

Figure 7: Section through Rheda CITY D Trackform

RAIL FIXING COMPONENTS

| Nr. | NAME  | MATERIAL                                      |
|-----|---|---|
| 1   | RAIL 59R2                                   | STEEL GRADE 900A                              |
| 2   | SLEEPER CREW Ss35 DD                        | STEEL 5.6                                     |
| 3   | RAIL JOINT SEALING COMPOUND                 | BITUMOUS FILLING MATERIAL                     |
| 4   | ELASTIC RAIL PAD                            | SYLOMERE/PDM ELASTOMER                        |
| 5   | CHAMBER ELEMENTS - EDL ON (TO BE CONFIRMED) | RUBBER RECLAIM WITH POLYURETHANE (PU) BINDING |
| 6   | ISOLATION CLIP (OPTIONAL) FOR SKI25         | POLYAMDE PA6 OR PA6.6 (WITH 30% GLASS FIBRE)  |
| 7   | TENSION CLAMP SKI25                         | SPRING STEEL                                  |
| 8   | ANGLED GUIDE PLATE K-W/p25                  | POLYAMDE PA6 OR PA6.6 (WITH 30% GLASS FIBRE)  |
| 9   | COVERING CAP                                | PE  |
| 10  | WASHER Uls7                                 | STEEL 5.6                                     |
| 11  | SLEEPER TYPE TB/ZB-1435-KW-25 Ri 180        | CONCRETE C50/60 L LATTICE GIRDER BS1-500      |
| 12  | PLASTIC PLUG sdu 26                         | POLYAMIDE PA6 OR PA66                         |
| 13  | ADJUSTING SCREWS                            | STEEL ST37                                    |
| 14  | BASE PLATE - WITH CENTRE HOLE FOR ADJUSTING | STEEL ST37                                    |
| 15  | SPACE HOLDER                                | PE FOAM MATERIAL                              |
| 16  | SQUARE FILLING PROFILE                      | RUBBER RECLAIM WITH POLYURETHANE (PU) BINDING |

THIS DRAWING REPLICATES DETAILS FROM THE BSC TRACKFORM PROPOSAL. REFER TO SOURCE DRAWING FOR DEFINITIVE DETAILS. (SEE NOTE 2)

Figure 8: The components of Rheda CITY D trackform

Figure 7 shows just the track form construction. As noted in section 2 of this report the following structure is proposed in relation to supporting the trackform:

- A type 1 compacted sub-base layer – depth dependent on the existing ground conditions
- A 50mm deep concrete blinding layer
- A 250mm deep reinforced concrete slab, the track improvement layer. This is a standard requirement to provide the required support to the track slab (120MN/m<sup>2</sup>) for the duration of the lifespan of the track slab. This also addresses potential voids (either now or in the future). The experience from the first phase works is that

ground conditions are unreliable and so it is recommended the same layer is provided. This could however be examined at the next stage of the project and is related to the CEC chosen procurement route.

- The track slab with an overall depth of approximately 410mm – this incorporates the concrete sleepers, the rails and rail fixings and the concrete shoulders and road coverage layer.

The trackform will be installed in the following sequence in parallel to or after the drainage, ducting and OLE pole foundations have been installed depending on the optimal construction sequencing:

- Californian Bearing Ratio (CBR) testing on existing ground to establish the bearing capacity.
- If CBR fail, type 1 layer will be installed to the required depth as directed by the designer to suit CBR requirements.
- An unreinforced concrete blinding layer is laid to provide a controlled layer to start the track infrastructure construction.
- Reinforcement is then placed to provide the track improvement layer and formwork erected. The intent is that the slab is poured as a continuous section for the full width of one track. The slab has construction joints where breaks in the slab are required due to construction programme and sequencing.
- The track improvement layer surface is left with rough finish.
- The sleepers are then laid on the track improvement layer followed by the rails and fixings.
- The rail levels are roughly set using the adjustment screws.
- The formwork is installed for the track slab.
- The track slab concrete is the poured with construction joints typically every 21m.
- The rails are then adjusted to the correct and final line and level once the trackslab concrete has reached sufficient strength.
- The track encapsulation (i.e. chamber elements) is then installed.
- Reinforcement for the concrete shoulders is fixed in the track slab – refer figure 9.
- Formwork is then placed including bullnose formers attached to the rails and chamber elements to allow the edges of the concrete shoulders to be formed at the correct level relative to the top of rail height.
- The concrete shoulders are then poured with transverse expansion joints every 21m and formwork subsequently removed.
- Depending on the trackform finish (e.g. setts, concrete, asphalt, imprint etc.), the road surface is then laid.
- The joint sealant is installed prior to the traffic management being removed.
- All required road markings & High Friction Surfacing are applied.

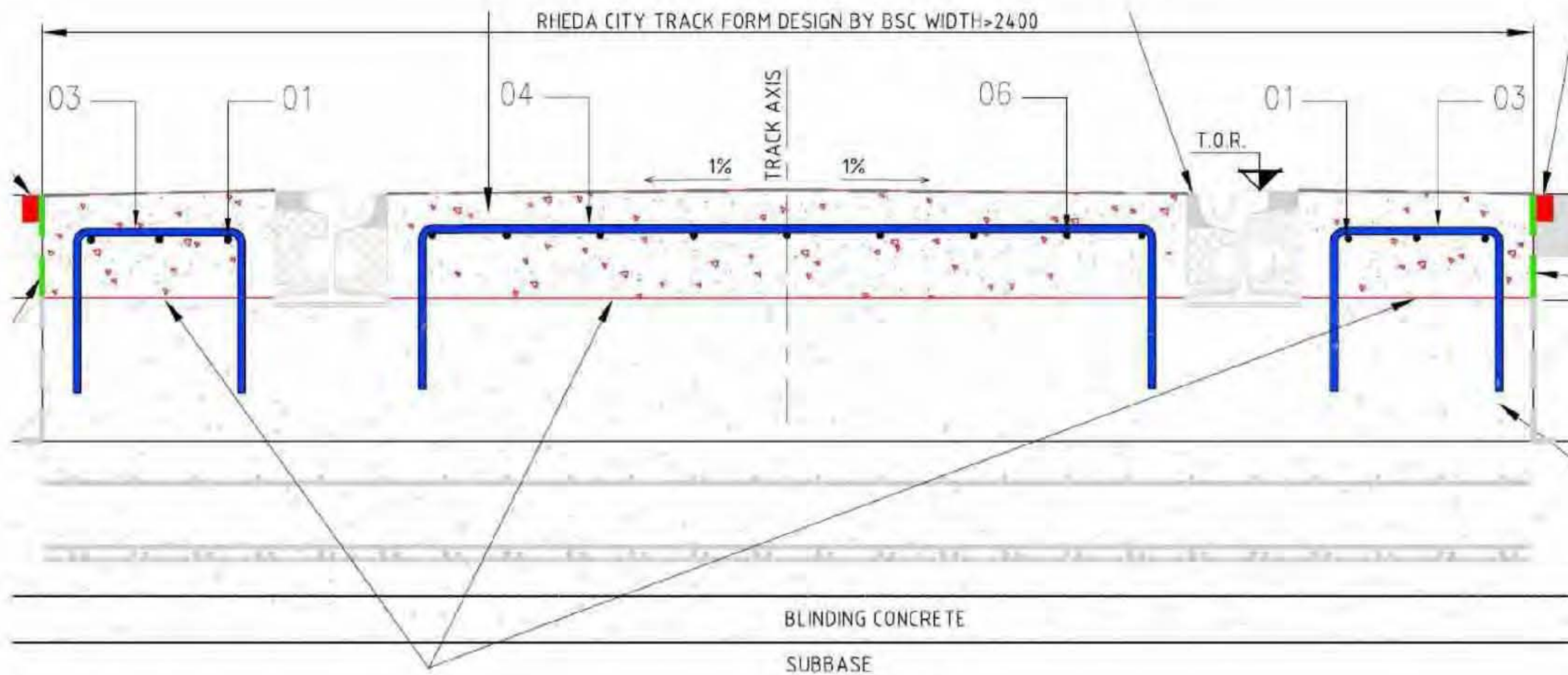


Figure 9: Reinforcement layout

### 3.7 Stop Construction

The civil elements, ducting, drainage of the Stop will be constructed in line with the main civil works along the alignment. The track will then be laid, including the final surfacing. The paving will then be placed including the copings, which are set relative to the rails.

The Stop equipment and furniture will then be installed including the technical cabinet and associated cabling. The equipment will be site tested to ensure it functions as a discrete element. When all the systems are fed back to the control room the functionality of the equipment will be tested for full integration.

### 3.8 Overhead line works and traction power

The 750V traction power is supplied to the system via a number of purpose built substations. To provide this power to the extension two new substations are required. One is located on Leith Walk on the old tram depot site with the other being at Leith Sands as indicated on figures 10 and 11 respectively.

As noted above there is a requirement to supply the new substations with a SP 11kVa supply. This supply is taken from the existing SP network which in both locations is local to the tram substation and therefore it is not expected that extensive works out with the LOD will be required to provide connections. The 11kVa supply is connected and metered by SP in their substation room which forms part of the overall tram substation. This room belongs to SP and cannot be accessed by the tram team when the works are complete.

The SP substation room shares a wall with the main tram substation. The cables are ducted through this wall into the tram substation and into the equipment to step down the supply from 11kVa to the 750V DC power required to power the tramway. The power is then ducted from the tram substation to the tramway and connected to the OLE by a feeder pole.

The substation also houses the equipment to collect the stray current and return it in to the traction power system. There is measuring equipment associated with the stray current which is monitored in the substation.

As the substations are remote to the OCC there is a requirement to provide an alarm system which alerts the OCC to any problems. The alarms are monitored through the SCADA system, with the required telemetry cables feeding back to the substation via the tramway ducting network.

As well as the high voltage (HV) traction supply each substation requires a low voltage (LV) supply to power the building services, fire alarm and control cabinets. The LV supply is taken from the local Scottish Power network and metered in the substation. Elements of the equipment powered by the LV supply are also supported by an uninterruptible power supply (UPS). This UPS is a set of batteries which, if the LV power to the substation is lost, will provide power for four hours.



