



**London Underground**  
Infrastructure Protection

3<sup>rd</sup> Floor  
Albany House  
55 Broadway  
London SW1H 0BD

[www.tfl.gov.uk/tube](http://www.tfl.gov.uk/tube)

Your ref:  
Our ref: 20403-SI-2-231115

Francis Williams  
Ground and Water Limited  
[francis.williams@groundandwater.co.uk](mailto:francis.williams@groundandwater.co.uk)

23 November 2015

Dear Francis,

**18 Ornan Road London NW3 4PX**

Thank you for your communication of 17<sup>th</sup> November 2015.

I can confirm that London Underground assets will not be affected by works at the above location.

However, there are Network Rail assets close to this site.

Please contact the following to query what affect if any your proposals will have on the railway:

Asset Protection Anglia Route  
Network Rail  
Floor 11  
One Stratford Place  
Stratford  
London  
E20 1EJ

Telephone number 0203 356 2510

Email: [AssetProtectionLNEEM@networkrail.co.uk](mailto:AssetProtectionLNEEM@networkrail.co.uk)

If I can be of further assistance, please contact me.

Yours sincerely

**Shahina Inayathusein**  
Information Manager  
Email: [locationenquiries@tube.tfl.gov.uk](mailto:locationenquiries@tube.tfl.gov.uk)  
Direct line: 020 7918 0016

London Underground Limited  
trading as London Underground  
whose registered office is  
55 Broadway  
London SW1H 0BD

Registered in England and Wales  
Company number 1900907

VAT number 238 7244 46

London Underground Limited is  
a company controlled by a local  
authority within the meaning of  
Part V Local Government and  
Housing Act 1989. The controlling  
authority is Transport for London.

**Subject:** Fwd: EN11510 RE: 18 Orman Road, London NW3 4PX  
**From:** Francis Williams <francis.williams@groundandwater.co.uk>  
**Date:** 07/01/2016 13:27  
**To:** Joseph Khavari <joseph.khavari@smartspaceuk.com>, Joseph Khavari <josephkhavari@aol.com>, Marko Nesovic <marko@sts-se.co.uk>

FYI

----- Forwarded message -----

**From:** Galloway Peter <Peter.Galloway@networkrail.co.uk>  
**Date:** 7 January 2016 at 12:23  
**Subject:** EN11510 RE: 18 Orman Road, London NW3 4PX  
**To:** "francis.williams@groundandwater.co.uk" <francis.williams@groundandwater.co.uk>

Dear Sirs,

Your enquiry has been forwarded to this office for attention.

Thank you for contacting Network Rail. Your initial enquiry reference is EN11510, please use this reference on all associated correspondence.

Network Rail has no objection in principle to the proposed works, subject to discussing the proposals when more details are available and your Client providing reasonable assurances that Network Rail's tunnel will not be adversely affected during or on completion of the works. Please find attached Network Rail's generic Engineering Conditions for works in proximity to tunnels which will be the basis for those discussions and reassurances.

The structure in the vicinity of your Client's property is Belsize No.2 Tunnel carrying the Midland Main Line slow lines, used principally by the intensive Bedford to Brighton Thameslink Passenger services and also the majority of freight services using this route. Also attached are:

An extract from Network Rail's Property Database showing the alignment of both Belsize Tunnels. (The yellow outline indicates the internal bore)

A drawing showing the vertical alignment of the tunnel relative to ground level. (This indicates a probable depth of cover to the tunnel extrados of the order of 24.0m at Ormond Road).

A drawing showing the designed cross section dimensions of the tunnel.

A drawing showing the long section, principally of Belsize No.1 (Fast Lines) Tunnel but with No.2 Tunnel indicated by dotted line, annotated with a depth of cover at Haverstock Hill of 80' 0" (c.28.0m – probably to the intrados).

The accuracy of historic records cannot be guaranteed and should be regarded as indicative until verified on site, as necessary.

If your Client decides to proceed with the proposed works early discussions with Asset Protection are recommended. In particular, if correlation surveys and monitoring of the tunnel structure are required track possessions and electrification equipment isolations to facilitate access to the tunnel are limited in duration and availability and need to be planned well in advance. Completing the attached enquiry questionnaire, as fully as possible, and returning it to the Asset Protection Generic e-mail address together with preliminary details of the proposed works will initiate arrangements for a meeting to establish the extent of Network Rail's involvement and establish a basis for preparing a Basic Asset Protection Agreement and cost estimate.

