CP 604 Instructions for specifiers for CC 604 Trenchless Installation of Underground Assets

(formerly)

Version LIVE_2024-11-07

Summary
MCHW Series 8000: Trenchless Installation of Highway Drainage and Service Ducts has been rewritten to make it compliant with the new National Highways Standards drafting rules.

Feedback and Enquiries
Users of this document are encouraged to raise any enquiries and/or provide feedback on the content and usage of this document to the dedicated National Highways team. The online feedback form for all enquiries and feedback can be accessed at: www.standardsforhighways.co.uk/feedback.

This is a controlled document.

Contents

Latest release notes

Document Code	Version number	Date of publication of relevant change	Changes made to	Type of change
CP 604	LIVE_2024-11-07	Not available	Core document, England NAA, Northern Ireland NAA, Scotland NAA, Wales NAA	Change to policy, major revision, new document development
MCHW Series 8000: Trenchless Installation of Highway Drainage and Service Ducts has been rewritten to make it compliant with the new National Highways Standards drafting rules.				

Previous versions

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Foreword

This document provides specifier instructions for the production of the works specific requirements for CC 604 Trenchless Installation of Underground Assets.

This document does not form part of the works specification.

The works specification is made up of both the Specification for Highway Works and the works specific requirements completed by the Specifier.

This document is applicable for contracts throughout the UK, complemented by the additional specification requirements and contractual changes of each Overseeing Organisation.

Users are responsible for applying all appropriate documents applicable to their contract.

Users are responsible for archiving contract documentation in accordance with the user's quality management system.

1. Specification requirements for trenchless crossings

Work specific requirements for trenchless crossings

1.1 Trenchless crossings to be completed shall be as specified in CC 604/WSR/001.

Trenchless crossings to be completed							
Trenchless crossing identification number	**Trenchless crossing construction method**	**Trenchless crossing asset internal diameter**	**Trenchless crossing bore diameter**	**Trenchless crossing length**	**Drawing or model reference number (s)**	**Geotechnical Design Report (GDR) document number**	**Overseeing Organisation's reference number**
(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)

a) Enter a unique reference.
b) Enter a value, from options Microtunnelling, Pipe Eating, Pipe Jacking, Horizontal Directional Drilling, Thrust Bore, Auger Boring, Pipe Ramming, Impact Moling, Pipe Bursting, Narrow Trenching, Mole Ploughing, Cured-in-Place Lining, Sliplining, to identify type of trenchless crossing.

c) Enter a number in units of mm, to identify the trenchless crossing asset's internal diameter.

d) Enter a number in units of mm, to to identify the trenchless crossing's bore diameter.

e) Enter a number in units of m, to to identify the trenchless crossing's length.

f) Enter text, to identify the drawing or model reference of the trenchless crossing.

g) Enter text, to identify the Geotechnical Design Report document number.

h) Enter text, to identify the Overseeing Organisations document number.

Trenchless crossings to be completed (continued)	
Trenchless crossing identification number	**Contractor design of item required or not required**
(a)	(i)

i) Enter one or more values, from options Required, Not required, to identify trenchless crossing items that are to be Contractor design items.

1.2 The summary and interpretation of all existing information from previous work including reference to any Ground Investigation Factual Reports shall be as stated in CC 604/WSR/001.

SI.1.2 Summary and interpretation of existing information shall be found in the following Ground Investigation Report (GIR): [enter free text].

1.3 The details of known existing assets shall be as stated in CC 604/WSR/001.

SI.1.3 The details of known existing assets shall be as follows: [enter free text].

1.4 The requirements for the handling of waste shall be as identified in the Environmental Management Plan (EMP) in accordance with "Environmental, cultural and habitat management" in Section 1 of GC 103 [Ref 6.N].

1.5 NVQ Level 2 in 'Directional Drilling Operations', or equivalent, competent staff shall supervise Horizontal Directional Drilling operations at all times.

1.6 The following Documentation shall be submitted for verification of NVQ Level 2 in 'Directional Drilling Operations' onsite staff prior to the commencement of trenchless works: NVQ Level 2 'Directional Drilling Operations' Certification or equivalent.

Contractor design for trenchless crossings

1.7 The design of trenchless crossings shall be in accordance with CD 622 [Ref 9.N].

1.8 The design of trenchless crossings shall be in accordance with CC 604/WSR/001.

SI.1.8a The standards to be used in the design of trenchless crossings shall be [enter free text].

SI.1.8b The industry best practice guidance documentation to be used in the design of trenchless crossings shall be [enter free text].

1.9 The requirements for "Technical approval of highway structures" in Section 18 of GC 101 [Ref 8.N] shall apply to the design of trenchless crossings.

1.10 The requirements for "Contractor design" in Section 17 of GC 101 [Ref 8.N] shall apply to the design of trenchless crossings.