Figure 10: Leith Walk substation location and outline extract from drawing ULE90130-01-DCT-00011 r11

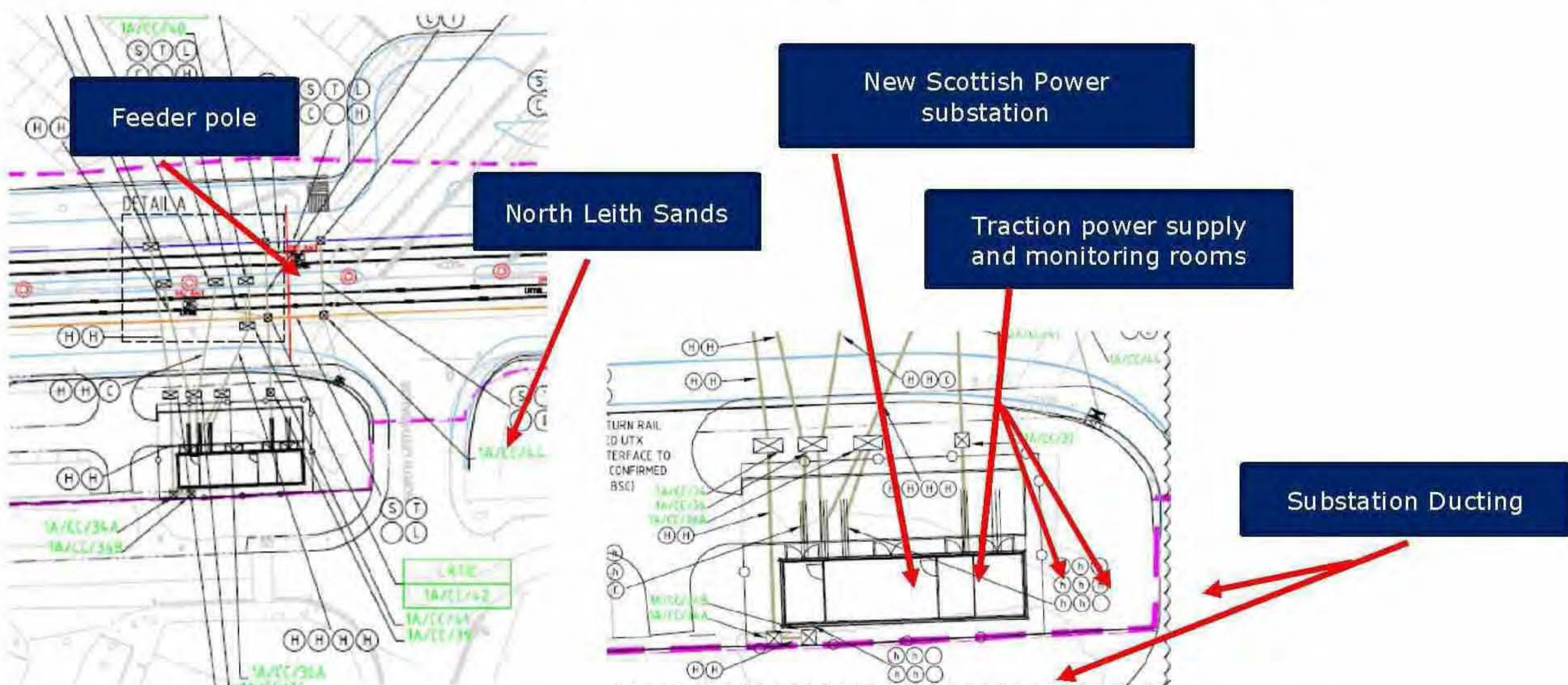


Figure 11: Leith Sands substation extract location and outline from drawing ULE90130-01-DCT-00001 r07

The substations are built on an in situ reinforced concrete base which has channels constructed within it to allow for the laying of the cabling network. The shell of the substations is preformed sheet metal which can be quickly erected on the in situ base. The equipment is then installed into the substations through permanent large doors.

The substation works are in the main independent of the alignment works and can be progressed without the need for separate traffic management.

The overhead line is supported either on poles running down the centre of the alignment supported on pad foundations, side poles in the footway supported on piled foundations or on building fixings. The poles along the alignment will be erected at the end of each section of each traffic management phase. The side poles and building fixings can be installed independent of other activities. When the wires are strung out localised traffic management will be provided.

The majority of the OLE design is complete however a design review is required to ensure the proposed OLE supports can be accommodated.

### **3.9 Tramway control systems**

The extended alignment will be equipped with the same level of supervisory control and communication systems as are currently in use on the existing tramway namely:

- Supervisory Control and Data Acquisition (SCADA)
- Operational Radio System
- Tram positioning and detection subsystem
- Passenger information system
- Telephone network
- Passenger help/Passenger emergency help points
- Closed Circuit Television System (CCTV)
- Operation data network
- Software

#### **3.9.1 Supervisory Control and Data Acquisition (SCADA)**

SCADA is provided to act as the control rooms eyes and ears as to the health of the tramway equipment. The system is made up of cabling which is housed in the tramway ducting system, control cabinets in the substations, technical cabinets on Stops and the Gogar Depot equipment room with software on the front end computers in the Gogar Depot control room and equipment room.

The cables will be installed at the end of each phase after the ducts have been installed and tested. The cabinets in the equipment room have the required space to accommodate the extension equipment, however depending on the procurement strategy and successful contractor these cabinets may require replacement.

The software updates are performed remote to the control room. When the updates are performed a schedule will be provided which explains the update and any impact on controls of the existing line and what the control room staff should expect to witness.

#### **3.9.2 Operational Radio System**

The current radio system will not have coverage to reach Newhaven Stop. A new base station is required at Jane Street. There is no cabling associated with the radio system but agreement has to be finalised on the location and operation agreement of the base station which is currently in the BT building.

### **3.9.3 Tram positioning and detection subsystem**

The tram detection system is installed as part of the track from and links back, via fibre optic cables, to OCC via the technical cabinets on the each Stop and the ducting provided. The detection system is also linked to the traffic signals to allow the tram traffic sequence to be instigated as the tram approaches a junction. The protocols for this will be agreed with CEC and a testing regime, similar to that used in the first phase will be established.

### **3.9.4 Passenger information system:**

The system is associated with the timetabling system and provides up to date information of tram arrival times. Passenger Information Displays (PIDs) are installed as part of the Stop and tested with all other Stop equipment.

In addition to standard PIDs at Stops, Ocean Terminal will have a non-standard PID inside the shopping centre. The system is linked to the OCC via the ducting network.

### **3.9.5 Telephone network**

The telephone network is situated in the Depot. There are telephones in the substations to allow for direct communication with the Gogar Depot.

### **3.9.6 Passenger help/Passenger emergency help points**

Passenger help/emergency points are situated at each Stop and linked to the OCC via the ducting network. These are standard units incorporated into the Stop shelters and are installed as part of the Stop and tested with all other Stop equipment.

If a non-standard shelter is used for one of the optional termination locations, a non-standard help point as currently used at York Place Temporary Stop will be used.

### **3.9.7 Closed Circuit Television System (CCTV)**

CCTV cameras are situated at each Stop and linked to the OCC via the ducting network. These are standard units incorporated into the standard Stop design, mounted on multi-use poles and are installed as part of the Stop and tested with all other Stop equipment.

If a non-standard Stop is used for one of the optional termination locations, surface mounted CCTV cameras may be mounted within the shelter as currently used at York Place Temporary Stop will be used.

### **3.9.8 Operation data network**

The Operational Data Network will be extended through the ducting system for the full length of the proposed extension. This provides the communication between the OCC and the tramway via cabling in the tramway ducting and supported by the technical cabinets at the Stops. The cables will be installed and tested at the end of each section of works.

Some duplication of cabling can be expected between St Andrew Square and Picardy Place, as the network will be extended to minimise disruption to the current timetable.

### 3.9.9 Software

The current equipment is supported by a bespoke software system supplied by Siemens. If the new equipment is supplied and installed by them the software can be upgraded relatively easily. The Operator could continue to use the OCC in its current configuration. A protocol, to minimise operational disruption and assist in installation, would be required between the operator and contractor to allow for the management of OCC alarms generated by equipment on the extension which is installed, recognised but not yet in use.

If the systems supplier is changed a new bespoke software system is required. To minimise disruption a shadow control room would be required. This control room would be created, the software installed and tested and then the systems migrated over to the OCC.

### 3.10 Traffic junction upgrades

There are 21 junctions which require upgrading to accommodate the extended tram route. The works associated with the junction upgrades will be carried out during the main works using the traffic management in place. Where there are works out with the main works these will be done under local traffic management.

It is anticipated the commissioning of the signals will be performed in the latter stages of the programme for efficiency reasons.

The signals will be linked back to the CEC control room to allow them to be centrally control if required using the existing tram fibre connection. The ability for the tram control room to force a request will also be provided in the OCCI, as is currently available.

### 3.11 Temporary works

There are minimum temporary works associated with the project. Safe means of access will be provided to any elevated works and all excavations will be supported as appropriate. All work sites will be protected with temporary fencing which will be agreed on a section by section basis.

The significant temporary piece of work is the provision of the site compound on Leith Walk. This will be in the old tram depot site. To facilitate this, the existing dilapidated structure will be demolished and temporary site accommodation provided. The site accommodation will be serviced by mains utilities.

Where remote site compounds are required standalone welfare and office facilities will be provided.

### 3.12 Third party interfaces

The third party interfaces will require full examination at the next stage of the project, but the general overview performed to support the business case has not found any significant variance to those expected during the initial planning of the tramway. This is with the exception of the introduction of the redevelopment by Edinburgh St James. As these works are adjacent to Picardy Place a governance structure should be put in place to ensure these works do not negatively impact the tramworks.

There are currently agreements in place with the following third parties which will be reviewed in greater detail at the next stage of the project to determine their applicability:

- Forth Ports

- ADM Milling
- Network Rail
- Ocean Terminal
- All Statutory Undertakings
- Stanley Casino
- Royal Yacht Britannia
- BT specifically in relation to the radio base station at Jane Street

The majority of works are being constructed within the LOD, with minor footway modifications being required out with the LOD, and so the requirement to make agreement with neighbouring properties is limited. There will however be a support team put in place as noted in the CoCP to assist with general queries and to supporting third parties in the accessing of their premises.

