



# Australasian Society for Trenchless Technology Sample Specification for Pipe Bursting

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## CONTENTS

1.0	INTRODUCTION	1
2.0	DEFINITIONS	1
3.0	SPECIFICATION FORMAT	2
4.0	SUBMITTAL	2
5.0	PIPE BURSTING METHODOLOGY	3
5.1	Pipe Bursting Installation of Pipe	4
5.2	Settlement and Surface Heave Monitoring	4
5.3	Performance Requirements	5
5.4	Entry and Exit Chambers	6
5.5	Gradient and Alignment Tolerances	6
5.6	Obstructions and Loss of Ground	7
5.7	Pipe Testing, Disinfection and Inspection	7
5.8	Closing of Chambers	7
5.9	Quality Control and Assurance	8
6.0	GENERAL REQUIREMENTS	8
6.1	Environmental Impact Assessment	8
6.2	Geotechnical Data Report	8
6.3	Traffic and Public Relationship Management Plan	8
6.4	Safe Work Practices	9
6.5	By-pass Pumping	9
7.0	CONTINGENCY PLANNING	10
8.0	MEASUREMENT AND PAYMENTS	10

## 1.0 INTRODUCTION

The Australasian Society Trenchless Technology has developed this Specification for assisting industry users in Australia and New Zealand in utilising Pipe Bursting.

This document does not replace any existing relevant manuals or standards. It remains the user's responsibility to ensure that all relevant laws, standards and specifications are adhered to during the course of a Works with use of Pipe Bursting.

[a1]Additional Pipe Bursting information can be obtained from the Australasian Society Trenchless Technology website ([www.astt.com.au](http://www.astt.com.au)), they are:

- Guideline for (Horizontal Directional Drilling, Pipe Bursting, Microtunnelling and Pipe Jacking).
- Standard for Pipe Bursting.
- National Utility Contractors Association Trenchless Assessment Guide[a2], a web-based tool that can be used for identifying trenchless construction methods suitable for a particular set of project attributes (i.e.: diameter, length, depth, geological conditions and so on).

## 2.0 DEFINITIONS

**ASTT** - Australasian Society for Trenchless Technology.

**Client** - Person or company requiring the Works to be undertaken.

**CCTV** - Closed Circuit Television. The use of video cameras to visually inspect the works. Often used where man entry not feasible/ possible.

**Contingency Plan** - A plan for backup procedures, emergency response, and post-disaster recovery.

**Contractor** - Person or company undertaking the Works required.

**Entry Chamber** - Also called insertion, thrust, drive or launching pit. A point in the ground where the pipe bursting machine is setup to start the bursting process.

**Exit Chamber** - Also called reception pit. An area where the pipe bursting machine complete it bursting process.

**Frac- out?**

**Guideline** - General information about an item, process, method, material, system or service.

**HDPE** - High Density Polyethylene Pipe.

**NUCA TAG** - National Utility Contractors Association Trenchless Assessment Guide.

**Operator** - Suitably trained or qualified person who operates machinery, an instrument, or other equipment.

**PB** - Pipe Bursting. A trenchless method of replacing pipes. Involves destruction of the existing pipe while simultaneously installing the new pipe.

**Specification** - A document that specifies, in a complete, verifiable manner, the requirements, design, behaviour, or other characteristics of a system, component, product, result, or service and, often, the procedures for determining whether these provisions have been satisfied.

**Standard** - A document that provides uniform technical criteria, methods and processes to established a norm.

**Work** - The project or task to be completed by the Contractor on behalf of the Clients.

### 3.0 SPECIFICATION FORMAT

The format of this specification has been deliberately formatted to one that would typically be used in a TT Works specific scope of works and specification. This has been done for the purpose of ease of use by TT industry users.

### 4.0 SUBMITTAL

The Contractor shall submit documentation and tenders in accordance with this specification's SUBMITTAL and GENERAL REQUIREMENTS.

- (i) Documentation detailing the training and relevant experience of the Contractor's personnel shall be submitted to the Client for review which include personnel that would undertake the work. All Contractor's personnel are required to be fully trained in their respective duties and the safe operation of any equipment that will be utilised during the course of the Works. Please refer to DRT03 Training Package for the Drilling Industry<sup>1</sup> and BCC03 Civil Construction Industry Training Package<sup>2</sup> for relevant competency standards and qualifications.

Prior to letting the Contract, the Client should ensure:

- (i) Pipe Bursting is possible i.e. ensure the presence of and proximity to existing services is clearly known and the risks understood.
- (ii) That a comprehensive geotechnical investigation is carried out and available at the time of tender.
- (iii) Liaison with relevant authorities e.g. railways, road authorities and local residents has been initiated system of liaison during the construction works is required to be developed and detailed in the tender documents. Define any third party requirements, which will impact the works e.g. extent of ground settlement monitoring required during the works.

