

Crossrail presentation to Barbican residents 24 September 2013

An account of the meeting and the Q+A session appears below and Crossrail's presentation and their account of the meeting will appear here soon. The BA had the meeting videoed and this is available for viewing to residents, via a weblink. If you would like the link please email Jane Smith (chairBA@btinternet.com)

Crossrail came and presented to a packed meeting on residents on 24 September. They started with a short video which showed the tunnel boring machines at work (you can see it at <http://www.crossrail.co.uk/news/videos>) and then Bill Tucker, director for the central area, talked about progress and timescales and Mike Black, geotechnical director, talked about settlement.

The information in the article on Crossrail that appeared in the last issue of the BA Newsletter (<http://www.barbicanassociation.co.uk/wp-content/uploads/2015/02/ba-newsletter-jul-2013.pdf>) remains accurate, but the speakers did update the timescales and go into more detail about the work, the timings, and the assessments and monitoring and described their experience so far of tunnelling from Paddington to Farringdon. The good news is that having completed 43% of their tunnelling Crossrail has experienced no problems with settlement except a few reports of cosmetic damage to buildings.

Tunnelling progresss

Bill Tucker explained that the train service should be phased in during 2018, with initial full service from December 2018. Two tunnels (east and west bound) will be bored under the Barbican Estate. Tunnel boring machine Elizabeth has travelled about two miles west of Canary Wharf towards Stepney Green, and Victoria has just left Canary Wharf and is under West India Quay.

Crossrail expects these machines to bore under the Barbican Estate from October 2014 to January 2015. The machines are due to leave Liverpool Street on 2 October 2014 and 22 December 2014 and will take about two weeks to traverse the estate. The railway itself will probably be installed under the Barbican from July to September 2016, though as all materials will be brought underground from Plumstead residents are unlikely to notice this phase. The railway itself will be installed on a floating slab track to minimise noise and vibration.

Crossrail is forced by its act to limit surface noise from tunnelling to 25dB, less than Hyde Park on a Sunday morning. Moreover, vibration should be barely perceptible since noise control is much harder than vibration control.

To date Crossrail has had no complaints of tunnelling noise, and only a few reports of cosmetic damage to buildings, even though the two machines that started at Paddington have already reached Farringdon and Tottenham Court Road, respectively. On the way they have gone under several sensitive buildings and passed within 1 metre of London Underground tunnels.

Minimising settlement

Mike Black said that the tunnel boring machines were "earth pressure balance machines", a 20-year-old technology which limits ground movement by pushing out at the ground until concrete segments are fixed immediately behind the cutting head. The machines run continuously 24 hours a day all year round to minimize the chance of settlement.

On the tunnel already bored between Holborn and Farringdon, Crossrail aimed for settlement of no more than 6mm to 18mm, depending on the sensitivity of buildings overhead. They kept well within this except for two small areas under Gray's Inn, but even here there was no effect on the lawyers' buildings.

Barbican buildings are at low risk of settlement: they have concrete frames with deep foundations in London clay, and at least 14m clearance between the deepest foundations and the top of the Crossrail tunnels. All Barbican buildings scored zero on Crossrail's scale of zero to five for settlement risk, implying no more than minor cosmetic damage at worst, with settlement of no more than about 5mm. The entire estate was assessed because it is listed, though detailed assessments were done only on the buildings within the 10mm settlement contours/30m around the works.* Some buildings then got a score of 1 under the Heritage scale.

Long leaseholders who are within one of the buildings in the settlement zone* can get a Settlement Deed for free, if they apply by December 2013, but Crossrail is legally obliged to make good any damage anyway, either with Crossrail's own contractors or reimbursing residents who use their own. The City of London has taken out Settlement Deeds for the physical structure of the Estate and the communal areas: these are currently with the solicitors awaiting signing. Long leaseholders can download settlement deeds and information from <http://www.crossrail.co.uk/construction/managing-the-effects-of-construction/ground-settlement-managing-the-effects-of-tunnelling>.

Crossrail will monitor settlement on the Estate for 12 months before tunnelling starts, and afterwards until settlement is less than 2mm pa, and therefore for at least 12 months. During tunnelling, settlement data will be checked two or three times a day.