### 3.13 Tie in to the existing tramway

When the first phase of tram was completed a temporary Stop was installed at York Place as shown in figure 1

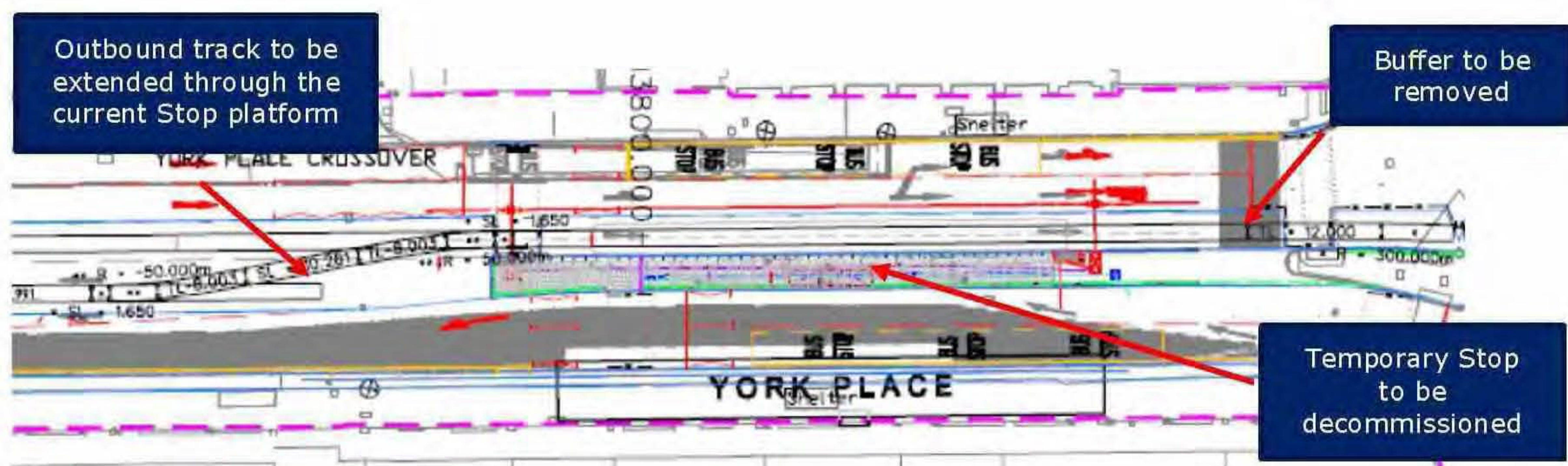


Figure 12: Current alignment at York Place temporary Stop

The general requirement is to maintain a full service for the duration of the works to extend the route. To try and accommodate this Picardy Place (PPL) Stop, infrastructure and tram control systems must be fully commissioned and available to the Operator prior to the commencing the decommissioning works at York Place (YPL). PPL effectively becomes the end of the route for a time.

To enable the above to be achievable the following broad sequence of work noted in figure 13 is required.





Figure 13: Proposed new tram alignment and Picardy Place junction upgrade works with sequencing

Below is table 5 showing the general sequencing which has been determined, following a review of the current infrastructure and how sensibly the works can be completed restricting the impact on the current operations, but also acknowledging that a certain amount of works cannot be carried out without creating restrictions. Under the current proposals it is not envisaged that the existing line will ever be closed, but more that service disruptions will be occur and in particular the introduction of reduced timetables.

Where "inbound track" is referred to, this is the track from the Airport to Newhaven with "outbound" being from Newhaven to the Airport

To facilitate this the following is required:

- Reconfiguring of the OLE in YPL as the current arrangement supports the temporary Stop arrangement required under the first phase works. See Appendix C for the details.
- A temporary signalling arrangement will be required to control the Broughton Street junction to allow for the end of line turn back and the fact the trams will be performing a wrong line manoeuvre in the temporary arrangement.
- Software upgrades in the control room will be required which when installed and tested will create alarms linked to works which the operator will be required to manage.
- Single line running to PPL, as is the current arrangement at YPL, will be required during the works to extend the line. The double track arrangement will be tested and commissioned in line with the testing and commissioning of the whole extension.
- Edinburgh Trams (ET) will have to accommodate works within the general 2m exclusion zone currently around the tramway. To facilitate this the contractor will provide adequate risk mitigation proposals.
- Under this arrangement the ability to stable a tram will be lost when the YPL buffer is removed until the dualled track installation including testing and commissioning is complete. It is anticipated the buffer would be removed at the end of the initial phase of the works i.e. after the extending of the alignment between Broughton Street and Picardy Place and just prior to the testing and commissioning of the single track arrangement.

The following methodology describes at a high level the works required to remove YPL Stop and construct works associated with the outbound track from its current termination point at the YPL crossover to bring it parallel to the current inbound track position at the Broughton Street / PPL junction (approx. 120m of track) in line with the above constraint to “maintain a service for the duration of the works to extend the route”. Further to this it gives a broad outline of the works to construct the full alignment from the existing buffer to PPL Stop.

| Task Description   | Impact to Operations (Assuming a level of disruption due to the physical works required) | Approx. Duration (days and including disruption due to night time working) |
|--|--|--|
| <p>Advance installation of interim ducting across Broughton Street to facilitate change from York Place TEC to Picardy Place TEC. This would include construction of Picardy Place TEC (including foundation etc.) as a minimum.</p> <p>Traffic management required to run along the tram route and location of ducting to be determined.</p> <p>Assumed a suitable route will be found so the works can progress in day shift hours. The duration assumes no utility conflicts.</p>   | None   | 25 days  |
| <p>Extend dual trackwork including track circuits across Broughton street junction from the current buffer position to PPL Stop.</p> <p>Note: buffer will need to be repositioned to allow connection works so ability to stable a tram will be lost at this point. However the phasing will be such to keep the buffer in position as long as possible.</p> <p>Scope: Traffic management; Excavation; utility diversions; ducting; drainage; OLE foundations; ground improvement works; blinding; track improvement layer; track; track slab; IMU boxes etc.; finishes.</p> <p>Excluded: Upgrade to the general Picardy Place Junction.</p> | No ability to stable a tram at York Place after a point in time                          | 100 days   |
| Install PPL Stop.  | None   | 40 days  |
| Install TEC at PPL and pull longitudinal cables.   | None   | 10 days  |
| Install links to the TEC from Traffic signals, track circuits, stop furniture etc.   | None   | 10 days  |
| <p>Make switch from YPL to PPL TEC</p> <ul style="list-style-type: none"> <li>• Cable connections required</li> <li>• Software modification required</li> <li>• Testing &amp; Commissioning required</li> </ul>  | Loss of junction control but assumed no impact as suitable manual means of controlling   | 13 days  |

| Task Description  | Impact to Operations<br>(Assuming a level of disruption due to the physical works required)   | Approx. Duration<br>(days and including disruption due to night time working) |
|---|---|---|
| <p>Certain existing junction control may not function during the changeover therefore manual control required.</p> <p>When the YPL TEC is decommissioned the Stop equipment will no longer work.</p>  | <p>the junctions could be put in place during the changeover.</p> <p>Manning of YPL Stop for ticket sales and general customer services.</p>                    |   |
| <p>Install overhead line poles Broughton Street to PPL.</p>   |   | 5 days  |
| <p>Install OLE works to support the single line running to PPL including</p>  |   | 20 days   |
| <p>Integration testing of single line from YPL to PPL.</p>  | <p>Trams terminate at West End Princes Street due to isolation points and existing turn back facility</p>   | 1 day   |
| <p>Dynamic testing of the temporary arrangement excluding driver familiarisation.</p>   | <p>Drivers required to support testing.</p> <p>Trams terminate at West End Princes Street due to isolation points and existing turn back facility</p>           | 2 days  |
| <p>Installation of buffer at PPL Stop and PPL opened and used as the "new temporary" end stop.</p>  | <p>Termination stop in a different place</p>  | Milestone   |
| <p>Install temporary works to protect the existing single line through York Place during the works to construct the second track. Some demolition of the Stop would be required at this stage.</p> <p>Assumed to be 5 days duration but 100% being performed under night time possession of 4 hrs with associated inefficiencies particularly around maintaining and moving site boundaries of working; therefore total duration of 12.5 days required.</p> | <p>None as assumed to be a night time activity. When the works are installed agreement is required with ET with regards to the current working restrictions</p> | 12.5 days   |

| <b>Task Description</b>   | <b>Impact to Operations<br/>(Assuming a level of disruption due to the physical works required)</b> | <b>Approx. Duration<br/>(days and including disruption due to night time working)</b> |
|---|---|---|
| Scope includes decommissioning of pedestrian crossings to YPL Stop.   |   |   |
| Demolish YP stop (disconnect CCTV, PIDs, TVMs etc.) Assumed works can be done without impacting the service.  | Trams run through to PPL adjacent to the work site  | 3 days  |
| Removal of equipment and materials at York Place Stop. Demolition of York Place Stop. Assumed to be 5 days duration but 50% being performed under night time possession of 4 hrs with associated inefficiencies of working; therefore total duration of 10 days required.   | Trams run through to PPL adjacent to the work site  | 10 days   |
| Excavation to formation level in the location of the Stop. Assumed to be 10 days duration but 50% being performed under night time possession of 4 hrs with associated inefficiencies of working; therefore total duration of 20 days required.   | Trams run through to PPL adjacent to the work site  | 20 days   |
| Installation or reconfiguration of any drainage and ducting.<br><br>(Assumes all manholes and connections to SW network in place). Assumed to be 10 days duration but 50% being performed under night time possession of 4 hrs with associated inefficiencies of working; therefore total duration of 20 days required. | Trams run through to PPL adjacent to the work site  | 20 days   |
| Installation of blinding layer. Assumed to be 1 day's duration but 100% being performed under night time possession of 4 hrs with associated inefficiencies of working; therefore total duration of 2 days required. Assume no ground improvement works are required.   | Trams run through to PPL adjacent to the work site  | 2 days  |
| Kerbing works. Assumed to be 5 days duration but 50% being performed under night time possession of 4 hrs with associated inefficiencies of working; therefore total duration of 10 days required.  | Trams run through to PPL adjacent to the work site  | 10 days   |
| Track works including placing of sleepers and fixing and setting of rails etc.<br><br>(Section of outbound track from the crossover to tie into the track laid over Broughton Street to make the connection). Assumed to be 10 days duration but 100% being performed under night time possession of 4 hrs              | Trams run through to PPL adjacent to the work site  | 25 days   |

