



Subway Modernisation - progress update

Date of meeting 24 June 2022

Date of report 7 June 2022

Report by Director of Subway

1. Object of report

To provide to the Partnership the latest progress update on the Subway Modernisation programme.

2. Background

The Subway Modernisation programme is the most significant investment and improvement programme to be undertaken in the Subway within the last 40 years.

The programme was scoped for delivery under five principal workstreams. The first two of these workstreams are now fully complete:

- Stations and accessibility improvements; and
- New Ticketing System.

The three remaining active workstreams are:

- Renewal and Upgrade of Existing Infrastructure & Depot Facilities;
- New Rolling Stock, Signalling and Automated Control Systems; and
- Organisational Change and Employee Relations.

This report provides an update on the key areas of progress and emerging issues since the last written report to the Partnership in December 2021.

Since the last report, restrictions and delays caused by the COVID-19 pandemic have continued to ease. Where and when necessary, COVID-safe working arrangements within SPT and contractor premises has continued to allow site works to progress. Efforts continue to be made across SPT and its supply chain to manage ongoing and emerging issues and minimise impacts to delivery.

3. Progress to date

3.1 Existing infrastructure

Works have continued on the infrastructure workstream with the ongoing focus of completing key improvement and modification works across tunnel, track and line assets, in readiness for the new system. Progress made since the last update is as follows:

- Works to improve structural clearances and gauge infringements within the tunnels as well as adjustments to equipment locations have been completed. Further laser surveys were undertaken and analysed to provide safety assurance prior to the start of tunnel testing.
- The five year programme of further tunnel lining improvements awarded to Freyssinet Ltd continues. The prioritisation for void grouting and lining repair works is based upon the exploratory surveys completed in early 2021.
- Works to confirm the continued health of legacy electrical, telecoms and IT assets have continued with the primary focus of agreeing extensions to the various supply and service contracts that are due to expire in 2022 but are still required to support the existing infrastructure through to the end of life. Extension to the Airwave secure communications contract with an option to take through to end of 2026 is ongoing and finalising terms for the other identified requirements are in progress.
- The conceptual and functional design process for improvements and/or upgrades of the Subway substations is now underway and efforts will be made during this work to maximise energy efficiency principles for both climate and cost purposes. Earthing surveys and analyses are currently ongoing to complete the required inputs, along with SPEN (Scottish Power Energy Networks) supplied network data.
- The Traction Power Negative Feeder cable replacement at Byres Road Substation (Hillhead) has been completed and planning for the next cable replacement at Dundasvale Substation (Cowcaddens) is now underway. Installation works at Dundasvale is expected to be carried out in parallel with nightly train testing, with planned completion by the end of 2022. The remaining three Substations: Broomloan, Cornwall Street and Eglington Street are planned for completion during 2023 and 2024, to align with track access restrictions generated by the ongoing modernisation and training testing activities.

3.2 Broomloan Depot facilities

Work activity to ensure the integrity, reliability and longevity of key assets within Broomloan Depot, in conjunction with readiness and new asset introduction, continues. The staff welfare and office facilities at Broomloan Depot were upgraded and modernised prior to the commencement of the other Depot improvements. In addition, the key areas of progress on this workstream are:

- The required Stabling Shed extension commenced at the start 2021 and was completed by the end of the calendar year. The extended building provides four additional berths to stable the future enlarged fleet. Throughout the works, effective stakeholder engagement was necessary with nearby residents (noise) and monitoring of the tunnels (vibration), as well as engagement with Operations colleagues in order to have agreed phased working within isolated possessions at the entrance to the existing stabling shed.
- The installation of the mechanical and electrical fit out, testing and commissioning for the Automatic Train Inspection (ATI) equipment has been completed. Following completion of training, this equipment will be handed over to SPT during 2022.
- Fit out of the new control and signalling equipment with the new Operational Control Centre (OCC) building is largely complete and focus remains on cabling from trackside infrastructure into the OCC.

- Following survey of the retaining walls of the ramp access to the sub-surface tunnels at Broomloan Depot, an improvement works scope has been defined and appropriate repair designs developed. The tendering process has been concluded and a preferred supplier identified. To facilitate the ability to undertake the works on the ramps in parallel with train testing, there is a need to reconfigure the electrical traction layout in Broomloan Depot and to update operational procedures. These changes are underway alongside finalising the agreement with the preferred supplier.
- Power cabling installation into the newly installed cable ducts and draw pit chambers through the operational yard area is continuing.

