

## 4. CAUSE AND EFFECT

### 4.1. Introduction

4.1.1. The following narrative describes in a chronological method those items which have impacted the progress of the MUDFA Works (Works) for the Work Sections Haymarket to Shandwick Place 1D-01-01 and South St Andrew's Street to York Place 1C-03-02. Appendix ~~???~~ A contains a schedule for each of the Work Sites sections and these which detail the cause of delay, affected activity ID, a brief description, start and finish date of the delay, impact on the programme, any other comments and reference documents. These schedules are hereinafter entitled Delay Schedule 1 and 2 (1D-01-01) and (1C-03-02) respectively.

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### 4.2. Haymarket Terrace to Shandwick Manor Place (1D-01-01)

4.2.1. At Haymarket numerous events have occurred which impacted the programme, caused delay and disrupted the regular progress of the Works. The following details demonstrate that the major contributors for the period analysed (01<sup>st</sup> October 08) to (28<sup>th</sup> February 09) were the changed alignment of the Developed Kinematic Envelope (DKE) or swept path of the tram, tie Ltd's (tie's) designers (SDS) inability to provide the MUDFA Contractor (Contractor) with a comprehensive and properly detailed design, tie's inability to comply with its obligations to liaise with stake holders or obtain appropriate traffic management requirements to meet the Construction Programme revision 7.9 (Programme), tie's

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inability to resolve technical query issues in a timely manner to maintain the programme and productivity and also tie Ltd failing to gain agreements with each SU on the location of the new diversions following issues on site.

4.2.2. The Contractor was instructed as part of an overall package to build new side entry manholes (refer letter reference DEL.MUDFA.10603.SC.GB???<sup>1</sup>). At Haymarket there was a requirement for one additional side entry manhole which was to be located at (MH 2302), Torphichen Street Junction?????. The side entry manhole which was not shown on the Information for Construction (IFC) drawings, and not programmed, was commenced 01<sup>st</sup> October 08 and completed 14<sup>th</sup> November 08 respectively. The effect this had was to prevent the traffic management for phase 1 Works between Palmerston Place and Manor Place being switched to phase 3 in the same location. The envisaged traffic phasing is detailed in the graphics in impact of this delay can be found in Appendix C??? (DWG Ref 60040743 070 1289 & ULE90130-01-UTL-02130) and the impact on Delay schedule 1.<sup>3</sup>

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4.2.3. In October 08 the Contractor became aware that the DKE, in the location of Clifton Terrace, contained within phases 2 and 2a traffic management may have varied from the Information for Construction drawings and asked tie for clarification as to whether the DKE had

<sup>1</sup> Correspondence Appendix item no 1

<sup>2</sup> Drawings and Graphics Appendix Haymarket TM item no1

<sup>3</sup> Refer Delay schedule 1 item 1



changed, refer Delay Schedule.<sup>4</sup> Having asked the question on the 14<sup>th</sup> October 08 a response was not received from **tie** until 23<sup>rd</sup> October 08.

4.2.4. The Contractor was advised by **tie** that the route of the tram was to be redesigned and **tie** would set out the line of the revised DKE. The revised alignment, which at its greatest dimensional variation was over 4.50metre different from that shown on the IFC drawings, was set out by **tie** on ~~the~~ the 13th October 08, yet not confirmed to the contractor until 23<sup>rd</sup> October 08. [??? October 08]. As a result of this change in design a large number of trial holes were instructed by **tie**<sup>5</sup> to determine the position of existing utilities which were not scheduled to be diverted before they could not be diverted until the DKE realignment was confirmed, and thus establish if further diversions were required to prove the proposed new route. The labour and plant resources on site were utilised ~~to excavate the required trial holes and as such works ceased whilst this operation was carried out between the 11<sup>th</sup> November and 12<sup>th</sup> November 08.~~ On 12<sup>th</sup> November 08 the Contractor raised a technical query regarding extent and location of diversions on Clifton terrace, which was not TQ not answered until 12<sup>th</sup> February 09 [??? October and ??? October 08].

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4.2.5. On the 15<sup>th</sup> October 08 the Contractor encountered 6 events in the same day which were an adverse physical condition or artificial obstructions, the proximity of Verizon ducting causing issues with trench

<sup>4</sup> Refer Delay schedule 1 item 2

<sup>5</sup> Correspondence Appendix item no 2 [??????] - Verbal instruction



widths, concrete, unchartered structures and the existing Haymarket retaining wall, all of which were not detailed on the drawings. These events impacted on 7 diversions at various locations (for further details see items 3 to 8 in the Delay schedule 1<sup>6</sup>).

4.2.6. On the 17<sup>th</sup> October 08, whilst excavating for a 355mm diameter water main in phase 1 traffic management, an item of archaeological interest was discovered, namely a 15<sup>th</sup> century well. Consequently, diversion reference 1D/SW/D/25, which was partly installed, had to be removed and relocated on another alignment. Having relocated the 355mm water main on another alignment a further underground structure was encountered (refer Technical Query (TQ) 1012). The overall delay to that part of the Work Sectionite extended to 10 days at that time however, its full impact as a result of follow on activities was still to be realised.<sup>7</sup>

4.2.7. From the 20<sup>th</sup> to the 23<sup>rd</sup> October 08 two artificial obstructions (concrete), a multitude of uncharted services and an uncharted drainage chamber, all of which were located in phase 1 TMI were discovered. Each of which caused approximately 1 day delay to the respective service diversions.<sup>8</sup>

4.2.8. On the 23<sup>rd</sup> October 08 the Contractor received a response to his original TQ, that following the series of trial holes to prove the line it was confirmed that the DKE was to be revised to a new alignment which took

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<sup>6</sup> Refer Delay schedule 1 items 3-8

<sup>7</sup> Refer Delay schedule 1 items 9

<sup>8</sup> Refer Delay schedule 1 items 10 to 13



it further North towards Clifton Terrace. Given the complexity of trams and that the DKE is the result of a complex analysis of tram type, timetables and other influencing factors, including speeds in and out of tram stops etc, it is difficult to understand why the DKE was revised after the IFC drawings were issued although there has been a suggestion that it resulted from a traffic safety audit. Consequently the revision to the DKE necessitated a revised traffic management scheme in order to give greater space on the North side of Clifton Terrace to accommodate the diversions which were to be located closer to the North side.<sup>9 10</sup>

4.2.7.

~~4.2.8. On the 23<sup>rd</sup> October 08 the Contractor received a response to his original TQ, that following the series of trial holes to prove the line it was confirmed that the DKE was to be revised to a new alignment which took it further North towards Clifton Terrace. Given the Contractor's previous experience of trams and knowing that the DKE is the result of a complex analysis of tram type, timetables and other influencing factors, such as, twist, entry and exit speeds in and out of tram stops, noise and vibration etc. The Contractor fails to understand why he thought the DKE would take any other route than its final alignment. Consequently the revision to the DKE necessitated a revised traffic management scheme in order to give greater space on the North side of Clifton Terrace to accommodate~~

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<sup>9</sup> Correspondence Appendix item no 3 TQ 967

<sup>10</sup> Correspondence Appendix item no ? letter 11292



~~the diversions which were to be located closer to the North side.~~<sup>11</sup> ~~Letter Ref 11292 shows revised Co-ordinates for the DKE reroute.~~

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4.2.10.4.2.9. The revised traffic management scheme shown on drawings ~~[60040743\_070\_3\_100\_???~~<sup>12</sup> meant that from the 23<sup>rd</sup> October to the 07<sup>th</sup> November 08 the transportation of materials for both loading and unloading, in what was originally designated phase 1, had to be transported through a circuitous route shown on ~~dumper route drawing, dumper route drawing, Change Reference 154.72\_????~~<sup>13</sup>. Given the restricted space which was now available on the South side of Clifton Terrace (subsequently to become even more restricted), the Contractor had to make the decision to locate all the vast majority of materials and dispose of all arisings at the main site compound located in Haymarket Yards. Introducing not only a lengthier time from transportation but also double handling of both material and arisings. This revised method of working was ultimately to be the cause of considerable disruption to the construction of the Works between Clifton Terrace and Grosvenor Street including Dalry Road.<sup>14</sup>

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4.2.11.4.2.10. Because of the constraints caused by the DKE realignment i.e. it was not possible to locate as much of the services as originally planned on the North side of Clifton Terrace, on the 27<sup>th</sup>

<sup>11</sup> Correspondence Appendix item no 3 TQ 967

<sup>12</sup> Drawings and Graphics Appendix item no 2 Drawing ~~?,60040743\_070\_3\_100]???~~

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<sup>13</sup> Drawings and Graphics Appendix item no 3 Drawing ~~dumper route drawing, Change Reference 154.72\_????~~