| <b>Task Description</b>  | <b>Impact to Operations<br/>(Assuming a level of disruption due to the physical works required)</b> | <b>Approx. Duration<br/>(days and including disruption due to night time working)</b> |
|--|---|---|
| with associated inefficiencies of working; therefore total duration of 25 days required.   |   |   |
| Installation of formwork for outbound track slab concrete. Assumed to be 2 days duration but 100% being performed under night time possession of 4 hrs with associated inefficiencies of working; therefore total duration of 5 days required.         | Trams run through to PPL adjacent to the work site  | 5 days  |
| Pouring of track slab concrete. Assumed to be 5 days duration but 100% being performed under night time possession of 4 hrs with associated inefficiencies of working; therefore total duration of 10 days required.                                   | Trams run through to PPL adjacent to the work site  | 10 days   |
| Placement of drainage boxes, IMU boxes etc. Assumed to be 2 days duration but 100% being performed under night time possession of 4 hrs with associated inefficiencies of working; therefore total duration of 4 days required.                        | Trams run through to PPL adjacent to the work site  | 4 days  |
| Installation of formwork and reinforcement for concrete shoulders. Assumed to be 5 days duration but 50% being performed under night time possession of 4 hrs with associated inefficiencies of working; therefore total duration of 10 days required. | Trams run through to PPL adjacent to the work site  | 10 days   |
| Pouring of concrete shoulders and coverage layer. Assumed to be 10 days duration but 50% being performed under night time possession of 4 hrs with associated inefficiencies of working; therefore total duration of 15 days required.                 | Trams run through to PPL adjacent to the work site  | 15 days   |
| Complete tie in to carriageway and outbound track. Assumed to be 5 days duration but 50% being performed under night time possession of 4 hrs with associated inefficiencies of working; therefore total duration of 10 days required.                 | Trams run through to PPL adjacent to the work site  | 10 days   |
| Civil finishing works (lining etc.). Assumed to be 5 days duration but 50% being performed under night time possession of 4 hrs with associated inefficiencies of working; therefore total duration of 10 days required.                               | Trams run through to PPL adjacent to the work site  | 10 days   |

| Task Description   | Impact to Operations<br>(Assuming a level of disruption due to the physical works required)         | Approx. Duration<br>(days and including disruption due to night time working) |
|--|---|---|
| Rework to the OLE to take it from serving just the inbound track to both tracks.   | Trams terminate at West End Princes Street due to isolation points and existing turn back facility. | 5 days  |
| Dynamic gauging of the new track at YPL to allow it to be used to stable a tram.<br><br>The dual track cannot be used for trams as there is no enhancement to the YPL crossover. The dual track can only be used when full turnback facilities are provided further down the alignment   |   | 1 day   |
| Joint Sealant works. Assumed to be 2 days duration but 100% being performed under night time possession of 4 hrs with associated inefficiencies of working; therefore total duration of 4 days required<br><br>(Outbound track only).<br><br>Note: This work is weather dependent and can only be completed when the temperature is above 5oC therefore a programme review is required to determine if these works can be done at night. |   | 4 days  |

Table 5: Overview of works at York Place/Picardy Place

This methodology and approximate durations for each task assume no utility conflicts. The methodology assumes that a suitable traffic management scheme can be implemented that closes York Place west bound from Broughton Street to Elder Street. Picardy Place/Broughton Street junction may need to be configured in such a way as to allow the appropriate length of rail to be placed. It assumes that appropriate traffic management is in place to allow any necessary advance or interim ducting required assuming that PPL Stop is constructed prior to any works at YPL. Further to this it is assumed the works to construct the new PPL junction, in its entirety with in the tram works limit of deviation, are ongoing at the same time or completed in advance as the new arrangement is required to facilitate the new PPL Stop.

It has been assumed the general working window is 4 hours under possession. This is an inefficient way of working and it cannot be assumed that this equates to half a standard shift. The programmed works have to take account of leaving the site safe for the passage of a tram upon completion of each nights work. This is not required under normal working conditions. There is also no ability to extend a shift if works are going well or if the works have been disrupted.

The requirement for floating track slab is to be assessed following noise and vibration works. Currently it is assumed no floating track slab is required.

There has been no allowance made for ET to perform their own tests. It is also assumed minimum driver training will be required to support the testing and operation of the infrastructure as there is no significant differences to driver training being introduced. ET must advise on their requirements.

The OLE and the works required to extend the alignment is significant if disruption is to be avoided. The current platform sits over the proposed outbound track and incorporates one OLE pole which require moving. The works required to the OLE arrangement are attached in Appendix C. To try and reduce disruption the following sequence of works can be assumed in the OLE extension works transition zone:

- New pole locations to be constructed first.
- Once completed the inbound overhead line section from west of YPL to East of PPL is re-installed and commissioned. It is questionable if this can be done in one night shift. Alternatively the existing wire run can be used and extended with a 'connector'. This however common practice in OLE repairs but usually unwanted by clients on new systems.
- Once YPL Stop is demolished the OLE pole 120+720 can be repositioned and the outbound wire beyond YPL be installed.
- T&C prior to any operational tram running required at appropriate stages.

The methodology assumes the CoCP for used in the first phase is applicable. The methodology is shown in series as a list of tasks; however, some works may be able to be run concurrently. The methodology assumes one squad for each activity working within CoCP guidelines.

This is provided as a high level proposal. There may be certain constraints which have not been considered. A full technical and programme review is required at the next stage of the project to determine the preferred sequencing. It is recommended that during the review full consideration is given to allowing an increased disruption to current operations to aid construction of the extension.

## 4 Section by Section Overview

The OBC is being developed to provide CEC with a suite of options which allow for the staged construction of the extension. All these stages include some or all of the elements of construction works described above. The table 6 below notes each stage, IFC design status, the key elements of construction required or where changes are needed to the base line route (York Place to Newhaven) to accommodate the staging. These changes will be discussed as separate items under this section.

|                    | York Place to Newhaven   | York Place to McDonald Road   | York Place to The Foot of the Walk  | York Place to Ocean Terminal   |
|--------------------|--|---|---|--|
| Traffic Management | <p>York Place to London Road Set Up, Manage and Remove including wider city diversionary works.</p> <p>London Road to Foot of the Walk Set Up, Manage and Remove including wider city diversionary works.</p> <p>Foot of the Walk to Constitution Place Set Up, Manage and Remove including wider city diversionary works.</p> <p>Forth Ports Set Up, Manage and Remove including wider city diversionary works.</p> | <p>York Place to London Road Set Up, Manage and Remove including wider city diversionary works.</p> <p>London Road to McDonald Road (truncated version of TM between London Road and Foot of the Walk) Set Up, Manage and Remove including wider city diversionary works.</p> | <p>York Place to London Road Set Up, Manage and Remove including wider city diversionary works.</p> <p>London Road to Foot of the Walk Set Up, Manage and Remove including wider city diversionary works.</p>   | <p>York Place to London Road Set Up, Manage and Remove including wider city diversionary works.</p> <p>London Road to Foot of the Walk Set Up, Manage and Remove including wider city diversionary works.</p> <p>Foot of the Walk to Constitution Place Set Up, Manage and Remove including wider city diversionary works.</p> <p>Forth Ports to Ocean Terminal (removing phases 5 -9) Set Up, Manage and Remove including wider city diversionary works</p> |
| Utility Diversions | <p>Advanced Utility investigations</p> <p>General Utility Clearance Works.</p> <p>Scottish Water Legacy Works.</p> <p>Scottish Water CCTV Surveys.</p> <p>Picardy Place Realignment Utility Works.</p> <p>Works to Protect, Divert of Remove Scottish Power Tunnel.</p>  | <p>Advanced Utility investigations</p> <p>General Utility Clearance Works.</p> <p>Scottish Water Legacy Works.</p> <p>Scottish Water CCTV Surveys.</p> <p>Picardy Place Realignment Utility Works.</p> <p>Works to Protect, Divert of Remove Scottish Power Tunnel.</p>       | <p>Advanced Utility investigations</p> <p>General Utility Clearance Works.</p> <p>Scottish Water Legacy Works.</p> <p>Scottish Water CCTV Surveys.</p> <p>Picardy Place Realignment Utility Works.</p> <p>Works to Protect, Divert of Remove Scottish Power Tunnel.</p> | <p>Advanced Utility investigations</p> <p>General Utility Clearance Works.</p> <p>Scottish Water Legacy Works.</p> <p>Scottish Water CCTV Surveys.</p> <p>Picardy Place Realignment Utility Works.</p> <p>Works to Protect, Divert of Remove Scottish Power Tunnel.</p>  |



|                          | York Place to Newhaven   | York Place to McDonald Road  | York Place to The Foot of the Walk   | York Place to Ocean Terminal   |
|--------------------------|--|--|--|--|
|                          | 275Kv Arthur Street.<br>Jane Street Diversions<br>Baltic Street Diversion Works.<br>Constitution Street Sewer.<br>Constitution Street Gas main Works.<br>Forth Ports Sewers.<br>Lindsay Road Sewer.  |  | 275Kv Arthur Street.<br>Jane Street Diversions   | 275Kv Arthur Street.<br>Jane Street Diversions<br>Baltic Street Diversion Works.<br>Constitution Street Sewer.<br>Constitution Street Gas main Works.<br>Forth Ports Sewers.   |
| Archaeology              | Archaeological Watching Brief from York Place to Foot of the Walk.<br>Archaeological Excavation & Investigation Works between Foot of the Walk and Constitution Place.<br>Constitution Street Wall Archaeological remains removal, storage and reburial.<br>Archaeological Watching Brief from Constitution Place to Newhaven. | Archaeological Watching Brief from York Place to McDonald Road.  | Advanced Archaeological investigations<br>Archaeological Watching Brief from York Place to Foot of the Walk.   | Advanced Archaeological investigations<br>Archaeological Watching Brief from York Place to Foot of the Walk.<br>Archaeological Excavation & Investigation Works between Foot of the Walk and Constitution Place.<br>Constitution Street Wall Archaeological remains removal, storage and reburial.<br>Archaeological Watching Brief from Constitution Place to Ocean Terminal. |
| Significant Design Items | Design of the tie in works to support single line running to Picardy Place<br>Design of Utility diversions<br>Design of the trackslab over/adjacent to the Scottish Power tunnel   | Design of the tie in works to support single line running to Picardy Place<br>Design of Utility diversions<br>Design of the trackslab over/adjacent to the Scottish Power tunnel | Design of the tie in works to support single line running to Picardy Place<br>Design of Utility diversions<br>Design of the trackslab over/adjacent to the Scottish Power tunnel | Design of the tie in works to support single line running to Picardy Place<br>Design of Utility diversions<br>Design of the trackslab over/adjacent to the Scottish Power tunnel   |

