

Subway Modernisation – progress update

Date of meeting 23 June 2023

Date of report 6 June 2023

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 to report

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 2022.

3. Outline of proposals

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 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 analysis have now been completed, along with the analysis of the supporting High Voltage supply network to ensure compliance with modern standards. The next phase of these design preparation activities will start in financial year 2023/2024 where the capturing and storage of regeneration braking energy will be assessed.
- The Traction Power Negative Feeder cable replacements at Byres Road Substation (Hillhead) and at Dundasvale Substation (Cowcaddens) are now complete, with Broomloan Substation works due to start in July 2023. Cornwall Street and Eglington Street are planned for completion during late 2023 and early 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:

- Following a 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, a contract awarded and these works have now commenced. To facilitate the ability to undertake the works on the ramps in parallel with train testing, reconfiguration of the electrical traction layout in Broomloan Depot has been undertaken as well as an update to operational procedures.

3.3 New Rolling Stock and Control Systems

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

- In-tunnel testing of the new trains at night successfully continued throughout 2022 and 2023 with all vehicle tests now successfully completed. The testing of the modifications to the legacy signalling system is nearing completion in preparation for the planned introduction of the new fleet in autumn 2023 (known as 'Configuration Point X' or 'CPX').
- Stadler has continued with full scale production run of the remaining trains. The Factory Acceptance Tests of all trains up to unit 15 have been completed and these trains have now also arrived in Glasgow. The Factory Acceptance Tests for the final two trains are scheduled for June 2023 in Switzerland and will be delivered to Glasgow shortly thereafter, marking the completion of the train manufacturing and delivery phase. Members of the senior team attended a Factory Acceptance Test in April 2023 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 and the trains are formally handed over.
- As reported previously, the installation of the new signalling and control equipment in station equipment rooms has been completed in all stations with snagging continuing. The ongoing installation of communications equipment and cabling within the stations means that ceiling cableways remain exposed in certain parts of the system. This will be remedied as soon as practically possible.
- 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 continued in the system, as has installation of the new axle counters. Work has commenced on the installation of the communications backbone ‘waveguide’ cable that will facilitate communication between the new Operational Control Centre (OCC) and the new trains.
- 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

Since the last report we have completed a further two Sunday 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 two closures were successfully conducted on 15 and 22 January 2023 with service being restored the following day without any issue or delay. Work carried out during the closures included:

- On Sunday 15 January, the ANSTA team installed further cable management ‘j-hangers’, axle counter cables, axle counters and carried out other surveys.
- On Sunday 22 January, the ANSTA team continued with axle counter, axle counter cables, cable management as well as installation of fibre optic cables in multiple tunnel sections.

The next planned closures will re-commence in the second half of 2023 with the exact details to be communicated in due course. These closures will be used for the installation of the main power and communications backbone cables around the system. 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

The extensive programme of vehicle system train testing is now complete. Work in this area is now focussed on collation of the test reports and assurance evidence that will, after validation by independent safety assessors, feed into the safety case to support the start of passenger operations.

Examples of vehicle 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 is now focussed on the testing of modifications to the legacy signalling system to ensure that the new trains can be safely controlled from the legacy system whilst the new signalling is installed. This test phase is ongoing and is nearing completion.

Examples of signalling and communications tests that are currently underway are as follows:

- Tetra radio tests – checking all vital functions of the radio communications between train and control room.
- Odometry tests – checking the automatic train speed throughout the system taking into account all track curves and gradients.
- Balise checks – checking all trackside signalling beacons have been correctly installed and are communicating with the train as expected.
- Functional tests – thoroughly testing each discrete function of the signalling system to ensure it responds as expected.
- System tests – ensure the train and signalling system interact correctly as a whole, this includes under all normal operating and also emergency scenarios.

On completion of the signalling system testing, the focus will move to the final phase of testing which is Fault Free Running (FFR). During this phase, each new train will be run at night to simulate, as closely as possible, normal passenger service. The test will be carried for each vehicle and only when each train completes a significant and set number of miles without fault will it then be accepted by SPT for introduction into passenger service (the initial trains need to cover 2000 miles without a fault occurring during fault free running or the clock is reset).

As noted previously, the above testing of the legacy signalling and new trains is being implemented concurrently with the new signalling system being installed.

3.6 Manufacturing & Supply Agreement

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.95%+ 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.

ANSTA is currently holding the position that new trains will be in revenue service ('CPX') in autumn 2023. Following the new fleet introduction, new signalling finalisation and commissioning will become the next key milestone, followed by the installation of Platform Screen Doors and full Unattended Train Operation (UTO) capability.

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)

Work continues to ensure that Subway Operations and Maintenance staff are ready for the introduction of the new trains later this year. There is ongoing work on developing new processes, behaviours and models throughout Subway to ensure Readiness at each stage of the Modernisation Project.

Increased employee engagement activities continue to be a theme within Subway. Monthly Staff Council Meetings have continued within Operations and has encouraged open and honest conversations around the challenges that customer facing staff manage in their role. The monthly meetings also provide staff with opportunities to provide helpful input on areas for improvement. As an example, a recent initiative which arose from the suggestions of the Staff Council members was to advertise our staff vacancies within our stations. Marketing followed this up, with a QR code on the advertisements linking to our website. Since going live, SPT has noted a 60% increase in web traffic to the site, with 55% of those coming direct from the QR code on the advertisements.