1.11 The following Documentation shall be submitted for approval and be approved prior to the commencement of the works: CD 622 [Ref 9.N] Geotechnical Design Report.

1.12 The requirements for "Documentation" in Section 2 of GC 101 [Ref 8.N] shall apply to Geotechnical Design Report.

Three dimensional tracking requirements for trenchless crossings

1.13 Probing from ground surface shall not be used for the tracking and recording of the three dimensional position of underground equipment, unless agreed otherwise with the Overseeing Organisation.

1.14 The requirements for tracking and recording the three dimensional position of underground equipment shall be as stated in CC 604/WSR/001.

SI.1.14a The units of measurement used for tracking and recording the three dimensional position of underground equipment shall be [select one from: millimetre [mm], metre [m].

SI.1.14b The accuracy of tracking and recording the three dimensional position of underground equipment shall be [enter a number] .

1.15 Verification shall be undertaken for the three dimensional position of underground equipment by means of tracking and recording.

1.16 The frequency of tracking and recording shall be as stated in the CD 622 [Ref 9.N] Geotechnical Design Report.

1.17 The requirements for "Verification" in Section 14 of GC 101 [Ref 8.N] shall apply to the three dimensional position of underground equipment.

1.18 The following Documentation for the three dimensional position of underground equipment shall be submitted as continuous records: three dimensional tracking data.

1.19 The requirements of "Records" in Section 3 of GC 101 [Ref 8.N] shall apply to the records that demonstrate the three dimensional position of underground equipment.

Existing ground levels & baseline survey for trenchless crossings

1.20 The existing ground levels shall be verified in accordance with " Works data" in Section 1 of GC 104 [Ref 19.N].

1.21 A baseline survey to measure ground movements shall be undertaken to GG 951 [Ref 7.N]and GS 952 [Ref 16.N].

1.22 The extent and frequency of the baseline survey shall be as stated in CC 604/WSR/001.

SI.1.22a The extent of baseline survey shall be [enter free text].

SI.1.22b The frequency of time between measurements shall be [enter a number] .

Permitted surface and subsurface settlement and heave limits from trenchless crossings

1.23 The permitted limits of settlement or heave acting at the surface, road and associated existing above ground and below ground assets shall comply with CD 622 [Ref 9.N].

1.24 The permitted limits of settlement or heave acting at the surface, road and associated existing above ground and below ground assets shall be as specified in CC 604/WSR/001.

The permitted limits of settlement or heave acting at the surface, road and associated existing above ground and below ground assets			
Asset ID	**Above or below ground surface level**	**Permitted limit of settlement**	**Permitted limit of heave**
(a)	(b)	(c)	(d)

a) Enter a unique reference.
b) Enter a value, from options above, below, to indicate if the asset is above or below the ground surface level.

c) Enter a number in units of mm, to identify the permitted limit on settlement.

d) Enter a number in units of mm, to identify the permitted limit on heave.

Verification of surface settlement or heave from trenchless crossings

1.25 Verification shall be undertaken for the measurement of surface settlement or heave from trenchless crossings by undertaking monitoring as stated in the CD 622 [Ref 9.N] Geotechnical Design Report.

1.26 The frequency of measurements for monitoring of surface settlement or heave from trenchless crossings shall be as stated in CC 604/WSR/001.

SI.1.26a The frequency of measurements for monitoring of surface settlement from trenchless crossings shall be [enter a number] .

SI.1.26b The frequency of measurements for monitoring of surface heave from trenchless crossings shall be [enter a number] .

1.27 The measurement of surface settlement or heave from trenchless crossings shall comply with the requirements in "Verification" in Section 14 of GC 101 [Ref 8.N].

Abandoned trenchless bores

1.28 Where drilling equipment becomes lost downhole and is unrecoverable, its position shall be surveyed to GG 951 [Ref 7.N] and GS 952 [Ref 16.N].

1.29 Where drilling equipment becomes lost downhole and is unrecoverable, its position shall be provided in the as-built documentation and the Geotechnical Feedback Report.

1.30 In the event of a bore being abandoned it shall be reinstated to be free of voids.

1.31 Where drilling equipment becomes lost downhole and is unrecoverable, the entire length of the abandoned bore leading to the lost construction equipment shall be filled with a cementitious grout.

1.32 Cementitious grout for abandoned trenchless bores shall comply with "Drainage pipes" in Section 1 of CC 500 [Ref 3.N].

Overbreak annulus between the trenchless crossing and the ground

1.33 The overbreak annulus between the trenchless crossing and the ground shall be as stated in CC 604/WSR/001.

SI.1.33 The width of overbreak between trenchless crossing and ground shall be [enter a number] .

1.34 Overbreak annulus between trenchless crossing and ground shall be filled with a grout compliant with "Drainage pipes" in Section 1 of CC 500 [Ref 3.N].

1.35 Surface levels shall not be disturbed due to grouting.

1.36 The grout to fill the overbreak annulus between trenchless crossing and ground shall not become segregated before and during pumping.

