the adjacent road and the compaction of materials between the rails.

A presentation was given at this meeting by Siemens and this presentation material forms part of your submission. This presentation gave an introduction to RHEDA and the track and pavement design that has been constructed in Princes Street. It also gave details of the nature of deterioration on Princes Street, proposed reasons for these defects and stated that this design is fit for purpose.

Your submission included alternative Track Designs that have been proposed for areas which have "very high wheel turning forces" and a "design enhancement" for other on-street sections. What has not been provided is clear justification where these alternative construction details are required. In particular it is not clear why an alternative design is needed for locations with high numbers of

Dave Anderson, Director, City Development
Transport, City Chambers, High Street, Edinburgh EH1 1YJ

INVESTORS IN PEOPLE

turning buses, if this was not factored in the original design, how is it fit for purpose? **What the Council would require is clear justification which would explain when either of these enhanced designs would be required, the extents of these areas and an outline of the benefits of these designs in comparison to the track surfacing design installed on Princes Street.**

The general reasons given for the defects on Princes Street are related to programme pressure and adverse weather. However, what has not been provided is a correlation between the areas where failures have occurred and the specific reasons for these failures.

The Council therefore require to see details of the failures in Princes Street and the specific reasons why each length of track is requiring remedial measures.

I note that work has been carried out on Princes Street when neither programme nor weather has been a constraint and these repairs have not resolved the evident defects, with further repair work being required. **The Council would also require details of why these areas are showing further failure.**

Your submission states that the surfacing layers are selected from Appendix 7/1; however as the track bed and the concrete slab are fixed in your design it is only the top 173 mm which is selected from Appendix 7/1. Considering this track support, what I would consider is crucial to this track design is adequate compaction of materials around the track. Specific details of the construction methods for each cross section were requested in our letter of the 15 November 2010, these have not been provided. **I still require that information.**

The Council would also request examples of where these on-street track designs have been installed elsewhere and details of their performance.

As the asphalt surfaced cross section has been installed in Princes Street, with the evident defects, the Council is not able to close out this Informative or give Technical Approval to the Track design until the above concerns have been resolved to our satisfaction.

I trust that the above is in order but if you require any further information, please contact Andy Conway on [redacted]

Yours sincerely

[redacted]

pp Marshall Poulton
Head of Transport

Cc Steven Bell **tie ltd**

Record of Review

Submission No:	SPM-TRW-GEN-0106/ BAL-0101/ RHC-0101/ RHD-0101	**Originator:**	K Deiker
Title:	Location of Designated Trackforms - Lines 1 and 2 Basic Design: Ballasted Track v.B Basic Design: Rheda City C v.B Basic Design: Rheda City D v.A	**Issue status:**	For Review
		Required review date:	18/02/2009

Reviewer:	Role	Date of review:
Frank McFadden	Infrastructure Director	21/01/2009
Andy Steel	TSS Senior Advisor	21/01/2009
Sinead Scott	Transdev Engineering Manager	21/01/2009
Gavin Murray	Engineering PM	21/01/2009
Willy Biggins	Trackform PM	21/01/2009

Scope of review: Basic Design Review

Review status

Level A – No objection	
Level B – Proceed subject to comments	
Level C – Resubmit	X

Ref.	Comment	Advisory	Mandatory	Response
General	As with the earlier Trackwork subsystem submission this documentation		✓	

Ref.	Comment	Advisory	Mandatory	Response
	is written entirely from the Trackwork supplier's perspective and fails to provide an integrated design solution. This should be rectified prior to resubmission of a complete, integrated package outline the Trackwork subsystem design. The following comments are provided to assist BSC in their completion of their integrated design submission.			
General	As discussed in the meeting held on 22 January each of the 3 documents need to be developed to show how the integration of all the elements which interface with the track are incorporated or accommodated by the track form design. This relates also to earlier Track Design deliverables which have been issued to and reviewed by tie. It is anticipated that on resubmission of this documentation including this integrated information tie will be able to provide additional response.		✓	
Basic Design: Ballast Track (referencing lines 1 and 2 drawings)				
4.2.4	BSC are to confirm that a calculation has been carried out to verify that the chosen ballast depth in combination with the sleeper spacing is sufficient to evenly spread the load to the sub-base. In a track technical meeting on the 08/12/08 BAM rail noted that the SDS drawings for ballast track showed a greater depth of ballast than that proposed by BAM. They confirmed that they would present calculations to give assurance as to the final depth and shoulder arrangement proposed. The proposed shoulder arrangement assured in the calculations in relation to lateral stability of the rail.		✓	
4.5	BSC are to confirm that heating of the rail in order to achieve the required		✓	

