



## Subway Modernisation – progress update

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**Date of meeting** 28 June 2024

**Date of report** 10 June 2024

### Report by the Director of Transport Operations

#### 1. Object of report

To provide the Partnership with 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 2023.

#### 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. As previously reported, void grouting is substantially complete and work continues on lining repairs and water ingress management.

- Works to confirm the continued health of legacy electrical, telecoms and IT assets have continued with the primary focus being to ensure that sufficient obsolete spares are available, and that SPT staff have the right knowledge, competence and information available to them, to keep the legacy systems operational.
- The conceptual and functional design process for improvements and/or upgrades of the Subway substations has continued, 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 has started, where the capturing and storage of regeneration braking energy is being assessed.
- As previously reported, the Traction Power Negative Feeder cable replacements at Byres Road Substation (Hillhead) and at Dundasvale Substation (Cowcaddens) are complete. Broomloan Substation negative feeder works is currently planned to commence following train testing completion. Work to replace the transformers at Broomloan has also commenced.

### 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:

- Works have continued to improve the condition and secure the long-term integrity of the retaining walls of the ramp access to the sub-surface tunnels at Broomloan Depot. These works are expected to be completed by the end of 2024.
- Works have commenced on a package of track and civil works within the yard, including replacement of sections of embedded track. These works are expected to be completed by summer 2024.

### 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:

- As previously noted, Stadler has completed production of all seventeen new trains. Since the last update to Partnership, the final two trains have now been delivered to Glasgow.
- The Fault Free Running (FFR) programme for the fleet is nearing completion with FFR complete for fourteen out of the seventeen new trains.
- On successful completion of FFR, each train is then taken through the formal acceptance process. Only when all criteria have been met are the trains formally handed over to SPT, until that time the trains remain the property of ANSTA.
- On 11 December 2023 the first two trains of the new fleet were brought into passenger service for the very first time. This was a momentous occasion for Glasgow Subway as it was the first time in 43 years that new rolling stock had run on the network.
- As reported previously, the installation of the new signalling and control equipment in station equipment rooms has been completed in all stations with close out of snags continuing.
- Installation of signalling and communications equipment and cabling within the stations and tunnels is proceeding on multiple work fronts each night in readiness for the start of system testing later in 2024. Ceiling cableways remain exposed

in certain parts of the system and ceiling tiles will be replaced as soon as possible after the cable installation works are completed, from summer 2024.

- Installation of new CCTV cameras and driver despatch screens in stations that are required for the new trains has been completed.
- Installation of the new fibre optic cabling and relevant “J” hanger supports have continued in the system.
- Work is nearing completion on the bracketry for the communications backbone ‘waveguide’ cable that will facilitate communication between the new Operational Control Centre (OCC) and the new trains. Installation of the new waveguide cable which must be installed throughout the entire system and the yard is well advanced and continues on a nightly basis.
- Installation of the structural supports for the future installation of the platform screen doors has commenced and is now nearing completion.
- SPT continues to challenge and monitor the evidence provided by ANSTA to demonstrate the safety case required under SPT’s Safety Verification (SV) Scheme. The previous tunnel testing safety case has been updated for start of passenger services, and the specific portfolio of evidence required for passenger operation has been collated.

### 3.4 Subway Sunday closures

As noted previously, SPT has agreed for ANSTA to utilise a number of Sunday closures. These closures allow the contractor extended periods of time to carry out more complex installation activities and also gives the opportunity for other activities such as further FFR or other system testing.

Following a successful trial installation of a section of waveguide cable during a standard night shift, the decision has been taken to postpone the Sunday closures previously planned for early 2024 until later in the programme in order to utilise these closures for other activities. 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 Fault Free Running

Since the completion of the previously reported vehicle type testing and signalling system testing, the focus since the last update to Partnership has been on the final phase of testing which is Fault Free Running. During this phase, each new train is run at night to simulate, as closely as possible, normal passenger service. The testing is carried out for each vehicle and only when each train completes a set number of miles without fault can it then be accepted by SPT for introduction into passenger service.