Peter Galloway

Asset Protection Engineer

Tel: 01904 384011 (Direct)

**From:** Francis Williams [mailto:francis.williams@groundandwater.co.uk]  
**Sent:** 17 November 2015 12:46  
**To:** Location Enquiries; Asset Protection LNW (South)  
**Subject:** 18 Orman Road, London NW3 4PX

Dear Madam/Sir,

We are currently looking at undertaking a basement extension at the above property. A location plan is attached.

We are aware that the site is located close, if not over, tunnels associated with the London Underground and/or also National Rail.

Would it be possible to provide us with plans showing an accurate location of tunnels and their depth. Obviously should there be a charge for this then please let us know.

Would it be possible to let me know what your turnaround times are for this information.

Should you require any further information then please do not hesitate to contact the undersigned.

--

**Francis Williams** Mgeol (Hons.)

CEInv AGS FGS MS08RA

*Director*

Ground and Water Limited

Mob:07979 754715

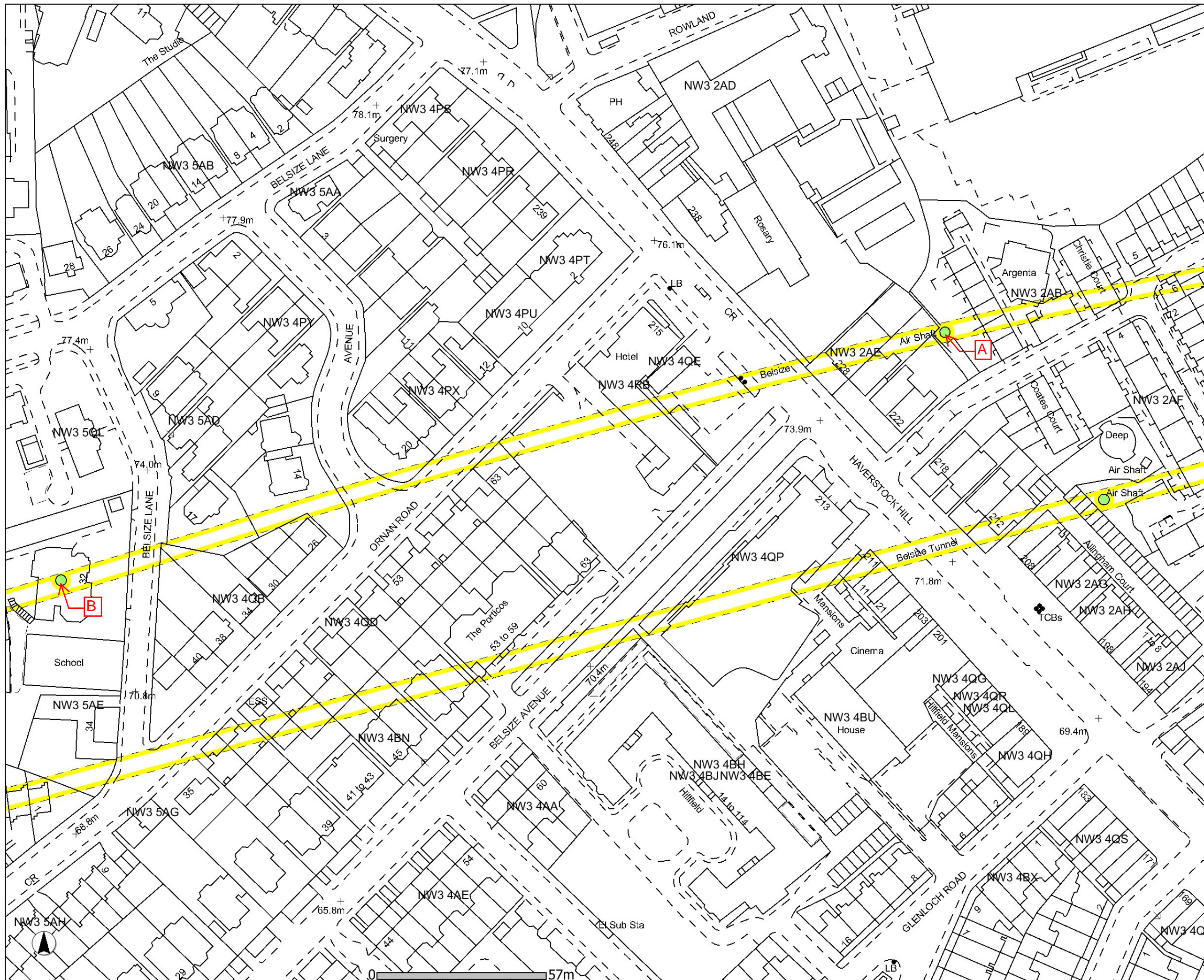
[www.groundandwater.co.uk](http://www.groundandwater.co.uk)