3.3 New Rolling Stock and Control Systems

All of the following activity is delivered by ANSTA and their sub-contracted supply chain under the Manufacturing & Supply Agreement (MSA) contract:

- As reported previously, off-line dynamic testing on the test track of the first three trains delivered to Glasgow is now complete with any design improvements identified being carried forward to the serial production of further units.
- In-tunnel testing of the new trains at night successfully commenced on the morning of 5 April 2022. This is an extremely significant milestone for the project and is described in more detail in the section below.
- As reported previously, Stadler commenced the full scale production run of the remaining 14 trains. The Factory Acceptance Tests of trains 4 and 5 have now been completed, and these trains have now also arrived in Glasgow. Trains will now be delivered approximately one per month with the final unit due to arrive in Glasgow in the summer of 2023. The trains in Glasgow remain the property of ANSTA until all testing is complete. The final detailed design work elements for the signalling, telecoms and controls systems and software are nearing completion.
- ANSTA has now completed the detailed design of the system to allow new trains to temporarily run on the existing signalling and control systems, until the new control system commissioning is complete. Additional trackside equipment has now been installed and associated on-train software has been designed.
- Installation of the new signalling and control equipment in station equipment rooms has been completed in all stations with snagging currently underway. The ongoing installation of signalling equipment and cabling within the system means that ceiling cable ways remain exposed in certain parts of the system. This will be remedied as soon as practically possible.
- Installation, testing and commissioning of the Automatic Train Inspection equipment has been completed.
- ANSTA has been experiencing some issues with one of the subcontractors for installation of the new signalling and control equipment in the tunnels. An alternative subcontractor has now been appointed and an extensive programme of works is due to commence by the end of Q2 2022.
- Trackside signalling communication beacons ('balises') that will be used for precise positioning of the new trains have now been installed at all stations and through both circles and will shortly be installed within the operational yard and stabling shed areas.
- Installation of the new CCTV system has continued with a focus on the platform cameras and driver despatch screens (to allow the drivers a full view

of the platform) in stations that will be required when the new vehicles come into passenger use.

- SPT continues to challenge and monitor the evidence provided by ANSTA to demonstrate the safety case required under SPT's Safety Verification (SV) Scheme. Based upon the required assurance review carried out earlier in 2021, the specific portfolio of evidence required for mainline testing has been collated to allow commencement of tunnel testing.

The safety of all staff, contractors and customers remains the top priority for the Subway Modernisation programme and to support this, SPT continues to work with ANSTA to ensure that all works are carried out using safe systems of work and that industry standard best practise is used. Any 'near miss' events are thoroughly investigated to ensure that any unsafe conditions are eliminated as and when they are observed, and lessons are learned to prevent future repeat occurrences.

3.4 Commencement of in-tunnel testing

Following the previously reported initial tunnel entry exercise on 5 December 2021, on the morning of 5 April 2022, new train testing fully commenced in the tunnels. This test marks the first in a rigorous and in-depth test programme to ensure all aspects of the new rolling stock and the new signalling system are safe and efficient to operate. The commencement of this testing is the culmination of a huge amount of work by the combined SPT and ANSTA teams and is a significant milestone for both the project and the history of the Subway and the first time new powered vehicles have entered the system since the 1970s.

Testing commenced with speed increasing to gradually build up vehicle speed to ensure there are no clashes between the train and tunnel infrastructure, to prove the extensive safety modelling that had been undertaken. This was initially carried out in a limited section between Kinning Park and Partick with the speed gradually increased to full line speed between these stations. Following successful completion of this testing on both the inner and outer circles, on 16 May 2022 the speed increase testing was expanded to the full system. Completion of speed increase testing in the full circle is expected within 2022 which will allow the full suite of gauge clearance evidence to be finalised.

