

# Edinburgh Tram Project

## Proposed Programme Rev.02 Initial assessment of EoT2 requirement

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Initial Assessment of Infraco Claim for Extension of Time in  
relation to the issue of the proposed Programme Rev.02.

# DRAFT

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# Initial Assessment of EoT2 (Programme Rev.02) submission

## Introduction

### Background

Infraco has submitted a programme for acceptance by **tie**. It projects a Sectional Completion C Date 56 weeks later than that shown on the current Programme. It is presented pursuant to Clause 60 of the Infraco Contract.

The submission was made under cover of a letter dated 20<sup>th</sup> May 2009 entitled “*Submission of Programme (Revision 2) – 31 March 2009 – Sub-Revision 0*”. It contains a seven page narrative and a soft copy (in “pdf” and “xer” formats) of the programme referred to. The narrative explains that this programme is based on the EoT Entitlement Programme – 31 March 2009, previously provided to **tie** under cover of a letter dated 15 May 2009. It states that Infraco has mitigated the delays contained within the EoT entitlement programme;

*“by resequencing of the activities etc to bring the Sectional Completion Dates C & D (at the expense of putting back sectional completions A & B) earlier than those contained in the EoT Entitlement Programme – 31 March 2009”.*

It also states that the submission has been restricted to information that was available up to 31 March 2009.

The current Programme (Revision 1) contains 1697 activities. The “Revision 2” programme contains 5407 activities. This significant increase in detail is attributable, primarily, to:

1. The addition of more detail from sub-contractor programmes for certain parts of the works, particularly structures.
2. The introduction of additional detail to parts of the current programme following completion of design where only summary detail had previously been provided.
3. The introduction of additional work arising from tie instructions and/or agreed changes.

It should be noted that this additional level of detail applies to only certain sections of the programme. Some sections contain much more detail than the current Programme. Others contain no more, and in some instances this is no more than summary information.

Further to this submission, meetings were held between Infraco and **tie** programme managers (Messrs Sharp and Hecht representing Infraco and Mr Hickman representing **tie**). At these meetings Infraco provided further explanation of its submission and the programmes referred to in it.

**tie** is of the opinion that both the “EoT Entitlement” and “Revision 2” programmes over-state the consequences of the delays experienced to-date. **tie** also considers they mis-represent Infraco’s contractual entitlement to relief from, through the granting of extension of time, as they contain, amongst other things;

1. Incorrect and/or superseded physical logic.
2. Superseded and/or inappropriate preferential logic.

3. Delays for which Infraco carries liability.
4. Delays in which Infraco has culpability.
5. Increased activity durations for which no justification has been provided.

They also do not include or incorporate;

1. Readily achievable delay mitigation measures.
2. Constraint relaxations (including specialist resources, traffic management and embargos)
3. Agreed re-sequencing and re-scheduling.
4. Revised sub-programmes that Infraco is currently worked to.
5. Established rates of productivity that supersede estimates.
6. Progress actually achieved, particularly where it is an improvement over that previously planned.
7. Measures to implement Change in the most cost effective manner.

As part of the mediation process the parties' representatives have met to discuss some of these matters in an attempt to reach a consensus on an assessment of Infraco's current entitlement to extension of time. Through these detailed discussions Infraco identified four parts of the Works that it considered were the critical areas driving the projected completion dates. These parts are as follows;

1. Newhaven / Lindsey Road
2. Inner City Works
3. Section 5A structures
4. Gogar Depot

Subsequent to these discussions tie identified that the Tram Test Track (primarily, Section 7), which may determine the Sectional Completion B Date, to also be a critical area.

It is understood that Infraco has not formally requested an extension of time based on this programme, merely that tie accept it in accordance with Clause 60.4. However, through meetings and discussions, Infraco has made it clear it considers that this programme provides evidence from which tie should assess Infraco's requirement for extension of time. Infraco has made it clear it is of the opinion that the required EoT shown on this programme represents its entitlement under the Contract.

### **Contractual Entitlement**

Infraco has made this submission under Clause 60 of the Contract. This clause does not contain the mechanism for notifying, assessing and granting extension of time. The submission does not contain sufficient information to comply with the requirements of the contract clauses that do provide for granting extension of time.

On 21<sup>st</sup> August 2009 tie wrote to Infraco, in accordance with Clause 60.4, rejecting the programme submission and provided reasons for doing so.

### **Initial Assessment**

Notwithstanding tie's rejection the Infraco submission, an initial assessment of the critical areas noted above has been carried out and is reported in this paper. It has considered what, in tie's

opinion, has or will actually caused delay and whether such delay gives rise to entitlement to relief through the granting of extension of time to the Sectional Completion Dates. This assessment takes into account tie's knowledge of matters creating delay that appear to be Infracore's liability under the Contract. **It is important to note that this tie assessment has examined only the five critical areas referred to in this report. No work has been undertaken on assessing delays and potential entitlement on all of the other areas of the route.**

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## Interim Assessment of Entitlement to Extension of Time

### Executive Summary

**tie** has carried out a detailed examination of each of the five identified critical areas. It compares the current programmes for the activities involved (as shown on the current Programme) with those on the proposed "Revision 2" programme. The differences have been carefully examined and comments prepared in relation to how **tie** views them. **tie** has then prepared a third programme using the component information from the preceding two, relating it to the significant delay events experienced to-date which **tie** considers it **may** be liable. For some of the identified critical areas a fourth programme has been prepared. It develops the assessment in the third programme to include particular mitigation measures that would appear to be readily applicable and cost effective.

This process has indicated that significantly earlier completion than that shown on Infraco's most recent programme submissions should be readily achievable or, indeed, has actually been achieved. It is also noted that there appear to be many opportunities to employ delay mitigation measures to reduce the projected delays and the time risk associated with the each of these parts of the Project.

It is concluded that, at present, based on this interim assessment of the five identified critical areas, Infraco **may** be entitled to relief through the granting of extension of time to the Sectional Completion, as follows:

1. Sectional Completion A: +0 weeks
2. Sectional Completion B: +0 weeks
3. Sectional Completion C: +14 weeks
4. Sectional Completion D: +14 weeks

This assessment of potential relief does not include examination of the areas of the route outwith the five identified critical area and therefore does not report on an entire assessment of Infraco's "Revision 2" programme submission. It is apparent to **tie** that there are other areas along the route where critical delays may be accumulating and it may prove that some of these are, or will be in the future, driving some of the Sectional Completion Dates.

It is important to note that in **tie**'s assessment of the delays to each of these Sectional Completion Dates there are concurrency issues for which **tie** considers Infraco to be liable. This should be taken into consideration is any assessment of additional cost that is related to time relief referred to above.

The follows sections of this paper set-out, in some detail, a commentary on the assessment process for each of the five identified sections. Included in the appendices are copies of the associated assessment programmes, as referred to above.

### Note

It should be noted that in this assessment activity durations have, generally, been rounded to the nearest whole working week. The time unit used in the Infraco programmes is working days. Various

project calendars have been used in the Infraco programmes to define available working times. Consequently, there may be slight discrepancies between some of the durations noted in this assessment and their equivalents in the Infraco programmes. While this is not considered to be of any great significance in terms of establishing the magnitude of the delays, in calculating revisions to the Sectional Completion Dates the unit of time should be days.