Scheduled training weeks in February within Subway Operations focused on our Service Delivery Officers within Stations and included new car park barrier training, a modernisation update and refresher training on fire/traction current and detrainning. A Q&A session with managers from Subway Operations, Maintenance and Transformation also took place.

A Staff Suggestion Scheme was launched in April 2023 to encourage all staff within SPT to provide suggestions which will improve quality, decrease cost, increase revenue, save time or reduce our Carbon footprint/help the environment. The first batch of suggestions received are due to be reviewed in June 2023.

The following summarises key readiness progress since the last update:

3.8.1 Authorisation, Certification and Stakeholder consultation:

A review of the 5-year authorisation with the ORR is complete (which includes the new trains in operation). This was formally submitted on 13 April 2023, with a 28-day consultation period with third parties complete with no comments or objections lodged. Therefore, although approval has not yet been received, it is expected imminently. Regular meetings with Transec, British Transport Police and Fire Service continue. At the request of the emergency services, the preliminary date for a “Live Play” Emergency Response Exercise has changed, with a desktop exercise now planned for September 2023 and a “Live Play” exercise to follow in 2024.

3.8.2 Rules, Regulation and Procedure

- Train Testing – Live Line Procedure (LLP)

Train Testing has continued at night under the Live Line Procedure since April 2022. This procedure allows train and system testing to be carried out on one Circle whilst the other Circle is isolated to allow maintenance of the infrastructure, a substantial change to the way Subway operated previously during “engineering hours”. 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.

ANSTA is now about to enter a period of “Fault Free Running” where more than one train will be running on the Circle assigned to testing. This will require a review of the LLP Procedure. With briefing/increased training of staff and contractors around Safety Critical Communications now complete, a “Monitoring of Safety Critical Communications” procedure which ensures regular monitoring of safety critical communications has been introduced. Development and Support Plans will be put into place as needed to manage instances where communications do not meet the required standard.

- Fleet Introduction Strategy

The fleet introduction strategy is in its final form, 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.

- Rulebook update

In preparation for Mixed Fleet Operation, changes are being made to the Subway’s Operational Rulebook, with ANSTA and SPT working closely together. SPT is presently carrying out a second review of all Modules with feedback to be reviewed by ANSTA. Once complete, internally Subway will need to update all relevant procedures affected by the changes to the Rulebook. Further, there will be a need to brief all Subway staff on all the changes. Online modules through Moodle will also be used as a method of communicating the changes.

3.8.3 People, Resources and Structure

- Target Operating Model (TOM) and Transformation Plan

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. With the use of scored ‘Benefit Maps’ which have been built using input from the Subway Senior Managers, key objectives have been developed.

There is ongoing work on defining how our staffing model may change internally as we progress through modernisation.

- 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. The latest Training Officer to be appointed will have a key focus on Controller Training to ensure our Controllers are ready for the move to the new OCC which will go live at CP4 (the point where the new trains will operate with the new signalling system). This will be a substantial change for the Controllers around their methods of working and the equipment they will use to carry out their role.

Personal Development Plans have been introduced throughout SPT, encouraging managers to have a conversation with their staff around their training and development needs.

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

- All appropriate Maintenance Staff have been trained and assessed in New Train Driving and New Loco Driving.
 - All Subway Drivers have completed Modules 1 & 2 for the new trains, with Module 3 commencing at end of May 2023. Module 4 will involve driving the new train whilst in the system alongside some classroom learning. Feedback on the new fleet driving experience from the Drivers remains overwhelmingly positive.
 - A new Rolling Stock Familiarisation and Safety Conditions Course has been delivered to all relevant Maintenance staff.
 - A Line Fault Handling training course has been delivered to the Technical Craft Line staff within Maintenance.
 - With a continued focus on safety as we move modernisation forward, a total of 55 staff have attended an IOSH course, with a further 19 still to attend.
- **Other Learning and Development**
Subway Heads and Managers involved in our modernisation programme attended a three-day Six Sigma course aimed toward improving business processes. There were two cohorts, comprising of six delegates in each, with delivery of theory and one-to-one coaching taking place over a 12-week period. Each delegate worked on a specific project relevant to their own area within Subway Operations, Maintenance and Engineering to practice their learning, making the training more meaningful.

Senior Subway Managers have attended an Essential Leadership Course which has involved attendance at six sessions focusing on Workplace Innovation and Fair Work, Innovative and Inclusive Business Structures, Change Leadership and Resilience.

3.9 Programme budget

Within the overall Subway Modernisation budget of £288.7m, the 2023/2024 budget stands at £25.5m.

To date, £209.4m 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 testing of the new trains running on the existing signalling system, leading to the 'fault free running' tests and the fleet entering passenger service.

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 December 2022;
- ongoing progress on the MSA contract including the completion of in-tunnel train vehicle testing, and also ongoing progress on the testing of the modifications to the existing signalling system, all driving towards new fleet introduction to passenger service ('CPX') in autumn 2023;
- 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 December 2023.

6. 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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