Support, lubrication and drilling fluids for trenchless crossings

1.37 Support, lubrication and drilling fluids for trenchless crossings shall comply with "Support fluid for piles and embedded retaining walls" in Section 20 of CC 602 [Ref 11.N].

Installation and reinstatement of chambers for trenchless crossings

1.38 The installation and reinstatement of chambers used during trenchless crossings shall comply with "Chambers for drainage pipes" in Section 3 of CC 500 [Ref 3.N].

1.39 The installation or reinstatement of chambers used during trenchless crossings shall comply with "Chambers for service ducts" in Section 4 of CC 500 [Ref 3.N].

Reinstatement of ground disturbed by trenchless crossings

1.40 The reinstatement of ground disturbed by trenchless crossings shall be as specified in CC 604/WSR/001.

The reinstatement of ground disturbed by trenchless crossings					
Trenchless crossing identification number	**Reinstatement identification number**	**X (Easting) coordinate**	**Y (Northing) coordinate**	**MCHW documents number(s) that reinstatement of ground disturbed by trenchless crossings shall be in accordance with**	**Backfill material class**
(a)	(b)	(c)	(d)	(e)	(f)

a) Enter a unique reference.
b) Enter a unique reference.

c) Enter text, to identify the location requiring reinstatement of ground after trenchless crossings.

d) Enter text, to identify the location requiring reinstatement of ground disturbed by trenchless crossings.

e) Enter text, to identify the MCHW document number that reinstatement of ground disturbed by trenchless crossings must be in accordance with.

f) Enter text, to identify the backfill material class for reinstatement of ground disturbed by trenchless crossings, where CC 601 [Ref 5.N] is specified in SI. 1.40e.

Continuous construction records for trenchless crossings

1.41 Minimum requirement of continuous construction records for trenchless crossings shall be as detailed in Table 1.41.

Table 1.41 Minimum requirement of continuous construction records for trenchless crossings to be kept (R = Required)												
	Microtunnelling & pipe eating	**Pipe jacking**	**Horizontal directional drilling**	**Thrust boring**	**Auger boring**	**Pipe ramming**	**Impact moling**	**Pipe bursting**	**Narrow trenching**	**Mole ploughing**	**Cured-in-place lining**	**Sliplining**
Date of work of working shift	R	R	R	R	R	R	R	R	R	R	R	R
Start time of working of shift	R	R	R	R	R	R	R	R	R	R	R	R
Finish time of working shift	R	R	R	R	R	R	R	R	R	R	R	R
Reference of pipe runs installed in working shift	R	R	R	R	R	R	R	R	R	R	R	R
Details of any stoppages during working shift	R	R	R	R	R	R	R	R	R	R	R	R
Joint packing material installed in working shift	R	R	R	n/a	R	n/a	R	R	n/a	n/a	n/a	n/a
Length installed in working shift	R	R	R	R	R	R	R	R	R	R	R	R
Soil conditions encountered in working shift	R	R	R	R	R	n/a	n/a	n/a	R	n/a	n/a	n/a
Unexpected driving or boring conditions encountered in working shift	R	R	R	R	R	R	n/a	n/a	n/a	n/a	n/a	n/a
Groundwater level encountered in working shift	R	R	R	R	R	n/a	n/a	n/a	R	n/a	n/a	n/a
Line and level achieved in working shift	R	R	R	R	R	R	R	R	R	R	n/a	R
Lubrication material,	R	R	n/a	n/a	n/a	n/a	n/a	R	n/a	n/a	n/a	n/a

Table 1.41 Minimum requirement of continuous construction records for trenchless crossings to be kept (R = Required)												
	Microtunnelling & pipe eating	**Pipe jacking**	**Horizontal directional drilling**	**Thrust boring**	**Auger boring**	**Pipe ramming**	**Impact moling**	**Pipe bursting**	**Narrow trenching**	**Mole ploughing**	**Cured-in-place lining**	**Sliplining**
pressures, viscosity, discharge, flow rates during working shift												
Support fluid material, pressures, viscosity, discharge, flow rates during working shift used during shift	n/a	n/a	R	R	n/a	n/a	n/a	R	n/a	n/a	n/a	n/a
Jacking or pullback loads during working shift	R	R	R	R	R	R	R	R	n/a	n/a	n/a	n/a
Shield role, pitching, steering adjustment during working shift	R	R	R	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Thrust rate, cutting torque, soil discharge during working shift	R	R	R	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
NVQ Level 2 in 'Directional Drilling Operations' timesheets for working shift	n/a	n/a	R	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Trenchless Crossing Monitoring Report for working shift	R	R	R	R	R	R	R	R	R	R	R	R

1.42 The following Documentation for trenchless crossings shall be submitted as continuous records: the records detailed in Table 1.41.