## 1. Newhaven / Lindsay Road

### Background

The Contract Programme was based on the information made available by tie for pricing prior to 25 November 2007. The Infraco programming assumptions contained in Schedule Part 15 of the Contract note that at the time when the Programme was prepared there was insufficient information on a number of sections of the Works to properly programme them. Consequently, the programme for these works could not be "firmed up". These sections included various part of Section 1A and include the Lindsay Road Retaining Wall.

It is understood that the current design for the works in this area has changed significantly from the information made available prior to 25 November 2007. It is also understood that this change process has not, as yet, been concluded. Third party consents and agreements have still to be finalised. Utilities diversions by other have still to be undertaken. Also, tie considers that the current design might not work and is of a form that will take unnecessarily long to construct. Many part of it do not appear to be the most cost effective solutions.

For this reason the activities, durations and network logic for the Lindsay Road works, as included in the current Programme, cannot be reliable upon, without careful review and appropriate adjustment, as a legitimate basis from which to conduct an assessment of delay.

### Programme Overview

The first (top) section of Appendix 1 sets-out, in Gantt chart format, the works in the Lindsay Road area as shown in the current Programme.

The works, as envisaged by the current design involve the lowering of Lindsay road over a section approximately 250m long, the construction of three small and one large retaining walls, the formation of a road link between Lindsay Road and Shore Road, and the construction of the tram route along the line of Shore Road. The main utilities diversion is to move the existing services in Shore Road into adjacent land belonging to Forth Ports so that the large retaining wall can be constructed along part of the existing route of Shore Road.

### Observations on the current Programme (Rev.1)

1. The Programme envisages that the MUDFA diversions will be complete throughout Area 1 before the road works and retaining walls commence.
2. The start of Retaining Wall B Contiguous Bored Piles is driven by the IFC date (plus 20 day lag). Retaining Wall A Reinforced Earth is connected, finish-to-start, to completion of Retaining Wall B.



3. The start of the road works is driven by the IFC date (plus 20 day lag). The ch. 700 to 850 section starts first and runs for 10 months. There is then a 4½ month gap until the ch. 300 to 700 section commences. This 400m section progresses for just over 2 months. Its start is driven by the completion of track works in the same area. The final section of road works, ch. 000 to 300 commences almost 3 months following completion of the previous section. It is again driven by completion of the track works in the same area. The duration for this 300m section is the same as that for the preceding 400m one.
4. The start of the first track laying activities is driven by the release of resources from other sections of the Project. Track work in this area proceeds on an intermittent basis, driven by resource availability and the inter-relationships with road works.
5. Some of the track laying activities are shown as being on the critical path to completion. It is noted that this is because of preferential logic links, apparently, inserted for resource smoothing purposes.
6. The Lindsay Road part of Section 1A is not driving the Sectional Completion C Date. The construction works are complete 23 weeks prior to this date.

### **Proposed “Revision 2” Programme Overview**

The second section of Appendix 1 sets-out, in Gantt chart format, the Lindsay Road area works as shown in the proposed “Revision 2” Programme.

This programme is very different from the current Programme. The first activities do not start until September 2009, 10 months later than in the current Programme. There are now four retaining walls, one large and three small. Reference to the IFC drawings shows they are all constructed of reinforced concrete. This is completely different from the structural forms referred to in the current Programme. The construction duration for the large wall (approx. 250m long) is almost 1 year. This compares with a duration of approximately 5 months for the equivalent structure in the current Programme. The road works now include an additional two phases. It is understood these are for the lowering of approximately 250m of Lindsay Road. These additional phases add eight months to the duration for the road works in this area. The overall duration is now almost 2 years. The track works have been extended by a similar time scale.

### **Observations on the proposed “Revision 2” Programme**

1. The road works do not commence until walls 2, 3 & 4 are complete and wall 1 have been progressed for a period of four months. This sequencing does not appear to make sense and unnecessarily prolongs the overall construction period.
2. The durations for the major elements of civil engineering works appear unnecessarily long.
3. Infraco imposed track laying resource constraints are extending the overall construction period.
4. Completion of the construction works on Lindsay Road is now projected 39 weeks beyond the current Sectional Completion C Date.

### **Overview of tie’s Extension of Time Entitlement Assessment**

It is recognised that the design for the works in this section have changed from that on which the current Programme is based. The nature and scale of this change and the delays impacting on this

section requires the complete re-programming of these works. Such a re-programming exercise appears to have been undertaken by Infraco in its preparation of the "Revision 2" programme.

tie considers that the activity sequencing and durations shown in the "Revision 2" programme do not represent the most cost effective implementation of the changes. It has, therefore, prepared its own programme from which to base its initial assessment of the requirement for extension of time. This has included significant input from tie's Project Manager for this part of the Project route and includes his knowledge of anticipated dates and timescales for what will be required to complete this section. The resulting programme is shown on the third section of Appendix 1.

### Notes and Comments on the Initial Assessment

1. Cognisance has been taken of the utility diversion works required on Shore Road and these have been shown on the programme based on tie's most recent knowledge.
2. On the assumption that Lindsay Road lowering will be over a length of approximately 250m, it has been programmed to commence in February 2010. This should allow sufficient time to secure any outstanding approvals and consents. It has been programmed to be carried out in two phases with the existing traffic flows being accommodated (one lane in each direction) within the existing road corridor.
3. Construction of the large retaining (Wall 1a) commences following completion of the Shore Road utilities diversions and the first phase of the lowering of Lindsay Road. The duration for this 250m long retaining wall has been assessed at 14 weeks (as opposed to the 1 year shown by Infraco in the "Revision 2" programme).
4. Construction of the 3 small retaining walls has been programmed to tie in with the construction of the Shore Road / the Lindsay Road link, as is required by the logical sequencing and physical logic for these works.
5. Track, E&M and tramstop works follow completion of the structures and road works. It is noted that these work require to be co-ordinated with the construction activities in the adjacent area.

This initial assessment programme indicates that the works in this area can be completed within the current Sectional Completion C Date. That being so, there is no requirement for extension of time arising from the Lindsay Road part of Section 1A.

### Delay Mitigation and Risk Reduction

The current design of the retaining walls, while achievable, appears inefficient, both in terms of structural form and speed of construction. tie's Project Manager is seeking to challenge this in the interest of securing better value and mitigating programme risk by reducing the time required for construction of these structures. (The tie assessment, referred to above is based on Infraco's current design, not this alternative.)

The extent of Lindsay Road reconstruction, as shown on the current Infraco IFC drawings, is considered to be excessive. At either end of the route, approximately 100 linear metres of existing road pavement is shown for reconstruction solely to achieve lowering of areas of existing road pavement by less than 100mm. This appears to be unnecessary work giving rise to unnecessary additional cost.



The **tie** assessment programme does not show the earliest possible dates for commencement of many of the activities. Opportunities to commence these earlier than shown should not be missed if they prove beneficial in terms of reducing resource demand in the later stages of the overall programme and/or introduce additional float thereby de-risking the Project.

### **Other matters**

To successfully progress the works in this area will require collaboration, approvals and consents from many third parties. These include Forth Ports, Forth Ports' tenants, utilities companies, CEC, other contractors. All of this will require careful management and planning if the **tie** initial assessment programme is to be achieved.

### **Conclusion**

The works in this area have been the subject of significant change. This was anticipated when the Contract was formed. They have also been subjected to significant delay. At the time this paper was prepared, several consents had still to be finalised and arrangements concluded for much of the utilities diversions.