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<sup>14</sup> Refer Delay schedule 1 item 14



October 08 **tie** instructed<sup>15</sup> that the water meter adjacent to Clifton Terrace be relocated. The options were either Dalry Road, in the footpath adjacent to the other meter<sup>16</sup> or alternatively, at the road junction of Dalry Road and Clifton Terrace. However, **tie** abrogated their design responsibility and left the choice to the Contractor stating their only preference was to locate the telemetry chamber in the footpath. The Contractor naturally chose to locate this water meter in **tie's** preferred location. ~~H~~ however, it was subsequently found that there was not enough space for both ~~the~~ water meters. Consequently, the Contractor had to relay a 1550m metre stretch of 355mm diameter water main in order to accommodate the position of the additional water main in the South of Clifton Terrace.<sup>17</sup>

4.2.12.4.2.11. On the 28<sup>th</sup> October an artificial obstruction i.e. concrete was encountered on diversion 1D/CW/D14.<sup>18</sup>

4.2.13.4.2.12. Having instructed the Contractor to relocate the water meter referred to in paragraph 4.2.10 and abrogating responsibility for the design by leaving the choice of location unto the Contractor, it became apparent that ~~the scheduled planned materials to be used as per the design schedule planned types of water meter~~ would not fit into the available space. The decision to locate in the alternative position was not

<sup>15</sup> Correspondence Appendix item no 4 TQ 964

<sup>16</sup> Correspondence Appendix item no 5 TQ 1012 ~~TQ does relate~~

<sup>17</sup> Refer Delay schedule 1 item 16

<sup>18</sup> Refer Delay schedule 1 item 17



possible because of the timing implications and therefore the whole design of the two water meters on the South side of Clifton Terrace had to be re-thought. On the 04<sup>th</sup> November 08 ~~tie instructed~~required the use of ductile iron joint fittings so that the two water meters could be located side by side in the space available<sup>19</sup>

4.2.14.4.2.13. The Contractor, whilst proving the revised alignment of the DKE<sup>20</sup>, identified that a 15" gas main at Haymarket may need to be moved to accommodate the revised alignment and requested clarification. In discussion it was evident that this was not contemplated by ~~tie~~ in their redesign of the DKE<sup>21</sup>. This clarification was not forthcoming and the excavation remained open until 07th March 09, at which time ~~tie~~ instructed<sup>22</sup> that the main should be backfilled because they were unable to advise on the design. [At this time the gas main is located within the limits of the DKE].

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4.2.15.4.2.14. The re-routing of the DKE meant relocation and total redesign of services on the North side of Clifton Terrace. The re-alignment of the DKE closer to the northern side resulted in extremely limited space/restriction for the installation/diversion of the gas main. Consequently, the services in the said location had to cross over each other in several locations, as well as having to negotiateting existing

<sup>19</sup> Refer Delay schedule 1 item 18

<sup>20</sup> Refer paragraph 4.2.8

<sup>21</sup> Correspondence Appendix item no 6 TQ 1009, refer Delay schedule 1 Item 19

<sup>22</sup> Correspondence Appendix item no 7. Need CVI????





utilities, some of which were not showing on existing P.U. drawings had to be laid on top of each other to accommodate them within the available space. Due to tie having to redesign the Works in this area of the Work Section the Contractor was given information relating to the design in a piecemeal manner as and when tie were able to obtain approval from the Statutory Undertakers. [The reduced space on the North side of Clifton Terrace, after the realigned DKE+2m zone was established, meant that there was insufficient space to accommodate the 2no new Scottish Power diversions and it had to be moved to the South side of Clifton Terrace to make more room for the Water, Gas and Comms (including a new Verizon) services etc.<sup>23</sup> In the event the 2no new Scottish Power Cables had to be re-routed through the location of the existing taxi rank which as described herein after were further delayed and disrupted. TQ 1008] Due to 2 new diversions being unable to be located within the DKE+2m zone due to the lack of space (one being Verizon). The services have all had to be deepened to allow services to be laid on top of the other services.

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4.2.16.4.2.15. As a consequence of tie's failure to liaise with and inform the taxi companies (having taken back the role of Stakeholder management pursuant to letter ??) about the proposed movement of the taxi Rank at Dalry Rd, the taxi company refused to move from their current location. This introduced a requirement to keep the rank 'live' and imposed major restrictions upon the Contractor's method of working. At this location the Contractor was required to split his works (two diversions of Scottish power ducts) into four separate phases as opposed to the

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<sup>23</sup> Correspondence Appendix item no 8 TQ 1008 Need a reference ??

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single phase that had been planned in order to enable the taxi rank to remain open. Each time a new phase is commenced the excavations had to be backfilled and resurfaced, then the traffic management systems then had to be dismantled and subsequently re-erected. Furthermore, all excavations had to be backfilled on a daily basis to keep the taxi rank live. The Works were planned to be completed within a 2 week period but are, as a consequence of the imposed altered conditions/restrictions, currently forecast to take in excess of [3] months. The Works commenced on the 16<sup>th</sup> November 08 and at the end of February 09 were still ongoing. The delay to the Work Sectionite is as detailed on the Delay Schedule 1 ~~item no 210.~~<sup>24</sup> To date, two of the four phases have been carried out, however, the final overall impact is currently unknown until such time the Works are complete i.e. the remaining two phases of the power diversion and BT diversion.

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~~4.2.17.4.2.16.~~ From the 10<sup>th</sup> and to the 12<sup>th</sup> November 08, two obstructions were encountered on diversions 1D/BT/D/51 and 1D/BT/D/53 comprising of concrete and steel that had to be removed. Also, hand digging was required around existing utilities in order to install Scottish Power cable diversion 1D/SP/D/24.<sup>25</sup>

~~4.2.18.4.2.17.~~ Site rRestrictions resulting from having to maintain the live taxi rank and the DKE revised alignment, meant that revised traffic

<sup>24</sup> Refer Delay schedule 1 item 21

<sup>25</sup> Refer CVI 00871 and Delay schedule 1 Item 22,23 & 24



management restrictions caused delays to materials handling. [The original plan for programme 7.9 was to have possession of the Haymarket to Manor Place in 57 specific phases.] [As a result of splitting the Works into revised 11 traffic phases, the Contractor is having had to [multiple handle the majority of materials] on and off the Work Sectionite.

Also, phase 3 of the traffic management was withdrawn by TMRP at short notice which meant that area of the Works could not progress as planned. Refer to letter 1735.<sup>26</sup>

4.2.19.4.2.18. The result was that the revised traffic management plans caused further delay and disruption to the area which was already impacted. It also meant that a circuitous route for the delivery of materials and disposal of arisings was now in operation, as opposed to the original plan where all movements were contained within localised areas which had sufficient lay down space.

4.2.19. On the 12<sup>th</sup> November 08, due to the realignment of the DKE, the Contractor raised TQ 1070 regarding the location and alignment of BT Cable and Wireless and Scottish Water diversions requesting tie's revised design. The Contractor asked for a response by the 20<sup>th</sup> November 08, however it took tie until the 12<sup>th</sup> February 09<sup>27</sup> to respond. In the meantime the Contractor was provided with hand to mouth information in order to maintain some progress.]

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<sup>26</sup> Correspondence Appendix item no 910- letter 1735

<sup>27</sup> Refer Delay schedule 1 item 26



~~4.2.19. This defined the TQ process and the failure to design. However, tie do not drive the process in order to resolve the issues.~~

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~~4.2.21.4.2.20. From Starting on the 17<sup>th</sup> November through to the 27<sup>th</sup> November 08 there were five~~5~~ items of artificial obstructions discovered, namely concrete<sup>28</sup>, that had to be removed and also an uncharted services that required hand digging due to their proximity to new diversions . These artificial obstructions affected 7 diversions sometimes on more than one occasion~~occasion~~.~~

~~4.2.22.4.2.21. tie informed the Contractor at very late notice on Friday the 28<sup>th</sup> November 08 that they were unable to permit traffic management for phase 37 (intended TM phase), Plamerston~~Palmerston~~ Place to Manor Place, to go ahead, (-this was due to commence the following day). No reason was given and consequently the Contractor's operations and planning was left in disarray. In the event tie was unable to grant permission for a further 6 weeks. Access for these Works was finally facilitated on the 12<sup>th</sup> January 09.<sup>29</sup>~~

~~4.2.23.4.2.22. Furthermore, when permission was finally given to install traffic management, the Contractor was required to commence working in the area between Manor Place and Palmerston and Grosvenor without~~

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<sup>28</sup> Refer Delay schedule 1 items 27 to 31

<sup>29</sup> Refer Delay schedule 1 item 32



the issue of IFC drawings.<sup>30</sup><sup>31</sup> The lack of design meant that **tie** and the Contractor had limited knowledge, consequently resulting in the Works being completed unproductively and causing even further delay to the location.