1.43 The requirements of "Records" in Section 3 of GC 101 [Ref 8.N] shall apply to the records for trenchless crossings detailed in Table 1.41.

As-built records for trenchless crossings

Document requirements for as-built records for trenchless crossings

1.44 As-built records shall comply with "Records" in Section 3 of GC 101 [Ref 8.N].

1.45 The location of previously unknown assets encountered during the trenchless crossing shall be recorded as part of the as-built information.

1.46 Records required for Overseeing Organisation asset management databases shall be as stated in CC 604/WSR/001.

Records required for Overseeing Organisation asset management databases		
Asset database	**Required data**	**Required data format**
(a)	(b)	(c)

a) Enter a value, from options Ancillary, Carriageway Control, Drainage, Environmental, Geotechnical, Lighting, Pavement, Road Restraint, Roadside Operational technology, Structures, to detail the relevant database.
b) Enter text, to identify the topics of data required for specific Overseeing Organisation asset database.

c) Enter a value, from options .shp, .shx, .dbf, .prj, AGS4, .pdf, .csv., .pkg, to detail the data format required.

1.47 On completion of the works, a Geotechnical Feedback Report shall be produced, in accordance with CD 622 [Ref 9.N].

1.48 The following Documentation for the Geotechnical Feedback Report shall be submitted: CD 622 [Ref 9.N] Geotechnical Feedback Report.

2. Pipes for drainage, service ducts and communication cable installed via trenchless crossings

Product requirements for pipes installed by pipe jacking

Product requirements for concrete jacking pipes

2.1 Concrete jacking pipes for trenchless crossings shall be compliant with BS EN 1916 [Ref 2.N].

2.2 The concrete jacking pipes shall meet the performance characteristics as stated in table 2.4.

2.3 The requirements of "Designated standards" in Section 10 of GC 101 [Ref 8.N] shall apply to all concrete jacking pipes.

2.4 Concrete jacking pipes for trenchless crossings shall be in accordance with the performance requirements listed in Table 2.4.

Table 2.4 - Performance requirements for concrete jacking pipes for trenchless crossings

Performance requirement characteristic	Requirement
Crushing strength	See BS 5911-1 [Ref 1.N], Table 8
Longitudinal bending strength	Dimensionally acceptable in accordance with BS EN 1916 [Ref 2.N] Annex D
Watertightness	No leakage when tested in accordance with BS EN 1916 [Ref 2.N] Annex E
Durability	Maximum water/cement ratio of the concrete: not be greater than 0.45 Maximum chloride content of the concrete: Unreinforced: 1.0% Steel fibre: 0.4% Reinforced: 0.4% Maximum water absorption of the concrete not exceed 6% by mass. Conformity to the criteria in one of four methods for demonstrating the durability of joints: BS EN 1916; 4.3.4.2 Minimum concrete cover in reinforced units: BS EN 1916; 5.2.2 Special requirements for jacking pipes: a) Collars manufactured from weldable structural steel plate, stainless steel plate or reinforced plastics. b) The minimum concrete cover required increased by 5mm on external surfaces to be in permanent contact with the ground. No steel within the concrete cover on joint surfaces which will transmit load during installation is permitted.

Product requirements for vitrified clay jacking pipes

2.5 Vitrified clay jacking pipes shall be compliant with BS EN 295-7 [Ref 18.N].

2.6 The vitrified clay jacking pipes shall meet the performance characteristics as stated in table 2.8.

2.7 The requirements of "Designated standards" in Section 10 of GC 101 [Ref 8.N] shall apply to vitrified clay jacking pipes.

2.8 Performance requirements for vitrified clay jacking pipes for trenchless crossings shall be as stated in Table 2.8.

Table 2.8 Performance requirements for vitrified clay jacking pipes for trenchless crossings	
Performance requirement characteristic	Requirement
Reaction to fire	A1
Internal diameter	Pass
Length	Pass
Squareness of ends	Pass
Joint interchangeability	Pass
Watertightness	Pass
Release of dangerous substances	<0.25%
Chemical resistance to effluent	Pass
Thermal cycling stability	Pass
Long term stability	Pass

Product requirements for pipes and service ducts installed by non-pipe jacking technique

2.9 Pipes for drainage and service ducts shall be selected in accordance with CC 500 [Ref 3.N].

2.10 Cable communications ducts for roadside technology and communications shall be selected in accordance with TC 131 [Ref 17.N].

Pipe and service duct material schedule

2.11 The materials for pipes and service ducts installed via trenchless crossings shall be as specified in CC 604/WSR/002.

