National Audit Office

Report
by the Comptroller
and Auditor General

Department for Transport

Completing Crossrail

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Key facts

£14.8bn	£17.6bn	£2.8bn
funding agreed for Crossrail in 2010, including contingency	current total funding package for Crossrail, including contingency, an increase of 19%. As at March 2019 Crossrail Ltd expects the overall programme to cost around £17 billion	increase in available funding for the Crossrail programme to cover cost increases and remaining risks

October 2020 to March 2021	revised target period for opening services on the central section of the Elizabeth line
Yet to be announced	opening date of full Elizabeth line services
December 2018	date, announced in 2010, when the Crossrail sponsors and Crossrail Ltd expected to start running services on the central section of the railway
£600 million	assumption in 2018 Transport for London's (TfL's) business plan of revenue losses between 2019-20 and 2023-24, as a result of delays to the opening of Crossrail services. To be reviewed in line with opening dates announced on 25 April 2019.
£2.5 billion	increase in the cost of contracts between 2013 and 2018 due to design and contract changes
£2.05 billion	value of loans from HM Government to London, including £1.3 billion to the Greater London Authority and £750 million as contingency to TfL to cover the increased cost of Crossrail

Summary

The Crossrail programme

1 Crossrail is a large, complex programme to run new, direct rail services between Reading and Heathrow Airport at the western ends of the railway, to Shenfield in Essex and Abbey Wood in south-east London at the eastern ends. When complete, the railway will be around 73 miles (118 kilometres long), stopping at more than 40 stations, including 10 new stations and 26 miles (42 kilometres) of new tunnels. Once Crossrail is open, it will become part of Transport for London's (TfL's) rail and underground network and will be known as the Elizabeth line.

2 The Department for Transport (the Department) and TfL are jointly sponsoring the Crossrail programme. Crossrail Ltd, a wholly owned subsidiary of TfL, is responsible for delivering an operational railway. Network Rail is undertaking work to improve existing surface infrastructure to meet the needs of the new service. In July 2014, TfL awarded the contract to operate Elizabeth line services to MTR Crossrail.

3 In August 2018, Crossrail Ltd announced that the programme could not be delivered on time and that they would not be in a position to open the central section through London in December 2018 as planned. In December 2018, the Department announced that cost increases on the programme had resulted in an increase in funding to £17.6 billion (some £2.8 billion more than the level of funding announced in 2010), including more than £2 billion of loans from the government to TfL and the Greater London Authority. The guiding principle of this funding package was that London should pay for the cost increases, as it will be the primary beneficiary of the Elizabeth line.

4 Since the end of 2018, Crossrail Ltd has been developing plans that set out when it will complete the programme and introduce Elizabeth line services. In April 2019, Crossrail Ltd announced that it plans to introduce services, excluding Bond Street station, which is still significantly delayed, on the central section of the railway at some point between October 2020 and March 2021.

Scope of the report

5 This report is not intended to apportion blame for what has happened to the Crossrail programme. Our aim is to set out why and how the programme ran into difficulty, and what Crossrail Ltd needs to do to manage the remaining risks to the programme and deliver the promised benefits to passengers and the economy.

6 We have focused primarily on the period from 2015 to March 2019, as problems started to emerge on the programme from 2015. We have also looked at some of the decisions Crossrail Ltd made before this point. This report is based on review and analysis of documents produced by Crossrail Ltd and sponsors, including reports on the programme's progress, and interviews with key senior figures involved in the delivery and oversight of the programme. Crossrail Ltd now has a new management team, Chair and board members. We have not audited the work of the new management team.

Key findings

7 **Crossrail is past the point of no return.** Nearly £16 billion has already been spent. Tunnelling completed in 2015, trains have been ordered and some are already in service, and Network Rail has lengthened platforms, and enhanced stations and signalling on the existing network in readiness for Crossrail services. In our view, there is no going back. We are not TfL's auditors and have not looked in detail at TfL's finances. It is, however, the case that TfL's financial position depends, in part, on the timing and scale of future revenue that it raises from Elizabeth line services, which remains uncertain, and the final cost of the programme to build the railway (paragraphs 3.1 and 3.16 to 3.21).