4.2.24.4.2.23. On the 03rd December 08 an uncharted 150mm diameter water main was found to be on the line of a new 400mm diameter water main service (diversion 1D/SW/D/25) located in Clifton Terrace. Consequently the 150mm diameter water main had to be diverted in order to make way for the 400mm diameter water main<sup>32</sup> which took until the 17<sup>th</sup> December 08 to complete.

4.2.25.4.2.24. The design for the Water meters and associated elements<sup>33</sup> which had been changed to ductile iron fittings in order that they could be accommodated within the available space on the South side of Clifton Terrace was still insufficient. This lead to a long and protracted process of design on site commencing on the 08<sup>th</sup> December 08. Following Scottish Water's inspection on the 12<sup>th</sup> January 09 and the Contractor's subsequent T-Q's<sup>34</sup>, it was necessary not only to [reduce] the size of the water meters but also to revise the design and size of the

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<sup>30</sup> Correspondence Appendix item no 14Q TQ 1070

<sup>31</sup> Correspondence Appendix item no ? **tie** letter 13992

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<sup>32</sup> Refer Delay schedule 1 Item 34

<sup>33</sup> Refer paragraph 4.2.12

<sup>34</sup> Refer Delay schedule 1 item 35



thrust blocks. In addition, permanent sheet piling was introduced to give further support to the thrust blocks and because the excavation had remained open for such a considerable period of time it was necessary to remove unsuitable material which then had to be backfilled. The water meters affected diversions 1D/SW/D/25 and 1D/SW/D23.

4.2.26.4.2.25. ~~tie~~, on the 09<sup>th</sup> December 08, then instructed ~~required~~ the Contractor to infill the existing 15<sup>th</sup> century well previously discovered.<sup>35</sup>

4.2.27.4.2.26. On the 09<sup>th</sup> December 09, whilst demolishing and rebuilding a BT chamber at Clifton Terrace to provide sufficient space for the new gas main, it was discovered that the existing chamber contained fibre optics and consequently there was a delay whilst it was established whether the chamber could be relocated, maintaining the fibre optic cable intact. Having established that sufficient slack was available to allow the box to be moved, it became apparent that an existing sewer was adjacent to the proposed relocation. This meant that the chamber had to be constructed at a shallower depth and therefore necessitated a further review in order to determine if there was still sufficient slack in the fibre optic cables.<sup>36</sup>

4.2.28.4.2.27. The specification for the backfilling and reinstatement of a multi utilities trench was requested by TQ 1106 dated the 10<sup>th</sup> December 08, but it took ~~tie~~ until the 12<sup>th</sup> March 09 to respond with the specification

<sup>35</sup> Refer paragraph 4.2.2.6

<sup>36</sup> Refer Delay schedule 1 Item 3.7.8



and details. Until such time as this was received, the excavations remained open awaiting details of the specification. Consequently progress of the Works was further disrupted by virtue of the fact that the Contractor's available working space was restricted<sup>37</sup>

~~4.2.29.~~ 4.2.28. As Christmas approached a number of excavations remained open pending resolution of unanswered TQ's. (Diversions 1D/CW/D/14, 1D/SW/D/25, 1D/SW/D/25a, 1D/SW/D/23, 1D/SW/D/23a). To leave the Work sSite in a safe and secure condition the Contractor was instructed by tie to temporarily backfill the excavations with pea gravel. This additional work was confirmed by CVI reference 02280 and carried out on the 18<sup>th</sup> and 19<sup>th</sup> December.<sup>38</sup>

~~4.2.30.~~ 4.2.29. Immediately after the Christmas break a potential gas leak was reported and SGN arrived on site on the 5<sup>th</sup> January 09. The leak was suspected to be adjacent Clifton Terrace. SGN issued a notice of 'No Working' whilst investigations took place and then proceeded to undertake the repair but left the excavation open. The Contractor was unable to recommence the diversion Works in this vicinity until the excavation was backfilled. ~~however~~-SGN ~~however~~, did not return to site. On the 9<sup>th</sup> February 09, in an effort to mitigate even further delays, the Contractor took the decision to backfill the excavation. This decision

<sup>37</sup> Refer Delay schedule 1 item 386

<sup>38</sup> Refer to delay schedule 1 item 39



allowed the Contractor to progress the effected activities diversions 1D/SW/D/25, 1D/BT/D/51, 1D/CW/D/14 and Verizon<sup>39</sup>

~~4.2.29.4.2.30.~~ On the 06<sup>th</sup> and 10<sup>th</sup> January 09 the Contractor discovered an artificial obstruction (concrete) located outside the Ross Liddle building and was required to excavate by hand in order to complete diversions 1D/CW/D/14, 1D/SW/D/25, 1D/BT/D/51. The Works are recorded on CVI 04165 and 04169.<sup>40</sup>

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~~4.2.30.4.2.31.~~ On the 13<sup>th</sup> January 09, due to restricted working space, the Contractor was instructed required by tie to carefully uplift 65m of granite kerb stones along West Maitland Street to make way for the diversion Works. As at the 27<sup>th</sup> February 09 the kerbs had still to be re-laid as the Works are still ongoing.<sup>41</sup>

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~~4.2.31.4.2.32.~~ Existing mass concrete was encountered in the Northern pavement along West Maitland Street, between Grosvenor Street and Palmerston Place, in the Northern pavement. In addition, the underlying strata was solid was solid rock, none of which had been shown on the [IFA] drawings. Consequently the Contractor was required to install a [125250mm diameter water main based on only IFA drawings] by a process of hand digging. The delays commenced on the 13<sup>th</sup> January 09 and were ongoing at the end of February 09. The progress at this location was slow by the very nature that Works were carefully excavated

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<sup>39</sup> Refer to Delay schedule 1 item 41

<sup>40</sup> Refer to Delay schedule 1 item 61 & 62

<sup>41</sup> Refer to Delay schedule 1 item 43





as it was impossible to assess what lay below the mass concrete. As at the end of February 09 there were a number of TQ's in relation to these diversions which remain unanswered, refer TQ's 1169 <sup>42</sup>

~~4.2.32.4.2.33.~~ On the 15th January 09 the Contractor encountered unchartered services which required hand digging. <sup>43</sup>

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~~4.2.33.4.2.34.~~ Due to the movement of the DKE further north towards Clifton terrace this meant that a Verizon chamber now had to be moved as it was within 2 metres of the DKE. On the 16<sup>th</sup> January 09 the Contractor had to excavate to find a location for a new chamber. The old chamber was supposed to be demolished by Verizon contractor however it was only partially demolished when fibre optic cables were found running through the chamber wall. Delay then ensued as to the decision/instruction on how the demolition should be carried out. Ultimately it was decided that the chamber could be carefully demolished by hand and it was established that sufficient slack in the fibre optic cables was available to allow them to be moved over. Extra track had to be excavated to facilitate the movement of the fibre optic cables and to extend the ducting to new chamber <sup>44</sup>

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~~4.2.34.4.2.35.~~ Double handling of materials continued to be recorded at that time. <sup>45</sup>

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<sup>42</sup> Refer to Delay schedule 1 item 44

<sup>43</sup> Refer to Delay schedule 1 item 45

<sup>44</sup> Refer to Delay schedule 1 item 46

<sup>45</sup> Refer to Delay schedule 1 item 47



~~4.2.35.4.2.36.~~ On the 20<sup>th</sup> January 09 whilst excavating for diversions 1D/SW/D/10 and 1D/SP/D/14 the Contractor uncovered an old broken sewer. The Contractor was delayed whilst waiting an instruction to either break out the sewer or excavate around it. No Works could be carried out on West Maitland Street until such time an answer was received.<sup>46</sup>

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~~4.2.36.4.2.37.~~ Double handling of materials was continuing to be recorded at this time.

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~~4.2.37.4.2.38.~~ On the 23<sup>rd</sup> January 09 the Contractor encountered unchartered services which required hand digging. This work was located at the junction of West Maitland Street and Manor Place and affected service diversions 1D/SW/35,36 & 37 and took 2 days to complete<sup>47</sup>.