Defect surveys

Defects surveys record the external and internal state of buildings as a baseline to check any damage caused by Crossrail. Crossrail will write to the relevant Barbican residents about three months before tunnelling starts (probably around July 2014), and follow up with two rounds of door knocking, but will not conduct an internal survey if a household can't be contacted by then. The baseline survey is, of course, for the benefit of the householder, so Crossrail hopes people will respond. The surveys are done by an independent building surveyor, though paid for by Crossrail. Crossrail expect any cracks or other damage would appear within two days of tunnelling.

No one has been unable to get insurance as a result of Crossrail activity, and Crossrail has had no major claims to date.

Residents' first point of contact is the 24-hour Crossrail helpdesk, at helpdesk@crossrail.co.uk or 0345 602 3813.

Bill Tucker offered to come back in a year's time to update residents again. Notes of the Questions and Answers are on the BA's website (www.barbicanassociation.com). We videoed the meeting, and we will shortly let people know how they can access the video and the slides that Crossrail presented.

Garth Leder and Jane Smith

*Buildings that have settlement reports are: Shakespeare, Willoughby and Speed, John Trundle and Bunyan, Lambert Jones, Lauderdale, Defoe, Gilbert, Andrews, Brandon Mews. Copies are available from house group chairs and in the Barbican library.

Q&A

Have the fixings for measuring settlement got listed building consent?

Agreeing fixings with the City is under way. Crossrail will avoid really obvious façades and sensitive points. The City has the final say on method. Some reference points stick on but others need to be drilled in.

Will the railway operation itself disturb residents?

The Crossrail Act requires the trains to create less than 25dB of surface noise, so residents should not notice them. Crossrail runs 25m to 40m under the Barbican Estate, much deeper than the existing Underground track.

How risky is London clay for tunnelling?

London clay is excellent for tunnelling, much better than gravel or sand. The clay stays up a long time behind the cutting head, giving only gradual slopes into the settlement area.

Might a cutter intervention increase settlement risk?

On the machines that will bore under the Barbican, Crossrail has planned interventions (to replace the cutting edge) at Canary Wharf, Stepney Green, Whitechapel and Liverpool Street. The edge will therefore have been renewed just 200m before the machine bores under the Barbican, giving a low risk of any unscheduled intervention.

Might residents hear noise, as transmitted up through the concrete foundations into Brandon Mews during work on the Moorgate [former Thameslink] line?

Crossrail is much deeper than the Moorgate line, at least 14m below foundation, so residents should notice little or nothing during tunnelling. Ove Arup have provided good information on Barbican foundations, which they had kept from their work constructing the Estate.

Will residents have to declare tunnelling to potential insurers?

Crossrail will check this.

In what units is vibration measured?

Crossrail will check this, though, as noise is tightly controlled, residents are extremely unlikely to be disturbed by vibration.

Is special engineering required to tunnel directly under the Underground line?

Crossrail has assessed the Underground line just as it has assessed the surface buildings. The Underground runs through a concrete box buried in the ground, so presents low risk.

What noise might the Moorgate station works produce?

The noisiest phase, the demolition, is now over, and the large machines that have worked since February 2012 have now left the site. Digging down through the remaining foundations does involve munching concrete, but should be quieter and will get quieter still as they dig deeper.

Is Defoe House at risk as the tunnels run under the full length of the building?

No. Crossrail have modelled not just the eventual settlement from the tunnelling but also the ripple as the machines bore under the building. The tunnel alignment was chosen to avoid more difficult features and sharp corners on the railway line.

Will extra temporary cabins, etc., be needed?

No. The Moorgate and Finsbury Circus sites are fully installed.

Why are all eight tunnel boring machines female?

This is a mining tradition!

How will spoil be removed?

From the tunnels themselves, spoil will be removed by train to Canning Town and then by barges to Wallasea Island in Essex. From the station works, spoil will be removed by lorry

and then barge, also to Wallasea. Crossrail expects to deposit four million cubic metres of spoil on Wallasea.

Have the tunnellers found any surprises?

Just one: old crane foundations at West India Quay were thought to go straight down but turned out to be splayed, requiring metal to be cut out in advance of the cutting head.

Are the lift shafts through more than 40 storeys of Lauderdale Tower at risk?

Crossrail has assessed this risk as well within tolerable limits.