|                 | York Place to Newhaven  | York Place to McDonald Road  | York Place to The Foot of the Walk   | York Place to Ocean Terminal   |
|-----------------|---|--|--|--|
|                 | <p>Full design of York Place to Picard Place tram alignment</p> <p>Full design of the new Picardy Place road junction</p> <p>Leith Walk analysis following the Leith Programme works</p> <p>London Road/Leith Walk junction redesign</p> <p>Design of the trackslab spanning the Network Rail overbridge</p> <p>Design finalisation of Tower Place and Victoria Dock to accommodate the tramway i.e. OLE corbels, ducting, bridge expansion joints and trackform</p> <p>Redesign of Ocean Terminal Stop due to de-scoping</p> | <p>Full design of York Place to Picard Place tram alignment</p> <p>Full design of the new Picardy Place road junction</p> <p>Leith Walk analysis following the Leith Programme works</p> <p>London Road/Leith Walk junction redesign</p> <p>Redesign associated with the revised termination point</p> | <p>Full design of York Place to Picard Place tram alignment</p> <p>Full design of the new Picardy Place road junction</p> <p>Leith Walk analysis following the Leith Programme works</p> <p>London Road/Leith Walk junction redesign</p> <p>Design of the trackslab spanning the Network Rail overbridge</p> <p>Redesign associated with the revised termination point</p> | <p>Full design of York Place to Picard Place tram alignment</p> <p>Full design of the new Picardy Place road junction</p> <p>Leith Walk analysis following the Leith Programme works</p> <p>London Road/Leith Walk junction redesign</p> <p>Design of the trackslab spanning the Network Rail overbridge</p> <p>Design finalisation of Tower Place and Victoria Dock to accommodate the tramway i.e. OLE corbels, ducting, bridge expansion joints and trackform</p> <p>Redesign of Ocean Terminal Stop due to de-scoping and to make it a terminus stop</p> |
| Civil Work      | Approximately 4600m of general civil works  | Approximately 700m of general civil works  | Approximately 1800m of general civil works   | Approximately 3700m of general civil works   |
| Structural Work | <p>Work to the Scottish Power Tunnel</p> <p>Network Rail Overbridge</p> <p>South Leith Parish Church wall</p> <p>Tower Place Bridge</p> <p>Victoria Dock Bridge</p> <p>Works to the existing partially constructed Lindsay Road retaining wall</p>  | <p>Work to the Scottish Power Tunnel</p>   | <p>Work to the Scottish Power Tunnel</p> <p>Network Rail Overbridge</p>  | <p>Work to the Scottish Power Tunnel</p> <p>Network Rail Overbridge</p> <p>South Leith Parish Church wall</p> <p>Tower Place Bridge</p> <p>Victoria Dock Bridge</p>  |

|                                  | York Place to Newhaven  | York Place to McDonald Road   | York Place to The Foot of the Walk   | York Place to Ocean Terminal   |
|----------------------------------|---|---|--|--|
| Track work                       | <p><b>Track slab:</b></p> <p>Approximately 980m floating Track</p> <p>Approximately 60m Rheda City Soft</p> <p>Approximately 125m thin special track to cross structures</p> <p><b>Crossovers:</b></p> <p>Foot of the walk - Single</p> <p>Newhaven Stop-Scissors</p> | <p><b>Track slab:</b></p> <p>Approximately 140m Floating Track</p> <p><b>Crossovers:</b></p> <p>McDonald Road stop - Scissors</p> | <p><b>Track slab:</b></p> <p>Approximately 100m Floating Track</p> <p>Approximately 40m Rheda City Soft</p> <p>Approximately 20m thin special track to cross structures</p> <p><b>Crossovers:</b></p> <p>Foot of the Walk - Scissors</p> | <p><b>Track slab:</b></p> <p>Approximately 980m floating Track</p> <p>Approximately 60m Rheda City Soft</p> <p>Approximately 125m thin special track to cross structures</p> <p><b>Crossovers:</b></p> <p>Foot of the Walk - single.</p> <p>Ocean Terminal Stop - Scissors</p> |
| Stops                            | <p>Picardy Place</p> <p>McDonald Road</p> <p>Balfour Street</p> <p>Foot of the Walk</p> <p>Bernard Street</p> <p>Port of Leith</p> <p>Ocean Terminal</p> <p>Newhaven</p>  | <p>Picardy Place</p> <p>McDonald Road</p>   | <p>Picardy Place</p> <p>McDonald Road</p> <p>Balfour Street</p> <p>Foot of the Walk - This stop would be moved in to Leith Walk</p>  | <p>Picardy Place</p> <p>McDonald Road</p> <p>Balfour Street</p> <p>Foot of the Walk</p> <p>Bernard Street</p> <p>Port of Leith</p> <p>Ocean Terminal</p>   |
| Overhead Line and Traction Power | <p><b>Substations:</b></p> <p>Leith Walk</p> <p>Leith Sands</p> <p><b>Overhead Line:</b></p> <p>4600m terminating at Newhaven Stop</p>  | <p><b>Substations:</b></p> <p>No new required</p> <p><b>Overhead Line:</b></p> <p>700m terminating at McDonald Road Stop</p>      | <p><b>Substations:</b></p> <p>Leith Walk</p> <p><b>Overhead Line:</b></p> <p>1800m terminating at relocated Foot of the Walk Stop</p>  | <p><b>Substations:</b></p> <p>Leith Walk</p> <p>Leith Sands</p> <p><b>Overhead Line:</b></p> <p>980m terminating at Ocean Terminal Stop</p>  |
| Tramway control systems          | <p>All works for the full alignment including provision of the radio base station</p>   | <p>All works to McDonald Road Stop including provision of the radio base station</p>  | <p>All works to the Foot of the Walk Stop including provision of the radio base station</p>  | <p>All works to Ocean Terminal Stop including provision of the radio base station</p>  |
| Traffic Junctions                | <p>Realignment of Picardy Place</p> <p>Realignment of London Road</p> <p>Balfour Street public realm works</p>  | <p>Realignment of Picardy Place</p> <p>Realignment of London Road</p> <p>5 junctions requiring signalisation</p>                  | <p>Realignment of Picardy Place</p> <p>Realignment of London Road</p> <p>Balfour Street public realm works</p>   | <p>Realignment of Picardy Place</p> <p>Realignment of London Road</p> <p>Balfour Street public realm works</p>   |

|                            | York Place to Newhaven  | York Place to McDonald Road                            | York Place to The Foot of the Walk                                      | York Place to Ocean Terminal  |
|----------------------------|---|--|---|---|
|                            | Foot of The Walk realignment<br>Forth Ports roundabout removal<br>Lindsay Road works<br>21 junctions requiring signalisation                                      |  | Foot of The Walk realignment<br>10 junctions requiring signalisation    | Foot of The Walk realignment<br>Forth Ports roundabout removal<br>16 junctions requiring signalisation  |
| Third Party Interfaces     | Edinburgh St. James<br>Leith Programme<br>SP / SW / SGN<br>Network Rail<br>South Leith Parish Church<br>Forth Ports<br>Casino<br>33 Ocean Drive<br>Ocean Terminal | Edinburgh St. James<br>Leith Programme<br>SP/ SW / SGN | Edinburgh St. James<br>Leith Programme<br>SP / SW / SGN<br>Network Rail | Edinburgh St. James<br>Leith Programme<br>SP / SW / SGN<br>Network Rail<br>South Leith Parish Church<br>Forth Ports<br>Casino<br>33 Ocean Drive<br>Ocean Terminal |
| Tie in to existing tramway | As described in the section above   |  |   |   |

Table 6: Changes to York Place to Newhaven base case alignment

**4.1 York Place to McDonald Road**

To facilitate the termination of the route at McDonald Road the requirements as shown in figure 14 is required:

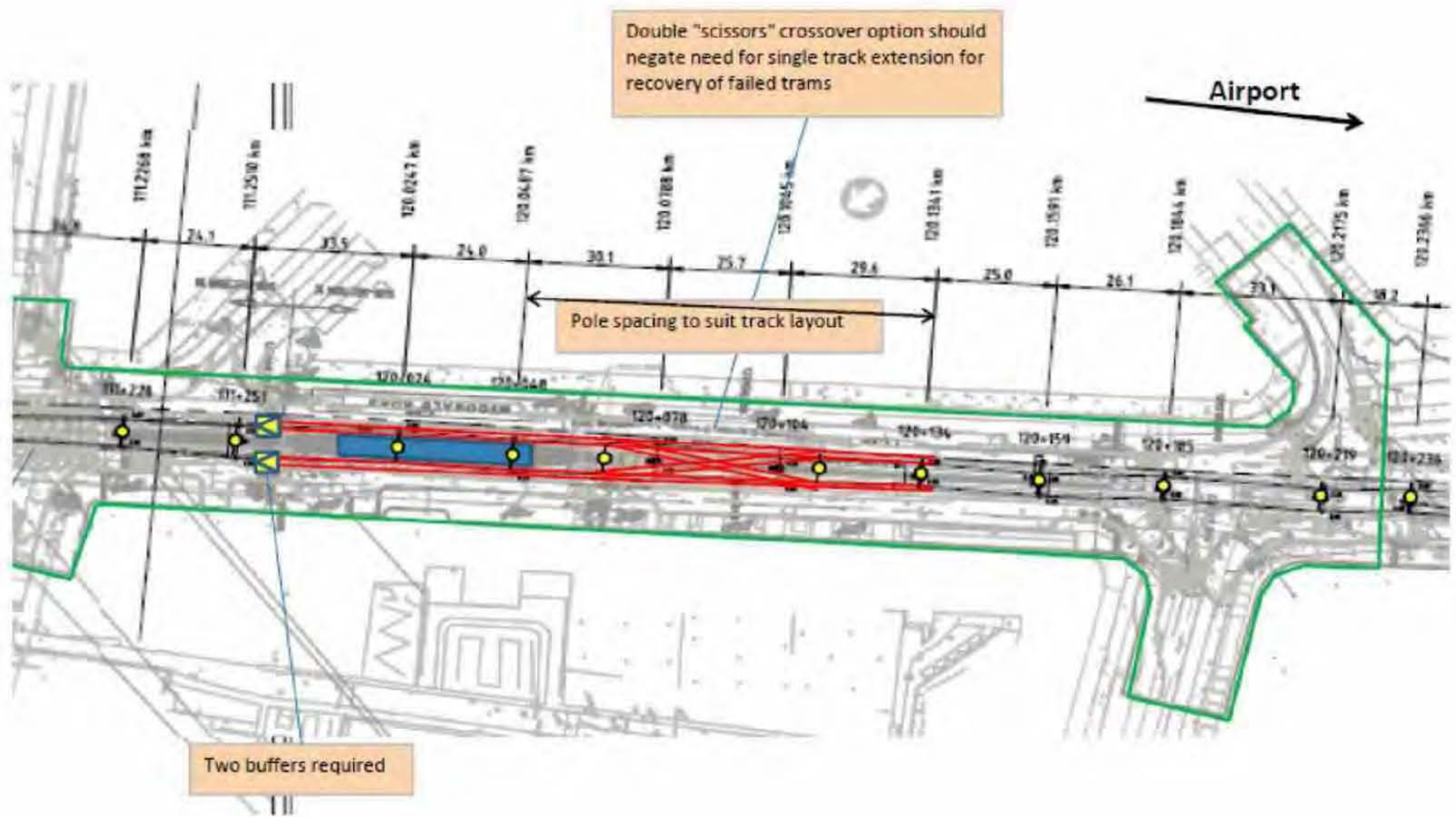


Figure 14: Proposed layout if terminating at McDonald Road

It is assumed the track would terminate prior to Brunswick Street to prevent disruption to the Brunswick Street/McDonald Road junction. If there is a need to stable a tram during operational hours this will be done at the stop.