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~~4.2.38.4.2.39.~~ On the 25<sup>th</sup> January 09 the contractor encountered further unchartered services on West Maitland Street whilst excavating for 1D/SW/D/10 and 1D/SP/D/14 taking 0.75 day to complete. The Works are recorded on CVI 04153.<sup>48</sup>

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~~4.2.39.4.2.40.~~ Whilst excavating for diversions 1D/CW/D/14, 1D/SW/D/25, 1D/BT/D/51 CVI 02300 records that on the 26<sup>th</sup> January 09

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<sup>46</sup> Refer to Delay schedule 1 item 48

<sup>47</sup> Refer to Delay schedule 1 item 50

<sup>48</sup> Refer to Delay schedule 1 item 51



the Contractor encountered artificial obstructions which required to be broken out and removed i.e. more concrete.<sup>49</sup>

4.2.40.4.2.41. On the 27<sup>th</sup> January 09 in the location of the highway junction of West Maitland Street and Manor Place large areas of concrete slabs were discovered below the surface of the highway. After initial exploration and investigation it was evident that the concrete had been installed, by others, as backfill to existing live services (gas/water/33Kv/telecoms), in other words the concrete was a cover slab protection to the existing services. The concrete slab[s] were found to be up to 250mm thick and affected services 1D/SW/D/13,20,23,25 1D/CW/D/09, 1D/SP/D/14 and 1D/BT/D/34, 43. To progress the Works the Contractor was required to break out the concrete [by hand tools] to make way for the diversions and installation of new service ducts/pipes. Upon discovery of the concrete and initial investigation the Contractor ceased work and requested **tie**, for health and safety reasons, to have the services temporarily shut off whilst the breaking out operation was conducted. **tie** did not respond to this request for a period of two weeks. The response requested the Contractor to produce method statements for breaking out the the concrete whilst all the services remained live and consequently the Contractor had no choice other than use a method that carefully excavated by hand around the services, giving no opportunity to mitigate delay. The delay to these diversions was 3 weeks (two weeks awaiting an instruction to proceed with the services in a live condition and one week whilst the concrete was broken out). TQ 1169 records the

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<sup>49</sup> Refer to Delay schedule 1 item 52



request and the response from ~~the~~ CVI 04179 records when the Works were carried out.<sup>50</sup>

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~~4.2.41. On the 06<sup>th</sup> and 10<sup>th</sup> January 09 the Contractor discovered an artificial obstruction (concrete) located outside the Ross Liddle building and was required to excavate by hand in order to complete diversions 1D/CW/D/14, 1D/SW/D/25, 1D/BT/D/51. The Works are recorded on CVI 04165 and 04169.<sup>51</sup> ~~COULD THIS BE PART OF 4.2.40???~~~~

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~~4.2.44.4.2.42.~~ On the 16<sup>th</sup> February 09 the Contractor had to commence a 5 day hand digging exercise to establish the location of existing utilities whilst installing 1D/BT/D/43 and 1D/LP/D/109 along West Maitland Street. These delays are recorded on CVI 02553 and 02557.<sup>52</sup>

~~4.2.45.4.2.43.~~ Double handling of materials continues to be recorded at this time.

~~4.2.46.4.2.44.~~ On the 20<sup>th</sup> February 09 the Contractor was required to excavate and expose a ~~recently~~ recently completed water diversion to prove it had ~~not risen~~ was satisfactorily installed after being reinstated. The investigation found the initial Works to be satisfactory. The Works are recorded on CVI 04193.<sup>53</sup>

<sup>50</sup> Refer to Delay schedule 1 items 53 to 60

<sup>51</sup> Refer to Delay schedule 1 item 61 & 62

<sup>52</sup> Refer to Delay schedule 1 item 632 & 643

<sup>53</sup> Refer to Delay schedule 1 item 65



4.2.47.4.2.45. The Contractor was instructed by reference to CVI 04198 to reconstruct and make safe part of an existing tram underground structure discovered whilst excavating for the water mains. The Works were carried out on the 23<sup>rd</sup> and 24<sup>th</sup> February 09.<sup>54</sup>

4.2.48.4.2.46. On the 24<sup>th</sup> February 09 the Contractor was required to excavate 4 trial holes to help find a route for the diversions around Manor Place. These Works are recorded on CVI 02556.<sup>55</sup>

4.2.49.4.2.47. Commencing also on the 24<sup>th</sup> February 09 the Contractor started 5 days of hand digging to overcome uncharted services. The excavations were for 1D/BT/D/34, 1D/CW/D/07 and 1D/SP/D/14. These Works are recorded by reference to CVI 02555.<sup>56</sup>

4.2.50.4.2.48. On the 27<sup>th</sup> February 09 the Contractor was required to construct a footway signal chamber adjacent to Ryries Bar. The Works took 3 days to complete.<sup>57</sup>

#### 4.3. Haymarket Terrace to Shandwick Manor Place – Summary

<sup>54</sup> Refer to Delay schedule 1 item 66

<sup>55</sup> Refer to Delay schedule 1 item 67

<sup>56</sup> Refer to Delay schedule 1 item 68

<sup>57</sup> Refer to Delay schedule 1 item 69



4.3.1. Key factors have led to delay and disruption of the regular progress of this Work Section. However, no single event dominates, albeit some are more important than others. It is evident from the above chronology that some significant events have resulted in multiple further events. Notably the realignment of the DKE accepted by tie in correspondence<sup>58</sup> and having to maintain a 'live' taxi rank outside the existing railway station- resulted in a more complex traffic management arrangement and extended route for site access. These instances have been summarised in correspondence which have also included other events such as the demolition of the Caledonian Ale House which impacted on phase 1 TM<sup>59</sup>

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4.3.1.4.3.2. Revised TM for this Work Section has been a major feature in having to progress the Works complicated by all types of issues as described above however in addition to this has been the imposition of maintaining a the Haymarket bus stop, waiting instructions regarding Variogaurd barrier at the Caledonian Ale House, waiting TM layouts for phases 4-7 all of which occurred between October 08 and November 08 and would need a complete revision due to key factors referred to in paragraph 4.3.1.

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4.3.1.

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4.3.3. The Works have also and continue to be impacted by delays in receiving design information, waiting for answers to TQ's and then subsequent delays in implementing the revised/ changed scope of work, In addition, progress has been disrupted by the discovery of significant

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<sup>58</sup> Correspondence Appendix item no ? tie letter 13994

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<sup>59</sup> Correspondence Appendix item no ? letter. 1635



artificial obstructions and rock at the junctions of West Maitland Street/ Grosvenor Street and Manor Place, which were not envisaged. Also fibre optic cables were unexpectedly found at two locations which have taken a considerable period of time to resolve. In [all] cases tie have been unable to give an immediate answer and in most cases it has taken a considerable period of time to resolve the event.

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~~4.3.2. The Works have also and continue to be impacted by delays in receiving design information, waiting for answers to TQ's and then subsequent delays in implementing the revised/ changed scope of work. In addition, progress has been disrupted by the discovery of significant artificial obstructions and rock at the junctions of West Maitland Street/ Grosvenor Street and Manor Place, which were not envisaged. Also fibre optic cables were unexpectedly found at two locations which have taken a considerable period of time to resolve. In [all] cases tie have been unable to give an immediate answer and in most cases the response has taken weeks if not months.~~

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~~4.3.3. To conclude the Contractor has been unable at any time to progress the Works as was envisaged when the accepted programme 7.9 was issued, consequently production outputs have been significantly less than those planned through no fault of the Contractor.~~

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York Place to South St Andrew's Street (1C-03-01)2

4.3.7.4.3.4. This particular Work Sectionite has been delayed and disrupted by numerous issues in particular those which have affected South St Andrews Street however, because of the inability to commence Works in this area in earnest before the end of 08 and combined with the additional works for the side entry manholes, the effect has been to delay and disrupt the whole of the Work Sectionite. As will be identified in the following chronology, events have included the discovery of underground structures/obstructions, cellars (which SDS should have taken into account as they were clearly visible) requiring the re-routing of diversions, uncharted underground services, a combination of which has resulted in a complete onsite re-design of the planned diversions throughout this Work Sectionite. Many TQ's have been raised which tie have been unable to answer in time to progress the Works. The TQ's have been so challenging to answer in full with complete design information that in [most] instances the details provided by tie have been sketched without reference to the other services or restrictions. tie has ultimately accepted the CThe Contractor's assertionconsiders that the design iswas so inadequate and poor that they-tie had tove asked the Contractor (-who has no design responsibility) for their-proposals on\_a numerous\_of occasions using the Contractor's expertisewhilst reviewing the design on site. Consequently-ilt has become accepted practice that the design is revised and confirmed by tie as and when the services are exposed predominantly with the issuing of a free hand sketch.