At the time of writing, the first fourteen trains have completed their respective Fault Free Running mileages. The Fault Free Running for the remainder of the fleet is currently ongoing, with up to three trains being tested each night. It is expected that the Fault Free Running will be complete for the full fleet by July 2024.

The Fault Free Running testing of the new trains on the legacy signalling system has, and continues to be, implemented concurrently with the new signalling system being installed.

### 3.6 Vehicle handover and new fleet introduction

Once each vehicle has completed its respective Fault Free Running phase, each train then undergoes a thorough final inspection by SPT and any issues identified are rectified by ANSTA before each vehicle is formally handed over to SPT.

Following handover of the first two vehicles and completion of the final CCTV works, the

required evidence was provided by ANSTA to demonstrate the safety case required under SPT's Safety Verification Scheme. This safety assurance evidence was reviewed by both ANSTA's Independent Safety Assessors and SPT's Independent Competent Person. Only when all parties were satisfied, the first trains of the new fleet were formally accepted by SPT as ready for passenger service.

The new trains were initially run in passenger service in the daytime off-peak period only in order to build up operating experience before introducing them to the peak periods and weekends.

Following the introduction of the first two trains, additional new trains have been handed over and brought into passenger service. At the current time twelve trains have been formally handed over and are in daily passenger operation. It is expected that the full fleet will be handed over by August 2024.

### 3.7 Legacy train disposal

As new trains have been handed over and brought into passenger service, the legacy trains have started to be retired from service and removed from the system. At the current time a total of fifteen carriages, equivalent to five legacy trains, have been retired. Further trains will be removed in the coming weeks and months as the new fleet is introduced.

The trains are recycled at a local facility with in excess of 90% of the material being recycled.

SPT has agreed with Glasgow Life that one carriage will be retained for public display in the Riverside Museum. Planning is well underway and the carriage will be transported to the museum shortly.

There was significant public interest in obtaining legacy units at the time of the first retirement. Interested parties were directed to ANSTA as they hold the commercial agreement for the disposal of the fleet.

### 3.8 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 June 2022, an updated budget contract value of £5.0m 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 £5.5m to project completion (current spend is c.£4.8m).

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.

### 3.9 Manufacturing & Supply Agreement

The Partnership should 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 be strong with patronage now c.7% above 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.

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.

### 3.10 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 material supplies to SPT 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. TSSSA readiness progress remains under review at Project Board level.

### 3.11 Challenges associated with new fleet introduction

The significant successes of new fleet introduction seen in the last six months have also been accompanied by a level of service disruption which has directly affected our customers. We have seen a rise in complaints and an interest in the overall fleet performance as a result of this disruption.

Increased disruption was a known risk, common with all new fleet introductions and which SPT has focussed on.. Our legacy fleet is at end of its life and regularly causes delays and disruption, while our new fleet has also experienced some issues which would reasonably be expected at this stage of operation. The loss of a number of drivers to a recent Scotrail recruitment campaign compounded this impact. Our Projects, Engineering, Operations and Maintenance teams have been working tirelessly with this new equipment to continuously improve our service and seek to minimise delay and disruption to our customers.

### 3.12 Organisational Change and Employee Relations

Planning for the organisational change component of Subway Modernisation continues in parallel with the technical workstreams. The development of Target Operating Models is well advanced in Operations, with Maintenance and Engineering following closely behind. As previously shared, the Target Operating Model assumptions does include extension of our opening times on a Sunday although periods for extended engineering access will still need to be accommodated. It is-planned that the new Operational Control Centre (OCC) will become a hub for the Subway team which will present a major new opportunity in how we deliver the service.

Our new system will be capable of 'Unattended Train Operation' (UTO). We understand that our customers will require a level of service which will still necessitate a considerable presence from our staff in the system. This is being actively considered as part of our Target Operating Model planning.

We are committed to keeping our team informed about the progress in developing our Target Operating Model and sharing what it will mean to them. The delivery of each major technical milestone will be accompanied by engagement with our staff to keep them aware of the upcoming changes in how we operate.

Through the introduction of the new fleet, and particularly as a result of the ramp up of unit numbers in recent weeks, we have been able to practically test our plans for our operational readiness across all workstreams. We are actively learning from lessons on a daily basis and seeking to update our processes, procedures and training.