The OLE alignment will require minor redesign to accommodate the termination.

A full scissors crossover would be provided to allow for optimal operational usage. This crossover would be constructed on a floating trackslab due to its proximity to listed building in the area.

The substation on Leith Walk would be required if terminating at the Foot of the Walk.

**4.2 York Place to the Foot of the Walk**

To facilitate the termination of the route at the Foot of the Walk the requirements as shown in figure 15 is required:

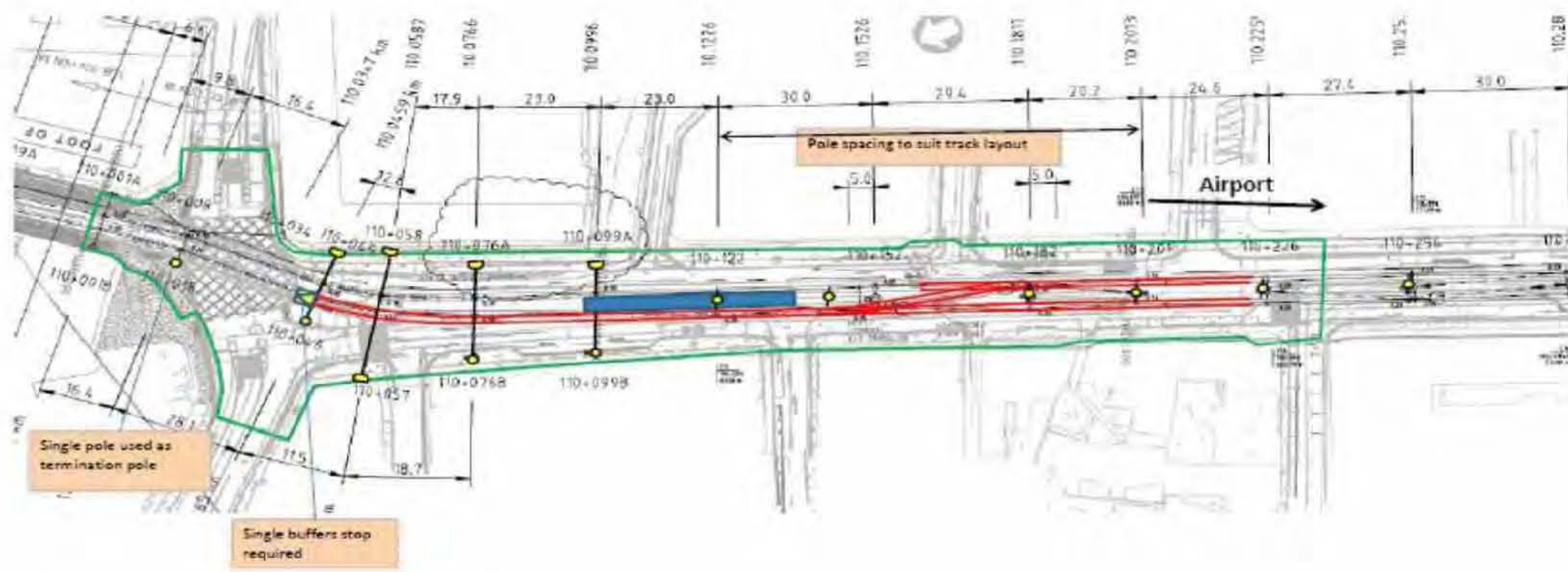


Figure 15: Proposed layout if terminating at the Foot of the Walk

An arrangement very similar to the current York Place Stop will be used. Facility to stable a tram will be provided behind the stop and the crossover provided to move the trams from the inbound to the out bound track.

The Stop will be moved from the proposed location, on Constitution Street to Leith Walk to prevent disruption to the Duke Street/Leith Walk/Great Junction Street junction.

The traction power substation, and associated ducting, on Leith Walk will have to be provided.

**4.3 York Place to Ocean Terminal**

In order to extend the route to Ocean Terminal the traction power substation, and associated ducting, at Leith Sands will have to be provided.

A full scissors crossover would be provided in front of Stop for optimal operational usage.

## 5 Programme

### 5.1 Overview

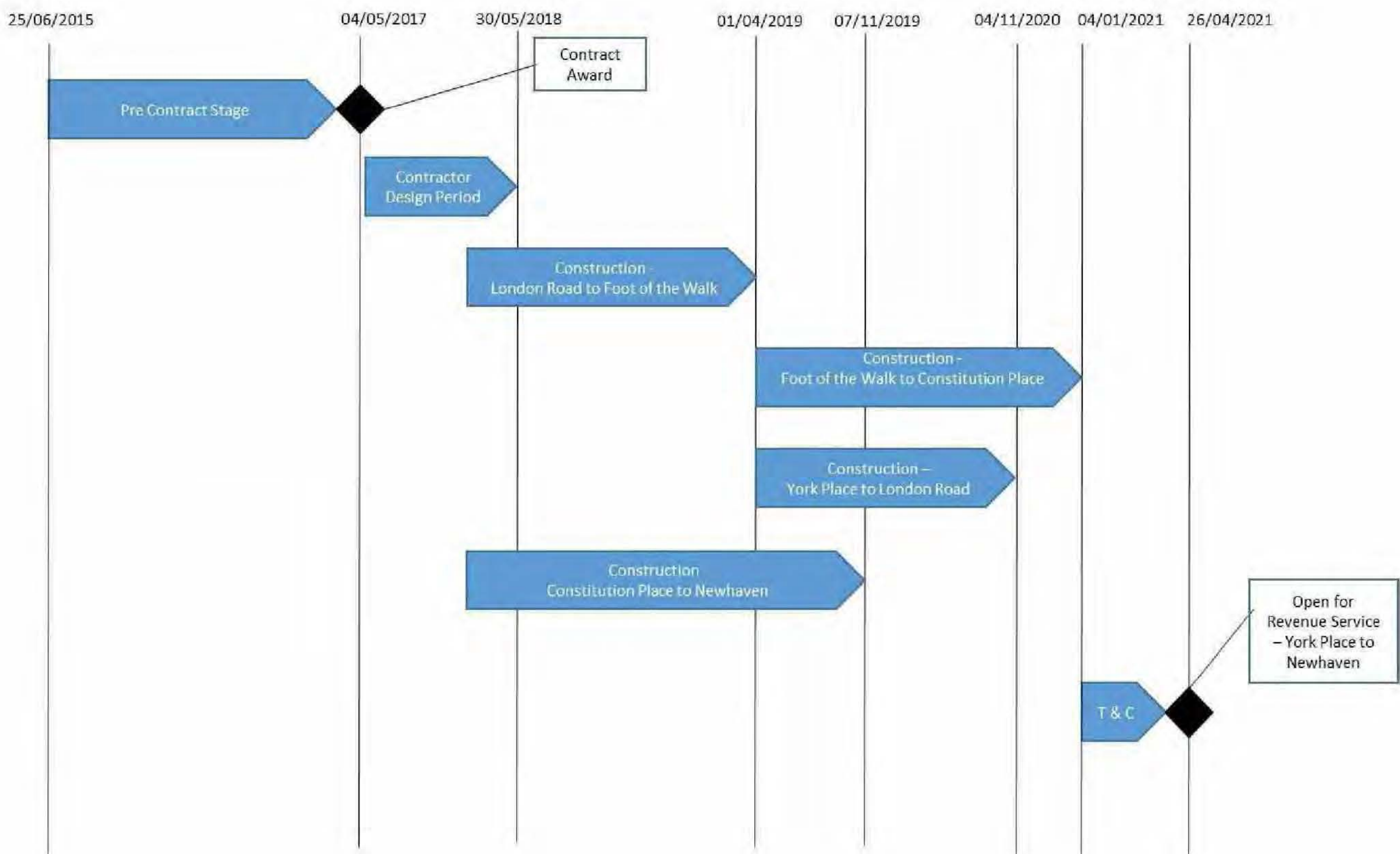
The programme has been developed based on the following:

- The method of working developed when constructing York Place under the first phase and noted in section 4.
- The durations are based on those provided in the programme for the first phase of tram.
- The traffic management sequencing agreed at the TWG established to develop the OBC.
- Ongoing discussions and agreements with the TWG and others (John Lawson, City Archaeologist).

The full programme can be found in Appendix C.

### 5.2 Assumed sequencing

The following is the assumed sequencing of the works for the full scheme between York Place and Newhaven, taking into account traffic management constraints:



The above diagram can be illustrated in table form below:

| Item   | Start Date | End Date | Duration  |
|--|------------|----------|-----------|
| Pre Contract Stage<br><i>(this includes mobilisation, advanced Site Investigation, Advanced Accommodation Works and Tendering Periods)</i> | 25/06/15   | 03/05/17 | 22 months |
| Contract Award   | 04/05/17   | 04/05/17 | N/A       |
| Contractor Mobilisation & Design Stage   | 04/05/17   | 30/05/18 | 13 months |
| London Road to Foot of the Walk Construction   | 10/01/18   | 01/04/19 | 15 months |
| Foot of the Walk to Constitution Place Construction  | 02/04/19   | 04/01/21 | 21 months |
| York Place to London Road Construction   | 01/04/19   | 04/11/20 | 20 months |
| Constitution Place to Newhaven Construction  | 10/01/18   | 07/11/19 | 22 months |
| Testing & Commissioning  | 04/01/21   | 26/04/21 | 4 months  |
| Open for Revenue Service   | 26/04/21   | 26/04/21 | N/A       |

