

Network Rail

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**King's Cross Station  
Redevelopment  
Programme Package 6  
GRIP 5**

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Civil Specification  
Volume 9: Underpinning

**Job Number 123345-00**

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Network Rail

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Volume 9: Underpinning

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**Ove Arup & Partners Ltd**  
13 Fitzroy Street,  
London W1T 4BQ  
Tel +44 (0)20 7636 1531 Fax +44 (0)20 7755 2044  
[www.arup.com](http://www.arup.com)

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Job number 123345

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|           |          | Name        | Mike Devriendt   | Ken Wiseman        | John Batchelor     |
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|           |          | Name        | Mike DeVriendt   | Ken Wiseman        | John Batchelor     |
|           |          | Signature   | <i>M. de Vr</i>  | <i>Ken Wiseman</i> | <i>J Batchelor</i> |
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## 1 General

This Specification is to be read in conjunction with the Specification, Preliminaries and all other contract documents.

All work is to be carried out in accordance with relevant British Standards including Section 9.8 of BS 8004. In cases of conflict the requirements of this specification shall take precedence.

The employer for the works is Network Rail Infrastructure Limited.

Underpinning Works Contracts are subordinate to the Network Rail 12 Contract between Network Rail Infrastructure Ltd and the Main Contractor.

The Employer's Representative (ER) is such person(s) as may be nominated by the Employer to act as such for the purposes of the Contract. Refer to the Network Rail 12 Contract for the Works. In this specification and documents to which it refers, delete all references to "Employer", "Contract Administrator" and "Engineer", and replace with "Employer's Representative".

## 2 Proposed Underpinning Works

Please refer to design drawings and specifications.

## 3 Information to be Supplied to the Contractor

When available, the following information will be available to the Contractor:

- Drawings detailing the proposed works.
- Record drawings of the existing structures that have been recovered. The reliability and accuracy of this information is not yet verified.
- Geometric surveys of the internal spaces of the existing structures.
- Reports of intrusive structural surveys of the existing structures.
- Relevant soil investigation reports.
- Network Rail requires method statements and construction sequences to be submitted as Works Package Plans. Standards for Works Package Plans and any specific requirements for underpinning works will be indicated by the Employer's Representative.

## 4 Information to be Provided by the Contractor

### 4.1 Programme for Submissions

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Submit for approval to the Employer's Representative a programme for the delivery of all information to be provided by the contractor well in advance of the date of the first proposed submission.

### 4.2 Experience

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Provide details of experience of work of a similar nature.

### 4.3 Proposed Methods and Sequence

Prepare and submit to the Employer's Representative a detailed and comprehensive method statement and construction sequence for executing the works. These should include:

| Items                | Details   |
|----------------------|---|
| Sequence             | <ul style="list-style-type: none"> <li>i) Whether existing footings, basement slabs or other obstructions will be broken out prior to excavation for underpins; if so the proposed sequence and assumed constraints.</li> <li>ii) Excavation and underpinning sequence.</li> <li>iii) Proposed duration of each underpinning cycle.</li> </ul>  |
| Excavation           | <ul style="list-style-type: none"> <li>i) Method of excavation through each soil stratum.</li> <li>ii) Proposal shoring techniques for each side and for far face.</li> <li>iii) Proposals for temporary or permanent cast-in support to masonry above.</li> <li>iv) Method for control of ground water.</li> <li>v) Procedures for minimizing loss of fines through shoring.</li> <li>vi) Any proposals for grouting.</li> <li>vii) Whether any excavations will be left open overnight.</li> <li>viii) Procedures for trimming existing structure.</li> </ul> |
| Construction         | <ul style="list-style-type: none"> <li>i) Procedures for placing concrete.</li> <li>ii) Installation of dowels as necessary.</li> <li>iii) Method of placing dry pack.</li> </ul>   |
| Control of Movements | <ul style="list-style-type: none"> <li>i) Temporary propping, vertically and laterally, of existing foundations.</li> <li>ii) Temporary lateral restraint to underpinning blocks.</li> <li>iii) Jacking system to achieve specified preload where proposed.</li> <li>iv) Method of monitoring of horizontal and vertical movements.</li> </ul>  |
| Quality Control      | <ul style="list-style-type: none"> <li>i) Concrete mix details</li> <li>ii) Concrete placing</li> <li>iii) Formation of construction joints.</li> <li>iv) Accuracy of line and level to within the specified tolerances.</li> </ul>   |
| Programme            | <ul style="list-style-type: none"> <li>i) Proposed programme for these works.</li> </ul>  |

These proposals may require review by Network Rail (as owner of the existing structures to be affected). The submission programme should allow sufficient time for review by these bodies and for the incorporation of their comments and re-submission for final approval.

## 5 Materials

### 5.1 Concrete

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Use FND3 concrete in accordance with the *Civil Specification Volume 4: Structural Concrete* (ENG-SPE-G5-OAP-006-CSTR-0146).

