

Engineering Construction Specification C34 Trenchless Conduit Installation

Print version is uncontrolled. Current version is maintained on Wingecarribee Shire Council Website in searchable PDF format.

Working with you

WSC.NSW.GOV.AU



Table of Contents

1	General	3
1.1	Responsibilities	3
1.2	Cross references	3
1.3	Standards	3
1.4	Interpretations.....	3
1.5	Tolerances.....	3
1.6	Submissions	4
1.7	Inspections.....	6
2	Materials.....	6
2.1	Conduits and pipework.....	6
3	Execution	7
3.1	Geotechnical	7
3.2	Trenchless methodology	7
3.3	Construction	7
3.4	Completion	8
4	Annexures	9
4.1	Annexure – Geotechnical.....	9
4.2	Annexure - Summary of hold and witness points.....	9
4.3	Annexure - Referenced documents.....	11

1 General

1.1 Responsibilities

1.1.1 General

Requirement: Provide conduit, pipework and pits, using trenchless technology systems, as documented.

1.2 Cross references

1.2.1 General

Requirement: This worksection is not a self-contained specification. In addition to the requirements of this worksection, conform to the following:

- *C01 General requirements (Construction).*
- *C02 Quality management (Construction).*
- *C03 Control of Traffic.*
- *C04 Control of erosion and sedimentation (Construction).*
- *C13 Road openings and restoration.*
- *C23 Stormwater drainage (Construction).*
- *C25 Pipe drainage.*
- *C28 Auxiliary concrete works.*
- *C30 Water supply – reticulation and pumping stations (Construction).*
- *C31 Sewerage systems - reticulation and pumping stations (Construction).*

1.3 Standards

1.3.1 General

Concrete pipes, design and installation: To AS/NZS 3725.

Horizontal directional drilling: To the ASTT *Standard for Horizontal Directional Drilling*.

Pipe bursting: To the ASTT *Standard for Pipe Bursting*.

Microtunnelling: To the ASTT *Standard for Microtunnelling and Pipe Jacking*.

1.4 Interpretations

1.4.1 Abbreviations

General: For the purposes of this worksection the following abbreviations apply:

- ASTT: Australasian Society for Trenchless Technology.

1.4.2 Definitions

General: For the purposes of this worksection the definitions given in the ASTT Guidelines for horizontal directional drilling, pipe bursting, microtunnelling and pipe jacking apply.

1.5 Tolerances

1.5.1 General

Construction tolerances will depend on the installation methodology, geological conditions and other project risks, and should be reviewed on a project-by-project basis.

For installations with higher risk or technical complexity (eg risk of 'break out' and subsequent environmental damage when crossing beneath water course, risk of impacts to existing services or

residents/businesses), appropriate tolerances will be determined at concept design and detailed design stage.

For low risk or low complexity installations, the following tolerances may be adopted:

Trenchless Method	Tolerances				Comments
	Vertical	Horizontal	Grade	Planned Surface Exit	
HDD	± 500mm	± 500mm	± 3%	+/- 3m longitudinally	
Augerbore					
Conventional	± 500mm	± 500mm	± 2%	N/A	Up to 50m
Pilot Tube	± 100mm	± 100mm	± 1%	N/A	Up to 100m
Microtunnel/Pipejacking					
Open Faced	± 75mm	± 75mm	± 0.25%	N/A	
Vacuum Extraction	± 30mm	± 50mm	± 0.25%	N/A	
Slurry	± 30mm	± 50mm	± 0.25%	N/A	
Earth Pressure Balance	± 30mm	± 50mm	± 0.25%	N/A	
Vermeer-Axis	± 30mm	± 50mm	± 0.25%	N/A	
Pipe Ramming	± 100mm	± 100mm	± 3%	N/A	Up to 50m. Highly dependent on geology

1.6 Submissions

1.6.1 Authority approvals

Work located at rail and road crossings: Submit evidence of approvals from the relevant authorities including railways and road authorities.