Skype: groundandwater

Based at:  
Head Office  
2 The Long Barn  
Norton Farm, Selborne Road



A = Air Shaft N0.3  
 B = Air shaft No.4



<b>LONDON: ORNAN ROAD</b> Belsize Tunnels	
Plot Scale	1:1250
Plot Date	6/1/2016
	





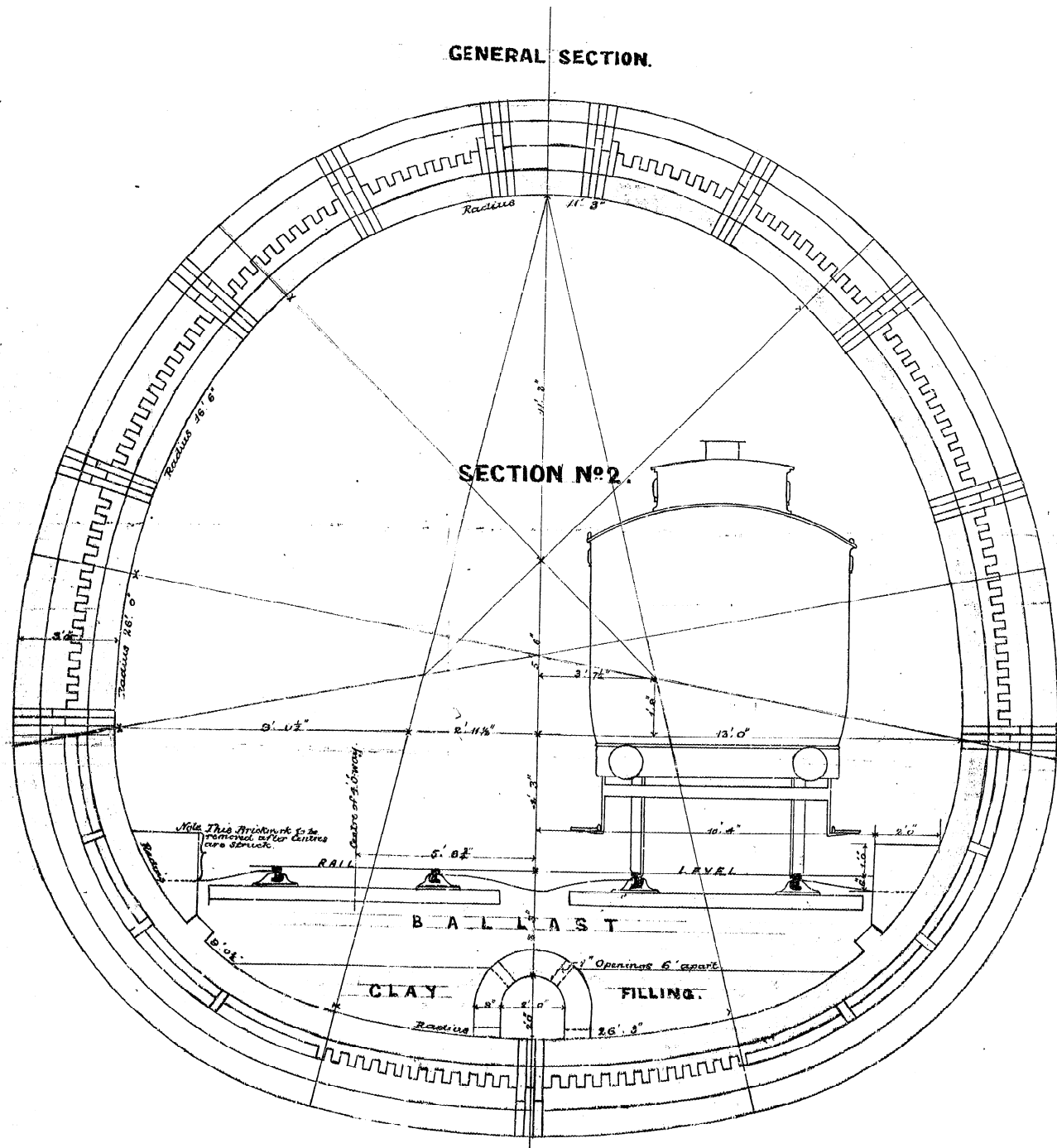


# M. RY BELSIZE SECOND TUNNEL.

3056023

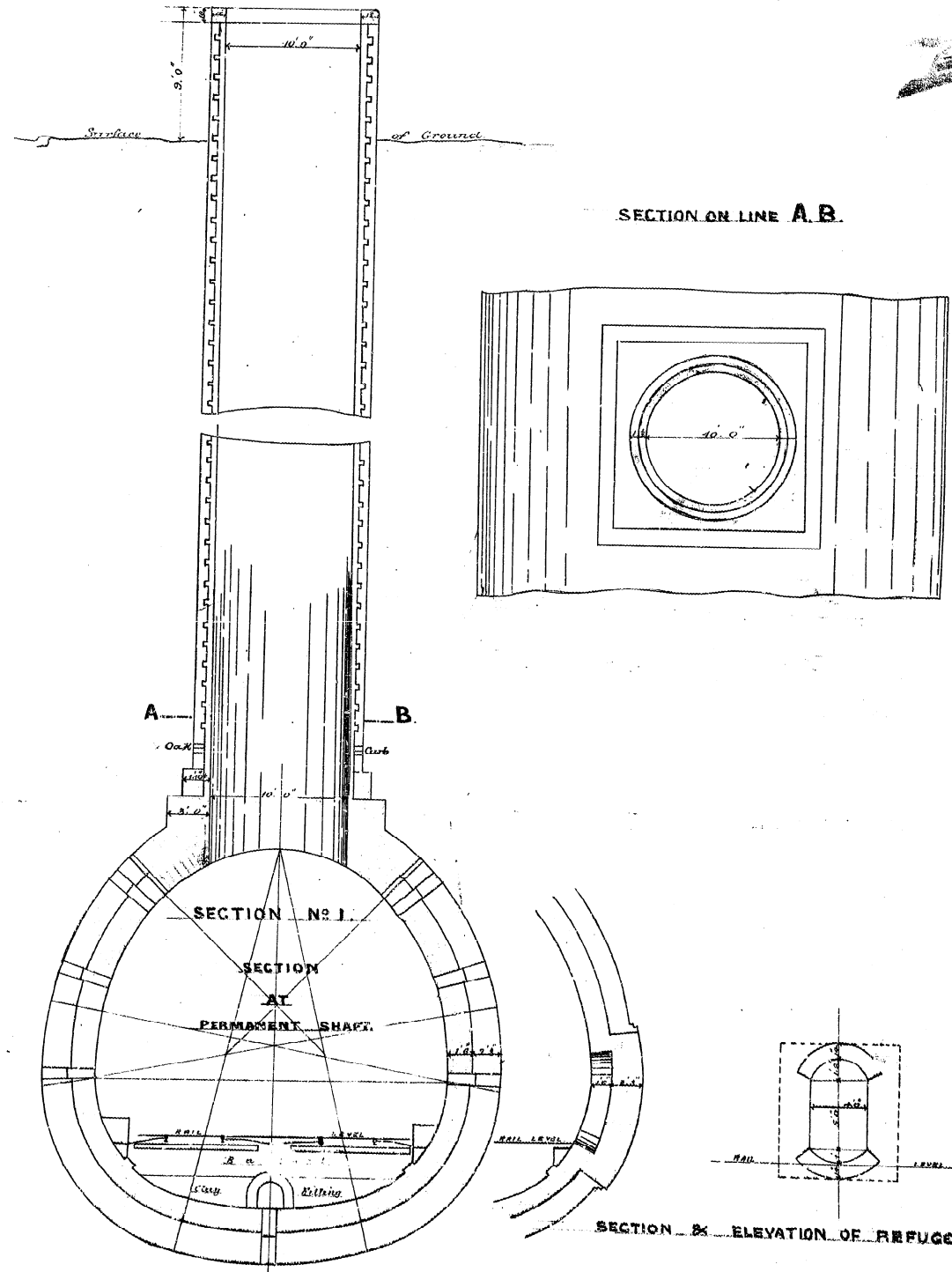
Passage Tunnel - Bridge No. 29.