The Contractor may submit an alternative mix proposal to the Employers Representative for approval.

### 5.2 Dry Pack

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1:3 cement: sand mix with just sufficient water to ensure full mixing and achieve suitable workability.

Well compact the dry pack with suitable tools to practical refusal so that it completely fills the gap between the top of underpin and bottom of existing foundation.

### 5.3 Joints and Other Materials

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As shown on the drawings.

## 6 Execution of the Works

### 6.1 Supervision

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Keep on site a competent site supervisor, experienced in this type of work, to be in charge of the underpinning.

Submit a curriculum vitae of the supervisor for the approval of the Employer's Representative prior to commencement of the Works.

### 6.2 Records

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Keep the following records for each underpinning block constructed:

- Depth of excavation from commencing surface
- Depth from commencing surface to any change of strata
- Soil condition at base of excavation
- Size of underpinning block (depth x length x width)
- Record of any groundwater ingress
- Record of any obstructions or delays
- Preload applied if any
- Dates of: completion of Excavation
- Concreting
- Dry-packing

Submit signed copies to the Employer's Representative no later than two weeks after the completion of each block.

### 6.3 Site Conditions

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Immediately notify the Employer's Representative should the conditions of any of the following encountered onsite differ significantly from those described in the contract documents.

- Soil conditions
- Dimensions of existing structure
- Condition of existing structure

## 7 Excavation

### 7.1 Support of Excavations

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Support all excavations in accordance with the approved method statement (see 4.3 above) in such a manner as to prevent damage to adjoining/adjacent property and to avoid adversely affecting the ground upon which it is intended to build.

### 7.2 Inspections and Approvals

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- Comply with all the requirements of the London Borough or Camden and English Heritage regarding notification, inspections and approval of all excavations and formation levels and of Grade 1 listed building elements.
- Give the Employer's Representative a minimum period of notice of 24 hours before the completion of each formations level so that it can be inspected.

### 7.3 Formation Protection

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- Maintain all excavated surfaces at least 150mm above formation level until just prior to inspection.
- All formations shall then be trimmed, levelled and cleared of loose material ready for inspection.
- Do not expose the formation for more than 3 hours.
- Place a layer of blinding or mass concrete on the formation as soon as possible after inspection in order to seal the surface.

### 7.4 Disposal of Water

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- Maintain the works free of water.
- Form all surfaces of excavations to provide adequate drainage at all times. Provide temporary drains, sumps and pumping at all times as necessary.
- The method of excavation and temporary support of side walls together with the method of groundwater control must be such as to minimize the loss of fines carried by groundwater seepage through the sides of the excavation.
- Seek any necessary approvals for the disposal of water off-site.

### 7.5 Backfilling Working Spaces

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After completion of each underpinning block, including dry-packing, backfill the working space to the level shown on the drawings. The backfill material can include that excavated for the underpinning and should be compacted in layers with a layer thickness not exceeding 150mm.

When tested in accordance with Section 8 of BS 812: Part 111, the backfill material shall have the following minimum 10% fines values:



| Material | 10% Fines (kN) |
|----------|----------------|
| 6N       | 100            |
| 6P       | 30             |
| Hardcore | 5              |

## 8 Methods and Sequence

### 8.1 Actual Methods and Sequence

Follow as far as reasonable those proposed and agreed. Should the actual works be significantly affected by any circumstance secure the existing structure and the works as carried out to that time in a safe manner, then seek further direction from the Employer's Representative.

If the methods and/or sequence are varied in a manner not significant to the specified requirements then keep the Employer's Representative fully informed.

### 8.2 Groundwater

Should groundwater conditions significantly vary from those anticipated, secure the existing structure and the works as carried out to that time in a safe manner, then seek further direction from the Employer's Representative.

### 8.3 Trimming of Existing Structure

Trim the existing structure in a manner not detrimental to remaining structure.

Provide temporary support to the existing structure, vertically and laterally, which may be required by the trimming works.

### 8.4 Restriction on Vibration

Carry out all works in a manner so as not to cause any vibration which could be detrimental to the existing structure.

## 9 Accuracy of Construction

### 9.1 Excavation

Permissible deviations from the positions shown in the drawings:

|   |       |
|---|-------|
| Back (external) face of excavation below existing foundation  | ±75mm |
| Front (internal) face of excavation below existing foundation | ±25mm |
| Formation level   | ±30mm |

### 9.2 Concrete

Permissible deviations from the positions shown in the drawing.

|   |                                       |
|---|---------------------------------------|
| Top of blinding   | ±15mm                                 |
| Toe of underpinning block                                 | ±15mm                                 |
| Top of block to ensure there is adequate zone for drypack | ± 10mm                                |
| Vertical face of concrete (external)                      | Hard up to the face of the excavation |
| Vertical face of concrete (internal)                      | ±10mm                                 |