1.6.2 Calculations

Quantity calculations: Submit calculations for components such as pipes and equipment.

Submission time: 10 working days before commencement.

1.6.3 Products and materials

Materials and product information: Submit product information for conduits, fittings and other components and evidence from the manufacturer that all conduit and pipework materials are suitable for the proposed method of trenchless installation.

Conduits, fittings and other components: Submit test data of conformance with the standards required in this worksection.

1.6.4 Design documentations

The Designer/Contractor is to consider the appropriate trenchless method prior to works commencing, demonstrating the costs and benefits of trenchless technologies against open cut methods. For trenchless pipe installations with higher risk or technical complexity, a feasibility study and/or concept design should be completed including:

- detailed survey of the site

- geotechnical investigations
- ground water conditions
- ground contamination investigations (including presence of asbestos)
- site safety
- existing services/infrastructure including review of Works As Executed documentation
- impacts to existing roads and traffic, residents and businesses etc, particularly in built-up areas.
- impacts to the environment
- disposal of waste
- constructability including installation process, pipeline routes and crossing locations, sufficient area for the trenchless equipment, entry and exit points and layout of pipe, and site access.
- risk assessment and contingency planning
- CCTV of existing assets if required (eg pipebursting projects)

Feasibility Study / Design: Submit investigation; design drawings to include sufficient details including as a minimum pipe type, pressure rating and diameter, geotechnical conditions and risks.

Geotechnical information: Submit investigation and requirements for additional information.

Ground contamination: Submit investigation

Submission time: 10 working days before commencement.

1.6.5 Execution details

Method statement: Submit a method statement including, as a minimum, details of the following:

- General description of methodology and sequence of operation.
- Provision of temporary services if required
- Connection to existing infrastructure – contractor must consult with Council staff regarding connection to all live infrastructure
- Details of proposed method of any required cutting and disposal of existing asbestos cement pipe
- Procedures for dealing with geotechnical conditions (eg recognising risk of ‘break out’ and subsequent environmental damage when crossing beneath water course).
- Management of drilling mud/slurry including estimates of quantity, time for dewatering, method of disposal and any testing required
- Conduit type, including details of compliance with the relevant Australian Standard and suitability to withstand the jacking forces.
- Jointing type.
- Grout type, methodology and equipment for grout injection, if required.
- Mechanical description of any motorised pumping, jacking, horizontal boring, directional drilling or mining equipment.
- Existing underground utility services, including the following:
 - Treatment at conflict locations.
 - Protection of services in zone of influence.
- Consideration of ground heave implications when crossing roads and driveways

- Management of existing tree root zones
- Survey equipment and methodology.
- Direction of installation of conduit.
- Size, depth and position of temporary access pits.
- Location of temporary spoil site, if required, and the nature of haulage equipment.
- Programmed daily working hours and duration of operation.
- Strategy for dealing with noise pollution.
- Traffic management.
- Dewatering.
- Emergency response plan
- Supply and install of site fencing, site delineation

Submission time: 10 working days before commencement.

1.6.6 Records

Survey: Submit set-out survey of service conduit works.

- Submission time: 5 working days before installation.

Work-as-executed drawings: Submit drawings including service conduit system information sheets and works.

1.6.7 Samples

Materials: Submit samples of conduits, fittings and other components.

1.6.8 Subcontractors

Specialist subcontractor: Submit name and contact details of proposed contractor specialising in trenchless technology.

Contractor's personnel: Submit a training and experience register.

Submission time: 10 working days before commencement.

1.6.9 Tests

Load tests: Submit test data for conduits and pipework of conformance to the requirements of this worksection.

1.7 Inspections

1.7.1 Notice

General: Give notice so that inspection may be made of the following:

- Bulkheads: Completed installation.
- Pits: Cleaned and reinstated lid.

