



Subway Modernisation – progress update

Date of meeting 16 December 2022

Date of report 23 November 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 June 2022.

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:

- 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 were due to expire in 2022 but are still required to support the existing infrastructure through to the end of life.

- 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 Scottish Power Energy Networks (SPEN) supplied network data.
- The Traction Power Negative Feeder cable replacements at Byres Road Substation (Hillhead) and at Dundasvale Substation (Cowcaddens) are now complete. The remaining three Substations: Broomloan, Cornwall Street and Eglinton Street are planned for completion during 2023 and 2024 to align with track access restrictions generated by the ongoing modernisation and 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. In addition, the key areas of progress on this workstream are:

- The installation, testing and commissioning for the Automatic Train Inspection (ATI) and Carriage Wash equipment has been completed. Following completion and training, this equipment will be handed over to SPT imminently.
- Fit out of the new control and signalling equipment within the new Operational Control Centre (OCC) building is largely complete and focus remains on cabling from trackside infrastructure into the OCC. Power cabling installation to the new OCC is complete with permanent power planned to go live around the start of 2023 (3rd party supplier).
- 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, with contract award approved. 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.

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:

- In-tunnel testing of the new trains at night has successfully continued throughout 2022 with the vast majority of unit tests now successfully completed. The focus has now turned into conducting existing signalling testing with the new units in preparation for the introduction of the new fleet in 2023.
- As reported previously, Stadler has commenced the full scale production run of the remaining trains. The Factory Acceptance Tests of trains 6 and 7 have been completed and these trains have now also arrived in Glasgow. Remaining Factory Acceptance Tests are already scheduled in Switzerland and it is the intention that members of the senior team will also attend a Factory Acceptance Test across the next circa 6 months, to support the necessary contract and stakeholder engagement at this important time. The trains in Glasgow remain the property of ANSTA until all testing is complete.
- 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.

- ANSTA experienced some issues with subcontractors for installation of the new signalling and control equipment in the tunnels, however an alternative subcontractor has been appointed and an extensive programme of works has now commenced.
- Trackside signalling communication beacons ('balises') that will be used for precise positioning of the new trains have now been installed at all stations, through both circles and 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 in stations that will be required when the new vehicles come into passenger use.
- Installation of the new fibre optic cabling and relevant "J" Hangers have commenced in the system, as has installation of the new axle counters.
- 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 previously reported assurance reviews carried out, the specific portfolio of evidence required for mainline testing has been collated to allow the continuation of tunnel testing.

3.4 Subway Sunday closures

We have recently completed two one day Subway closures to facilitate the continued rollout of Subway Modernisation. These short closures allow the efficient and safe installation of signalling cabling and equipment, mainly focused within the tunnel infrastructure. The closures also give us the opportunity to progress initial civil works required to strengthen our station platforms to enable the installation of Platform Screen Doors (PSDs) at a later date.

The first two closures were successfully conducted on 6 and 13 November 2022 with service being restored the following day without any issue or delay. Examples of work carried out include:

- On Sunday 6 November, the ANSTA team managed to install the first fibre optic cable from Partick to Govan on both Circles, install 14 axle counters and over 370 "J hangers" (necessary cable management).
- On Sunday 13 November, the ANSTA team continued running fibre cables in multiple tunnel sections, installed another 4 axle counters and over 300 "J hangers" plus commenced the installation of cables from Govan station up through the operational area towards the new OCC.

The next planned closures will re-commence mid-January 2023 with the exact details to be communicated in due course. We will continue to communicate the forthcoming closures with the public via media outlets and our own social media channels.

3.5 Continuation of in-tunnel testing

Following the previously reported commencement of unit testing, the vast majority of unit tests are now complete.

Examples of unit tests that have now been successfully carried out are as follows:

- Fire Protection – using simulated smoke to test that a fire will be detected at various positions in the train within the specified time.
- Coupling and Rescue – trains are uncoupled, coupled and hauled on the most challenging gradients and track curvatures.

- Traction Performance – checking all functions of the traction package with a focus on achieving necessary performance while staying within defined temperature limits.
- Noise – interior sound levels are measured at various defined positions using a microphone array.
- Running Behaviour – running safety and ride comfort are tested by measuring car body accelerations over a range of operating conditions (load and speed).
- On Track Fatigue – validation of the vehicle fatigue strength assessment using a vehicle with instrumentation included during manufacture.