## 5.0 PIPE BURSTING METHODOLOGY

Prior to commencing any work, the Contractor shall submit a clear and detailed statement for the execution of the trenchless pipe installation to the Client, which shall include, but is not limited to, the following activities:

- Risks management plan,
- Traffic and public relationship management plan,
- Safety management plan,
- Quality management plan,
- Environmental management plan and plans to limit noise pollution,
- General description of the construction method and sequence of operations,
- Type of existing pipe,
- Manufacturer and type of bursting equipment, operating system proposed and capability of equipment chosen,
- Existing underground utility services location and special precautions required,
- Ground monitoring equipment and methods, for example heaving, fluid loss or frac-out<sup>[a3]</sup>,
- Type of existing pipe and services reconnection joints used and their relevant specification,
- Calculation of size, depth exit pit required,
- Hydraulic calculation for bypass pumping (where applicable),
- CCTV inspection frequency
- Supply of temporary services for waterline services (if applicable),
- Dewatering working chambers
- Bypass pumping of existing pipeline services during PB operations,
- Location of launching and receiving chambers, trench support and work sites layout,
- Method of temporary spoil storage and disposal,
- New piping type, butt-fusion methods and equipment used,
- Programmed daily work hours and duration for the operation,
- Details of Specialist subcontractors including relevant competency training records of personnel.

<sup>1</sup> Australian Drilling Industry Training Committee [www.aditc.com.au](http://www.aditc.com.au).

<sup>2</sup> Construction Industry Training Board [www.constructionskills.com.au](http://www.constructionskills.com.au).

## 5.1 Pipe Bursting Installation of Pipe

The Contractor shall furnish all labour, plant, materials, tools, equipment required to complete the work.

The Contractor shall have a quality management system and work in accordance with the quality management plan.

The Contractor shall follow the recommended drilling pipe installation procedures details below:

### Pipe Installation

- (i) They must be capable of withstanding all forces imposed upon them during the PB phase as well as the final installed conditions. All pipes must be able to withstand a tensile loading greater than the pulling load of the machine. In pushing processes the pipe must be able to withstand the compressive load.
- (ii) The pulling end and intermediate points of the pipe shall be protected against damage. The pipe shall be homogenous and smooth outer surface throughout and shall be free of visible damage.
- (iii) The pipe manufacturer shall be designated at the time of the tender. Any subsequent change of pipe manufacturer must be approved by the Client in writing. The Contractor shall provide a record of experience the product and relevant product specification at the time of tendering.
- (iv) The Contractor shall transport, handle and store the pipes and fittings in accordance with the manufacturers' recommendations at all times. Materials that are damaged or lost shall be repaired or replaced by the Contractor. All such work is for the account of the construction.

### Drawing and Calculations

- (i) All construction drawings and design calculations used during the construction shall return to the client marks up and revised to status. The mark-ups shall include pipe final alignment, entry and exit pit, pipe connection joints and lateral service connections.

## 5.2 Settlement and Surface Heave Monitoring

- (i) The Contractor shall take all care and necessary precautions to protect existing structures, utilities and services in planning and execution of the Works. All potential affected work area shall be visually inspected to document condition prior to any work conducted. Any damage to adjacent properties caused by all or part of this work shall be repaired and restored to its original condition at the Contractor's expense.
- (ii) The Contractor shall be responsible for the identification and protection of services where these are crossed by construction activities.
- (iii) Where crossing of roadways and railways are involved, the Contractor shall be required to record and report any ground settlement to the satisfaction of the respective controlling agencies.

- (iv) Where crossing of roadways and railways are involved, the Contractor shall be required to record and report any ground settlement to the satisfaction of the controlling agencies.
- (v) Where crossing any utilities and pipelines during the HDD process, the Contractor shall monitor ground settlement or heave directly above and 3m before and after the utility or pipeline intersection.
- (vi) The Contractor shall cease operations when monitoring points indicate any surface disruption that exceed the degree specification. The Contractor shall propose immediate action for review and approval by the Client to remedy the problem.