Notwithstanding, there remains a period of 1½ years to carry out the construction works in this area within the current Sectional Completion C Date. Given sufficient forward planning and adequate resourcing, **tie** considers that these works can readily be completed within this time-frame. **tie** also believes there are opportunities to revise much of the design to reduce the build cost and time required for construction.

## 2. Inner City Works

### Programme Overview

The Inner City Works covers the sections from Haymarket junction to Picardy Place junction. Under the terms of the Contract, this area is subject to annual embargoes which restrict construction works from taking place during the months of August and December each year.

The programme for Inner City works is broken down into three distinct sub-sections, namely:

1. Haymarket to Shandwick Place
2. Lothian Road junction and Princes Street to its junction with Waverley Bridge
3. Waverley Bridge junction to Picardy Place junction.

The first (top) section of Appendix 2 sets-out, in Gantt chart format, a summary of the City Centre Works as shown in the current Programme.

### Observations on the current Programme (Rev.01)

#### Section 1 Haymarket to Shandwick Place

1. The Programme shows that the MUDFA diversions are to be complete before Infracore commences its activities on site at Haymarket junction.
2. The Programme shows that the Princes Street works are to be complete before Infracore commences its activities at Shandwick Place.
3. The programme indicates that the IFC design for roads and track will be available July 2008.
4. The track activities at West Maitland Street are dependent on track resources becoming available from St Andrew Sq.
5. The track activities at Torphichen Street are dependent on track resources becoming available from Balfour Street.

#### Section 2 Lothian Road Junction and Princes Street to Waverley bridge

1. The Programme shows that the MUDFA diversions are to be complete before Infracore commences its activities on site at Lothian Rd junction.
2. The Programme shows that the 1<sup>st</sup> Phase of Lothian Road Infracore works will be complete prior to the commencement of the Princes St Works from South Charlotte Street.
3. The programme shows that the IFC design for roads and track will be available July 2008.

#### Section 3 Waverley Bridge junction to Picardy Place junction

1. The programme takes cognisance of the traffic management restrictions that were considered in late 2007 and are recorded in Schedule Part 15d of the Contract.
2. The programme shows that due to traffic management requirements that the sub-section between Waverley Bridge and the South-east corner of St Andrew Sq will not be constructed until after Princes Street is complete.

3. The programme shows that the works between Picardy Place and North St Andrew St working westbound do not commence until the east side of St Andrew Sq is complete. This delay is driven by preferential logic between the completion of track installation at St Andrew Sq (1C-16-TRCK-70) and commencement of civil works at Picardy Place Phase 1 (A13580) which could commence 21 days earlier.
4. The programme indicates that the IFC design for roads and track will be available August 2008.

## **Proposed "Revision 2" Programme Overview**

In general the base logic of the proposed "Revision 2" programme remains the same as that shown in Revision 1 with the following notable exceptions.

- St Andrew Square, east side is sub-divided into smaller sections. (See observations below).
- The construction sequence between Picardy Place and North St Andrew Street has been reversed. It is to be constructed eastbound rather than westbound, as shown in Revision 1.

The second section of Appendix 2 sets-out, in Gantt chart format, a summary of the City Centre Works as shown on the "Revision 2" Programme. It projected an over-run on the current Sectional Completion C Date of approximately 59 weeks.

## **Observations on the proposed "Revision 2" Programme**

### **Section 1 Haymarket to Shandwick Place**

The commencement of tram works at Haymarket junction is dependent on the completion of MUDFA Utility diversions at an Intermediate Sectional level, and a "*mobilisation*" period of 30 days has been added between the completion of the MUDFA Works and the commencement of the tram works. This additional time has not been explained and appears unnecessary, in the circumstances.

The commencement of tram works at Shandwick Place is dependent on the completion of Princes Street works.

### **Section 2 Lothian Road Junction and Princes Street to Waverley bridge**

The programme has been adjusted to re-sequence the construction activities to take account of incomplete Utility Diversions at the Mound.

The programme envisages an August embargo and allows for a 4 week period to close-down and prepare for the embargo and a two week period to re-commence works. (These periods appear to be unnecessarily long and, in any event, take no account of what actually happened on site. The embargo was lifted and, consequently, there is no need to make provisions for it.)

The programme, as presented, does not meet the specific requirements to have Princes Street works complete prior to the Christmas embargo in December 2009.

### **Section 3 Waverley bridge junction to Picardy Place junction**

The section from Waverley Bridge to North St Andrew Street has been sub-divided in the proposed Rev 2.0 programme as:



- Waverley Bridge to South East corner of St Andrew Sq
- South East corner of St Andrew Sq to North St Andrew Street

Additional sets of activities have been added to the proposed "Revision 2" programme to incorporate the CEC Public Realm works at St Andrew Sq. These works are not part of the Infraco contract and should play no part in an analysis of delay. They should be removed from the programme.

### **tie Extension of Time Entitlement Assessment Overview**

The third section of Appendix 2 sets-out, in Gantt chart format, tie's interim assessment of the delays to date and how these appear to have impacted on the City Centre programme.

The starting point for the assessment has been both the actual delays experienced to-date and the actual progress achieved. Advancement of the Infraco Works has concentrated on Princes Street. Following the late completion of the MUDFA Works and the implementation of instructed additional enabling works, the programme projection for 2009 is based on Infraco's current programme for completion which includes the provisions of the Supplemental Agreement entered into by the parties in March 2009. This shows completion of the main works on Princes Street by end November 2009.

From the beginning of 2010, work recommences on three fronts, namely;

1. the progression of the Princes Street works from Waverley Bridge towards St Andrew Square (14 weeks);
2. the progression of works on the east side of the Square (44 weeks), and;
3. the progression of works at Haymarket Junction (69 weeks).

The logic is based on Infraco's current plan to advance works between Princes Street and St Andrew Square as expeditiously as possible to facilitate traffic management arrangements that permit earliest commencement of the works in York Place and Picardy Place. On this basis, works in York Place and Picardy Place commence in mid. June 2010. The durations used are 9 months for track and road in York Place and 8 months for track and road at Picardy Place (to facilitate the tram, with a further 2 phases of civil works continuing on the junction re-configuration. These final two phases run for a period of 5 months. It has been taken that the summer embargo on City Centre Work will be relaxed, as it was in 2009. This approach projects completion of the City Centre Works by the end of October 2010.

The Shandwick Place to Haymarket works are projected from a commencement at the beginning of 2010, generally, using the same construction sequences and durations as in "Revision 2". It has been taken that the embargo on summer working will be relaxed, as noted above, and there will be no restriction on working in this area at the same as the York Place / Picardy Place.

### **Notes and Comments on the Initial Assessment**

1. Princes Street actual start dates and current progress achievement have been used.
2. The August 2010 embargo has been removed to achieve November 2009 completion as per Infraco's current working programme for this area (Rev. "D" Programme).