2 Materials

2.1 Conduits and pipework

2.1.1 General

Conduits and pipework: Conform to the following worksections:

- *C25 Pipe drainage.*
- *C30 Water supply - reticulation and pumping stations (Construction).*

- *C31 Sewerage systems - reticulation and pumping stations (Construction).*

2.1.2 Tests

Load testing: Perform testing of conduit or pipework to the following standards:

- Precast concrete: Proof load test and watertightness to AS/NZS 4058.
- Heavy duty galvanized steel tube: To AS 1074.
- Flexible conduits: Bending test, flexing test, collapse test and test of pull out strength of joints to AS/NZS 61386.23.
- Rigid conduits: Bending test, flexing test, collapse test and test of pull out strength of joints, and pipe stiffness to AS/NZS 61386.21.

3 Execution

3.1 Geotechnical

3.1.1 General

Geotechnical investigation: To AS 1726.

3.2 Trenchless methodology

3.2.1 General

Required method: Use one of following methods of installation:

- Horizontal directional drilling (HDD).
- Pipe bursting.
- Microtunnelling and pipe jacking.
- Methodology: Use method of installation best suited to the project and the following information:
 - Geotechnical assessment.
 - Cost factors.
 - Alignment and level design.
 - Pipe/conduit type required.
 - System requirements.
 - Crossing location.
 - Pipeline route.

3.3 Construction

3.3.1 General

Concrete work: To the *C28 Auxiliary concrete works* worksection.

Permanent and temporary pits or access chambers: To the *C27 Drainage structures* worksection.

Restoration of temporary pit surfaces: To the *C13 Road openings and restoration* worksection.

3.3.2 Installation

General: Conform to the following:

- Voids around the conduit: Eliminate by grouting before completion of works, using materials and grouting method documented in the approved method statement.
- Line and grade of conduit: To TOLERANCES or as documented.

- Joints on completion: Flush with the internal conduit walls and watertight.
- Bulkheads: Locate as documented. Install after conduit installation and before any grouting.
- Adjacent building foundations: Provide consistent support before, during and after installation.
- Trees: Preserve the stability and health of tree root systems marked for retention by the council's Tree Preservation Officer.
- Roads/driveways: avoid ground heave impacts when crossing roads and driveways
- Tracing wire/tape for non-metallic pipelines: if feasible provide tracer wire or tape with new non-metallic pipe installations

3.3.3 Bulkheads

Requirement: Provide bulkheads in conformance with the following:

- Construct in reinforced concrete as documented and to the approved method statement.
- Bond to the conduit to exclude direct grout pressure loss at the conduit/soil interface.
- Install bulkheads and provide grouting before starting construction of adjacent conduits using conventional trench techniques.

3.3.4 Protection measures

Protection: Protect buried pipes or sensitive surface structures adjacent to the installation.

Protection measures: Select from the following:

- Access chambers.
- Surface movement monitoring devices.

3.3.5 Connections to existing systems

Connections to existing water and sewerage systems: Conform to C30 Water Supply – Reticulation and Pumping Station (Construction) and C31 Sewerage Systems - Reticulation and Pumping Stations (Construction)

3.4 Completion

3.4.1 General

Work-as-executed drawings: Record the locations of all conduits including sizing and grades.

CCTV: Complete CCTV inspection after hydrostatic testing. Provide CCTV footage of installed pipeline and conduit conforming to the *1859 CCTV inspection of drainage conduits* worksection.

3.4.2 Pits

Requirement: Clean to remove debris and fit lids securely.

3.4.3 Testing

Ovality tolerances: Test completed conduits to the manufacturer's requirements.

Hydrostatic testing of pipes: Conform to *C30 Water Supply – Reticulation and Pumping Station (Construction)* and *C31 Sewerage Systems - Reticulation and Pumping Stations (Construction)*.

CCTV: confirm works are on grade and within allowable tolerances. Check for ponding of water and new works are not undulating, flat or at negative grade at any point along the constructed works

Cleaning and Disinfection: For water mains conform to C30 Water Supply – Reticulation and Pumping Station (Construction).

