

Date: 28 June 2017

Item: Elizabeth Line Operations and Transition Update

This paper will be considered in public.

1 Summary

- 1.1 This paper summarises recent progress towards staged opening of the Elizabeth line as well as transition of the Crossrail Project to become an integral part of TfL.
- 1.2 Further information in respect of project progress is included in the Crossrail Sponsor Board Update.

2 Recommendation

- 2.1 **The Committee is asked to note the paper.**

3 Background

- 3.1 Construction is being undertaken by Crossrail Limited (CRL), a wholly owned subsidiary of TfL, sponsored jointly by TfL and the Department for Transport.
- 3.2 Overall, construction is now around 85 per cent complete. The major physical activities currently underway are fitting out of stations, installation of the mechanical and electrical systems including ventilation, lifts and escalators, as well as installation of cabling, communications, power, signalling systems and platform edge doors.
- 3.3 There remains a significant focus on finalising design and fulfilling the various assurance processes necessary to allow the handover of the infrastructure and its bringing into use as an operational railway.

4 Current Operations

- 4.1 Train services between Liverpool Street and Shenfield are currently branded as 'TfL Rail' in advance of the opening of the central tunnel and their renaming as the Elizabeth line in December 2018.
- 4.2 TfL Rail continues to be amongst the most reliable of any of the national train operators. At the end of Period 2 the annual average Public Performance Measure (PPM), was 94.5 per cent the third best performance of any operator in the country. Notwithstanding the sustained high performance, Period 2 itself was below target at 92.3 per cent, due to a number of infrastructure failures and two failed freight trains which disrupted services for a prolonged period.

5 Progress towards Phased Opening

- 5.1 The Elizabeth line will open in five stages to allow the various parts to demonstrate reliable operation before all the train, tunnel and surface elements are brought together in 2019.
- 5.2 Stage 1 is the introduction of the first of the new Class 345 trains to run on existing tracks between Liverpool Street and Shenfield.
- 5.3 Class 345 testing between Liverpool Street and Shenfield commenced 13 January 2017 and driver training in February 2017. There are three trains at Ilford Depot being prepared for passenger service and a further eleven units completed and are undergoing testing at Bombardier's factory at Derby or at the Network Rail test track at Melton. Overall the fleet has completed over 40,000km of testing, driver training and high speed running.
- 5.4 Two train simulators, currently based at Ilford are in use for driver training and allow a degree of familiarity with the cab and route to be gained in advance of train delivery.
- 5.5 The first train was due to enter passenger service in late May but this has been delayed slightly, into June, whilst further testing takes place. Further releases of software for the Train Control and Management System ('TCMS') have been required addressing issues such as passenger and driver displays and other functionality that do not prevent training and testing but would be unacceptable in passenger service. These updates have also required to be taken through an Independent Safety Assessment (ISA) before final approval for the train was sought from the Office of Rail and Road (ORR). Final approval from the ORR was received on 9 June 2017.
- 5.6 A critical component of the programme for introduction of the Class 345 is work by Network Rail (NR) to adjust platform edges and provide other equipment, including cameras for the Driver Only Operation (DOO) CCTV system at stations on the route. Work to adjust platform edges to match the new trains has been completed. Extensive testing of the DOO CCTV (a very high specification system that transmits pictures from wayside cameras into the train cab) continued, to ensure that both platform and train elements worked fully on all platforms that could be served, not just those in regular use.
- 5.7 Work at Ilford Depot to accommodate the new trains is also nearing completion, with the first of the new sidings brought in to use at the end of May. Work to clear remaining issues continues, alongside staff training and familiarisation with the new facilities.
- 5.8 Lessons learned from the introduction of the new trains and infrastructure at Stage 1 are being captured and incorporated into planning for future Stages.
- 5.9 Stage 2 in May 2018 will provide four trains per hour between Paddington and Heathrow replacing the current two trains per hour Heathrow Connect service, operating to Terminals 2/3 and Terminal 4.
- 5.10 For Stage 2 the Class 345 train will be upgraded by Bombardier to operate with European Train Control System (ETCS) signalling, as the tracks between

Heathrow and Stockley (where trains join the current Great Western Main Line) are amongst the first in the UK to be fitted with this system. NR has completed installation and some testing of 'wayside' (track mounted) equipment. This is provided by Alstom. This then needs to be tested with the train, as whilst both are to a common ETCS specification, experience elsewhere in Europe demonstrates that detailed incompatibility issues often arise. In the case of ETCS to Heathrow this will be addressed by laboratory testing involving both Alstom and Bombardier and then by physical testing with the train, both in the second half of 2017. The development and introduction of this complex new on train signalling system remains the most significant single risk to timely commencement of Stage 2 services.