The materials for pipes and service ducts installed via trenchless crossings					
Trenchless crossing identification number	**Drawing or model reference number(s)**	**Drawing or model title**	**Pipe and service duct material type**	**Pipe and service duct dimensions**	**Standard Dimensional Ratio (SDR)**
(a)	(b)	(c)	(d)	(e)	(f)

The materials for pipes and service ducts installed via trenchless crossings					
Trenchless crossing identification number	**Drawing or model reference number(s)**	**Drawing or model title**	**Pipe and service duct material type**	**Pipe and service duct dimensions**	**Standard Dimensional Ratio (SDR)**

a) Enter a unique reference.
b) Enter text, to identify the drawing or model reference.

c) Enter text, to identify the drawing or model title.

d) Enter text, to identify the pipe material type.

e) Enter a number in units of mm, to identify the pipe dimensions.

f) Enter text, to identify the SDR where Polyethylene (PE), Polypropylene (PP) and un-plasticised Polyvinyl Chloride (PVC-U) pipes are used.

Installation requirements for pipes and service ducts installed via trenchless methods

2.12 The pipes or service ducts that are to undergo tensile loading as part of installation shall not exceed the manufacturer's maximum permissible tensile load.

2.13 The pipes or service ducts that are to undergo end thrust loading as part of installation shall not exceed the manufacturer's maximum permissible end thrust.

2.14 The pipes or service ducts that are to undergo angular deflection as part of installation shall not exceed the manufacturer's maximum permissible angular deflection.

2.15 Rigidly jointed pipes shall not exceed the bending radii limits recommended by the manufacturer for both horizontal and vertical curvature.

2.16 The pipe joint shall be capable of transmitting the axial loads expected during the installation.

2.17 The pipe joint shall remain watertight under the permitted angular deflection.

2.18 The jointing of drainage pipes shall comply with "Drainage pipes" in Section 1 of CC 500 [Ref 3.N].

2.19 All pipes shall be installed free from defects when used in trenchless activities.

2.20 All trenchless pipes shall be installed in accordance with the manufacturer's installation instructions.

2.21 Pipes and service ducts trenchless installation shall be as specified in CC 604/WSR/002.

Pipes and service ducts trenchless installation					
Trenchless crossing identification number	**Drawing or model reference number**	**Drawing or model title**	**Pipe alignment**	**Maximum pipe end tensile load**	**Maximum pipe end thrust load**
(a)	(b)	(c)	(d)	(e)	(f)

a) Enter a unique reference.
b) Enter a unique reference.

c) Enter text, to identify the trenchless crossing drawing or model title.

d) Enter text, to identify the pipe vertical and horizontal alignments.

e) Enter text, to identify the maximum permissible pipe end tensile load.

f) Enter text, to identify the maximum permissible pipe end thrust load.

Pipes and service ducts trenchless installation (continued)		
Trenchless crossing identification number	**Maximum pipe angular deflection**	**Maximum axial load at pipe joint**
(a)	(g)	(h)

g) Enter text, to identify the maximum permissible pipe angular deflection.

h) Enter text, to identify the maximum permissible pipe axial load.

Installation verification for pipes installed via trenchless methods

2.22 Verification shall be undertaken for the tensile loading of pipes during installation by measurement to ensure the manufacturer's maximum permissible tensile load is not exceeded.

2.23 The frequency of measurement of tensile loading of pipes shall be continuous throughout the installation unless otherwise stated in CC 604/WSR/002.

SI.2.23 The frequency of verification of tensile load of pipes during the installation shall be [enter free text].

2.24 The requirements for "Verification" in Section 14 of GC 101 [Ref 8.N] shall apply to the monitoring and recording of pipes that undergo tensile load as part of installation.

2.25 Verification measurements of tensile loading of pipes shall be recorded.

2.26 Verification shall be undertaken for the end thrust loading of pipes during installation by measurement to ensure the manufacturer's maximum permissible end thrust load is not exceeded.

2.27 The frequency of measurement of end thrust loading of pipes shall be continuous throughout the installation unless otherwise stated in CC 604/WSR/002.

SI.2.27 The frequency of verification of end thrust load of pipes during installation shall be [enter free text].

2.28 The requirements for "Verification" in Section 14 of GC 101 [Ref 8.N] shall apply to the monitoring and recording of pipes that undergo end thrust as part of installation.

2.29 Verification measurements of end thrust loading of pipes shall be recorded.

2.30 Verification shall be undertaken for the angular deflection of pipes during installation by measurement to ensure the manufacturer's permissible angular deflection is not exceeded.

2.31 The frequency of measurement of angular deflection of pipes shall be continuous throughout the installation unless otherwise stated in CC 604/WSR/002.

SI.2.31 The frequency of verification of angular deflection of pipes during installation shall be [enter free text].

2.32 The requirements for "Verification" in Section 14 of GC 101 [Ref 8.N] shall apply to the monitoring and recording of pipes that undergo angular deflection as part of installation.

2.33 Verification measurements of angular deflection of pipes shall be recorded.

2.34 Verification shall be undertaken for axial loading at pipe joint during installation by measurement to ensure the manufacturer's permissible axial load at the joint is not exceeded.

2.35 The frequency of measurement of axial load at pipe joint shall be continuous throughout the installation unless otherwise stated in CC 604/WSR/002.