The testing programme has now commenced on the existing signalling system to ensure that the new trains can be safely controlled from the existing signalling system. As noted previously, this is being implemented concurrently with 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.

3.6 Manufacturing & Supply Agreement

Progress on the ANSTA delivery of the Manufacturing & Supply Agreement 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. SPT has held a number of collaborative discussions at Corporate Board level with ANSTA in order to resolve the claims and agree a new baseline schedule. ANSTA is currently forecasting new trains to be in revenue service in 2023 and full Unattended Train Operation (UTO) to be achieved in 2025.

The Partnership should continue to 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 significant 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 now at c.90%+ of pre-pandemic levels.

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.

3.7 Technical Support and Spares Supply Agreement (TSSSA)

The Technical Support and Spares Supply Agreement is the other contract to be delivered by ANSTA. 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.

As previously reported, the TSSSA contract has continued to require close monitoring at Project Board level to ensure ANSTA is pressed for progress on readiness and progressing their workstreams with input from SPT. ANSTA has set a target for TSSSA readiness, the progress of which will remain under review at Project Board level.

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. Often in Industry, in terms of major technological or operational change, the development of new processes, behaviours, and general models of how the operation is to be run are often overlooked to the detriment of the capital investment. SPT is determined to ensure this is not the case with Subway Modernisation.

There is an increasing focus on Employee engagement within Subway as modernisation activity increases. “Meet the Manager” days have commenced to ensure that staff are able to meet and ask questions to not only their own Manager but also Managers from other departments. Subway Operations has commenced a monthly Staff Council meeting, where management, Unions and staff representatives attend to discuss issues that are important to staff, seeking to understand the complexity of these issues, and collectively move them forward if possible to do so. Further, a working group including train Drivers, rostering staff and management has been set up to gain an understanding of how we can improve shift arrangements for our driving staff.

The following summarises key readiness progress since the last update:

3.8.1 Authorisation, Certification and Stakeholder consultation

A meeting is planned with Office of Road and Rail (ORR) in April 2023 to discuss the upcoming August 2023 ROGS (Railway and Other Guided Transport Systems) resubmission for authorisation and certification, including the inclusion of aspects of the new rolling stock and control systems project. Routine liaison with Transec, British Transport Police and the Fire Service has continued. Whilst further work is on-going to arrange and facilitate an Emergency Response Exercise, with a preliminary date of 19 February 2023 set.

3.8.2 Rules, Regulation and Procedure

- Train Testing – Live Line Procedure (LLP)

As reported previously, night time testing of the new trains commenced on 5 April 2022 with the newly developed and approved Live Line Procedure (LLP) ensuring the safety of all who are in the system during night time “engineering hours”. The LLP allows train and system testing to be carried out on one Circle whilst the other Circle is isolated to allow maintenance of the infrastructure. The LLP introduced a substantial change to the way Subway operates during engineering hours, as prior to this both Circles would have been isolated and the full system available for maintenance during every night. By operating in this way, it has allowed Subway to remain open to the public and meet our daily service demands whilst we modernise and test, unlike the previous modernisation in the late 1970’s where the system closed to passengers for c. 2½ years.

With the need to now operate with one Circle live and a train in the system, SPT has ensured that ongoing monitoring and support for staff working under LLP has been in place, and the Subway Senior Management Team have been on site to assist and note any areas where we could improve. There have been three minor revisions of the LLP to date to implement learnings or to assist in providing the maximum track time for maintenance and testing whilst protecting a firm return to service each morning. Further training has also been carried

out with staff and contractors to strengthen Safety Critical Communications.

- Fleet Introduction Strategy

A fleet introduction strategy has been developed detailing options on how we plan to systematically introduce our new fleet and retire our legacy fleet. Mixed fleet running provides challenges for Subway, such as recovery of vehicles in the system in the case of breakdown and maintaining the competence of our Drivers on each type of vehicle during this period. Despite the significant levels of testing being undertaken, it is not uncommon for issues to arise during a new fleet introduction, and therefore careful planning and mitigations need to be considered in advance.