GENERAL SECTION.



SCALE, 1/4 INCH TO ONE FOOT.

SECTION ON LINE A.B.



SCALE, 1 INCH TO 5 FEET.

Derby May 22 1856

BOC No 9



## **CONDITIONS AND REQUIREMENTS FOR ENGINEERING WORKS IN THE VICINITY OF NETWORK RAIL TUNNELS**

**ISSUED IN CONNECTION WITH:  
EN11510 LONDON: 18 ORNAN STREET – PROPOSED BASEMENT CONSTRUCTION**

### **1 INTRODUCTION**

In order to carry out any works adjacent to or over Network Rail's structures and operational railway safely the following engineering safety requirements need to be fulfilled. The following is of a general nature and may be subject to additions or deletions when further details of the proposed works are known.

Works are defined as:

- Demolition of any buildings or structures on the site
- Any site investigation works
- Any excavations or earthworks
- Construction of any ground improvement (piling, vibro-compaction, etc)
- Any new construction

### **2 APPROVALS**

#### **2.1 Drawings**

Network Rail requires detailed drawings of the works, including temporary works, for acceptance.

#### **2.2 Method Statements**

Network Rail requires detailed site specific method statements and risk assessments for the works, including site survey, site investigations, demolition and construction, for acceptance. A minimum of four weeks notice is required for acceptance of each submission. Network Rail reserves the right to extend the acceptance period for complex schemes.

### **3 REGULATIONS**

All the works are to be carried out in accordance with CDM Regulations, HASWA, current legislation, current design standards and best practice. Network Rail must be advised of the identity of the Planning Supervisor and requires confirmation that working in close proximity to Network Rail's operational railway has been addressed in the Safety Plan.

### **4 DAMAGE**

Any damage to Network Rail's property caused by the works is to be made good to Network Rail's satisfaction and at the cost of the proposer of the works. Network Rail may require the proposer to carry out an examination of its tunnel before and / or after the construction works or at any time during the works to verify the condition of the tunnel structure. This is to be at the cost of the proposer.

## **5 COSTS**

All Network Rail's costs associated with the works, including acceptance of drawings and method statements, and provision of site safety supervision, protection, possessions and isolations, as necessary, are to be borne by the proposer under the terms of a Basic Asset Protection Agreement.

## **6 TRAIN DELAY COSTS**

Any train delay costs attributable to these works are to be paid for by the proposer. being dependant on the number of trains delayed and the extent of the delay the cost cannot be readily estimated.

## **7 CLAIMS**

Network Rail shall not be liable for any claims against it:

- as a result of any inaccuracies in any of the plans submitted to and accepted by it;
- as a result of noise and vibrations caused by the works (including demolition) carried out by the proposer on the site;
- as a result of noise and vibrations caused by the operation of trains.

Depending on drawings and method statements received, it may be necessary for Network Rail to provide site safety supervision and protection.

## **8 ACCESS ONTO NETWORK RAIL PROPERTY**

There is to be no unauthorised access onto Network Rail property.

## **9 SAFETY MEETING**

Before any works commence on site, a site safety meeting is to be held with the proposer, his contractors and Network Rail's agents for site safety. Emergency procedures regarding Network Rail's infrastructure are to be agreed and displayed on site.

## **10 WORKS IN TUNNELS**

Any works required in Network Rail's operational tunnels, e.g. surveys and inspections, are to be carried out during a possession / isolation period.

A possession is a closure of the operational railway. An isolation is a turning off of the power to the overhead line or third rail electrified equipment.

There is a minimum of 18 weeks notice required for booking of possessions / isolations. The possession / isolation will usually be at night and for a few hours duration only. For operational reasons, Network Rail may need to cancel possessions and isolations at short notice. Network Rail will not be held responsible for any costs incurred as a result of such cancellations, although every effort will be made to make alternative arrangements. If the proposer of the works cancels a booked isolation there will be a minimum charge of 25% of the total cost of the isolation.