Table 7: Programme duration for York Place to Newhaven



### 5.3 Programme durations

Using the details above and assuming a duration of 10 months for the section between London Road and MacDonald Road the following durations have been determined for each option:

|   | York Place to Newhaven                       | York Place to McDonald Road                     | York Place to Foot of the Walk               | York Place to Ocean Terminal                 |
|---|--|---|--|--|
| <b>Project Duration</b>   | <b>70 Months</b><br>(June 2015 – April 2021) | <b>64 Months</b><br>(June 2015 – November 2020) | <b>68 Months</b><br>(June 2015 – March 2021) | <b>70 Months</b><br>(June 2015 – April 2021) |
| Pre Contract Stage <i>(this includes mobilisation, advanced Site Investigation, Advanced Accommodation Works and Tendering Periods)</i> | 22 months<br>(June 2015 – May 2017)          | 22 months<br>(June 2015 – May 2017)             | 22 months<br>(June 2015 – May 2017)          | 22 months<br>(June 2015 – May 2017)          |
| Contract Award  | May 2017                                     | May 2017  | May 2017                                     | May 2017                                     |
| <b>Contract Duration</b>  | <b>48 months</b>                             | <b>42 months</b>                                | <b>46 months</b>                             | <b>48 months</b>                             |
| Contractor Mobilisation & Design Stage  | 13 months<br>(May 2017 – May 2018)           | 13 months<br>(May 2017 – May 2018)              | 13 months<br>(May 2017 – May 2018)           | 13 months<br>(May 2017 – May 2018)           |
| Site Construction Period  | 36 months<br>(January 2018 – January 2021)   | 30 months<br>(January 2018 – July 2020)         | 34 months<br>(January 2018 – November 2020)  | 36 months<br>(January 2018 – January 2021)   |
| Testing & Commissioning   | 4 months<br>(January 2021 – April 2021)      | 4 months<br>(July 2020 – November 2020)         | 4 months<br>(November 2020 – March 2021)     | 4 months<br>(January 2021 – April 2021)      |
| Open for Revenue Service  | April 2021                                   | November 2020                                   | March 2021                                   | April 2021                                   |

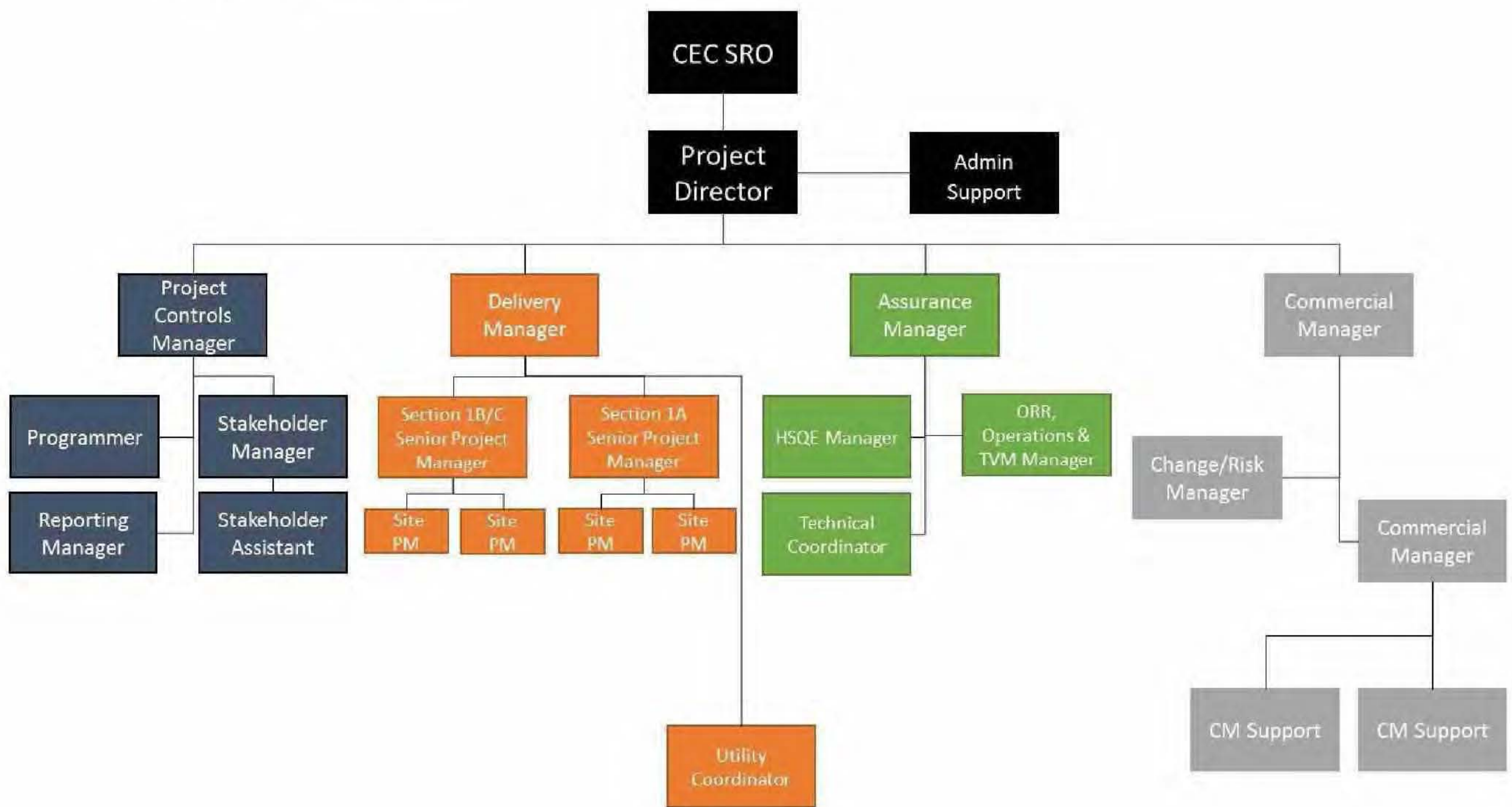
Table 8: Programme duration by option

## 6 Contract Management

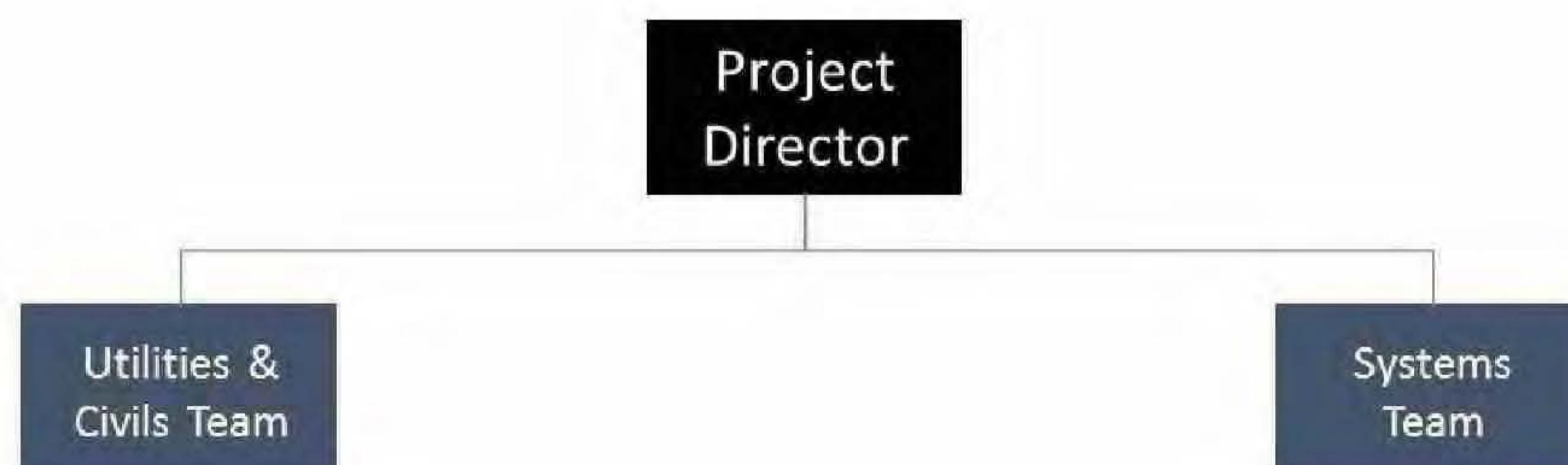
### 6.1 Management teams

The organisation charts below highlight the assumed management teams required for the key organisations.