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4.3.8.4.3.5. ~~tie~~ instructed the Contractor as part of an overall package to build new side entry manholes refer letter reference ~~DEC.MUDFA.11279.SC.GB???~~<sup>60</sup> Prior to the 1<sup>st</sup> October 09 the Contractor commenced the installation of 2 side entry manholes (which had not been allowed for in the Programme) in the central section of St Andrews, the manhole references are 1C2/D/MH/6101 and 6102. Until the manholes were complete the communications ducting and the water mains, 12 utility routes in all, could not be installed, ~~and this work had not been allowed for in the [Programme]~~. The excavations for these works were large and in effect sterilised the 162 utility planned for the central section because the works are located in the centre of the highway and the excavations extend to approximately 4m x 6m on plan and 3m deep on the opposite side of the intended diversions for the services. Therefore, until the side entry manholes were complete the installation of comms, water and Scottish Powergas, Works could not be undertaken thus causing delay to the completion of these Works. The effected activities were 1C/SW/D/10 (revised), new Verizon, 1C/CW/D/29, 1C/CW/D/3041, 1C/CW/D/31, 1C/CW/D/32, 1C/CW/D/39, 1C/CW/D/4130, 1C/CW/D/42, 1C/CW/D/43, ~~1C/CW/D/31~~, ~~1C/CW/D/32~~, 1C/SP/D/10, 1C/SP/D/12, 1C/SP/D/14, 1C/TH/D/11, 1C/TH/D/13, 1C/TH/D/15, ~~THUS Boxes de-scoped~~, 1C/VM/D/15. Delays to the service diversions occurred up until the ~~17<sup>th</sup> November 08~~<sup>5<sup>th</sup></sup> January 09 see paragraph 4.3.6. The dates of construction of the

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manholes are recorded in the Side Entry Status Register dated 31<sup>st</sup> March 09.<sup>61</sup>

4.3.5.

4.3.5.

4.3.5.4.3.6. Even though the side entry manholes were complete by the 17<sup>th</sup> November 08, tie was not able to obtain permission of the revised traffic management plan until the 05<sup>th</sup> January 09 which prevented access to the work area to commence the services in the central section. The work had originally been planned to commence on the 01<sup>st</sup> September 09. The traffic management drawings indicating the position of the manholes in relation to the sewer modification clearly demonstrate this point.<sup>62</sup> This can be found in Work Order Rev 7.<sup>9</sup> for Traffic Management.

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~~4.3.6. However even though the side entry manholes were complete by the 17<sup>th</sup> November 08, tie was not able to obtain permission of the revised traffic management plan until the 05<sup>th</sup> January 09 which prevented access to the work area to commence the services workssewer modifications in the central section.~~

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~~[The work had been programmed to commence on the 01<sup>st</sup> September 08, and therefore delays to the services workssewer modification occurred from that date until 5<sup>th</sup> January 09.<sup>1</sup> The traffic management drawings indicating the position of the manholes in relation to the sewer~~

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<sup>61</sup> Refer to Delay schedule 2 item 1

<sup>62</sup> Refer to Delay schedule 2 item 2 and Drawings and Graphics Appendix St Andrews.TM



modification clearly demonstrate this point.<sup>63</sup> This can be found in Work Order Rev 7,<sup>9</sup> for Traffic Management.

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~~4.3.13.4.3.7.~~ As at the 5<sup>th</sup> January the closure of the ~~The completion of the~~ Mound has ~~prevented~~ restricted the ability ~~to installation of~~ traffic management ~~at~~ for the junction of Princes Street and South St Andrews Street. ~~C,~~ consequently, the service diversions at the junction have been unable to commence,<sup>64</sup> the final tie-ins at the interface of South St Andrews Street and Waverley Bridge. These diversions are now planned to be done in parallel with [Mound Phase 1] Works, [but may be taken out of work scope however as it currently stands Mound is likely to be key to the substantial completion of the Works and the situation is unlikely to be improved by the events impacting the Works on the Mound. The services affected are identified on the Delay schedule and relate to TQ 1024.

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~~4.3.14.4.3.8.~~ ~~Upon~~ ~~When the Contractor~~ commencement of the works ~~at the~~ Work Site on the ~~01st October 08~~ it became immediately apparent that ~~tie's~~ designer (SDS) had taken no cognisance of the cellars that existed below the pavement and part of the highway. Cellars were encountered along both the East and West sides of South and North, St Andrews Street and at least one location in Central St Andrews Street. The size and extent of the cellars was considerable such that conflicts in the layout of proposed diversions arose immediately due to the cellars. The

<sup>63</sup> Refer to Delay schedule 2 item 2 and Drawings and Graphics Appendix St Andrews TM

<sup>64</sup> Refer Delay schedule 2 item 3



conflict of proposed service routes with the presence of existing cellars in particular at South St Andrews St meant the design had to be entirely re-thought however tie or SDS were not able to give meaningful design information and opted to design the work as it was exposed. TQ's relating to gas, power and water were not answered until mid February 09. The TQ's raised were as follows:

TQ's Raised under RATS 1C:

4.3.8.1. 328

4.3.8.2. 108

4.3.8.3. 329

4.3.8.4. 337

4.3.8.5. 308

4.3.8.6. CVI 17770

Other TQ's:

4.3.8.1.4.3.8.7. 948 - 9<sup>th</sup> Oct 2008 to 5<sup>th</sup> Nov 2008 – The cellars and existing services prevented excavation which meant that it was not possible to lay the new 2 way from 1C/TH/D/08 to 1C/TH/D/25

4.3.8.2.4.3.8.8. 949 – 9<sup>th</sup> Oct 2008 to 4<sup>th</sup> Nov 2008 – The contractor was unable to install the THUS manhole boxes in the footpath at

**Comment [GP1]:** Early TQ's to be added also reference to RATS to be added

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*diversions 1C/TH/D/16, 1C/TH/D/21, 1C/TH/D/23, 1C/TH/D/24 due to obstacles and cellars extending onto the footpath.*

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*4.3.8.3.4.3.8.9. 961– 14<sup>th</sup> Oct 2008 to 3<sup>rd</sup> Dec 2008 – Due to cellars being discovered below the footpath slab it was not possible to lay the Scottish Power Cables, which affected diversions 1C2/SP/D/10, 1C2/SP/D/14, 1C2/SP/D/16, 1C2/SP/D/33A*

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*4.3.8.4.4.3.8.10. 962– 14<sup>th</sup> Oct 2008 to 12<sup>th</sup> Nov 2008 - Due to congestion on the footpath it was not possible to lay the C&W ducts at diversions 1C2/CW/D/30, 1C2/CW/D/31, 1C2/CW/D/33, 1C2/CW/D/34, 1C2/CW/D/39, 1C2/CW/D/40*

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*4.3.8.5.4.3.8.11. 963– 14<sup>th</sup> Oct 2008 to 28<sup>th</sup> Jan 2009 – Congestion of services and cellars meant that it was not possible to lay the water main in the footpath at 1C2/SW/D/10, 1C2/SW/D/10C, 1C2/SW/D/17, 1C2/SW/D/18, 1C2/SW/D/18A*

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*4.3.8.6.4.3.8.12. 966– 15<sup>th</sup> Oct 2008 to 12<sup>th</sup> Nov 2008 – Existing services and cellars have meant the contractor was unable lay the Virgin Media Ducts in the Footpath at diversion 1C/M/D/15*

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*4.3.8.7.1054*

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*4.3.8.8.4.3.8.13. 1072– 14<sup>th</sup> Oct 2008 to 3<sup>rd</sup> Dec 2008 – Follow on from TQ 961 – Due to cellar construction discovered below the footpath slab it was not possible to lay the Scottish Power Cables, which affected diversions 1C2/SP/D/14, 1C2/SP/D/16, 1C2/SP/D/33A*

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*4.3.8.9.4.3.8.14. 1087– 25<sup>th</sup> Nov 2008 to 17<sup>th</sup> Dec 2008 – The existing cellars within the footpath area at diversions 1C2/SP/D/14 and 1C2/SP/D/15 meant that the Contractor was unable to lay the 6 way Scottish Power ducts.*

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*4.3.8.15. 1088– 25<sup>th</sup> Nov 2008 to 17<sup>th</sup> Dec 2008 – Due to cellars and toilet roof the contractor found that it would not be possible to lay ducts in the footpath, it would also not be possible to lay ducts on the carriageway as the DKE is less than 2.2mm from the kerb line. Affected diversion 1C2/SP/D/14.*

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*4.3.8.10.*

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*4.3.8.11.4.3.8.16. 1089– 25<sup>th</sup> Nov 2008 to 5<sup>th</sup> Feb 2009 – Due to cellars the Contractor found that it would not be possible to construct Joint Bays in the footpath at diversion 1C2/SP/D/33A*

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*4.3.8.12.4.3.8.17. 1090– 25<sup>th</sup> Nov 2008 to 28<sup>th</sup> Jan 2009 – Existing cellars within the footpath area have meant that it would not be possible to lay ducts on the footpath, it would also not be possible to lay ducts on the carriageway as the DKE is 0.9mm away from kerb line. Affected diversion 1C2/SP/D/16*

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*4.3.8.13.4.3.8.18. 1091– 25<sup>th</sup> Nov 2008 to 17<sup>th</sup> Dec 2008 – The position of underground cellars meant that it was not possible to lay Scottish Power ducting in the footpath at diversion 1C2/SP/D/16A*

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*4.3.8.14.4.3.8.19. 1095– 1<sup>st</sup> Dec 2008 to 17<sup>th</sup> Dec 2008 – Due to underground cellars it was not possible to lay ducts in the footpath at diversion 1C2/SP/D/18.*

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*4.3.8.20. 1021– 9<sup>th</sup> Jan 2009 to 30<sup>th</sup> Jan 2009 – The Contractor could not lay Scottish Power ducts to a depth of 1.2m because of a sewer which was at a depth of 0.7m and obstructing the line of new ducts. Effected diversion 1C/SP/D/07*

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4.3.8.16.4.3.8.21. 1128- 14<sup>th</sup> Jan 2009 to 28<sup>th</sup> Jan 2008 - The Contractor unearthed a 2m deep coal cellar on the footway outside 29 York Place.