8 **Crossrail was always going to be complex and challenging.** Crossrail involves constructing around 26 miles of tunnels beneath London and 10 new, bespoke stations, most of which connect to the existing underground network. Much of the construction work is taking place in small, enclosed, hard to reach places beneath London, which makes it more difficult to do. Taken together, the Crossrail works on the national rail network are among Network Rail's largest infrastructure projects. The programme also requires software to be developed for a new fleet of trains that can switch between the three different signalling systems along the route (paragraph 1.3).

9 **Crossrail has been dominated by a fixed completion date of December 2018.** On top of the inherent complexity of the project, in 2010 sponsors and Crossrail Ltd agreed a fixed opening date of December 2018 for the central section, which drove much of Crossrail Ltd's decision-making on the programme. The sponsors set the requirements for the programme, including the scope, budget and timetable. But by providing Crossrail Ltd with a high degree of autonomy, sponsors had few effective contractual levers to enable them to take action, particularly towards the later stages of the programme (paragraphs 1.3 to 1.8, 2.16, 2.20 and 3.12, and Figures 2 and 3).

10 **Delivering by December 2018 meant multiple activities ran in parallel.** This approach meant that some work to install systems required to operate the railway, and complete stations, would take place at the same time during the latter stages of the programme. This created vulnerability on the critical path. The delivery approach, delays to some contracts and the decision to set and then stick to the December 2018 opening date, led to increased compression in the programme and increased risks. A number of stakeholders we spoke to expressed the view that the Crossrail Ltd executive team recognised the challenges but believed this was an exceptional team capable of delivering exceptional results and overcoming these challenges (paragraphs 2.12, 2.16 to 2.17, Figure 7, and case example 3 in Appendix Three).

11 **Thirty-six main contracts increased delivery and cost risks.** Costs on most of the 36 main contracts have increased substantially. Crossrail Ltd did not require individual contractors to manage interfaces with other contractors, and so protected contractors from changes that were outside their control. Therefore, Crossrail Ltd had to compensate individual contractors for delays that occurred on other contracts, on which their work depended, and had to engage in costly change control negotiations. Changes to the design of construction and systems installation work, and changes to contractors' delivery schedules cost around £2.5 billion between 2013 and 2018. This resulted in substantial drawdowns of contingency, which Crossrail Ltd had set aside to manage such risks. Settlement of accumulated compensation events with contractors accounted for nearly £1 billion of these cost increases. Crossrail Ltd decided to hold the delivery and cost risks itself. Crossrail Ltd originally hired Bechtel and Transcend as project management partners to support it in managing the overall programme, including integrating the work of multiple contractors. However, in 2011, Crossrail Ltd chose to fold the Bechtel and Transcend teams into its own project management effort, rather than hold them at arm's length and accountable for integration of the overall programme (paragraphs 2.3, 2.8 to 2.9, and 2.11 to 2.19, Figure 4, Figure 5 and Box 1).

12 **Crossrail Ltd did not have a sufficiently detailed delivery plan against which to track progress.** Crossrail Ltd started to produce a detailed, realistic, bottom-up plan in late 2018. Prior to this, from 2015, it had based its management of the programme on an aspirational plan designed to improve progress by suppliers, rather than to provide a reality check on overall progress. Crossrail Ltd presented the plan as the critical path for completing the overall programme. However, the plan did not adequately reflect interdependencies across the programme. Consequently, Crossrail Ltd had a gap in its understanding of delivery risks and the likelihood of meeting the December 2018 opening date (paragraphs 2.22 to 2.27 and 3.5).

13 **During 2015 and 2016, pressures on the programme began to show and continued to escalate through to the end of 2018.** There were three main points when costs escalated:

- From 2015, Crossrail Ltd renegotiated some of its main contracts, to settle historical compensation claims and address the delays that had emerged, by aligning contractors' delivery milestones to its revised programme plan. By November 2016 Crossrail Ltd had drawn down substantial contingency and was forecasting that it would need to use contingency held by TfL, later in the programme.
- Soon after Crossrail Ltd revised the delivery plan in 2015 , a number of key contracts were behind schedule again. To meet the December 2018 opening date, Crossrail Ltd accelerated work on key contracts, which increased costs.
- In the run up to, and since, Crossrail Ltd's August 2018 announcement that it would not open the central section in December 2018, costs have increased further because completing the programme depended on contractors' workforces being required for longer than planned. Between March 2018 and December 2018, for example, the forecast final cost of the contract to install track and key systems in the tunnels increased by £189 million (25%), from £767 million to £956 million.

