Code of Practice for Piling using OTP

M&EE Networking Group
Background

A sub-group of the M&EE Networking Group have looked at the arrangements for Management of Points within Engineering Worksites. The M&EE Networking Group recommend this COP as good practice for the industry.

M&EE COPs are produced for the benefit of any industry partner who wishes to follow the good practice on any railway infrastructure. Where an infrastructure manager has mandated their own comparable requirements, the more onerous requirements should be followed as a minimum for work on their managed infrastructure.

The M&EE Networking Group makes no warranties, express or implied, that compliance with this document is sufficient on its own to ensure safe systems of work or operation. Users are reminded of their own duties under health and safety legislation.

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The M&EE Networking Group agreed and signed off this Code of Practice on 17 January 2018 and published on 3 March 2018

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Purpose
The purpose of this Code of Practice is to provide guidance on the arrangements for controlling the risks when planning and undertaking piling operations on the railway infrastructure. This is provided in addition to any Mandatory requirements specified by the Infrastructure Manager.

Scope
The scope of this Code of Practice applies to all piling activities covering competence groupings, piling driver vibratory, piling Hammer, piling torque head, or Auger driver when using OTP.
Definitions

ALO  
Any Line Open Working

FPS  
The Federation of Piling Specialists

On-Track Plant (OTP)  
Also known as ‘in possession only rail vehicles’ and includes road-rail vehicles (RRV), demountable machines and their trailers and attachments with guidance wheels.

1.  Planning

1.1  Long term planning  (guidance for infrastructure managers)

1.1.1  The infrastructure manager should engage a piling specialist at the earliest opportunity, prior to finalising the design concept in order that the most appropriate piling solution can be identified.

1.1.2  The infrastructure manager should engage a piling contractor at the design stage to review the site logistics and OTP selection, ensuring that it can carry out the works in accordance with the proposed design.

NOTE  The OTP selected should fully meet the infrastructure manager’s approval requirements

1.1.3  Site walkouts and logistical planning should be carried out in accordance with the infrastructure manager’s requirements to aid selection of OTP.

1.2  Design

1.2.1  Input should be provided by third party Geotechnical/Piling Contractors to ensure that the OTP and suitable attachments for the type of pile to be installed can be mobilised and utilised.

1.2.2  A Risk Assessment should be carried out to confirm that the static axle load does not exceed the maximum static axle load of 250kN (25.5 tonnes) as per section 5.5 Forces from NR/L2/TRK/2102.

This should also take into consideration the increased loads applied when extracting and manipulating piles that could compromise both the axial and lateral loads applied to the track.

NOTE  Wheel loading should be in compliance with the infrastructure managers plant approval requirements, e.g. Network Rail RIS-1530-PLT, London Underground S1171
1.2.3 Consideration should be given at the design to identify any existing Infrastructure furniture that may require relocation.

1.3 **Pre-works Planning**

1.3.1 COP0002 sets out the minimum requirements for planning for the use of OTP

1.3.2 An assessment should be undertaken to ensure all identified piling operation materials can be transported from the road rail access point (RRAP) to the site of work within the available possession time.

1.3.3 Any track Infrastructure that could be damaged during piling operations should have suitable protection planned.

1.3.4 OTP selection should be determined in conjunction with a specialised piling contractor with sufficient technical knowledge ensuring;

   a) OTP has the capability and hydraulic capacity to run the selected piling attachment to the manufacturer’s specification.

   b) Torque of either the OTP or the attachment is not greater than the other that it causes.

      i. OTP/attachment damage.

      ii. instability of the OTP.

      iii. increased load to the track geometry and infrastructure.

   c) OTP has the lifting capacity to lift the rig and any additional load.

1.3.5 All work should be planned to accommodate the design length and diameter of the pile section and the impact that it will have on the RCI system.

1.3.6 Personnel involved in the piling operations should meet the requirements of section 5.

1.3.7 If the correct OTP is not available, then the planned work should be postponed or rescheduled until the correct OTP and attachments are available.

1.4 **Site Visit**

1.4.1 A site visit should be carried out at the in accordance with COP0002 and COP0011.

1.4.2 Site walkouts should confirm the OTP selected is suitable and identify delivery, collection and storage requirements.
1.4.3 All known environmental hazards should be identified prior to breaking ground and necessary risk assessment and control measures developed prior to ground investigation or piling works taking place.

1.4.4 All known services, either above or below ground should be identified and if necessary diverted prior to any piling works.

1.4.5 Ensure suitable exclusion zones can be achieved where the piling will take place.

1.5 OTP Delivery, Collection and storage

1.5.1 When applicable the Principal Contractor should provide suitable traffic management for access/egress and loading/unloading.

1.5.2 Consideration should be given to the need for movement orders for deliveries and collections, taking into account;

   a) Local authority requirements,
   b) Time of day,
   c) Low/narrow bridges and roads,
   d) Weight restrictions on roads and bridges,
   e) Soft verges,
   f) Parking at work site,
   g) ALO,
   h) All overhead and buried services.
   i) Oversailing into 3rd party properties.

1.5.3 The need for safe and secure stabling points for OTP and material storage should be taken into consideration along with environment/site conditions.

1.6 Contingency planning

1.6.1 Contingency plan should be developed In accordance with COP0002.

2. Risk assessment

2.1 General
2.1.1 OTP configuration including the piling rig/attachment whilst manoeuvring between the installation of piles to be assessed and ALO guidelines also followed in accordance with COP0032.

2.1.2 On and off tracking should be carried out in accordance with COP0007, this should also be considered when on off tracking at the site of work.

2.1.3 Temporary works e.g. ground stabilization pads/working platforms etc. should be considered when working off track/lineside.