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4.3.8.17.4.3.8.22. 1129- 14<sup>th</sup> Jan 2009 to 28<sup>th</sup> Jan 2008 - The Contractor discovered that there is no room in the carriageway for the Scottish Power ducts at diversion 1C/SP/D/09 and 1C/SP/D/010.

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4.3.8.18.4.3.8.23. 1131- 15<sup>th</sup> Jan 2009 to 28<sup>th</sup> Jan 2009 - The Contractor was unable to lay Verizon and Scottish Power ducts to a depth of 1.2m due to a culvert which is 560mm below ground level.

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4.3.8.19.4.3.8.24. 1138- 29<sup>th</sup> Jan 2009 to 28<sup>th</sup> Jan 2009 - The Contractor discovered there was no room in the footway for Scottish Power ducts at diversion 1C/SP/D/09 - 1C/SP/D/010.

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4.3.8.20.4.3.8.25. 1150A- 21<sup>st</sup> Jan 2009 to 28<sup>th</sup> Jan 2009 - Because of a conflict between existing services the Contractor was unable to lay Scottish Power duct at diversions at 1C2/SP/D/02 (conflict No 1C2/SP/07).

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4.3.8.21.4.3.8.26. 1233232- 23<sup>rd</sup> Feb 2009 to 26<sup>th</sup> Feb 2009 - The existing cellars meant that the Contractor could not construct the Virgin Media box as per IFC at 1C/VM/D/23 and 1C/VM/D/24.

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*NB Brief description and delay effect to be inserted for each TQ*

Currently instructions regarding the cellars are ongoing and will remain so until the Works are complete. Such has been the extent of their



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influence on the design there are ~~1577~~ incidents alone recorded as delay events. <sup>65</sup> The structural integrity of the cellars has also been questioned and a structural engineers report is on going.

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**Comment [GP2]:** Reference to structural engineers report to be added

~~4.3.15.4.3.9.~~ As a result of the cellars, Additional trial holes had to be excavated in an effort to ~~find~~ improve the cellars route for the proposed revised diversions and this has consequently impacted on the commencement of the Works. During the course of January 09 further trial holes were additionally instructed to be undertaken to prove the proposed routes for the various utility diversions refer letter ~~Change Ref 129.78, CVI 02178 and Change Ref 129.57, CVI 02182 & Change Order 3906~~ ~~2222~~ <sup>66</sup>

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**Comment [GP3]:** Change to wording see PK

~~4.3.16.4.3.10.~~ These investigations/trial holes has prevented the Contractor from progressing the installation of the new planned services and it was only as a result of these investigations that ~~tie~~ began in February 09 to instruct a revised designs ~~designs~~ for The sections of St. Andrew's Square were effected as follows:

**Comment [GP4]:** Paragraph to be split into 3 sections covering North, South and Cental

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- ~~South Section – Work on trial holes was carried out during September and October 2008 – However, no responses were received from tie until January 2009~~
- ~~Central Section - Work on trial holes was carried out during January 2009 – However, no responses were received from tie until Febuary 2009~~

<sup>65</sup> Refer Delay schedule 2 item 4, 9,10, 14, 15, 18, 42, 43, 44, 45,46, 47,52,53 & 78

<sup>66</sup> Correspondence Appendix item no 132 Change Ref 129.78, CVI 02178 and Change Ref 129.57, CVI 02182 & Change Order 3906

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- North Section - ????

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4.3.17.4.3.11. ~~tie's~~ instructions were to relocate the planned diversions in the ~~streethighway~~ allowing for the DKE and where it was not possible to have the services located on the side of the street originally planned then install ~~\_crossings\_~~ below the DKE at sensible locations. This was a major ~~change~~ ~~to change~~ to the design and ~~adhoc~~ constraints such as varying the ~~wWork sSites~~ to suit the conditions found on a daily basis meant that the Contractor could no longer properly plan the Works. Having to divert the services from the ~~\_footpaths\_~~ along both sides of the ~~street~~ into the ~~streetroadhighway~~ in a much more congested location meant that the Contractor's modus operandi was changed. ~~It was no longer feasible~~ to excavate and backfill using Hiab lorries and an excavator, because of the congested areas available in the ~~streethighway~~, ~~weight~~ ~~restrictions~~ and proximity of the cellars the operation now had to be carried out using 6 tonne dumpers and mini excavators. Consequently, the materials had to be double handled into Hiab (s) at a central location. As a result the cycles for loading and offloading have increased by a factor of 4. A typical example of this changed modus operandi can be found in Delay Schedule.<sup>67</sup>

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**Comment [GP5]:** Insert paragraph for TM: issues and could never use hiabs see PK

4.3.18.4.3.12. The design having been changed was further complicated by ~~the chartered services which were not originally anticipated to be encountered and the extensive un-chartered services encountered.~~ This resulted in excessive hand digging from that envisaged and ~~this has been~~ a significant factor that has caused the

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**Comment [GP6]:** See PK for change to para

<sup>67</sup> Refer Delay schedule 2 item 5



Works to be disrupted on frequent occasions.<sup>68</sup> From 02<sup>nd</sup> October 08 to the 13<sup>th</sup> February 09 uncharted services have been found in numerous quantities and the design of gas, water, and power and comms diversions had to be changed to accommodate these uncharted services. The contract tender rates included approximately 11% of hand digging. The actual content of hand digging to this part of the project has been calculated to be circa 685%. This is hardly surprising given the degree of change that has resulted from the changes to what is considered to be an inadequate design.

4.3.13. The design inadequacies are further expressed by the number of TQ's raised by the Contractor. For example between October and December 08, which prevented the Contractor from commencing any substantial Works pre-xmas, consequently mile stone for the [Work Site] was not achieved

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4.3.20.4.3.13. In this example TQ's 884, 965, 969, 979, 980, 986, 987, 1045 and 1046 raised all manner of issues in summary:

4.3.20.1.4.3.13.1. confirmation of water main location,

4.3.20.2.4.3.13.2. further design clarification,

4.3.20.3.4.3.13.3. Uncharted Scottish Power cables,

4.3.20.4.4.3.13.4. Uncharted services which prevented gas main connection

<sup>68</sup> Refer delay schedule 2 items 6,7,21,29,49,57,66,67&73



4.3.20.5.4.3.13.5. Design clarification for THUS boxes

4.3.20.6.4.3.13.6. Design clarification for Cable and Wireless duct size

4.3.20.7.4.3.13.7. Design clarification about the use of existing THUS box

4.3.20.8.4.3.13.8. Request for specification of flagged footway and kerbs

4.3.21.4.3.14. Very few of the technical queries were answered ~~adequately timeously by tie due to the fact that tie also required approval from SU's. This and resulted in~~ because numerous technical queries were not being resolved prior to the Christmas work embargo, and the Contractor was required to backfill and subsequently reinstate the highway. In the New Year all excavations then had to be re-excavated ready for the necessary diversion Works.