Ref.	Comment	Advisory	Mandatory	Response
	stress free temperature compared to the alternative method of pulling the rail will not adversely affect the integrity of the rail. BSC are to provide appropriate documentation on this issue followed by more specific discussion between BSC and tie. (Section 3.2 Longitudinal Loads, of Appendix II also relates)			
4.6	It is noted that BSC have identified a 50m radius curved on a ballasted section over Gogar landfill as per SDS drawing ULE90130-SW-DRG-00070 v4. Siemens drawing (ETN(TRW)=TD&ATB # 055715-B) however, shows 50m curved section as grass track – This was discussed at the track technical meeting 22/01/09, Taking cognizance of ongoing maintenance concerns, BSC are to confirm the track form in this location and the method of construction to be used.		✓	
6	A cross sectional drawing showing the ballasted track form and integration of the substructure drainage design should be provided.		✓	
7.6 & Appendix V	Quality issue with using Markle Mains to supply the ballast – *BSC has previously been directed to show that the material from this quarry would achieve the relevant quality standards. The appendix addressing this should include a brief summary outlining the ability to achieve this.*		✓	
11.1	'For the calculation of the ballasted track the maximum combinations of factors according [2] will be 1.4'. Please confirm that this refers to the dynamic to static stiffness ratio.		✓	
Appendix 2 Summary	*'For switches with wooden sleepers in CWR ballasted track the sleepers under the pair of switches and in front of the switches have to be equipped with measures to increase the lateral ballast resistance'*. 3.3.4 states that		✓	

Ref.	Comment	Advisory	Mandatory	Response
	anchor shoes must be installed on the wooden sleepers to increase the ballast resistance. Confirm the measures to be taken and how these measures will be assured by BSC to deliver the required lateral stiffness			
Appendix 2	SDS to confirm switch Geometry with an aim of achieving consistent standard Radii.		✓	
Appendix 2 Calculations	There are several instances where the source of formula or values is not clear or how some of the conclusions were reached from the calculations provided. For the main part this is a very comprehensive and thorough report however it should be clear and logical where inputs come from and how data presented leads to the conclusions drawn.		✓	
Basic Design: Rheda City C (referencing lines 1 and 2 drawings)				
4.2 & 5.3	The integration of the different cover materials used on the Edinburgh project with the track form need to be clarified in the design.		✓	
4.4	Will rail head grinding be undertaken after installation and prior to commissioning as specified for ballasted track in step 6 of section 4.3 of Basic Design: Ballasted track? BSC to clarify.		✓	
5.1 - 5.3	A formation stiffness of 120MN/m^2 is required, a formation improvement layer is required if the formation stiffness is ≥45MN/m^2. Section 5.3 states that the formation improvement layer thickness shall be at least 120mm in order to be able to compact this layer. Please confirm the improvement layer design to be used in order to met the formation stiffness requirement of 120MN/m^2 BSC should provide evidence or calculation which show that a formation stiffness of 120MN/m2 is required?		✓	

Ref.	Comment	Advisory	Mandatory	Response
	What is the process for BSC to measure the formation stiffness at the track slab depth – is this something that can only be known once excavation/construction begins or has analysis work of actual ground conditions already been carried out?			
6	Confirm whether the drainage boxes shown in section 6 are the actual drainage boxes being provided along the tram route n the drainage positions as detailed in the SDS set of drawings ULE90130-XX-DNE-XXXX		✓	
7.3	Note that a technical query has been raised to provide the kinetic envelope in the direct vicinity of the railhead.		✓	
7.10	Note that tolerance on joint sealant is less than 5mm however in section 4.2.5.2 it was stated that the level to TOR is less than 1mm. Please confirm that this can be achieved within the stated tolerances.		✓	
8	Although in this section it states that derailment provisions are not applicable, this statement should be justified. Additionally, derailment protection measures will be incorporated into the structures where applicable. Therefore BSC need to confirm if the protection requirements designed into each structure is sufficient to contain a derailed tram and protect the structure from damage sustained from a collision.		✓	
10	BSC to assess the ground borne vibration generated by the tramway taking into consideration the proposed track form to assure BSC's commitment to meet the Noise and Vibration policy. Discussed and noted at a track technical meeting on the 22/01/09.		✓	
11	Have fatigue calculations been carried out on the track slab? BSC to confirm.		✓	

Ref.	Comment	Advisory	Mandatory	Response
Basic Design: Rheda City D (referencing lines 1 and 2 drawings)				
	Same comments as Rheda City C			

Additional comments
The Key issue noted in this review relates to the fact that this document is written purely by and for the Trackform subcontractor and does not provide any level of integration. Tie would expect to see BSC submissions to be fully integrated across the whole consortia not specific to BAM.

Review sign off

Name: Frank McFadden Signature: Frank McFadden

Organisation: tie Date: 30 January 2009