## **11 SURVEY AND PROTECTION WORKS**

Before any works (including site investigations, preliminary works or demolition of existing structures on the site) are carried out on any part of the site the proposer shall, at his own cost, have prepared and submitted to Network Rail for consideration and acceptance:

- a) A topographical survey of the site. This should locate and verify the depth and position of the tunnel or any other part of Network Rail's Infrastructure in relation to the proposed works. Closure of the survey's control stations between the tunnel and surface level should be to an accuracy of +/- 10mm and should relate to ordnance datum. Possessions may be required to undertake this work.
- b) Details of the manner in which Network Rail's property is to be protected during the works.
- c) Such further information as Network Rail may reasonably request.

Excavation of trial holes to locate the crown of the tunnel will not normally be permitted. If excavation is considered necessary, to ensure the protection of the asset, a detailed method statement of how trial holes would be conducted must be supplied together with a detailed description of alternatives considered, why they were rejected and why the excavation is necessary.

No works shall be carried out until such acceptance has been given and for the avoidance of doubt, it is agreed that Network Rail may give its acceptance in respect of part of the site or the whole of the site as appropriate.

## **12 DESIGN PROCESS**

Before the works commence on site the following design approval process, in accordance with Network Rail Standard NR/L2/CIV/003 "Engineering Assurance of Building and Civil Engineering Works", shall be followed with Network Rail in respect of the effects of the works on the tunnel:

- a) Form F001 (Approval in Principle) is to be submitted including outline Design Proposals, Methods of Analysis, General Arrangement drawings and an outline feasibility report, which should identify any movements which may occur in the tunnel lining as a result of the proposed temporary and/or permanent works. The proposer must predict what would constitute safe levels of stress, deformation, strain or other relevant criteria above which levels it would constitute a failure of the Network Rail infrastructure and why these levels should be adopted and accepted by Network Rail.
- b) Form F002 (Statement of Design Intent) is to be submitted, including a Designer's Risk Assessment, detail of the proposed methods of analysis, detail of any software packages to be used and detail of the staff proposed to undertake the analysis, including relevant experience on similar projects.
- c) Form F003 (Certificate of Design and Check) is to be submitted, including analysis of the existing capacity of the tunnel and the maximum movement that it can withstand without being overstressed or otherwise affected detrimentally, adequate documentation to demonstrate that the proposed works can be maintained within agreed limits (Form F001) and a summary of any further effect identified through the detailed analysis process and how it will be limited where it may be detrimental.

Any previous developments on the site should also be considered when analysing the effect on Network Rail's infrastructure. Where multiple developments are occurring adjacent to Network Rail's infrastructure it may be necessary for the proposer to consider the combined effect of these developments. The check is to be carried out by an independent organisation (Category III).

(Separate Forms F002 and F003 are required in respect of temporary works where failure could have an adverse effect on the tunnel structure).

20 working days are to be allowed from receipt for acceptance of these documents (40 working days for temporary works).

In addition, at any stage in the construction process, the change in applied pressure on the outside of the tunnel lining caused by the development shall not exceed 20kN/m<sup>2</sup> and resultant deformations/displacements of any point within a tunnel should not exceed 3mm. These are indicative values which may be unacceptable to Network Rail due to particular conditions. Any works that exceed these indicative values will require numerical substantiation and will generally not be acceptable.

The design shall include a desk study of the surrounding area, including but not exclusive to:

- BGS Boreholes
- Envirocheck (or similar)
- A study into the history of the site

Analyses submitted must consider all relevant factors which may affect Network Rail infrastructure. This should include but not be limited to the following:

- Amplitude of vibration i.e. peak particle velocity (ppv)
- Frequency
- Acceleration
- Stress changes
- Strain of individual elements of structures and of the structure
- Clearance
- Tension
- Alignment of the rail (vertical and horizontal)
- Cant
- Structural Capacity of elements and structures

Acceptance of this document will take up to eight weeks.

### **13 MONITORING**

Once allowable levels of movement have been established, the proposer is to submit a monitoring regime to measure actual movements against allowable. This regime should include trigger levels and specific actions against these levels (these actions must be analysed and supported by calculations within the Form B) and be agreed by Network Rail.

Possessions/Isolations may be required for monitoring and setting up any monitoring equipment.