4.3.22.4.3.15. New and updated IFC drawings in the event have not been issued leaving the design to be revised by TQ's and in some instances free hand sketches that relate solely to the affected diversion. This situation has become the accepted practice for Work Section ~~ite~~ 1C-03-01\_2 as the changes were so numerous, the IFC drawings could not be revised and issued timeously to match the progress of the construction Works. ~~It was accepted by the Parties tie ultimately was forced to conclude~~ that the design would be agreed on a 'design as you go' basis ~~and as a result information for construction drawings were not being revised.~~ tie verbally agreed ~~advised~~ that they would attend site to

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resolve problems as and when they occurred and vary the IFC drawings accordingly.<sup>69</sup>

4.3.23.4.3.16. On the 10<sup>th</sup> October 08 the Contractor raised a TQ relating to the connection of an existing water mains in order to understand where the flows existed and where the valves had to be operated. The response was not issued until during the currency of the Christmas embargo consequently no work in relation to diversions 1C/SW/D/42B ~~connection to and~~ 1C/SW/D/16 could be commenced until January 09 at the earliest, refer TQ 955. ~~tie~~ instructed the Contractor to ~~bore and tap the water main to establish if flows existed and to determine which valves would redirect the flow. In the event the valves to maintain flow did not operate properly and another solution had to be implemented which meant that properties served would be without water for a period of time. The Contractor had to demonstrate that the main could be shut off and reinstated in a reasonable period of time before tie would allow the 22 working~~ 1 day notice to be served. Thereafter the Contractor then had to wait whilst 22 ~~1~~ working day notices were served to adjacent property users in order to shut the water main off while the diversion was installed. In addition due to the location of the new water connection it was necessary to wait until a gas main was decommissioned making space for the new water connection. ~~All of this delay would have been unnecessary had the valve arrangement been properly maintained.~~<sup>70</sup>

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<sup>69</sup> Correspondence Appendix item no 143

<sup>70</sup> Refer Delay schedule 2 item 11



4.3.24.4.3.17. On the 10<sup>th</sup> October 08 the Contractor raised TQ 956 in relation to the location 2 existing THUS ducts the vertical alignment of which would have to be lowered.<sup>71</sup>

4.3.25.4.3.18. On the 14<sup>th</sup> October 08 at North St Andrews Street concrete artificial obstruction was discovered affecting 4 diversions. This delayed the diversions for 2 days whilst it was broken out.<sup>72</sup>

4.3.26.4.3.19. On the 14<sup>th</sup> October 08 the design of services in or around for the existing cellars was continuing to be clarified and again on the 15<sup>th</sup> October 08.<sup>73</sup>

4.3.27.4.3.20. The Contractor sought clarification between the drawings and schedules on the 15<sup>th</sup> October 08. The drawings showed diversions 1C/SW/D/17 and 1C/SW/D/10 with 250mm and 225 mm diameter pipes respectively. Whilst the schedule indicated 280 mm and 200mm diameter pipes respectively so the Contractor could not proceed. ~~tie~~ took until the 12<sup>th</sup> November 08 to respond.<sup>74</sup>

4.3.28.4.3.21. On the 15<sup>th</sup> October 08 the Contractor sought clarification of the existing Scottish Power cables exposed outside No 7 St Andrews

<sup>71</sup> Refer Delay schedule 2 item 12

<sup>72</sup> Refer Delay schedule 2 item 13

<sup>73</sup> Refer Delay schedule 2 item 14,15, 16 & 18

<sup>74</sup> Refer Delay schedule 2 item 17



Street. The response [what is the response] was not received until the 30<sup>th</sup> November 08.<sup>75</sup>

**Comment [GP7]:** Para needs checking

4.3.29.4.3.22. On the 16<sup>th</sup> October 08 whilst excavating for diversion 1C/SW/D10 and 16 at North St Andrews Street a large old brick structure was discovered and removed, resulting in a 1 day delay to the diversions.<sup>76</sup>

4.3.30.4.3.23. On the 22<sup>nd</sup> October 08 the Contractor requested clarification as to the requirements of an existing Virgin Media box which was in a dilapidated state. The response was received on the 30<sup>th</sup> October 08 which instructed the Contractor to demolish and rebuild.<sup>77</sup>

4.3.31.4.3.24. On the 22<sup>nd</sup> October 08 numerous events ensued:

4.3.31.1.4.3.24.1. the Contractor sought clarification of the location for THUS boxes,

4.3.31.2.4.3.24.2. the Contractor sought clarification between the drawings and schedule regarding whether a four way or two way duct was to be installed,

4.3.31.3.4.3.24.3. BT ducts which were installed under RAT 1C without reference to the multi diversions were discovered to be in the way of a new gas main diversion connection reference 1C2/LP/D/113,

<sup>75</sup> Refer Delay schedule 2 item 19

<sup>76</sup> Refer Delay schedule 2 item 20

<sup>77</sup> Refer Delay schedule 2 item 22



4.3.31.4.4.3.24.4. the Contractor advised that a connection to a 90mm gas main could not be made due to ducts running over the main,

The responses took 8 days with the exception of the last two that took 14 days.<sup>78</sup>

4.3.32.4.3.25. On the 22<sup>nd</sup> October 08 water main diversion reference 1C/SW/D/10 was found to have insufficient cover, the response was not received until the 03<sup>rd</sup> December 08 when **tie** instructed the Contractor to provide a reinforced concrete slab for protection.<sup>79</sup>

4.3.33.4.3.26. On the 23<sup>rd</sup> October 08 the Contractor carried a number of trial holes in order to establish whether it was possible to install the designed services given the quantity of existing ducts within that area. These have been subsequently instructed by **tie** that had to acknowledge the necessity for such.<sup>80</sup>

4.3.34.4.3.27. Between the 23<sup>rd</sup> October 08 and the 12<sup>th</sup> November 08 the Contractor was instructed by **tie** carry out further trial holes in South St Andrews Street and Square to establish whether the services at the location Barclays bank and Tiles bar could be installed.<sup>81</sup>

<sup>78</sup> Refer Delay schedule 2 items 23,24,25,26 & 27

<sup>79</sup> Refer Delay schedule item 28 & 30

<sup>80</sup> Correspondence Appendix item no 154 CVI 02179 and CVI 02158 need a document??

<sup>81</sup> Refer delay schedule 2 items 31 and 37.

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~~4.3.35.4.3.28.~~ On the 03<sup>rd</sup> November 08 a designed connection into gas main reference 1C/LP/D/101 was found unachievable due to the condition of the existing gas main. This was backfilled for the Christmas embargo and ~~installed~~ reinstated at a different location.<sup>82</sup>

~~4.3.36.4.3.29.~~ The Contractor sought details of the specification for backfilling of the flagged footway and kerb reinstatement on the 04<sup>th</sup> November 08 which took ~~tie~~ 8 days to provide.<sup>83</sup>

~~4.3.37.4.3.30.~~ On the 05<sup>th</sup> November 08 at South St Andrews Street outside Barclays bank to Muse Lane the Contractor was unable to obtain the necessary cover to the THUS ducts because of the existing cellars and confirmed to tie that it would be necessary to surround them in foam concrete.<sup>84</sup>

~~4.3.38.4.3.31.~~ Also on the 05<sup>th</sup> November 08 at the junction of Multrees Walk existing concrete slabs had to be removed so that the trench could be properly backfilled and compacted.<sup>85</sup>

~~4.3.39.4.3.32.~~ A structure was encountered on the 06<sup>th</sup> November 08 whilst excavating for diversions 1C/VM/D/24 and 1C/CW/D/34. In order

<sup>82</sup> Refer Delay schedule 2 item 32

<sup>83</sup> Refer Delay schedule 2 items 33 & 34

<sup>84</sup> Refer Delay schedule 2 item 35

<sup>85</sup> Refer Delay schedule 2 item 36





to establish the extent of the structure **tie** instructed a trial hole refer **tie** CVI 1665 and CVI 2162.

Upon investigation it was found to be an old tram turning point which comprised reinforced-concrete, steel girders and engineering brick, extended below ground a considerable length x 3m wide and approximately 2.4m deep.<sup>86</sup>

**Comment [GP8]:** Para needs checking

4.3.40.4.3.33. .... Also on the 06<sup>th</sup> November 08 clarification of the location for a **communications chamber**manhole location was sought which was detailed in drawings to be built on top of an existing gasmain.<sup>87</sup>

4.3.41.4.3.34. .... Proving the location and extent of existing cellars continued from 25<sup>th</sup> November 08 through to the 17<sup>th</sup> December 08.<sup>88</sup>

4.3.42.4.3.35. .... [The BT ducts and chambers which were installed originally under the Risk and Trade Off (an arrangement that allowed the Works to progress, reduce to delay the Programme with minimum design risk and gave an equitable reimbursement to the Contractor refer letter??<sup>89</sup>) subsequently had to be removed and re-laid in areas where it

**Comment [GP9]:** Additional Letter 3<sup>rd</sup> April reference to be added – see PK for changes to para

<sup>86</sup> Refer Delay schedule 2 item 38

<sup>87</sup> Refer Delay schedule 2 item 39

<sup>88</sup> Refer Delay schedule 2 items 42,43,44,45,46 & 47

<sup>89</sup> Correspondence Appendix item no 165 [RAT1C\\_21/12/07\\_AMIS/tie/letter/KAG/projects/700need-a-document??](#)

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was found that due to the major redesign, conflicts arose at certain locations.] This work which has had to be re-installed was substantive; the resulting conflicts are assessed to have had a ~~[20-30%]~~ significant impact on the overall programme [January 09] excluding any rectifications the Contractor has made due to his own shortcomings and which the Contractor recognises. This has been recorded by the Contractor in various letters.<sup>90</sup> The assessed impact of this delay is to be found in Delay schedule 2 item 48.<sup>91</sup>

4.3.43.4.3.36. [On the 08<sup>th</sup> January 09 a verbal instruction was received from **tie** site inspector to relocate diversion 1C2/SP/D09 & 10SP/D09-& D10] (North St Andrews) this was subsequently rejected by Scottish Power. On the 19<sup>th</sup> January 09 **tie** asked for two trial holes to determine if the cable could be located in the footpath however, it was not possible.<sup>92</sup> At a meeting on site it was verbally agreed the cable be relocated approximately 1metre further away from the DKE +1.