- 5.11 Stage 2 also requires work to the tracks and stations. There are significant platform works to be undertaken, including adjustment of heights, to allow successful introduction of the new trains to the route.
- 5.12 The main depot for the Elizabeth line train fleet is at Old Oak Common. The maintenance building is structurally complete and track laying, fit out of systems and equipment is underway. Whilst there have been some delays to the depot signalling system, the first section of the depot is planned to be ready in the Autumn to receive the trains that will operate to and from Heathrow from May 2018.
- 5.13 Finally, with respect to Stage 2, suitable track access agreements need to be in place to operate on the Heathrow branch. On 26 May, the High Court refused the request from Heathrow Airport Limited (HAL) to overturn the decision of the ORR in respect of track access charges for Elizabeth line services to Heathrow. Provided HAL do not seek leave to appeal, this allows services to Heathrow to be planned on a clear contractual basis. A number of less significant issues are currently being resolved under the jurisdiction of the ORR.
- 5.14 In December 2018 (Stage 3), services commence in the Crossrail central tunnel, operating between Paddington (new underground platforms) and Abbey Wood, via the West End, City and Canary Wharf. From this date services will be referred to as the Elizabeth line.
- 5.15 Testing of the new infrastructure will take place in the first half of 2018 and from the summer TfL expects to take over the railway for trial running (final demonstration of the capacity of the system) and then trial operations, using the trains and staff that will operate the line from December 2018. The first tranche of apprentices who will work on operations and maintenance of the central section of the line started training in 2016 and a further group will commence in September 2017. Engineers and maintenance technicians are being appointed to the team as are senior Control Room (signalling and command and control) staff who started work in May 2017 and will be based in the Route Control Centre (RCC) at Romford.
- 5.16 Specialised track maintenance trains, a rail milling machine to keep the tracks smooth and safe, and two engineering trains to support all aspects of maintenance are currently being assembled for delivery in 2018.

- 5.17 For Stage 3 the Class 345 train requires to be further developed to incorporate Communications Based Train Control (CBTC) signalling. This is similar to the systems used on several Underground lines in London but needs to be added to the two other systems that will already be fitted to the train, 'conventional' UK signalling for the surface sections of route and ETCS for the Heathrow spur. This is complex and a matter of significant focus from the train manufacturer (Bombardier) and TfL.
- 5.18 The focus over the coming months will remain on training, including the use of simulators and on integrating and assuring the infrastructure being constructed by the Crossrail Project so that it can be safely taken into passenger service.
- 5.19 Further details of operational readiness and plans for service introduction for Stages 4 and 5 will be included in future updates but in summary:
- a) in May 2019 (Stage 4) Shenfield to Liverpool Street services are connected into the peak central tunnel section to run as far as Paddington at this point the service in the central tunnel increases from 15 to 24 trains per hour; and
 - b) in December 2019 services from the West are connected into the central tunnel and Crossrail trains are extended in the West to Maidenhead and Reading. This is the final phase (Stage 5) of Crossrail service introduction and includes the additional services, west of Paddington agreed by the TfL Board in March. Final work on the timetable, including joint performance modelling with Network Rail continues.

6 Crossrail Transition and Integration Programme

- 6.1 The Transition and Integration Programme has been established, managed by a Steering Group of senior TfL and CRL managers reporting to the Integration Board, which comprises the Managing Directors LU, Finance and HR and the Chief Executive of CRL.
- 6.2 The aims of this programme are to:
- a) ensure the project is supported, protected, closed and integrated successfully; and
 - b) transfer talent, knowledge and processes for the benefit of TfL and Crossrail 2.
- 6.3 The focus of the most recent activity has been:
- a) the Tunnelling and Underground Construction Academy (TUCA) at Ilford has now fully transferred to TfL and continues to offer specialist construction and tunnelling training to contractors working on the Northern Line Extension and Thames Tideway as well as the Mines Rescue Service. Part of the facility is being reconfigured to be used for the training of Elizabeth line maintenance and operational staff;
 - b) there are a number of secondments to Crossrail 2 as well as an active process to transfer lessons learned in the current project to the design of the future works; and

- c) an Elizabeth line Communications Board is being established jointly by the Crossrail Project and TfL to ensure a smooth transfer of stakeholder and launch information as the focus changes from infrastructure to an operational focus.

7 Conclusion

- 7.1 Stage 1 of the Crossrail/Elizabeth line introduction is imminent. Whilst there are significant challenges, as to be expected with a project of this magnitude, the line continues to be on course to open as planned in Stages through to December 2019.
- 7.2 TfL and CRL continue with a structured programme to support and protect CRL project delivery and identify and mitigate the risks of transition into TfL.

List of appendices to this report:

Appendix 1 – Photos of Class 345 Train, Tunnelling & Underground Construction Academy (TUCA) and Romford Control Centre (RCC)

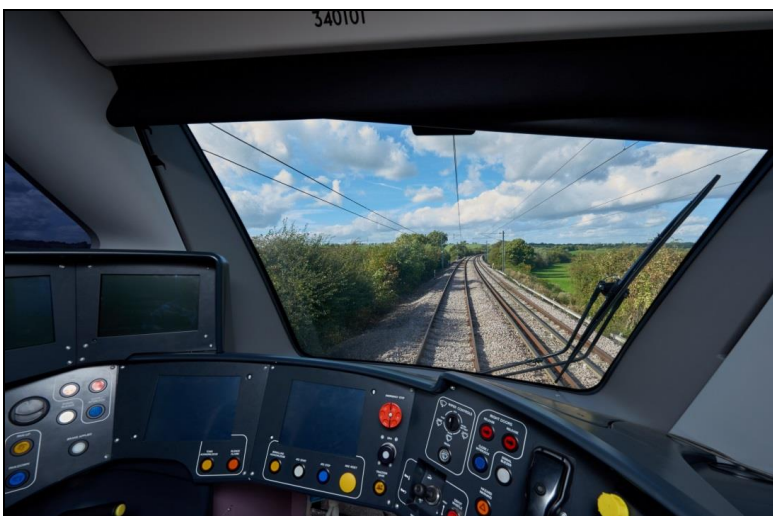
List of Background Papers:

None

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Class 345 Train



Tunnelling & Underground Construction Academy (TUCA)



Romford Control Centre