SI.2.35 The frequency of verification of axial loading at pipe joint during installation shall be [enter free text].

2.36 The requirements for "Verification" in Section 14 of GC 101 [Ref 8.N] shall apply to the monitoring and recording of pipe axial load at the joint.

2.37 Verification measurements of axial loading at pipe joint shall be recorded.

2.38 Verification shall be undertaken for the pipe joint by watertight joint testing in accordance with Section 1 (Verification requirements for the installation of drainage pipes) of CC 500 [Ref 3.N].

2.39 The frequency of testing shall be in accordance with CC 500 [Ref 3.N].

2.40 The requirements for "Verification" in Section 14 of GC 101 [Ref 8.N] shall apply to the watertight joint testing.

Documentation requirements for installation of pipes via trenchless methods

2.41 The following Documentation shall be submitted for manufacturer instructions and product technical data sheets for pipes not covered by harmonised or designated standards prior to the commencement of trenchless installation: Manufacturer instructions with evidence of calculated maximum permissible tensile load, maximum permissible end thrust, maximum permissible angular deflection and maximum permissible axial load across the joint.

2.42 The requirements for "Documentation" in Section 2 of GC 101 [Ref 8.N] shall apply to manufacturer instructions and product technical data sheets for pipes not covered by harmonised or designated standards.

2.43 The following Documentation for verification that the pipe manufacturer's maximum permissible tensile load, maximum permissible end thrust, maximum permissible angular deflection, maximum permissible axial load at pipe joints and watertightness of joints have not been exceeded during installation shall be submitted as continuous records: Jacking loads, pullback loads, angular deflections, joint watertightness reports.

2.44 The requirements of "Records" in Section 3 of GC 101 [Ref 8.N] shall apply to jacking loads, pullback loads, angular deflections and joint watertightness reports.

2.45 The following Documentation shall be submitted for watertight joint testing prior to the commencement of scheme handover: watertight joint test result certificates.

Tolerances for trenchless installation

2.46 The tolerances of the alignment of a finished sleeve or casing pipe shall be as specified in CC 604/WSR/001.

The tolerances of the alignment of a finished sleeve or casing pipe		
Trenchless crossing identification number	**Vertical tolerance of the finished sleeve or casing**	**Horizontal tolerance of the finished sleeve or casing**
(a)	(b)	(c)

a) Enter a unique reference.
b) Enter a number in units of mm, to identify the allowable vertical tolerance of the finished sleeve or casing.

c) Enter a number in units of mm, to identify the allowable horizontal tolerance of the finished sleeve or casing.

Connecting to existing drains, chambers and channels for trenchless crossings

Installation requirements for connecting to existing drains, chambers and channels for trenchless crossings

2.47 The connection to existing drains, chambers and channels shall comply with one of the following options: "Drainage pipes" in Section 1 of CC 500 [Ref 3.N], "Chambers for drainage pipes" in Section 3 of CC 500 [Ref 3.N], or "Chambers for service ducts" in Section 4 of CC 500 [Ref 3.N].

2.48 The length of the installed pipe shall fully recover from any temporary distortion caused by the installation method prior to connecting into existing drains, chambers and channels.

2.49 The length of the installed pipe connecting to existing drains, chambers and channels, post relaxation from temporary distortion caused during installation shall be as specified in CC 604/WSR/002.

The length of the installed pipe connecting to existing drains, chambers and channels, post relaxation from temporary distortion caused during installation	
Trenchless crossing identification number	**Length of installed pipe connecting to existing drains, chambers and channels, post full relaxation from temporary distortion caused during installation**
(a)	(b)

a) Enter a unique reference.
b) Enter a number in units of mm, to identify the length of the fully relaxed pipe, post installation from temporary distortion.

Installation verification for connecting to existing drains, chambers and channels for trenchless crossings

2.50 Verification shall be undertaken for the recovery of pipes from temporary distortion in length caused by the installation method by measuring the pipeline length to ensure that full relaxation has taken place prior to connecting the new pipelines into existing drains, chambers and channels.

2.51 The frequency of measurement of temporary distortion in pipe length shall be every 12 hours until the length of pipeline matches the required material installed length unless otherwise stated in CC 604/WSR/002.

SI.2.51 The frequency of measurement of temporary distortion in pipe length prior connecting into existing drains, chambers and channels shall be [enter free text].

2.52 The requirements for "Verification" in Section 14 of GC 101 [Ref 8.N] shall apply to measurement of temporary distortion in pipe length prior to connecting the new pipelines into existing drains, chambers and channels..

Documentation requirements for connecting to existing drains, chambers and channels for trenchless crossings

2.53 The following Documentation for verification of temporary pipe distortion shall be submitted as continuous records: records of the measurements of temporary distortion in pipe length.

2.54 The requirements of "Records" in Section 3 of GC 101 [Ref 8.N] shall apply to verification of temporary pipe distortion.