3. Picardy Place construction progresses in parallel with York Place, as per the "Revision 1" programme logic.
4. Picardy Place / York Place construction progresses in parallel with the Haymarket section on the basis that there are no traffic management constraints preventing this.
5. Waverley Bridge junction to south-east corner of St Andrew Square and the East side of St Andrew Square progresses in parallel, as per Infraco's current intentions following completion of the works in Princes Street.
6. Works in York Place commence only after the completion of the Waverley Bridge junction to south-east corner of St Andrew Square.
7. It is noted that Phase's 5 and 6 of the civils scope at Picardy Place do not affect Sectional Completion "C" date but only the Sectional Completion "D" date.
8. It is noted that Phase 4 of the track works at Picardy Place and completion of the York Place track works drive Sectional Completion "C"
9. It has been assumed that the August 2010 embargo will be relaxed to allow works in York Place / Picardy Place to progress without interruption.
10. It has been assumed that the utility diversions in Haymarket will be complete by the end of 2009 and Infraco works will commence unhindered in January 2010.
11. Construction durations remain the same as those programmed in "Revision 2", with the exception of E&M activities.
12. E&M durations remain the same as those programmed in "Revision 1" as they have been greatly prolonged in "Revision 2" as a result of Infraco imposed constraints.
13. This initial assessment projects completion of the City Centre construction works 14 weeks beyond the current Sectional Completion C Date.

### Delay Mitigation and Risk Reduction

The durations for individual activities have been used without detailed review and adjustment. It is considered there is scope to reduce durations by increasing resource levels and/or working hours.

Activity groups have been used without review and adjustment of the network logic that has been imposed on them. It is considered there is scope to reduce overall durations by increasing concurrent working and re-ordering some of the work sequences.

There may be further risk reduction opportunities still to be identified.

### Other matters

To successfully progress the works in this area requires very careful and detailed planning because there are so many physical constraints in what are particularly heavily trafficked areas. Close collaboration will be required with CEC and the numerous third parties who's co-operation and assistance will be required. All of this will require careful management and planning if the tie initial assessment programme is to be achieved.

### Conclusion

Commencement of the works in the City Centre has been delayed by late completion of the utilities work and the instruction of change. The February/March 2009 dispute between the parties added approximately 4 weeks to this delay. (Has liability for this delay been addressed in the supplemental agreement?) The Supplemental Agreement that came out of this dispute implements several delay



mitigation and acceleration measures. These benefits have not been reflected in the "Revision 2" programme but have been included in tie's assessment.

tie's assessment has been predicated on relaxation of several of the embargos set-out in the Contract. The principle of such relaxations has already been established and the benefit in terms of progressing the Works is readily apparent from the ongoing works in Princes Street.

On the basis of the approach set-out above, completion of the Infraco works in the City Centre section is projected 14 weeks beyond the current Sectional Completion C Date.

With the implementation of further mitigation measures, tie believes this projected delay could be reduced.

In terms of assessing Infraco's entitlement to a required extension of time, liability for the February / March 2009 dispute, which accounts for approximately 4 weeks of the assessed 14 week delay, requires to be taken into account.



### 3. Section 5A Structures

#### Programme Overview

Section 5 of the route is broken down into three distinct geographical sub-sections being:

1. 5A Roseburn Junction to Balgreen Road
2. Balgreen Road to Edinburgh Park Central
3. Edinburgh Park Central to Gogarburn

Over 68% of the structures required for the full Edinburgh Tram route are located within Section 5. Of that 68%, 45% are located within Section 5A.

The Contract Programme sets-out Infraco's intended sequencing for this set of structures. It is apparent there is a degree of interdependency between some, although not all, of them. There follows an overview of each of these three sub-sections.

#### 5A Roseburn Junction to Balgreen Road

This section commences at its eastern limit with S20 Russell Road Bridge and completes at its western limit at Balgreen Road. There are 13 structures within this sub-section.

This sub-section is sub-divided into two sub-sub-sections

1. Roseburn Junction to Murrayfield Stadium

##### S20 Russell Road Bridge

This section commences with the construction of Russell road bridge in June 2008 starting four weeks after the issue of IFC design. On completion of this structure the logic allows the track works in this section to commence but also has, what appears to be, a preferential logic link to S21A Roseburn Street viaduct which is understood to be for resource constraint and/or traffic management purposes.

##### W3/W4 Russell Road Retained Walls

These structures are programmed independently of each other and commence four weeks after receipt of the IFC design. On completion of these structures the network logic allows the associated track works to commence.

##### W18 Murrayfield TS RW

The commencement of this structure is not dependent on any of the others. It commences four weeks after receipt of the IFC design. This structure provides the east bankseat of S21A Roseburn Viaduct in the adjacent sub-section and therefore drives the commencement of that structure. There appears to be a preferential logic link to the commencement of track works in the sub-section between Murrayfield and Balgreen Road but this does not appear to be a "driving link".

There is also a logic link to the commencement of track works in this sub-section but, again, this is not a “driving link”.

### Track Works

The track works in this sub-section are constrained by the logic to allow commencement only after the completion (in driving order) of

- W3/W4 Russell Road RW's (Sep-09)
- W18 Murrayfield TS RW (Apr-09)
- S20 Russell Road bridge (Mar-09)
- Section 2 Track and Roads (Dec-08)

## 2. Murrayfield Stadium to Balgreen Road

### S21A Roseburn Street Viaduct

This structure sits on the west end of W18 Murrayfield TS RW (located in the previous sub-section) and therefore cannot commence until that structure is complete. The Roseburn Viaduct is an identified in the Contract as a Value Engineering saving with a value of £1.375m.

The decision to pursue this saving was instructed by tie in May 2008.

The completion of this structure allows commencement of a significant length of track works in this sub-section.

### S21B Murrayfield Stadium RW / Accommodation Works

The retaining wall structure programme includes an activity described as the Murrayfield Stadium Accommodation works. These works are the modification to the Edinburgh Wanderers Clubhouse and are understood to be required prior to the retaining wall although there is no programme logic for this.

The Murrayfield Stadium Accommodation Works are understood to have no interdependency constrains attaching to their commencement.

### S21B Murrayfield Stadium RW

The commencement of this structure is independent of the others and is scheduled to commence four weeks after receipt of the IFC design. It has logic linked to S21A Roseburn Viaduct as it provides the west abutment for that structure, but is not the “driving logic” to commence of the viaduct.

### S21C Murrayfield Underpass

The commencement of this structure is independent of any others and is scheduled to commence four weeks after receipt of the IFC design. The completion of this structure

determines the commencement date for the adjacent structure S21D Murrayfield Pitches RW.

#### S21D Murrayfield Pitches RW

This structure is logic dependent on the completion of the adjacent structure S21C Murrayfield Underpass.

Physical logic would indicate that this structure has to be built to half-height prior to the commencement of the adjacent structure (S21E Water of Leith Bridge) as it provides the east abutment for it and is the "driving logic".

#### S21E Water of Leith Bridge

The commencement of this structure is dependent on the structures to either side of it (S21D and W8) as they provide its abutments. The east abutment (S21D) is the driver to the commencement of this structure.

#### W8 Baird Drive RW

The commencement of this structure is independent of any others. It is scheduled to commence four weeks after receipt of the IFC design. This structure has logic linking it to S21E Water of Leith Bridge, S22A Balgreen Rd Bridge and the track works but it is not the "driving logic" for any of them.

#### S22A Balgreen Rd Bridge and W9 Balgreen Rd RW

These structures are programmed under one single set of programme activities. Commencement of these structures is dependent on substantial completion of the superstructure of S23 Carricknowe Bridge. It is understood this is to allow for access requirements to S23 Carricknowe Bridge North Abutment.

#### Track Works

Commencement of the track works in this sub-section is constrained by the completion of these structures as they are all required to create the track corridor. In the current Programme S21A Roseburn Viaduct is the driving activity set.