Our drivers have been a key element of the introduction process and following the milestone of four new units per circle, we introduced a monthly contact point for drivers to engage directly with Engineering and Maintenance departments. This dialogue is intended to support the free flow of information where technical improvements are being developed. Equally, where required, information is shared with drivers about key learnings and actions which can contribute to service improvement for the customer.

### 3.13 Learning and Development

Learning and Development remains a critical component of Subway Modernisation delivery. Our programme of training activities to prepare our teams for the new fleet and integrated system continues to be rolled out. We now have an increased focus on our new infrastructure assets (Automatic Train Inspection and Carriage Wash) and also fault finding capability across the elements of the integrated system we currently hold.

As well as continued focus on developing staff for the modernisation implementation, competencies associated with the legacy assets continue to be maintained.

Since January 2024, the Operations Training team co-ordinated a combination of onsite and online training courses ranging from new train driver training through to station fire evacuation.

During February training weeks (19 February – 1 March 2024), the training leads managed to capture 99 staff members on both early and late shift. During those two weeks they focussed on vital safety communications, the de-training procedure for the new trains, as well as having the opportunity to visit the new trains for a closer inspection.

### 3.14 Programme Review

At the completion of CPX, a decision was taken to conduct a wider programme review as we looked forward to the next stages of delivery. This review focussed on a deeper interrogation of the upcoming activities and a focus on the interdependencies between the ANSTA team and SPT. The exercise has yielded good results with a revised programme being issued by the contractor which incorporates a change in strategy. The change should bring greater efficiency in the later stages of delivery. The biggest change from a customer perspective will be the appearance of Platform Screen Doors at three stations earlier than originally programmed. This approach will reduce the number of changes of state of the system and result in one less submission to the ORR.

The Programme Review is aligned with the Corporate Plan in seeking to achieve the following targets:

<b>Milestone</b>	<b>Description</b>	<b>Planned Date</b>
New Fleet Introduced	Introduction of new fleet to passenger service on old signalling system.	June 2024
CP4+	New signalling system and Operational Control Centre ready for operation.	January 2026

CP5	Platform Screen Doors installed and operational at all stations	April 2026
CP6	Ready for Unattended Train Operation	July 2026

### 3.15 Rules, Regulations and Procedure

With the new trains now in operation, we have entered a cycle of continuous learning and updating of our Rules, Regulations and Procedures. Some examples of this are noted below which focus on both how we are delivering subsequent phases of the works and improving our services to customers today.

- Rulebook updates  
The Subway team has learned significant lessons from the delivery of rulebook updates associated with the introduction of the first of the new trains (CPX). This learning is actively influencing our approach to the delivery of the next round of rulebook updates associated with the move to the new signalling system.
- Defect in Service Instructions  
Supporting our Operations and Maintenance staff, we have a variety of resources including the Defect in Service Instructions. We are reviewing these documents on a weekly basis and seeking to publish updates as quickly as possible in order to support our staff and work towards improved service delivery for our customers.
- New driver training  
We have now completed the first driver training course completely focussed solely on new fleet. The performance on this course and during the introduction of these new drivers into operational service has been very positive.

### 3.16 Accessibility in the system

Our new fleet offers greater accessibility to our customers. Over the coming months we will be publishing further guidance to support customers with different accessibility requirements with a view to improving their journey experience. We will continue to identify and deliver improvements where reasonably practical within the system.

Some of the features supporting different accessibility requirements on the new trains will not be fully operational until CP4+. Aligned with this, our intention will be to refresh guidance as capability grows.

### 3.17 Journey to a Data Driven System

Subway Modernisation will see a very different digital environment for the Subway once all our new systems are commissioned and mobilised. We are actively working on measures now which will see us be better prepared for this full transition to a data driven organisation in future.

### 3.18 Programme budget

Within the overall Subway Modernisation budget of £288.7m, the 2024/2025 budget stands at £28.0m.

To date, £237.3m 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.

Funding in support of the project remains is subject to ongoing discussion between SPT and Transport Scotland.