3. On-line replacement techniques

Pipe bursting for on-line replacement

Installation requirements for pipe bursting for on-line replacement

3.1 Lateral connections to existing main pipes or chambers shall be in accordance with "Drainage pipes" in Section 1 of CC 500 [Ref 3.N].

Installation verification for pipe bursting for on-line replacement

3.2 Verification shall be undertaken for lateral connections affected by on-line replacement technique works by undertaking a Pipework and Chambers Defect Survey by CCTV in accordance with Section 7 of CS 551 [Ref 4.N].

3.3 The frequency of verification of location of lateral connections shall be once prior to on-line replacement works.

3.4 The requirements for "Verification" in Section 14 of GC 101 [Ref 8.N] shall apply to identification of lateral connections prior to on-line replacement technique works.

Document requirements for pipe bursting for on-line replacement

3.5 The following Documentation shall be submitted for verification of lateral connections prior to the commencement of on-line replacement technique works: Pipework and Chambers Defect Survey by CCTV in accordance with Section 7 of CS 551 [Ref 4.N].

Pipe eating / reaming for on-line replacement

3.6 The requirements for pipe eating/reaming for use as an on-line replacement technique shall be as detailed in the Geotechnical Design Report.

3.7 The Geotechnical Design Report shall be as stated in CC 604/WSR/003.

SI.3.7 The Geotechnical Design Report document reference and document location shall be: [enter free text].

4. New installations via minimum dig techniques

Specific requirements for new installations via minimum dig techniques

4.1 The reinstatement of ground after minimum dig works shall be as specified in CC 604/WSR/004.

The reinstatement of ground after minimum dig works					
Reinstatement identification number	**Drawing or model reference number(s)**	**X (Easting) coordinate**	**Y (Northing) coordinate**	**MCHW document number(s) that reinstatement of ground after minimum dig works shall be in accordance with**	**Overseeing Organisation's document(s) reference number**
(a)	(b)	(c)	(d)	(e)	(f)

a) Enter a unique reference.
b) Enter text, to identify the drawing or model reference of the minimum dig installation.

c) Enter text, to identify the location requiring reinstatement of ground after minimum dig works.

d) Enter text, to identify the location requiring reinstatement of ground after minimum dig work.

e) Enter text, to identify the MCHW document number(s) that reinstatement of ground after minimum dig works shall be in accordance with.

f) Enter text, to identify the Overseeing Organisation's document number.

4.2 The backfilling of minimum dig techniques for drainage installations shall comply with "Drainage pipes" in Section 1 of CC 500 [Ref 3.N].

4.3 The backfilling of minimum dig installations for service duct installation shall comply with "Earthworks fill, including embankments" in Section 10 of CC 601 [Ref 5.N].

5. Trenchless rehabilitation techniques

General requirements for trenchless rehabilitation techniques

5.1 New linings shall be installed in continuous lengths between points of access to the pipe.

5.2 The pipe shall be cleaned and left free from any obstruction such as silt, debris and loose fragments, in accordance with CC 500 [Ref 3.N], prior to rehabilitation.

Lateral connections for trenchless rehabilitation techniques

Installation requirements for lateral connections for trenchless rehabilitation techniques

5.3 The content of the Pipework and Chambers Defect Survey Report shall be as stated in CS 551 [Ref 4.N].

5.4 The re-connection of lateral connections to the existing main pipes or chambers shall be in accordance with the requirements of "Drainage pipes" in Section 1 of CC 500 [Ref 3.N].

Verification requirements for lateral connections for trenchless rehabilitation techniques

5.5 Verification shall be undertaken for locating all lateral connections by a Pipework and Chambers Defect Survey by CCTV, meeting the requirements of CS 551 [Ref 4.N].

5.6 The frequency of Pipework and Chambers Defect Survey by CCTV shall be once, prior to starting the lining operation on the cleaned pipe.

5.7 The requirements for "Verification" in Section 14 of GC 101 [Ref 8.N] shall apply to the Pipework and Chamber Defect Survey by CCTV.

Document requirements for lateral connections for trenchless rehabilitation techniques

5.8 The following Documentation shall be submitted for Pipework and Chambers Defect Survey by CCTV prior to the commencement of trenchless rehabilitation works: Pipework and Chambers Defect Survey Report.

Cured-in-place pipe (CIPP)

Product requirements for lining material for CIPP

5.9 CIPP systems for renovation on underground non-pressure drainage and sewerage networks shall be compliant with BS EN ISO 11296-1 [Ref 14.N] and BS EN ISO 11296-4 [Ref 15.N].

5.10 CIPP systems for renovation on underground drainage and sewerage networks under pressure shall be compliant with BS EN ISO 11297-1 [Ref 12.N] and BS EN ISO 11297-4 [Ref 13.N].