In summary, the current Programme shows completion of this set of structures, as follows;

- S21A Roseburn Viaduct (Apr-10)
- S21E Water of Leith Bridge (Feb-10)
- S22A Balgreen Rd Bridge and W9 Balgreen Rd RW (Jan-10)
- Civil track works Roseburn to Murrayfield (Nov-09)
- S21D Murrayfield Pitches RW (Jul-09)
- W18 Murrayfield Stadium RW (Jul-09)
- S21B Murrayfield Piches RW (Apr-09)
- S21C Murrayfield Underpass (Feb-09)
- W8 Baird Drive RW (Jan-09)



The first (top) section of Appendix 3 sets-out, in Gantt chart format, a summary of the Section 5A Works as shown on the current Programme. It is noted that the construction works are complete 10 weeks ahead of the current Sectional Completion C Date.

It can be seen from the above that a substantial section of track, spanning structures S21B – S21C – S21D is available from July 2009, although the continuation both east and west is not available until February 2010.

## **Observations on the current Programme (Revision 1)**

### **5A Roseburn Junction to Balgreen Road**

Russell Road RWs have a circa. 6 week delay in the programme between the bored piling and the pile caps which is due to a logic link to the completion of Haymarket Station Viaduct superstructure. It has been assumed this is a preferential logic link inserted for resource scheduling purposes.

The track activities between Roseburn junction and Murrayfield have a circa. 4 month break in the sequence following the completion of civils activities. This delay appears to be driven by further resource scheduling preferential logic. It links track works with those in Section 7 Ingliston Park and Ride to Edinburgh Airport.

The track activities between Murrayfield and Balgreen Rd have a circa. 10 week break in the sequence following the completion of civils activities. This delay appears to be driven by further resource scheduling preferential logic. It links track works with those in Section 1C York Place.

## **Proposed “Revision 2” Programme Overview**

### **5A Roseburn Junction to Balgreen Road**

The “Revision 2” programme shows significant delayed commencement to all of the structures within this sub-section.

Further detail has been added for several structures and some that were previously shown only as summary activities are now shown in more detail.

Durations for many activities has substantially increased over those shown in the current Programme (Rev. 1). No justification or explanation has been offered for these increases.

Additional activity groups have been added for structures not shown on the current Programme (Rev. 1).

The result of the foregoing is that activities in this sub-section are driving the projected Sectional Completion C Date 41 weeks beyond the current date.

The second section of Appendix 3 sets-out, in Gantt chart format, a summary of the Section 5A Works as shown on the proposed “Revision 2” programme.

## Observations on the proposed "Revision 2" Programme

Commencement of many of the activities appears to be delayed for reasons that are Infraco's responsibility under the terms of the Contract. e.g.;

### S20 Russell Road bridge

- Network Rail Work Package Plan & Form C Approval not in place
- Agreement of BDDI-IFC design

### W4 Russell Road RW No.2

- Site establishment and site access, followed by construct of the NetworkRail Depot Car Park
- Agreement of BDDI-IFC design

### W3 Russell Road RW No.1

- Agreement of estimate for utility diversions
- Diversion of utilities that have been transferred to Infraco
- Agreement of BDDI-IFC design

### W18 Murrayfield TS RW

- Delivery of agreed VE design for S21A Roseburn Viaduct which affects the IFC for this structure
- IFC design
- Agreement of BDDI-IFC design

### Track work Roseburn Junction to Murrayfield Stadium

- Conclusion of consortium integrated design
- Agreement of BDDI-IFC design

### S21A Roseburn Viaduct

- Delivery of agreed VE design

### S21B Murrayfield Stadium RW

- Agreement of BDDI-IFC design
- Completion of Accommodation works

### S21C Murrayfield Underpass

- Agreement of BDDI-IFC design

### S21D Murrayfield Pitches RW

- Agreement of BDDI-IFC design

### S21E Water of Leith Bridge

- Agreement of BDDI-IFC design

### W8 Baird Drive RW

- Agreement of BDDI-IFC design

#### S22A Balgreen Rd Tram Bridge

- Agreement of BDDI-IFC design

#### S22B Balgreen Rd NR Access Bridge

- IFC Design
- Agreement of BDDI-IFC design

#### Track work Murrayfield Stadium to Balgreen Rd

- Conclusion of consortium integrated design
- Agreement of BDDI-IFC design

### **tie Extension of Time Entitlement Assessment Overview**

tie is of the opinion that many of the activities currently in delay could have commenced significantly earlier than as shown on the proposed "Revision 2" programme.

The design for many of these structures was available from May 2008. tie specifically instructed Infracore to commence several of these. These instructions were not acted upon.

Several structures were delayed for reasons that may give rise to Compensation Events and/or tie Change. These include the presence of invasive species (Japanese Knotweed), the delivery of Prior Approvals, and the identification of unforeseen underground utilities. Notwithstanding these matters it appears to tie that there is considerable structural work that was not directly affected by these matters and could have commenced much sooner than that currently being forecast in the "Revision 2" programme.

The third section of Appendix 3 sets-out, in Gantt chart format, tie's interim assessment of the delays to date for which it considers it may be liable and how these appear to have impacted on the Sectional C Completion Date. The projected activity durations and associated inter-relationships for the remaining activities have been based on those shown in the current Programme and the proposed "Revision 2" programme, other than where actual performance on site has superseded projections. Account has also been taken of the matters referred to above that may entitle Infracore to relief under the Contract. Where delay has been caused by such matters, the start dates used in tie's assessment have been adjusted as considered reasonable in accordance with the terms of the Contract.

This initial assessment projects completion of the construction works in this section 11 weeks ahead of the current Sectional Completion C Date.

### **Notes and Comments on the Initial Assessment**

1. Cognisance has been taken on delays for which tie is likely to carry liability, although it should be noted there is a great deal of uncertainty as to why design and approvals for many of the structures have been delayed.
2. Commencement of works on sections of retaining wall W4 have been delayed until April 2009 on the understanding that it may not have been possible to confirm clearance of invasive species from these areas until that time. There remains some uncertainty as to whether or not this issue has yet been resolved.



3. The commencement of the Murrayfield Tramstop Retaining Wall has been delayed until mid-July 2009 awaiting clearance of Prior Approvals by CEC.
4. The durations shown for the many of the individual retaining walls, shown on the proposed "Revision 2" programme, are considered by tie to be unnecessarily long. They have been replaced by tie's own assessment of the time required for the works involved.
5. Generally, the initial assessment programme shows the majority of the structures commencing approximately one year earlier than shown on the proposed "Revision 2" programme.

### **Delay Mitigation and Risk Reduction**

Since commencement of the Contract, there appears to have been a great deal of work that could have been progressed if Infraco had been minded to do so. Opportunities to advance works remain open to Infraco but it refuses to do so. Such action appears to be contrary to Infraco's obligation to mitigate delay. It appears to be increasing time and cost risk, particular in the later stages of the programme but unnecessarily delaying what was, and may still be, non-critical work.

### **Conclusion**

The third section of Appendix 3 indicates that if Infraco had progressed available work from the commencement of the Contract, the construction works could have been completed around 11 weeks ahead of the current Sectional Completion Date. The fact that it did not, and in the process ignoring tie's specific instructions to commence particular structures, it has now, probably, created a situation where this section will over-run that date by a considerable margin.