The lack of a realistic programme plan and the frequent re-planning meant that the reducing likelihood of delivering in December 2018 and the sharp increase in cost suddenly became apparent in late 2018 (paragraphs 2.20 to 2.25 and case example 2 in Appendix Three).

14 **Between 2015 and 2019, there was little pressure on key contractors to deliver the programme efficiently.** During 2015 and 2016, some key contracts were moved from a target price to a cost reimbursement basis. This change meant that Crossrail Ltd removed the key incentive on contractors to minimise costs and took on the financial risk itself. The frequent re-planning of the programme, combined with increasing interfaces between contracts, meant that contractors continued to raise compensation events, and costs continued to increase. After it had announced that it would not open the central section in December 2018, Crossrail Ltd began negotiating fixed price contracts for some of the remaining work to improve certainty about costs. However, this form of contract means that Crossrail Ltd risks losing commercial levers to ensure that contractors prioritise completion of Crossrail over other projects and opportunities (paragraphs 2.13 to 2.14 and 3.8 to 3.9 and Box 1).

15 **Crossrail Ltd took some decisions that drove unnecessary cost into the programme.** In early 2018, to account for delays to the schedule, Crossrail Ltd began carrying out train and signalling system testing and construction activity in alternating time periods, to allow for early sight of potential train and signalling system issues. However, delays to the train and signalling software development meant that few meaningful results could be acquired at this point and took any spare time and space from construction workers on site. Crossrail Ltd also reduced its central programme and risk management capability during 2018, on the basis that they anticipated the programme reaching completion in December 2018. It is currently rehiring staff now that it is clear that significant work remains, although it has faced challenges recruiting the skills it needs (paragraphs 2.21 and 3.10 to 3.11, and case example 4 in Appendix Three).

16 **Crossrail Ltd now needs space and time to complete and deliver its plans**. In April 2019, Crossrail Ltd announced that it plans to introduce Elizabeth line services on the central section between October 2020 and March 2021. While it has made progress with the development of a detailed and realistic plan, Crossrail Ltd has not yet completed its assessment of the financial implications of this opening schedule. It is still unclear when the full Elizabeth line service will start . Crossrail Ltd will continue to come under pressure to open the railway, drive down costs and complete the programme as soon as possible. Notwithstanding these pressures, Crossrail Ltd's new executive team should take the time to make sure that this plan is deliverable and prudent (paragraphs 3.5 to 3.7).

Conclusion

17 Until the new services are open to passengers and the final costs of the programme are known, it is not possible to conclude on overall value for money. What we can say is that there are a number of features in the way the programme has been delivered that have driven unnecessary cost. The compressed schedule, the contractual model, the loss of downward pressure on costs, and the absence of a realistic plan were set against an atmosphere where 'can do' became unrealistic. All these factors and many more set out in this report have contributed to underachievement in terms of cost and progress so far.

18 As mentioned at the start of this report, Crossrail must be completed and the new Crossrail Ltd management team needs to be supported in getting that task executed in the most practical and achievable way possible.

Recommendations

For the Crossrail programme:

a Crossrail Ltd should continue to refine its plan to complete the programme, establish a realistic cost estimate, and resist external attempts to influence timetable and cost.

b Crossrail Ltd, working with sponsors, should establish a range of scenarios that set out the potential future impacts on the taxpayer, passengers and businesses and develop plans for how further cost increases or delays in collecting revenue will be financed.

c Crossrail Ltd should rebuild its capacity and capability to complete the programme in a timely and cost-effective way.

For the Department's other current and future major programmes

d We note that the Department has completed a lessons learned exercise and we would encourage it to also apply the lessons to other major projects including High Speed 2.