Product verification for lining material for CIPP

5.11 Verification shall be undertaken for the average CIPP lining thickness in accordance with BS EN ISO 11296-4 [Ref 15.N].

5.12 The frequency of CIPP lining thickness testing shall be as recommended in BS EN ISO 11296-4 [Ref 15.N].

5.13 The requirements for "Verification" in Section 14 of GC 101 [Ref 8.N] shall apply to records demonstrating average CIPP lining thickness.

5.14 Verification shall be undertaken for flexural modulus and strength of the CIPP in accordance with BS EN ISO 11296-4 [Ref 15.N].

5.15 The frequency of flexural modulus and strength testing of the CIPP shall be as recommended in BS EN ISO 11296-4 [Ref 15.N].

5.16 The requirements for "Verification" in Section 14 of GC 101 [Ref 8.N] shall apply to flexural modulus and strength testing of CIPP lining.

5.17 Verification for CIPP linings constructed and cured in place (in the field) shall be undertaken by an accredited testing laboratory in compliance with "Accredited laboratory" in Section 16 of GC 101 [Ref 8.N].

Installation requirements for lining material for CIPP

5.18 Heated water used in the curing of CIPP linings shall not be permitted to escape into the environment or enter surface water systems.

5.19 The CIPP lining shall be in contact with the host pipe for the full length of the installation.

Document requirements for lining material for CIPP

5.20 The following Documentation for average CIPP lining thickness shall be submitted as continuous records: certification showing conformity to BS EN ISO 11296-4 [Ref 15.N].

5.21 The requirements of "Records" in Section 3 of GC 101 [Ref 8.N] shall apply to the records demonstrating average CIPP lining thickness.

5.22 The following Documentation for flexural modulus and strength testing of the CIPP lining shall be submitted as continuous records: certification showing conformity to BS EN ISO 11296-4 [Ref 15.N].

5.23 The requirements of "Records" in Section 3 of GC 101 [Ref 8.N] shall apply to the records demonstrating flexural modulus and strength testing of the CIPP lining.

Installation verification for trenchless rehabilitation techniques

5.24 Verification shall be undertaken for rehabilitation techniques via a Pipework and Chambers Defect Survey, meeting the requirements of CS 551 [Ref 4.N].

5.25 The frequency of Pipework and Chamber Defect Surveys shall be once, post rehabilitation works.

5.26 The requirements for "Verification" in Section 14 of GC 101 [Ref 8.N] shall apply to Pipework and Chamber Defect Surveys.

5.27 The following Documentation shall be submitted for verification of rehabilitation techniques installation: A Pipework and Chambers Defect Survey Report, meeting the requirements of CS 551 [Ref 4.N].

6. Normative references

The following documents, in whole or in part, are normative references for this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

Ref.	**Document**
Ref 1.N	BSI. BS 5911-1, 'Concrete pipes and ancillary concrete products. Specification for unreinforced and reinforced concrete pipes (including jacking pipes) and fittings with flexible joints (complementary to BS EN 1916:2002)'
Ref 2.N	BSI. BS EN 1916, 'Concrete pipes and fittings, unreinforced, steel fibre and reinforced (Designated Standard - CPR)'
Ref 3.N	National Highways. CC 500, 'Drainage'
Ref 4.N	National Highways. CS 551, 'Drainage surveys'
Ref 5.N	National Highways. CC 601, 'Earthworks'
Ref 6.N	National Highways. GC 103 'Environment, Sustainability and Carbon Management '
Ref 7.N	National Highways. GG 951, 'General requirements for geomatical surveys'
Ref 8.N	National Highways. GC 101 'General requirements for the Specification for Highway Works'
Ref 9.N	National Highways. CD 622, 'Managing geotechnical risk'
Ref 11.N	National Highways. CC 602 'Piling and Embedded Retaining Walls'
Ref 12.N	BSI. BS EN ISO 11297-1, 'Plastics piping systems for renovation of underground drainage and sewerage networks under pressure. General '
Ref 13.N	BSI. BS EN ISO 11297-4, 'Plastics piping systems for renovation of underground drainage and sewerage networks under pressure. Lining with cured-in-place pipes'
Ref 14.N	BSI. BS EN ISO 11296-1, 'Plastics piping systems for renovation of underground non-pressure drainage and sewerage networks. General '
Ref 15.N	BSI. BS EN ISO 11296-4, 'Plastics piping systems for renovation of underground non-pressure drainage and sewerage networks. Lining with cured-in-place pipes'
Ref 16.N	National Highways. GS 952, 'Requirements for topographical surveys'
Ref 17.N	National Highways. TC 131, 'Roadside technology and communications'
Ref 18.N	BSI. BS EN 295-7, 'Vitrified clay pipe systems for drains and sewers. Requirements for pipes and joints for pipe jacking [Designated Standard - CPR]'
Ref 19.N	National Highways. GC 104 'Works data, third party aspects and customer

	communications'