At the bottom of Appendix 3 are what tie considers to be underlying delay issues, most of which are ongoing. Those in red are currently considered to be Infraco's responsibility, those green, tie's responsibility, and those in purple may involve culpability on the part of both parties. As noted elsewhere in this paper, there may be issue of concurrency and dominant cause that require further consideration when more precise information becomes available and Infraco presents its detailed case for relief.

## 4. Gogar Depot

### Programme Overview

Infraco's works commence following completion of MUDFA diversions around the perimeter of the depot site. The first Infraco task is bulk earthworks to reduce the level of the site to that required for the building, roads, car park and stabling. When this activity is sufficiently far advanced, construction of the building commences. The building construction is planned to be carried out in conventional sequencing. Only when the building is fitted out and commissioned does installation of the workshop equipment commence. Track works for the depot and its associated stabling starts following completion of the earthworks and drainage. The E&M works start four weeks prior to completion of the track laying. The Depot Access Bridge is programmed in the current Programme to start at the beginning of August 2009. This is determined by what appears to be an erroneous logic link to Phase 3 of the A8 Underpass. The logic has been adjusted in the proposed Revision 2 programme. In that programme it is linked to the Phase 2 traffic management for the A8 Underpass. The first tram is shown to arrive for assembly and commissioning three week before completion of the workshop equipment installation. Assembly and commissioning of all of the trams is shown prior to Sectional Completion C. The latest date for delivery of the first tram is shown as 21 October 2010. From this it can be calculated that the time required for assembly and commissioning of all trams is 18 working weeks, that being the duration between 21 October 2010 and Sectional Completion C (10 March 2011).

The first (top) section of Appendix 4 sets-out, in Gantt chart format, the depot building, stabling, access bridge and tram commissioning activities as shown in the current Programme.

### Observations on the current Programme (Rev.1)

6. The Programme envisages that the MUDFA diversions will be complete before Infraco commences its activities on site.
7. The earthwork design is to be available by the time the MUDFA diversions are complete.
8. There is a 4 week lag (lead-time) from completion of the MUDFA diversion to commencement of the bulk earthworks.
9. Despite what appears to be an unnecessarily late start date for the Depot Access Bridge, it does not appear to be driving other activities that are critical for achievement of Sectional Completion A.
10. There is a period of 28 weeks between the planned date for the delivery of the first tram and the latest date for delivery of the first tram.

### Proposed "Revision 2" Programme Overview

In general terms, the Gogar Depot activities in the proposed "Revision 2" programme are similar to those shown in the current Programme. There is a significant delay to the commencement of the Infraco works, primarily, due to late completion of the MUDFA diversion. Some activities have been added for additional works and events. Certain works activities have been broken down into more detail but, in general, the overall durations for the summary tasks show little change, other than as noted below.



The second section of Appendix 4 sets-out, in Gantt chart format, the depot building and tram commissioning activities as shown in the proposed "Revision 2" Programme.

### Observations on the proposed "Revision 2" Programme

1. Completion of the MUDFA diversions are shown 43 weeks later than programmed on the current Programme. (tie liability?)
2. The time lag from completion of the MUDFA diversions to commencement of the bulk earthworks has been increased from 4 weeks to 6 weeks. (Infraco liability?)
3. An additional 17 week earthworks activity now precedes the original bulk earthworks. (tie liability?)
4. There is an additional delay of 13 weeks to the start of the track works. This is to accommodate preparatory (civils type) activities for the stabling and shunting areas. In the current Programme these activities appear to have been included within the track works activity durations. In addition to this delay, the duration for the track work activities has increased from 40 weeks to 48 weeks (Infraco liability?)
5. The E&M activities start 10 weeks ahead of completion of the track works rather than the 4 weeks shown on the current Programme. The duration has increased from 22 weeks to 33 weeks with a break in the activity of 7 weeks during June / July 2011. (Infraco liability?)
6. The Depot Access Bridge starts 9 weeks earlier than shown on the current Programme and its duration has increased from 23 weeks to 32 weeks. This structure has not been planned in detail and is shown only as a one bar activity. (tie / Infraco liability?)
7. The date for delivery of the first tram remains as per the current Programme.
8. The duration between the latest date for delivery of the first tram and the projected Sectional Completion C date has reduced to 14 weeks. (shown as 18 weeks on the current Programme) (Infraco improvement/mitigation/revision?)
9. This programme shows a 55 week delay to the current date for Sectional Completion A.

### tie Extension of Time Entitlement Assessment Overview

The third section of Appendix 4 sets-out, in Gantt chart format, tie's interim assessment of the delays to date for which it considers it may be liable and how these appear to have impacted on the Gogar Depot programme. The projected activity durations and associated inter-relationships for the remaining activities have been based on those shown in the current Programme and the proposed "Revision 2" programme, other than where actual performance on site has superseded projections. In such circumstance the actual performance information has been used.

### Notes and Comments on the Initial Assessment

1. The delayed completion of the MUDFA diversions is not in dispute and, therefore, is coincident with that shown on the proposed "Revision 2" programme.
2. The additional bulk earthworks activity introduced in the proposed "Revision 2" programme is acknowledged as additional work (tie Change?) and therefore included as an impacting event. However, the duration shown on the proposed "Revision 2" programme is considerably longer than which has proven necessary to carry out this work. The assessment has, therefore, been based on the actual facts of the event.
3. The original scope earthworks duration has been revised to reflect the actual level of productivity achieved rather than a prospective assessment.



4. Commencement of the additional bulk earthworks has been based on when access to the site and a substantial part of this work was made available to Infraco.
5. Track works commencement retains the same duration and relationship to the building activities as per the current Programme.
6. The Depot Access Bridge start date has been set to coincide with the actual date of the Phase 2 traffic management associated with the A8 underpass. The construction duration has been taken, for the meantime, as per the proposed "Revision 2" programme because it is understood there is a question over the sufficiency of the design information available at time of tender. (This may require revision following further investigations.)
7. The duration for the E&M works is as per the current Programme as is its relationship to completion of the track works.

This initial assessment programme indicates that the delays to this part of the Works, which are or may be attributable to tie's liability, are *not* driving delays to the Sectional Completion C & D dates. The projected Sectional Completion A date is delayed by 23 working weeks, however, this is without the implementation of what appear to be viable delay mitigation measures that would attract no or very little additional cost (see below).

### Delay Mitigation and Risk Reduction

It is noted that Infraco has concerns that this part of the Works may ultimately cause delay to various sectional completion dates. It is also noted that Infraco currently appears to be in delay relative to the initial assessment programme.

It is acknowledge that the delayed completion of the MUDFA diversion works has consumed available programme float. Consequently, the risk of further delays to this part of the Works creating delay to the Project as a whole has increased. In such circumstances it is considered prudent to investigate delay mitigation and time saving measures that could decrease this risk and, where possible, increase the available float. It is also noted that the Contract obligates Infraco to use reasonable endeavours to mitigate delay.

Infraco's attention is drawn to the following items which are considered as potentially fertile areas for delay mitigate / de-risking / time savings.