#### **14 WORKS WITHIN 10M OF TUNNELS**

Where any part of the scheme falls within an annular distance of 10 metres from the outside of the tunnel lining or within the Zone of Influence of the tunnel, the proposer shall submit to the Network Rail for acceptance a detailed programme of such works and details of the construction techniques to be used.

No such works shall take place until such acceptance has been given. A minimum of four weeks notice is required for acceptance.

The Zone of Influence is defined as an area of land above a tunnel that may be influenced by the existence of the tunnel.

#### **15 SLAB AND RAFT FOUNDATIONS**

No part of any foundation raft or slab shall be constructed nearer than 5 metres from the outside of the tunnel lining.

#### **16 CRANE WORKING, PILING, GROUND IMPROVEMENT**

Crane Working/Piling Rig Working/Ground Improvements proposed for the site will be subject to the following restrictions, and must demonstrate that ppv, frequency or velocity increases will not cause a detrimental effect on the tunnel lining. Any works generating a ppv greater than 5mm per second at 5m from the extrados of the tunnel must be shown to have no detrimental effect to Network Rail's infrastructure.

Method Statements are required for any crane or piling rig operations on site, they are to indicate technical details of the equipment including load capacity, radii and diagrams showing jib length, position, outriggers position and anticipated load lifts, etc. Drawings are required to show crane and piling rig movements and lifting positions about the site.

Crane working may need to be supervised by Network Rail.

The necessary crane legislative documents and a crane supervisor will be required for cranes of over 50 tonne capacity.

All plant certification is to be checked by Network Rail.

Attention is drawn to the following:

- a) A level and stable platform is to be maintained for cranes or piling rigs.
- b) Placing of pile reinforcement and any casings is to comply with Item 18.

All piling and crane operations to be approved by Network Rail.

#### **17 SERVICE TUNNELS**

No service tunnel or pipe shall be constructed nearer to the outside of the tunnel lining than a distance equal to 5 metres plus the outside diameter of such service tunnel or pipe.

#### **18 PILING**



No piles are to be driven or bored within a zone bounded by vertical lines drawn at a distance of 5 metres horizontally from the extrados of the tunnel lining at the widest point of the tunnel and a horizontal line drawn at a distance of 5 metres vertically above the extrados of the highest point of the tunnel at the section under consideration.

### **18.1 Bored Piles**

- a) Bored piles shall not be under-reamed so that the under-reaming extends vertically below any of Network Rail's tunnels.
- b) Bored piles shall be sleeved to a depth of not less than 2 metres below a line drawn at 45° to the horizontal and tangential to the outer face of the underside of the tunnel lining.
- c) Where a bored pile is sleeved, it shall be so designed that no load is transmitted to the sleeves.
- d) When calculating any distances referred to in this schedule, the sleeve shall be deemed to be part of the pile.

### **19 TEST BORE HOLES**

Any test bore holes drilled on site shall be subject to the same guidelines as above (Clause 18) relating to bored piles. No works to undertake boreholes within 10m of the tunnel will be permitted unless the requirements of clause 11 have been complied with.

### **20 MARKING BOUNDARIES**

The proposer shall mark on site the extent of Network Rail's land and shall afford Network Rail and the emergency services at all times full access to all of Network Rail's land.

### **21 RIGHTS OF VENTILATION**

The proposer shall not at any time interfere with Network Rail's existing rights of ventilation on site and if it is subsequently agreed by the proposer and Network Rail to move any of Network Rail's ventilation ducts, the proposer shall provide equivalent size ducting to Network Rail's satisfaction.

### **22 PROTECTION OF STRUCTURES AND SERVICES**

The proposer shall at all times during the works protect Network Rail's structures and services.

### **23 SERVICES SURVEY**

In order for Network Rail to identify the location of its services in this area it may be necessary for it to carry out a services survey. A services survey would take 6 weeks to produce. The proposer would be required to complete the Basic Asset Protection Agreement before a survey could commence.

## **24 INSPECTION**

Network Rail shall have the right to inspect and to stop the proposer's works on the site at any time if it considers that the works could endanger Network Rail's tunnels and the traffic therein.

## **25 SURFACE WATER**

The proposer shall ensure that any surface water on the site drains away from Network Rail's property. Network Rail requires drainage details, including temporary drainage, to be submitted for acceptance.