In addition to the speed tests, while as many tests as possible are carried out off-line on the ANSTA test track, a number of tests are required to be carried out in the tunnels. Examples of such tests that have now been successfully carried out are as follows:

- In-train ventilation tests to ensure that there is sufficient air flow in the passenger and driver compartments while the train is travelling at operational speeds.
- Fire detection tests to check that the automatic fire systems can successfully detect smoke while the train is travelling at operational speeds.
- Adhesion tests to ensure that there is no wheel slip during acceleration or braking on the areas of the system with the steepest gradients.

The testing programme is now continuing with further vehicle related tests, including traction performance, running behaviour, noise and other tests planned over the coming months.

Testing will also shortly commence on the signalling system to ensure that the new trains can be safely controlled from the existing signalling system. As noted previously, this is being implemented as a temporary measure prior to the new signalling system being installed and tested. These signalling tests will ensure that the on-train software

is functioning correctly as well as checking the interface with the additional trackside equipment.

3.5 Manufacturing & Supply Agreement

Progress on the ANSTA delivery of the Manufacturing & Supply Agreement (MSA) contract remains subject to previously reported delays although every opportunity is being taken to mitigate these where it is safe to do so. The Partnership has previously been advised that claims for additional time and cost have been received from ANSTA throughout the project, including those relating to the pandemic force majeure and SPT continues to challenge and negotiate a resolution whilst protecting its contractual position. ANSTA is currently forecasting new trains to be in revenue service in 2023 and full Unattended Train Operation (UTO) to be achieved by 2025.

As reported in the last update, ANSTA continues to propose that SPT accepts a change to key contract dates based on their revised forecasting and claims. SPT's position on this and associated claims remains unchanged, although in reality working to a revised baseline 'working' programme is in operation. The Partnership will be advised of further progress to agree a workable and realistic forward programme and also advised on how delays and mitigations are being dealt with contractually in due course. These issues continue to be subject to discussion at corporate Board level across the contract parties.

As reported in the last update, SPT and ANSTA jointly tendered and commissioned an engineering consultancy, WSP, to examine the Subway Modernisation Project to review all key aspects of the Project to ensure that it continues to be set-up for successful delivery. This includes project management aspects, such as programme structure, appropriate resourcing, risk management focus, and management and project reporting arrangements between all parties. This review by WSP is now complete and identified areas where ANSTA and SPT could be more collaborative. To this end, SPT and ANSTA project teams are examining how the benefits of the review can be maximised by the way the teams work together in future.

The Partnership should also note that the existing Subway service continues to be maintained daily despite the scale of the work being undertaken each day/night, and this in itself continues to present challenges. However, SPT is committed to keeping a service running recognising the invaluable role the Subway plays in the transport network. Despite the challenges of this implementation, Subway patronage continues to recover strongly with patronage for the first two periods of the year at c.80% of pre-pandemic levels.

3.6 Client Technical Advisor

To enhance and supplement the 'in-house' technical capability of SPT during modernisation, SPT has a 'Client Technical Advisor' (CTA). The Client Technical Advisor contract approved at Partnership in March 2016 is a key support contract to SPT for Subway Modernisation delivery, providing specialist technical advice, technical assurance, support and resources to meet the demands of the MSA contract delivery.

This contract was awarded to Atkins and is a reimbursable (time and expenses) form of contract, providing support as and when required. In December 2018, a budget contract value of £4.0m was approved by Partnership. Given some of the complex technical issues as well as the extended programme, the forward forecast of this contract value has been revised and is now estimated at £5.0m to project completion (current spend is c.£3.8m).

This remains a necessary support requirement for SPT to fulfil its regulatory and safety obligations and provide the requisite technical challenge and assurance of the ANSTA

JV delivery. This revised forecast is accommodated in the current Subway Modernisation budget.

3.7 Technical Support and Spares Supply Agreement

The Technical Support and Spares Supply Agreement (TSSSA) is a second contract to be delivered by the ANSTA JV. This contract supplies all spares and special tools required for the integrated system, defines the maintenance approaches and plans for maintenance activities, and manages the stores in relation to the modernised equipment.

The TSSSA contract has continued to require close monitoring to ensure performance; as this previously led to an escalation to Project Board and a request for ANSTA to provide greater leadership and accountability from the TSSSA team. ANSTA is continuing to be pressed for progress on readiness, and are progressing their workstreams with input from SPT. These are now jointly reported at Project Board level (by both ANSTA and SPT) to encourage increased collaboration. ANSTA has set a target for TSSSA readiness which will remain fixed regardless of overall project readiness to ensure the support required is ready when required.