1. The activity durations for the building structure and envelope appear to be unnecessarily long. e.g. The structural steelwork is being erected at approximately 10 tonnes per day. The cladding is being fixed at approximately 100m<sup>2</sup> per day. On a building of this type and scale, these rates of production appear to be significantly lower than that regularly achieved in the UK construction industry. It is considered that, in total, there is the potential to save approximately 8 weeks on the building structure and envelope if sufficient resources are deployed and they work in an efficient manner.
2. The building services and fit out works are programmed for a period of 32 weeks. This appears to be an unnecessarily long duration. Given the size of the building and nature of the work involved, it is tie's opinion that there is scope to reduce this duration by around 12 weeks without creating inefficient working.
3. The installation of workshop equipment is programmed to commence only after all of the building services, fit-out and commissioning is complete. Having considered the nature, scale

and scope of this work there would appear to be clear opportunity to co-ordinate activities on site to allow earlier commencement, particularly of equipment that requires significant amounts of time for its installation. It is proffered that at least 4 weeks could be saved by such mitigation measures.

4. The overall duration for workshop equipment installation is 26 weeks. This is considered to be an unnecessarily long duration given the scale of the building and the nature of the works that require to be undertaken. It is proffered that up to 10 weeks could be saved by improved co-ordination of individual activities and a concerted effort to achieve timely completion.
5. The duration of the track works appears to be based on production rates much lower than that typically achieved on other European tram projects. It is noted that the stabling track work does not involve concrete infilling and therefore is relatively simple in its construction. It is tie's opinion that the actual time required to undertake both the civils and track laying works could be less than currently shown if sufficient resources are made available at the appropriate time. It is estimated that the overall duration for this 3,492m section of track could be reduced from 48 weeks to around 24 weeks.
6. It is recognised that the start of the E&M works is dependent of sufficient progress having been made on the track laying work. If the track laying can be advanced, as indicated at 5. above, the E&M works can start significantly earlier. In addition, tie is of the opinion that, given sufficient resources at the required time, an increased overlap with completion of the track laying can be achieved and the E&M duration reduced. It is proffered that an additional 4 to 6 weeks can be saved on this activity.
7. There may be scope to reduce the overall duration for the Depot Access Bridge once a detailed programme has been prepared.

The items noted above are not considered to be an exhaustive list but merely a selection of what appear to be readily available opportunities to mitigate delay and de-risk this part of the Works. It is tie's opinion that should Infracore be prepared to;

1. Progress the Works with due expedition and in a timely and efficient manner;
2. Adjust the order and sequence of the affected works; and
3. Apply reasonable mitigation measures to save time;

there is the potential to improve the projected Sectional Completion A Date on all three programmes by approximately 35 weeks.

### Other matters

At the time of this assessment no works are being progressed on the Section 6 site. It is understood this is primarily because designs, approvals and consents for the following elements are not yet in place.

1. Drainage
2. Building foundations
3. Building structural frame
4. Floor slab and pits
5. Depot access bridge



6. Depot access road
7. Services trenches and ducts

It is understood that Infraco has not provided detailed explanation for these matters and cites as **tie** Change as the underlying cause. This has not been accepted by **tie**. It is the understanding of **tie** staff that the principle cause is difficulties and delays associated with integration of the SDS and Siemens designs and gaining CEC building warrant.

The delay to commencement of each of these activities is almost certainly delaying the achievement of Sectional Completion A. These activities currently appear to be the dominant cause of delay to the Gogar Depot, as a whole, having subsumed the initial delay from the MUDFA works.

### **Conclusion**

There was considerable delay to the commencement of the Gogar Depot as a result of late completion of the MUDFA Works. Subsequently, the start of most of the depot construction works has been further delayed. It is understood this is primarily due to late delivery of finalised, approved and consented design. This is an ongoing issue and continues to increase overall delay to this part of the Works. **tie** is currently of the opinion, that liability for most if not all of the design delay lies with Infraco.

**tie** has reviewed the Infraco's submissions that relate to the impact of delays and Change to this part of the Works. **tie** has concluded that, based on these submissions, if Infraco had used reasonable endeavours to minimise the effect of delay the Gogar Depot could have been delivered in sufficient time to avoid the need to revise any of the current Sectional Completion Dates. In such circumstances, **tie** does not consider that Infraco is entitled to an extension of time to the Sectional Completion A Date.



## 5. Test Track (Section 7)

### Programme Overview

In general, Infraco's works in this part of the Works commence on delivery of the IFC design. The first tasks deal with treatment of contaminated land and creating access to the principal structures. The structures are then constructed followed by the civil works associated with the track. The final activities are laying the track and installing the E&M works. The tram stops are constructed in parallel with the track laying activities. The final activity on this part of the Works is testing the tram track, completion of which is linked to the Sectional Completion B date.

This described string of activities sets out, in summary, the programme requirements for the test track and its requirement in relation to achieving the Sectional Completion B date.

The first (top) section of Appendix 5 sets-out, in Gantt chart format, the test track activities as set out in the current Programme.

### Observations on the current Programme (Rev.1)

1. The Programme shows all of the principal structures being practically complete before any civil works for the track commences.
2. The civils works for the track are complete four months prior to the commencement of track laying. This delayed start appears to be driven by preferential logic associated with resource scheduling and is common to both the 1750m and 833m lengths of track.
3. The civil works for the 1750m track section is connected finish to start to the 833m track section.
4. The start dates for the track laying activities are being driven by preferential logic (resource links) from other sections of the Project.

### Proposed "Revision 2" Programme Overview

The programming logic contained in the current Programme appears, in general, to have been retained. This includes preferential logic (resource links).

The durations for Gogarburn Bridge, track works (civils and track laying), E&M Works, tram stops, and sub-stations have all increase by varying amounts. The time lags between completion of track civils works and the commencement of track laying have also increased. The combined effect of these differences from the current Programme projects a 60 week delay to the Sectional Completion B Date.

The second section of Appendix 5 sets-out, in Gantt chart format, these activities as shown in the proposed "Revision 2" Programme.

### Observations on the proposed "Revision 2" Programme

1. The overall duration for the Gogarburn Bridge has increased from 34 weeks to 51 week. (tie liability?)
2. The start date of the Gogar Culvert No. 1 has been delayed by 30 weeks. (Infraco liability?)

3. Gogar Culvert No. 2 has been split into two activities. One for "Precast" and one for construction. The first activity (Precast) is shown starting 11 weeks late. There is a 22 week period between these two activities leading to completion 30 weeks late. (Infraco liability?)
4. Gogar Culvert No. 3 has been split into two activities. One for "Divert Flows – Excavation - Precast" and one for construction. The first activity is shown starting 10 weeks late. There is a 25 week period between these two activities leading to completion 30 weeks late. (Infraco liability?)
5. The duration for the IPR tram stop has increased from 13 weeks to 17 weeks. (Infraco liability?)
6. The duration for the Airport trams stop has decreased from 13 weeks to 8 weeks. (Infraco mitigation/saving?)
7. The duration for the E&M works has increased from 18 weeks to 29 weeks. (Infraco liability?)
8. There is a 33 week delay to track laying which appears to be caused by a resource logic link from another section of the Project. (Infraco liability?)

### tie Extension of Time Entitlement Assessment Overview

The third section of Appendix 5 sets-out, in Gantt chart format, tie's interim assessment of the delays to-date for which it considers it may be liable and how these appear to have impacted on the Section 7 programme. The projected activity durations and associated inter-relationships for the remaining activities have been based on those detailed on the current Programme, other than where the proposed "Revision 2" programme has identified potential mitigation / time saving.