- Special Operating Instructions/Rulebook Update

With vehicle testing continuing, there is an ongoing need for SPT to produce and issue a number of Special Operating Instructions prior to new types of tests to ensure all staff who are involved in the testing are fully briefed. Work is ongoing at present with ANSTA to review our Rulebook and incorporate Mixed Fleet Operations into Passenger Service which is the next significant stage of the Project. There will be a requirement to ensure that relevant staff are aware of the changes through a briefing process.

3.8.3 People, Resources and Structure

- Target Operating Model (TOM)

Work with the Target Operating Model has progressed with the modernisation of Subway well under way. The Subway Management Team have been working on creating and articulating the TOM and associated action plan which will drive transformation and inform all aspects of how the Subway will operate through and beyond modernisation. The new high level TOM has been developed and workstreams identified to develop further.

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 required change is identified and will be planned, prioritised and managed going forward.

- Staff Training and Competence

Subway remains an area with significant Learning & Development (L&D) activity as we progress through Subway Modernisation, and as such with L&D being a vital component of the management of change, we have seconded three new Training Officers to support staff readiness for the modernisation programme.

There has been a focus on readiness in both Operations and Maintenance with the following courses delivered:

- All appropriate Maintenance Staff have been trained in the new Train Driver Course and competence assessments will be planned with the relevant staff prior to the year end.

- All Subway Drivers have completed initial Driver training for the new trains (Module 1 of 4). Feedback on the new fleet driving experience from the Drivers has been extremely positive.
- In addition, a new Rolling Stock Familiarisation and Safety Conditions Course is in the initial stages of development with the planned roll out to commence by the end of January 2023.
- Use was made of the Sunday Closures (6 & 13 November 2022) with Operations staff completing two training courses: "Coping with Change" and "World Host Training". Training will continue to be rolled out to staff during any similar Sunday closures in 2023.

The following SPT courses are also in the planning stages with roll out over the next few months:

- Technical Craft Rolling Stock/Supervisor - Fault Handling & Defect in Service Instructions (DISI)
- New Train 30-180 Day Planned Maintenance
- Signalling, Display Screen, IAM IATP (signalling), LEU & Balise Training

We are also putting our Technical Craft Line Staff within Subway Maintenance through a City & Guilds High Voltage Switching and System Control training. This is a 3-day course with all relevant employees scheduled to attend prior to the end of January 2023. We recognised that any person working in a high voltage environment should have a good understanding of the basic operational principles and safety considerations when preparing and performing switching and isolation of power systems.

A substantial amount of recruitment has taken place equating to approx. 12 weeks of induction training for new Subway employees to date. In addition, we have trained a number of drivers to support the new vehicle testing programme and are continuously involved in developing instructions and briefing all relevant staff for test purposes. At the end of August 2022, we commenced a 4-module programme in order to train all drivers on the new vehicles to enable readiness for Mixed Fleet Operations.

- Other Learning and Development
Further to the Partnership report on Climate Change dated 18 June 2021 and on the back of COP26, senior officers attended Climate Emergency Training provided by Keep Scotland Beautiful. This was in order to develop skills and knowledge in relation to the climate change, climate adaptation and carbon management. This involved self-study and reflection on their own carbon footprint.

3.9 Programme budget

Within the overall Subway Modernisation budget of £288.7m, the 2022/2023 budget stands at £37.2m.

To date, £192.55m 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.

Overall, the Subway Modernisation capital programme remains within the approved

budget, including programme contingency and available funding.

4. Conclusion

Progress continues to be made across all Subway Modernisation workstreams, most notably with the commencement of testing the new trains running on the existing signalling system.

5. Partnership action

The Partnership is asked to note:

- the continued progress made on all Subway Modernisation and improvements works since the last written update to the Partnership in June 2022;
- ongoing progress on the MSA contract including the commencement of in-tunnel train unit testing, and also on the existing signalling;
- continued challenge towards performance improvement on the TSSSA contract;
- progress made on operational readiness and delay mitigation actions including existing infrastructure and fleet maintenance improvements;
- that the modernisation programme remains within overall budget and funding; and
- that a further report on progress will be presented to the Partnership meeting in June 2023.

5. Consequences

Policy consequences	<i>The Subway Modernisation is a key objective of the Regional Transport Strategy.</i>
Legal consequences	<i>Reported delays and any proposed mitigation will be managed in accordance with the MSA contract terms and SPT Governance.</i>
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>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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