3.8 Organisational Change and Employee Relations (including Operational Readiness)

Key to allowing the new trains to enter passenger service will be the readiness of the Subway Operational and Maintenance staff to support this. The Transformation Team has continued to work hard to ensure this is the case and will continue to do so. In terms of major technological and operational change, the development of new processes, behaviours, and general models of how the operation is ran are often overlooked to the detriment of the capital investment. SPT is determined to ensure this is not the case with Subway Modernisation.

The following summarises key readiness progress since the last update:

3.8.1 Authorisation, Certification and Stakeholder consultation

Meetings have been held with the Office of Road and Rail (ORR) in December 2021 and February 2022. These covered the introduction of in-system train testing, further planned introduction of mixed fleet operation, and the significant changes associated with each stage of the Modernisation Project.

Routine liaison with Transec, British Transport Police and the Fire Service has continued, with SPT now commencing the process of working with these agencies to arrange the next Emergency Response Exercise.

3.8.2 Rules, Regulation and Procedure

- Train Testing – Live Line Procedure

As noted above, night time testing of the new trains commenced on 5 April 2022. There are presently five new trains in Glasgow under the control of ANSTA. These as yet have not been accepted into the SPT fleet and are undergoing rigorous testing in our tunnel system once the Subway has closed for the night to the public. Up until this year, Subway electrically powered down the full system after passenger service to carry out maintenance on both circles. To allow us to test in the system whilst maintaining our infrastructure, the Live Line Procedure (LLP) was designed to provide a safe environment to allow electrical power and test

train movement on one circle whilst maintenance is safely carried out on the other electrically and isolated circle.

Whilst train testing is happening and to ensure the safest environment for both contractors and our staff to carry out maintenance, the new safety measures include physical barriers in place at key points in the station and on the platform to protect the Live Line. To further protect everyone involved, a member of staff is in place on each platform to control access.

Prior to implementation of the procedure, table-top exercises were also carried out, ensuring various scenarios were covered and walked through to provide the highest level of protection for those working in the system whilst the new trains were carrying out their tests.

Given the criticality and safety significance of this change, a communication campaign around the procedure was imperative, with a briefing campaign delivered to both SPT staff and Contractor staff so everyone fully understood the changes they needed to be aware of. To further embed the process and new way of working, all routine courses that are being delivered to staff have been updated to include the Live Line Procedure.

We continue to monitor the effectiveness of the LLP procedure with a plan for a further review in late June/early July 2022. In these early stages, and in addition to their day jobs, all of the Senior Leadership Team within Subway are regularly in attendance at night for testing to support staff working within the testing environment and review where improvements can be made.

- Fleet Introduction Strategy

Work on the new Fleet Introduction Strategy has commenced, with internal stakeholders detailing how new and legacy fleet can operate together in passenger service alongside planning for stabling of all vehicles. The strategy will also detail the plan for retiring legacy fleet and continuing to maintain a robust parts supply for rolling stock during this period.

- Special Operating Instructions/Rulebook Update

With Vehicle Testing starting in April, there was a need for SPT to draw up and issue a number of Special Operating Instructions prior to April 2022. These instructions covered areas which were not within the Rulebook and would facilitate vehicle testing in the system at night. To facilitate the new trains operating in the system alongside our legacy fleet from February 2022 (mixed fleet), areas of the rulebook will need reviewed, with a Comms plan required to ensure all staff are briefed in a timely manner.

3.8.3 People, Resources and Structure

- Target Operating Model

With the modernisation of Subway well under way, the Subway Leadership Team have been working on creating and articulating a Target Operating Model (TOM) and associated action plan which will drive Transformation and inform how the Subway will look through and

beyond Modernisation. The new Target Operating Model has been developed and workstreams identified.

Central to everything we do, is to (i) provide a safe environment for everyone, and (ii) to retain and grow our passenger numbers. To enable us to continually deliver these two core objectives, our Structure, Processes, Assets and People each have sub-model plans where change is identified and managed. Further detail of and progress against the Target Operating Model will be presented at appropriate points in the future.