### Notes and Comments on the Initial Assessment

1. The start and finish dates for the treatment of contaminated land are not in dispute and, therefore, are coincident with that shown on the proposed "Revision 2" programme. It is noted these are also within the time period shown on the current Programme.
2. The start date for Gogarburn Bridge has been linked, finish-to-start, to completion of the contaminated land treatment. While it is recognised that some bridge works are reported as having commenced before this date, the initial assessment has ignored this for the time being. The duration allowed from this revised start date is the same as that shown in the current Programme. To this has been added two weeks for the actual duration of the sewer diversion. (tie Change?)
3. Gogar Culvert Nos. 1, 2 & 3 remain as per the start dates and durations shown on the current Programme.
4. Commencement of the civil and track works associated with the 1750m track section, both in terms of duration and relationship to the Gogarburn Bridge, remain as per the current Programme.
5. The durations for the IPR tram stop and sub-station, and their relationship to the track works remain as per the current Programme.
6. The start of the Airport Tram Stop retaining walls has been delayed by 53 weeks in recognition that the construction of a signification proportion of their length is dependent on the Burnside Road modifications (works by Others). (tie Change?)



7. The civils and track works associated with the 833m track section has been related to the completion of the culverts. The duration has been extended to identify the period when this work can be/could have been undertaken.
9. The relationship of the start of the Airport Tram Stop to the track works remains as per the current Programme and the duration is shown as per the current Programme. It is noted that the proposed "Revision 2" programme reduces this duration by 5 weeks. (Infraco mitigation/saving?) This time saving has not been taken into account in tie's initial assessment.
8. The E&M works, both in terms of duration and relationship to the track laying works, remain as per the current Programme.
9. The Test Track Tram duration and relationship to completion of the E&M works remains as per the current Programme.

This initial assessment programme indicates that the delays to this part of the Works, which are or may be attributable to tie's liability, are *not* driving delays to the Sectional Completion C & D dates. The projected Sectional Completion B Date is delayed by 7 working weeks, however, this is without the implementation of what appear to be viable delay mitigation measures that would attract no or very little additional cost (see below).

### Delay Mitigation and Risk Reduction

It is noted that Infraco has concerns that this part of the Works may ultimately cause delay to various Sectional Completion Dates and in particular A & B. It is also noted that Infraco currently appears to be significantly in delay relative to the initial assessment programme. This would appear to be attributable to ongoing delays to the delivery of design, rectification of defective work on the Gogarburn Bridge and delay to commencement of works by "Others" at the airport. The first two are considered to be Infraco's responsibility and therefore should not be included in the assessment of entitlement to extension of time. The latter is a matter for which tie carries liability.

It is acknowledged that the various delays affecting this part of the Works has consumed available programme float. Consequently, further delays carry the risk of adversely impacting on the programme for the Project as a whole. In such circumstances it is considered prudent to investigate delay mitigation and time saving measures that could decrease this risk and, where possible, increase the available float. The following items are considered as opportunities for delay mitigate / de-risking / time savings.

1. There would appear to be opportunity to start track civil work earlier than shown on the initial review programme. The various access points along the route reduce interdependencies on structural work and utilities diversions. This would reduce the amount of civil works that is dependent on preceding activities.
2. The duration of the track works appears to be based on productivity rates much lower than that which tie considers could be readily achieved. It is tie's opinion that the actual time required to undertake both the civil and track laying works could be less than currently shown if sufficient resources are made available at the appropriate time. It is estimated that the overall duration for this 2,583m section of track could be reduced from 52 weeks to around 18 weeks.



3. It is recognised that the start of the E&M works is dependent of sufficient progress having been made on the track laying work. If the track laying can be advanced, as indicated at 2. above, the E&M works can start significantly earlier. In addition, tie is of the opinion that, given sufficient resources at the required time, an increased overlap with completion of the track laying can be achieved and the E&M duration reduced. It is proffered that an additional 4 to 6 weeks can be saved on this activity.
4. It is tie's opinion that the entire length of Section 7 is not required for the Tram Test Track to fulfil its intended purpose. If the scope of the works required to achieve Sectional Completion B is revised that impact of the various delays on that date may be reduced.

The items noted above are not considered to be an exhaustive list but merely a selection of what appear to be readily available opportunities to mitigate delay and de-risk this part of the Works. It is tie's opinion that should Infraco be prepared to;

1. Progress the Works with due expedition and in a timely and efficient manner;
2. Adjust the order and sequence of the affected works; and
3. Apply reasonable mitigation measures to save time;

there is the potential to improve the projected Sectional Completion B date on all three programmes by approximately 26 weeks. The fourth section of Appendix 5 summarises this time saving and shows the construction works complete 19 weeks before the current Sectional Completion C Date.

## Conclusion

It is acknowledged there has been delay associated with the Gogarburn Bridge. There is also ongoing delay associated with the some of the civil works at the airport. tie has reviewed the Infraco's submissions that relate to the impact of delays and change to this part of the Works. tie has concluded that, based on these submissions, if Infraco uses its reasonable endeavours to minimise the effect of delays to date the Tram Test Track can be delivered in time to avoid the need to revise the current Sectional Completion B Date.

### [Principal Issues for further consideration:

1. Start of Gogarburn Bridge delayed until late October 2008 as a result of the need to for an unforeseen sewer diversion (tie liability?). Diversion took 2 weeks on the east side.
2. The Burnside Road diversion works are only now about to commence. This is delaying much of the work at the Airport Terminal/Tram Stop.
3. Retaining walls W14 & 15 (at airport) delayed by utilities diversions and SEPA consent. Neither is resolved at the moment. BDDI to IFC dispute also running on these walls. Tie PM has reservations about the viability and value of the current design.
4. The issues surrounding the OGL survey and earthworks/track alignment design appear to remain unresolved. It is understood that Infraco is about to undertake additional SI to inform the design. This is delaying civil and track design through much of this section.
5. The landfill site design appears to remain unresolved. It is unclear why this matter continues to be in delay.

6. BAA has yet to accept that there is no increased flooding risk from the design of the new works. Until this matter is resolved delays to that area of the site will continue.
7. Removal of Airport Tram Stop and adjacent track length from the Tram Test Track's specified scope may mitigate delay. This requires further investigation by both parties.
8. The accommodation works to the Hotel car Park appear to be in delay over a matter of contractual interpretation. If this is not resolved it has the potential to create critical delay.]

It is important to note that the Contract documentation states that the "Test Track" is **assumed to be** the section from Gogar Depot to the airport. Infraco's programme appears to have been prepared on this basis. However, in discussion, it has been acknowledged, separately by both tie's operations team and Infraco's representatives, that this entire section is not required to fulfil the purposes of the test track. Indeed, a different section of track, connected to the depot, could be used instead. Consequently, this review and initial assessment of delay on Section 7 may not be entirely relevant to the granting of relief with respect to the Sectional Completion B Date.

End. 7/9/09 IMcA/TH

**Appendix 1**

Initial Assessment of Delay on Section 1A Newhaven to Lindsay Road

DRAFT



## Appendix 2

Initial Assessment of Delay on Section 1D City Centre Works

DRAFT

## Appendix 3

Initial Assessment of Delay on Section 5A Structures

DRAFT

**Appendix 4**

Initial Assessment of Delay on Section 6 Gogar Depot

DRAFT



## Appendix 5

Initial Assessment of Delay on Section 7 Depot to Edinburgh Airport

DRAFT