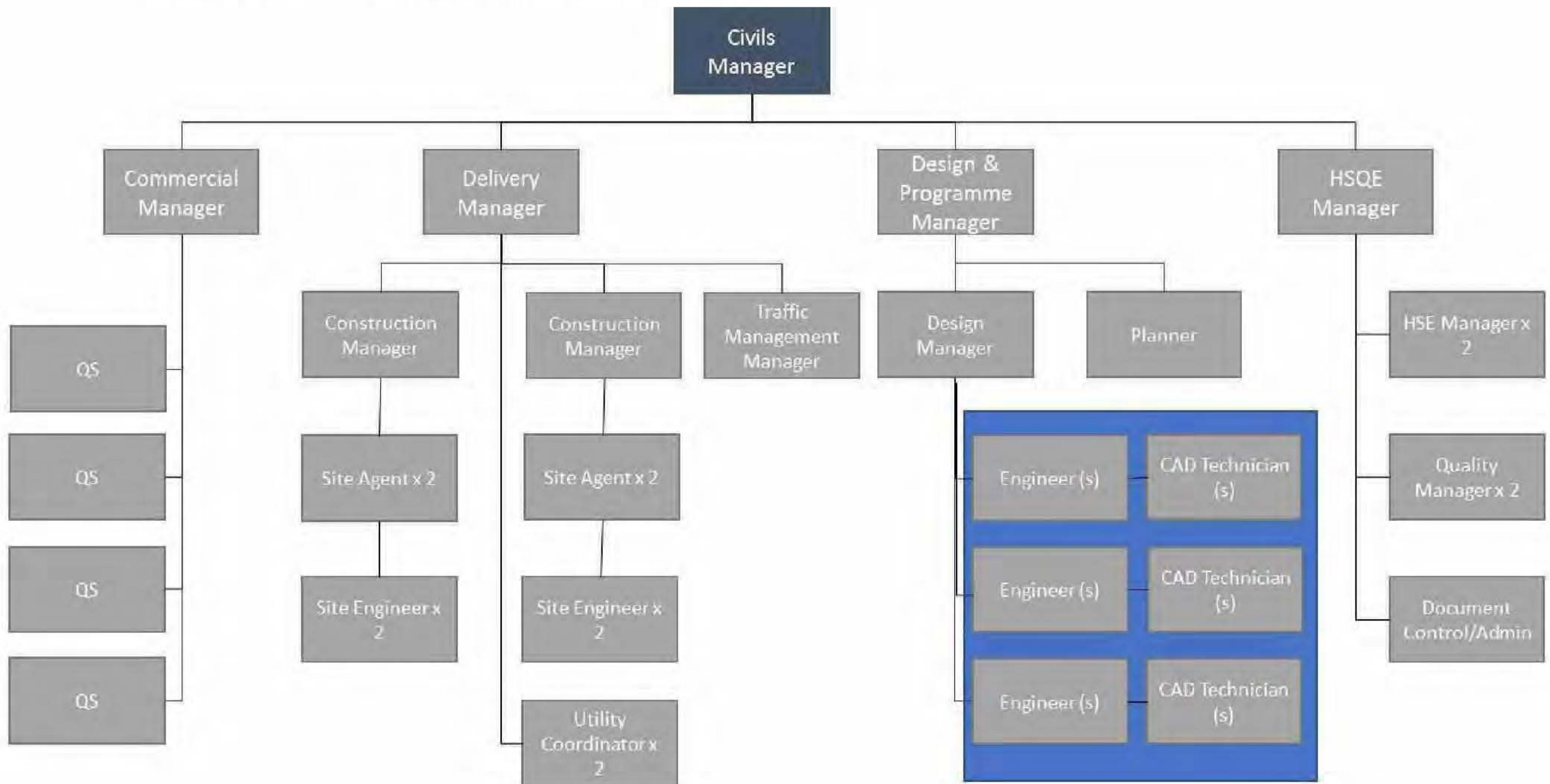
#### 6.1.1 Client Team



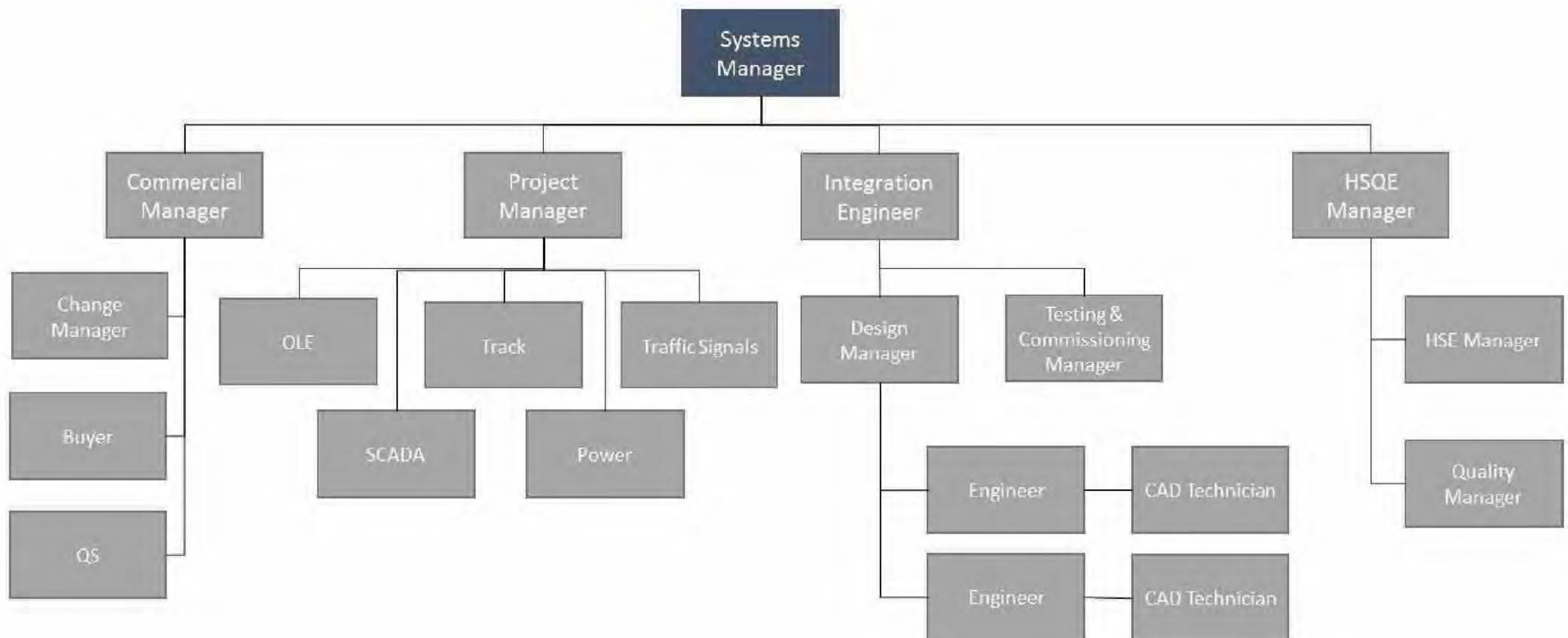
#### 6.1.2 Main Contractor



6.1.2.1 Utilities & Civils Sub Section



6.1.2.2 Systems Sub Section



## 7 Recommendations/ Next Steps

To ensure a robust procurement process and then onto delivery of the extension phase of the Edinburgh Tram the project would benefit from the following:

- **Traffic Management Modelling** – Following discussions with the TWG and agreement with the Project Board around the traffic management approach detailed above it is proposed that the plans are further developed and a level of traffic modelling is carried out on the traffic management approach to ensure a workable solution is available. During this exercise it is also proposed that a scoping exercise is undertaken to establish the level of works required to the diversionary routes to accommodate any increase in traffic due to the diversions.
- **Advanced Utility Site Investigation** – As part of this study a utility conflict schedule has been developed based on a desktop study. Within the next stage of the project it is advised that a series of advanced site investigation works are carried out in key areas identified by the utility conflict schedule. These areas are as follows:
  - Location 1 – Picardy Place in front of Cathedral
  - Location 2 – Picardy Place at Crossing of Scottish Power Tunnel
  - Location 3 – London Road Junction
  - Location 4 – Elm Row at Scottish Power Tunnel
  - Location 5 – Leith Walk Railway Bridge
  - Location 6 – Balfour Street Tramstop (275Kv)
  - Location 7 – Jane Street Junction
  - Location 8 – Foot of the Walk Tramstop area
  - Location 9 – Queen Charlotte Street Junction
  - Location 10 – Bernard Street/Baltic Street Junction
  - Location 11 – Lindsay Road Sewer

This advanced site investigation should be carried out ahead of the procurement and tender production to allow the advanced site investigation to inform the Tender Documentation, level of risk transfer and inform the accuracy of the as built information currently available.

- **Advanced Archaeological Site Investigation** – As part of this study various discussions have been held with the City Archaeologist to understand the likely finding of archaeological findings of interest during the project. Within the next stage of the project it is advised that a series of advanced site investigation works are carried out in key areas identified by through the discussions with the City Archaeologist. These areas are as follows
  - Location 12 – 1817 Dock structure at Ocean Terminal
  - Location 13 – Queen Charlotte Street to Baltic Street Archaeological Findings

This advanced site investigation should be carried out ahead of the procurement and tender production exercise to allow the advanced site investigation to inform the Tender Documentation.

- **Constitution Street Wall Advanced Works** – Due to the level of risk around the historic cemetery wall at Constitution Street and the impact on the programme if these works were to be carried out in conjunction with the main works it is advised that a separate advanced works contract should be procured to carry out the following scope to the wall:

- Advanced Consultation with church & family members affected by works
  - Careful dismantling, removal and labelling of existing wall parts
  - Removal/Archaeological dig of around 200nr bodies under wall
  - Construction of foundations as shown on attached drawing
  - Restoration of wall
  - Reinstatement of wall
- **Market Condition Survey** – Due to current market conditions and the competitive nature of the construction market at present it is advised that the CEC should embark on a level of market testing within the next phase of the project to advise on the level of appetite within the market for the project, level of risk exposure Contractors are willing to take on the project and delivery model Contractors will willingly Tender the project.
  - **Edinburgh St James Agreement Conclusion** – Within the early stages of the next phase of the project it is advised that any scope arrangements in relation to the agreement with the Edinburgh St James Development be ratified to ensure scope is well defined for the market testing element and the Tender production phase.
  - **3<sup>rd</sup> Party Engagement** – Throughout this phase of the OBC development most 3<sup>rd</sup> parties involved in the project have been engaged with. Within the next phase of the project it is advised that further ratification of outstanding issues and agreements be reached and agreed governance procedures be put in place with each of the 3<sup>rd</sup> parties. It is also advised a review of the 3<sup>rd</sup> party agreements and consider any additional 3<sup>rd</sup> party agreements that may need to be entered into.
  - **Current Detailed Design** – The TWG considered the current design was at an advanced stage but a thorough review of the current design is recommended to inform the Tender Documentation for the main works particularly with regards to:
    - the tie in works to support single line running to Picardy Place
    - the trackslab over/adjacent to the Scottish Power tunnel
    - the York Place to Picard Place tram alignment
    - the new Picardy Place road junction
    - Leith Walk following the Leith Programme works
    - London Road/Leith Walk junction redesign
    - the trackslab spanning the Network Rail overbridge
    - finalisation of Tower Place bridge and Victoria Dock bridge to accommodate the tramway i.e. OLE corbels, ducting, bridge expansion joints and trackform
    - the redesign of Ocean Terminal Stop due to de-scoping
    - review of the OLE design particularly the proposed building fixings
  - **Design Value Engineering** – During this phase of the OBC development the TWG a number of sections of the design that needed to be completed but along with this discussed areas of the design that could be improved or value engineered. It is advised CEC appoint a team who can review the current design along with the findings of this phase and consider any points of value engineering that may form part of the Tender Documentation.
  - **Operator Input** – The extension of the system though for the main part is isolated from ET. it is recommended discussions commence with them as early as possible and focus on:
    - The sequencing, scheduling and physical nature of the tie in at York Place
    - The requirements with regards to software upgrades and how these are managed.

- **Impact if a sectional approach is considered** – The TWG noted that should the route be extended in sections the following changes would be required to the current scheme:
  - Macdonald Road Termination:
    - The provision of a scissors crossover at the MacDonald Road Stop
    - Reconfiguration of the OLE design
  - Foot of the Walk Termination:
    - New tram stop at the foot of the walk
    - Reconfiguration of the OLE design
    - Road realignment to accommodate the stop
  - Ocean Terminal Termination:
    - Reconfiguration of the OLE design
    - Introduction of a scissors crossover in front of the stop

The above items should be considered when performing the scoping of any future extension.

The above recommendations have been made to inform the procurement of works required to extend the tramway and to highlight the key issues relating to the successful delivery of the extension.

## Appendix A

**A1 - Construction Code of Practice**



**A2 - Design close out report**

**A3 - Cost Plan assumptions**

Appendix B

**B1 - Overhead Line Equipment Building fixing schedule**

**B2 - Trackform schedule**

Appendix C

**C1 - Conflict Schedule**

**C2 - Leith Walk Programme site investigation**



**C3 - Leith Walk archaeological findings report**

**C4 - Advanced site investigation plan**

**C5 - Scottish Power tunnel condition survey**

**C6 - Overhead line works at York Place and Picardy Place**

**C7 - Construction Programme**

**C8 – Constitution Street Wall Works**

**C9 – Forth Ports Sewers**

**C10 – Proposed Site Compound**