2.1.4 Track Hand Back Engineers/surveyor should be utilised to monitor/review the working area as authorised by the Client.

2.1.5 Inclement or adverse weather will also require reassessment prior to and during the works.

2.1.6 Where stabilisers are used, then a full risk assessment should be carried out and location of services identified and sufficient bearers/pads be used at all times. Stabilisers must not be lowered onto sleeper ends or unsupported ground at any time without a temporary works assessment.

2.1.7 A noise assessment should be undertaken to identify PPE requirements for all staff involved in the piling operation. High attenuation headsets for communication may need to be worn by persons in close proximity to the operation e.g. Piling Installer.

The assessment should take into account persons not involved in the piling operation but who may be affected.

Section 61 prior consent application for noise should be in place where applicable and where practicably possible acoustic curtains or barriers are to be used.

2.1.8 Unless the plant is adequately supported on rail a piling mat should be designed and installed and maintained to FPS document WPC4D Guidelines. If other supports are being used (e.g. stabilisers, outriggers, jack legs, foot pads and other temporary work measures) then a site specific risk and temporary works assessment should be undertaken.

3. **Methodology**

3.1 **For all types of pile methodology**

3.1.1 Each location prior to pilling should be trial dug to the required/approved dimensions and scanned by a competent person using an approved cable avoidance tool.
3.1.2 A permit to dig confirming that each location is clear to pile should be issued prior to any works.

3.1.3 The OTP may on/off track fitted with the piling attachments if a safe system of work is in place and the limitations of use allow.

3.1.4 All movements should be in accordance with the manufacturer’s instruction e.g. RCI requirements and site specific lift plans.

3.1.5 Where piling attachments are used to lift piles or other items then this is classed as a lifting operation and should be planned in accordance with Lifting Operations and Lifting Equipment Regulations (LOLER). The piling attachment should have a thorough examination and be marked in accordance with LOLER.

3.1.6 An appropriate exclusion zone should be set up and maintained and should include collapse radius where applicable.

For personnel other that those involved in the piling, it is good practice to maintain the length of the pile + 50% exclusion zone from the pile being installed, until 25% length of the pile is buried.

3.1.7 If there is a variance in the ground conditions highlighted in the design or sudden voiding then works should cease immediately and instruction sought from the Site Supervisor, CRE or Designer.

3.2 Pile Driver Vibratory

3.2.1 Check the x, y co-ordinates with the engineer prior to piling taking place to ensure correct orientation.

3.2.2 As the pile section is driven into the ground, the orientation and level should be checked throughout. During these checks all piling operations should temporarily cease. When any deviations are identified the pile section should be manoeuvred and corrected (for X and Y axis level) before the pile is embedded too deep to adjust or manipulate.

3.2.3 Vibratory attachment installation guidelines and operating procedures should be followed and refusal criteria adhered to in order to mitigate damage to the plant.

3.3 Sheet Piles

3.3.1 Should the sheet pile require an impact hammer to drive the pile to the design depth, then further risk assessments carried out along with Section 61 of the Control of Pollution Act 1974 application for noise & vibration control must be completed.
3.3.2 Tag lines should be used when pitching under slung piles or until such time as 2 points of contact are achieved.

3.3.3 Adverse weather conditions or high winds will affect the works and guidelines followed as per the ArcelorMittal Piling Handbook current edition.

3.4 Piling Hammer

3.4.1 Excessive blows can damage the pile or crack the hammer casing, therefore refusal criteria for both the design and manufacturers instruction should be followed at all times.

3.5 Piling torque head (screw piles)

3.5.1 Once positioned correctly the operator should follow downward movement whilst using slow rotational drilling action to set the pile into harder ground and allow the installer to monitor the torque motor readings.

3.5.2 The Piling Supervisor/ Piling Installer shall also monitor the pile installation, torque motor readings and ground conditions every 500mm, or if different follow the manufactures pile hammer instructions or the recommendations from the pile manufacturer.

3.6 Auger Driver

3.6.1 Once positioned correctly the operator should follow downward movement whilst using slow rotational drilling action to set the auger into harder ground and allow the installer to monitor the augers position.

3.7 RCI requirements

3.7.1 RCI must be in lift mode at all times. If motion cut occurs then follow the process for recovery.
4. Documentation (list in appropriate sections)

4.1 Site documentation should consist of the following:

- Construction Phase Plan
- Environmental Plan
- Quality Plan
- Pile design
- Inspection Test Plan
- Works Package Plan
- Piling Platform certificate
- Permit to break ground/dig
- OTP Work plan
- ALO Plan
- Task Brief

5. Piling Contractor

5.1 The piling contractor should ensure that there are adequate competent personnel on site to supervise the piling operation.

5.2 Crane Controller

5.2.1 The Crane Controller should hold the relevant competency meeting the infrastructure manager’s requirements, including relevant attachments.

For Network Rail and London Underground the Crane Controller must hold the following specific piling competency:

Sentinel Group 2 Civils,
This group covers the following piling equipment.

a) Piling Hammer.
b) Piling Torque Head.
c) Auger Driver.
d) Cone Penetration Test Unit.
e) Piling Driver – Vibratory.
5.3 Operator

5.3.1 The operator should hold the relevant OTP and attachment competency meeting the infrastructure manager’s requirements.

5.3.2 For Network Rail and London Underground the operator must hold the following specific piling competency:

Sentinel attachment groups;

a) 03 – Auger Driver.

b) 13 - Cone Penetration (CPT Unit).

c) 21 - Piling Hammer.

d) 36 - Piling Driver – Vibratory.

e) 37 - Piling Torque Head.

5.3.3 Where the specific make or model of piling equipment competency cannot be provided through a recognized training/competence scheme, an authority to work card detailing the specific make or model of equipment should be provided by the employer.