- Staff Training and Competence

Additional training of staff around Safety Critical Communications has been carried out to enhance the Live Line Possession procedure. In addition, nine SPT train drivers have been trained in the operation of the new rolling stock to provide a pool of drivers to work with ANSTA during night-time testing. It is planned that training for the rest of the driving staff on the new fleet will commence in July 2022 allowing for the introduction of a mixed fleet (existing and new rolling stock) at the end of the current train testing requirements.

Training and competence of staff around the maintenance of new trains is an important part of reaching mixed fleet operation. SPT continues to work with ANSTA to ensure manuals and training are in place and provide all that is required to ensure SPT can safely maintain the new fleet. We are presently offering a fixed term training role as a development opportunity to assist with the training required in advance of SPT running a mixed fleet in service.

Training of staff is now taking place face to face due to the lifting of Covid restrictions as well as some via 'Moodle', an online training facility.

Subway Modernisation is a key enabler to the ongoing future operation of the Subway. Likewise, it has enabled an investment in our people, well demonstrated by the five Maintenance apprentices who have now finished their apprenticeships in January 2022 and have integrated into our Maintenance teams. The remaining two apprentices are due to complete their apprenticeship program in November 2023. All of these apprentices will continue to maintain the current fleet and migrate to the new fleet over time.

- Learning and Development

In order to ensure our staff are fully involved in the development of modernised working practices, focus groups were held in May 2022 to understand staff opinion around the future structure of development conversations with their managers/supervisors. The attendees at the focus groups included staff of varying grades and across all areas within SPT and also included our Union Learning Representatives. The Learning and Development team will now disseminate the feedback, working in conjunction with the focus group to introduce structured 1-1 meets throughout SPT which are fit for purpose for the staff member and reflective of their role within the organisation.

3.9 Programme budget

Within the overall Subway Modernisation budget of £288.7m, the 2022/23 budget stands at £37.2m.

To date, £188.5m has been incurred against the total budget of £288.7m on the programme. The remaining programme budget, including contingency, will be required and utilised solely for the delivery of the MSA contract and associated programme support costs.

As noted in 3.5 above, discussions continue between ANSTA and SPT on the commercial impact of programme delays, Covid-19 and the general economic environment including inflation. Overall, the Subway Modernisation capital programme remains within the approved budget, including programme contingency and available funding.

4 Conclusions

In conclusion, progress continues to be made across all Subway Modernisation workstreams, most notably with the commencement of the new trains within the entire length of both circles of the system. Although COVID-19 has had, and continues to, have an impact on progress, as detailed in the report.

5 Partnership action

The Partnership is recommended to note:

- the continued progress made on all Subway Modernisation and improvements since the last written update to the Partnership in December 2021;
- ongoing progress on the MSA contract including the commencement of in-tunnel train testing;
- continued challenge towards performance improvement on the TSSSA contract;
- impacts and potential delay and claims to both MSA and TSSSA contracts from COVID-19 as a Force Majeure event;
- the ongoing discussions with ANSTA to press delivery and resolve discussions relating to MSA claims and delays;
- the requirement to extend the Atkins CTA contract, and for the Partnership Board to approve the overall budget extension to £5m;
- progress made on operational readiness and delay mitigation actions including existing infrastructure and fleet maintenance improvements;
- the modernisation programme remains within overall budget and funding; and
- that a further report on progress will be presented to the Partnership meeting in December 2022.

6 Consequences

Policy consequences

The Subway Modernisation is a key objective of the Regional Transport Strategy.

Legal consequences

Reported delays and any proposed mitigation will be managed in accordance with the MSA contract terms and SPT Governance.

Financial consequences	<i>Overall the proposed works remain within the allocated capital and revenue budgets and Subway Modernisation business case.</i>
Personnel consequences	<i>No significant changes within this report although significant changes are expected in the future system migration stages and as the operational readiness programme continues to develop.</i>
Equalities consequences	<i>None within this report.</i>
Risk consequences	<i>COVID-19 and ANSTA delays impact to forward modernisation delivery, operational service delivery and budgeting. Impacts and risks are under assessment based on available information and mitigations are being continually reviewed and defined as required.</i>
Climate Change, Adaptation & Carbon Consequences	<i>Seeks to secure the future operation of a sustainably powered public transport option for West of Scotland communities by delivering a state-of-the-art underground railway within Glasgow City.</i>

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