Comment [GP10]: Para needs checking

4.3.44.4.3.37. On the 09<sup>th</sup> January 09 when installing a Scottish Power duct reference 1C2/SP/D/07 it was discovered that a sewer at junction of York Place was not deep enough to accommodate the ducts. The resolution took **tie** 14 days to respond.<sup>93</sup>

<sup>90</sup> Correspondence Appendix item nos? Letters 1567, 1572 & 2009

<sup>91</sup> Refer Delay schedule 2 item 48

<sup>92</sup> Refer Delay schedule no 2 item 50

<sup>93</sup> Refer Delay schedule no 2 item 51



4.3.45.4.3.38. On the 15<sup>th</sup> January 09 when installing Verizon communications duct and Scottish Power cable 1C2/SP/D/08 it was found that a culvert at a depth of 560mm was in conflict in the vicinity of North St Andrews Lane.<sup>94</sup> As a response to TQ 1131 ~~tie instruct to take the diversion to be taken under~~ ~~under road tie instructed the street.~~??????

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Comment [GP11]: See TQ for delay

4.3.46.4.3.39. On the 16<sup>th</sup> January 09 tie instructed that a series of trial holes be excavated in order to prove the route for diversions which now had to be located in the highway and to establish the exact extent of the cellars<sup>95</sup> in South St Andrews Street and Central St Andrews.

4.3.47.4.3.40. As can be derived from the aforementioned chronology the Works were completely stymied by the fact that the cellars had not been taken into account in design and given the other factor such as unchartered services and artificial obstructions in particular the old tram turning point it is evident that very little progress was made prior to Christmas 08. tie had obviously taken the decision to find the best fit design and to that end had decided to seek trial holes in order to prove the available routes.<sup>96</sup> In addressing the technical queries tie has had to instruct a full redesign of all the services for the Work Sectionite, in particular moving the services from the footpath into the road. Importantly the Contractor having commenced the Works in October 08 was only receiving substantive details in February 09.

Comment [GP12]: Para needs checking with Gill

<sup>94</sup> Refer Delay schedule no 2 item 54

<sup>95</sup> Refer Delay schedule no 2 item 55 & 56

<sup>96</sup> Refer Delay schedule 2 item 5



4.3.48.4.3.41. During the currency of the ongoing Works for 1C/SP/D/09 and D10 an uncharted fire hydrant started to leak which was subsequently repaired by the Contractor.<sup>97</sup>

**Comment [GP13]:** Para needs Stewart to check

4.3.49.4.3.42. ~~The Contractor had to abandon tracks for Scottish Power ducts when it was shown the area was too congested, also~~ On the 20<sup>th</sup> and 21<sup>st</sup> January 09 the Contractor was unable to lay Scottish Power ducts at the junction of North St Andrews and York Place due new and existing services being on the line of the direct route.<sup>98</sup> *Tie disputed the records*

**Comment [GP14]:** Redraft para – Stewart to check

**Comment [PK15]:** To be deleted unless Vinney proves otherwise.

4.3.50.4.3.43. On the 24<sup>th</sup> January 09 whilst excavating for diversions 1C2/SP/D09 and D10 the Contractor encountered an uncharted telecoms duct across the track at the same level as the new diversions.<sup>99</sup>

**Comment [GP16]:** Redraft para connected with para above Stewart to check

4.3.51.4.3.44. Due to the old tram turning point being in line of any crossings in South St Andrews Street and the fact that on the East side there insufficient space between the cellars and DKE it was necessary firstly to locate as many services as possible in the West side and thereafter form a track in the tram turning point. On the [03<sup>rd</sup> February

<sup>97</sup> Refer Delay schedule no 2 items 58 and 59

<sup>98</sup> Refer Delay schedule no 2 items 58, 60,61 & 62

<sup>99</sup> Refer Delay schedule no 2 item 64



09] the Contractor commenced this operation in order for the services to be re-routed from the West to East side.<sup>100</sup>

**Comment [GP17]:** Para needs checking maybe 3 weeks delay

4.3.52.4.3.45. Further trial holes were instructed by tie at this time to prove the route for 1C/2/SP/D/10.<sup>101</sup>

4.3.53.4.3.46. The design detailed both Cable & Wireless and THUS boxes in the same location ??? on drawing number ULE90131-01-UTL-00840-4 & 00940-4 diversion numbers 1C/CW/D/20 and 1C/TH/D/06 and the Contractor advised tie on the 09<sup>th</sup> February 09 for which the response was not received until the 12<sup>th</sup> February 09 stating that the Cable and Wireless should be reinstated at its current location and the THUS box should be moved 1.5 metres East????<sup>102</sup>

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4.3.54.4.3.47. Also on the 09<sup>th</sup> February 09 at the junction of North St Andrews and Queen Street the Contractor was required to slew a four way Cable and Wireless cable diversion 1C/CW/D/14 for a length of 28 metres for the revised THUS box position because it had to be relocated due to a design conflict between the original location of the box and the existing gas main.<sup>103</sup>

<sup>100</sup> Refer Delay schedule no 2 item 689

<sup>101</sup> Refer Delay schedule no 2 item 701

<sup>102</sup> Refer delay schedule no 2 item 712

<sup>103</sup> Refer Delay schedule no 2 item 734



4.3.55.4.3.48. On the 13<sup>th</sup> February 09 the Contractor was required to protect with concrete Cable and Wireless services found at a shallow level outside Harvey [Nichols] .<sup>104</sup>

4.3.49. Add para for 3" water main see Stewart

4.3.48.4.4. York Place to South St Andrew's Street-Summary

4.3.48.

4.3.48.4.4.1. Key factors have led to delay and disruption of the regular progress of this Work Section. However, no single event dominates, albeit some are more important than others. It is evident from the above chronology that some significant events have resulted in multiple further events. Notably the cellars which have impacted almost every diversion within the Work Section. Additionally there have been other events such as the side entry manholes and old tram turning point which have also impacted on the Works.

4.3.48.

4.4.2. The Works have also and continue to be impacted by delays in receiving design information, waiting for answers to TQ's and then subsequent delays in implementing the revised/ changed scope of work. In addition, progress has been disrupted by the discovery of significant artificial obstructions, throughout the Work Section which were not envisaged. In [all] cases tie have been unable to give an immediate answer and in most cases it has taken a considerable period of time to resolve the event.

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<sup>104</sup> Refer Delay schedule no 2 item 754.



4.5. As has been notified on the Key Issues Register the following has also influenced the Works:

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4.5.1. TM constraints (which Lothian Buses have influenced significantly) has resulted in diversions being completed in parts and the Contractor being unable to prove an entire diversion at one time, also working space has been severely restricted

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4.5.2. TM constraints have been influenced by Infracore whom the Contractor should never have interfaced with had the design been complete and readily available in order to allow the Contractor to progress the Works. Furthermore tie in their acceptance of the Programme did not advise the Contractor of any constraints on TM due to Infracore.

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4.5.3. The schematic drawings and further sketches has resulted in a number of conflicting services with tie having to liaise with each SU individually to obtain agreement of the final locations and in a number of instances obtaining final approval by trial and error.

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4.5.4. tie have refused to instruct the use of foam concrete upon which was a revision 7.9 Programme assumption.

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4.6. To conclude the Contractor has been unable at any time to progress the Works as was envisaged when the accepted Programme was issued, consequently production outputs have been significantly less than those planned through no fault of the Contractor.

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~~Add para for 3" water main see Stewart~~

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- South St Andrew's Street (1C 03 02) and Haymarket to Shandwick Place (1D 01 01) /Performed on  
26/04/05/09.