#### 4. Conclusion

Progress continues to be made across all Subway Modernisation workstreams, most notably with the introduction to passenger service of the new trains running on the existing signalling system, the completion of 'fault free running' tests and subsequent formal acceptance of the first twelve trains, and the continued installation of hardware in preparation for the introduction of the new signalling and telecommunications systems.

The achievements of the last six months have been significant and would not have been possible without the focus, drive and professionalism of the SPT delivery, our contractor ANSTA or indeed our wider supply chain.

#### 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 2023;
- ongoing progress on the MSA contract including introduction to passenger service of the first twelve trains running on the existing signalling system, the ongoing Fault Free Running and acceptance programme for the remainder of the fleet and the ongoing hardware installation work in readiness for the new signalling system;
- the challenges of introducing a new fleet to passenger service and delivering reliability growth;
- 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;
- the commitment and performance of the SPT, ANSTA and other contractors delivering the work;
- that a further report on progress will be presented to the Partnership meeting in December 2024; and
- approve the requirement to extend the Atkins CTA contract, and for the Partnership Board to approve the overall budget extension up to £5.5m.

#### 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>Ongoing updates to accessibility guidance and information for customers using Subway.</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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<b>Title</b>	<b>Director of Transport Operations</b>	<b>Title</b>	<b>Chief Executive</b>

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**Subway**

# **Subway Modernisation Overview**

**Partnership Update June 2024**

# Subway Modernisation Update



# Subway Modernisation

## Existing Infrastructure and Broomloan Depot



Overbridge track renewal.



Installation of access / egress platforms for use with the new trains.



Automatic Train Inspection (ATI) accepted and operational.



Maintenance Shed works to improve track alignment & replace embedded rail.



Ramp retaining wall concrete repairs.



Wheel lathe fully operational and supporting future wheelset strategy.

# Subway Modernisation

## New Rolling Stock and Control Systems



12 trains accepted



Three trains in post Fault Free Running (FFR) rework, pre-handover



Two trains in weekend FFR.

# Subway Modernisation

## New Rolling Stock and Control Systems



Driver Only Operation in use.



Waveguide and tunnel cabling installation progress good.

Waveguide signal strength testing planned later this year.



Communication Based Train Control (CBTC) testing from 2025.

Over and Back testing.

# Subway Modernisation

## New Fleet Introduction



Reliability growth challenges as foreseen, working on improvements.



Cross stakeholder improvement targets set.



Availability very good.

# Subway Modernisation

## Manufacturing and Supply Agreement

Continued delivery of programme whilst maintaining current services



**CPX**  
11/12/23

**New fleet only**

**CP4+**  
New OCC, CBTC & Initial PSDs

**CP5**  
PSD Install Complete

**CP6**  
Full UTO Operation

2024

2025

2026





# Organisational Change

## Learning and Development

- CPX training complete
- SPT staff maintaining Units

## Key Focus Points:

- Security
- Customer Service
- Maintenance

Preparations with ORR on Substantial Change submission for CP4+

## Authorisation and Certification



Revised delivery strategy for single substantial change agreed with ORR

## Target Operating Model

- Future Team
- How we work
- Bringing our customers with us

Becoming a data driven organisation



# **Subway Modernisation**

## Technical Support and Spares Agreement

**Continued  
Monitoring at  
Board Level**

**Continued  
development and  
improvements  
required**

**Learnings from  
Rolling Stock  
carried through  
to signalling and  
control systems**

# Subway Modernisation

## Legacy Fleet



Watch  
removal  
video



Watch  
car 128  
video



First nine legacy carriages removed from depot.

Carriage 128 leaving depot.

Carriage 128 now on display at Riverside Museum.

# Conclusions and Partnership Action

## **The Partnership is asked to note:**

- Continued progress made on all Subway Modernisation and improvements works since the last written update to the Partnership in December 2023.
- Ongoing progress on the MSA contract including introduction to passenger service of the first twelve trains running on the existing signalling system, the ongoing Fault Free Running and acceptance programme for the remainder of the fleet, and the ongoing hardware installation work in readiness for the new signalling system.
- The challenges of introducing a new fleet to passenger service and delivering reliability growth.
- That the modernisation programme remains within overall budget and funding.
- That a further report on progress will be presented to the Partnership meeting in December 2024.