4 Annexures

4.1 Annexure – Geotechnical

4.1.1 Information provided

Geotechnical information provided:

- Geotechnical report.
- Ground contamination report

4.2 Annexure - Summary of hold and witness points

Reference No:	Clause and description	Type*	Submission/Inspection details	Submission/Notice times	Process held
C34-HP01	SUBMISSIONS, Investigations, Feasibility Study Concept Design	H	Investigations for installation methodology and design	10 days before commencement	Commencement
C34-HP02	SUBMISSIONS, Authority approvals Work located at road and rail crossings	H	Evidence of approval of the Work from the relevant authorities.	10 days before commencement	Commencement
C34-HP03	SUBMISSIONS, Products and materials Conduits, fittings and other components	H	Testing data of conformance to required standards.	5 days before installation	Material ordering and delivery/ Installation
C34-HP04	SUBMISSIONS, Tests Load tests	H	Test data verifying conformance of conduits, pipework and other components.	5 days before installation	Material ordering and delivery/ Installation
C34-WP05	INSPECTIONS, Notice Underground services	W	Location and marking of existing underground services.	3 days before excavating	Excavation
C34-WP06	SUBMISSIONS, Authority approvals PE weld pre-qualification	W	Evidence of approval of proposed electrofusion and butt welding	5 days	-
C34-WP07	SUBMISSIONS, Material storage	W	Confirmation that suitable storage of	2 days before placement	Storage of material

Reference No:	Clause and description	Type*	Submission/Inspection details	Submission/Notice times	Process held
			material and capping of pipes.		
C34-HP08	SUBMISSIONS, Samples Materials	H	Samples of conduits, pipework and other components.	5 days before installation	Material ordering and delivery/ Installation
C34-WP09	INSPECTIONS, Notice Bulkheads	W	Completed installation.	5 days before inspection	-
C34-WP10	INSPECTIONS, Notice Pits	W	Cleaned and reinstated lid.	5 days before inspection	-
C34-HP11	INSPECTIONS, Notice Acceptance testing (Visual, Compaction, Pressure, CCTV, Water Quality, Special)	H	Acceptance testing being carried out	3 days before starting acceptance testing	For development inspections book through "MyInspect". Section 19 WSA 03.
C34-WP12	INSPECTION, Notice Swabbing	W	Swabbing	3 days before starting swabbing	Section 19 WSA 03
C34-HP13	INSPECTION, Notice Disinfection	H	Disinfection	3 days before starting disinfection	For development inspections book through "MyInspect".
C34-HP14	INSPECTIONS, Notice Connections	H	Connecting to existing main and charging new main	5 days before Council crew connecting to existing main	For development inspections book through "MyInspect".
C34-HP15	SUBMISSIONS, Work as Executed Drawings and Water Attribute Schedules	H	Submit certified drawings and schedules	2 weeks after completion of works	Prior to Subdivision Certificate / Occupation Certificate
	*H = Hold Point, W = Witness Point				

4.3 Annexure - Referenced documents

The following documents are incorporated into this worksection by reference:

AS 1074	1989	Steel tubes and tubulars for ordinary service
AS 1726	2017	Geotechnical site investigations
AS/NZS 2033	2008	Installation of polyethylene pipe systems
AS/NZS 3725	2007	Design for installation of buried concrete pipes
AS/NZS 4058	2007	Precast concrete pipes (pressure and non-pressure)
AS/NZS 61386		Conduits systems for cable management
AS/NZS 61386.21	2015	Particular requirements - Rigid conduit systems
AS/NZS 61386.23	2015	Particular requirements - Flexible conduit systems
ASTT Guidelines	2010	Guidelines for horizontal directional drilling, pipe bursting, microtunnelling and pipe jacking
ASTT HDD	2015	Standard for Horizontal Directional Drilling
ASTT Microtunnelling	2015	Standard for Microtunnelling and Pipe Jacking
ASTT Pipe	2015	Standard for Pipe Bursting