### 5.3 Performance Requirements

- (i) The Contractor shall provide documentary proof of the power, condition, and operational characteristics of all equipment to be used.
- (ii) The Contractor shall join all HDPE piping using the butt-fusion method. The jointing shall be carried out in accordance with the manufacturers recommendations and specifications. The joints shall be leak-free, straight and true and have uniform roll-back beads within limits specified by the manufacturer.
- (iii) The joints shall be held under pressure whilst being cooled. The cooling time shall be as specified by the manufacturer. Should the pre-inspection of the pipe material reveal defects, the defective section shall be cut out of the pipe. The pipe shall then be jointed as described above. Similarly, should a joint be found to be defective, the joint shall be cut out and a new joint made. All such work shall be at the cost of the contractor.
- (iv) The Contractor shall ensure that the terminal sections of new pipe are joined to existing pipes are connected with Central Plastics Electrofusion Couplings, or connectors with tensile strength equivalent to that of the existing pipe.
- (v) The Contractor shall ensure that the system is monitored by the operator at all times. The minimum information the Contractor must make available to the operator shall include, rate of advance length of conduit installed, thrust or pull force, deviation from line and gradient, and valve positions.
- (vi) The Contractor shall ensure that all utilities crossing within 600mm of the existing bursting pipe have soil excavated and removed to relieve pressure caused by heaving during the bursting operation.
- (viii) The Contractor shall ensure that the PB equipment has the capability of limiting the bursting force during the installation, so as not to exceed the manufacturers recommended tension loads for the pipe. This is to ensure the newly installed pipe is not damaged by the excessive pulling force.

## 5.4 Entry and Exit Chambers

The Contractor shall take the necessary action to ensure the safety of the work and shall ensure compliance with the pre-approved Safety Management Plan requirements at all times.

The sizes of all excavations shall conform with the following requirements:

- (i) Chambers shall be of the minimum practical size commensurate with safe working practices. The Contractor shall select the size and provide the details of all chambers.
- (ii) Every face of any excavation that exceeds a depth of 1.5 m shall be supported or contained by shoring.
- (iii) The shoring of the excavation shall be supported as the excavation progresses, the shoring shall be kept as close as practicable to the excavator.
- (iv) All necessary measures must be taken to ensure that excavations are left in a safe condition, the erection of suitable hard barricades, warning signs and hazard lights on the end of each operation day. This will include:....
- (v) The earthworks shall be set out in accordance with the design drawings.
- (vi) The Contractor shall inspect the site, and verify all existing levels, survey control points and set out points shown on the Drawings, before commencing the earthworks.
- (vii) All excavations shall be made to the depth and extent as shown on the Drawings with proper allowance for fill, additional cover (where required) and formwork. The excavations shall be kept free and clear of loose materials, water and rubbish. Should excavation to the nominated depth reveal unstable or unsuitable ground, the Contractor shall immediately notify the Client and take steps to make safe as additional cost to the client if the ground conditions reflect different from the initial ground conditions investigation.

## 5.5 Gradient and Alignment Tolerances

- (i) Tolerances in the gradient and alignment of the final installation shall comply with the Client's specifications.

## 5.6 Obstructions and Loss of Ground

After satisfactory completion of the installing the new pipe and removal of all equipments and excavated materials for the PB operations, the Contractor shall conduct the inspection outlined as follows:

- (i) If a work stoppage is encountered, the cause of the stoppage shall be determined by the contractor. Should the stoppage be a result of the Contractor's equipment, materials or method, all remedial costs will be for the Contractor's account. If the cause is found to be an obstruction, the installation methods shall be modified to the satisfaction of the client to best suit the actual conditions encountered.
- (ii) Should appreciable voids in the of ground occur during the PB operation, the voids shall be backfilled promptly to the extent practicable with soil. Where the local soil is not suitable for this purpose, the Contractor shall import suitable materials.
- (iii) Any concrete encasements, gibault<sup>[a4]</sup> joints, repair clamps and other point repairs shall be excavated and broken out prior to the bursting operation to allow the steady and free passage of the pipe bursting process. All in-line valves and fittings shall be removed prior to the bursting operation.

## 5.7 Pipe Testing, Disinfection and Inspection

After satisfactory completion of the installing the new pipe and removal of all equipment and excavated material, the Contractor shall conduct an inspection as follows:

- (i) All pipe joints should be tested by methods (in compliance with ASTM C828, ASTM C1103, ASTM C969, BS 5911).
- (ii) Hydrostatic testing and CCTV inspection for the entire pipeline.
- (iii) Further testing may be required to ensure the pipeline is leak proof, based on manufacturer provided material properties. If sewer pipeline is installed. The recommended testing standards (EN160, EPA).
- (iv) All test records shall be provided to the Client as part of the "As-Built" documentation.

## 5.8 Closing of Chambers

- (i) After satisfactory completion of all testing, removal of all equipment and excavated materials, the Contractor shall prepare the bottom of all pits to the specification required. The Contractor shall remove all loose and disturbed materials below pipe grade to the undisturbed earth level and shall recompact the materials to an agreed specification.

## 5.9 Quality Control and Assurance

- (i) The Contractor shall submit an Inspection and Testing Plan (ITP) and Manufacturers Data Report (MDR) for approval.
- (ii) The Contractor shall maintain a record of "As-Built" drawings and other data in accordance with the General Conditions of Contract, this Specification and the Scope of Works.
- (iii) The Client reserves the right to reasonable access to the Contractor's facilities and Quality Assurance records to conduct Quality Assurance Audit and inspection throughout the contract period.
- (v) The Contractor's Quality Management Plan shall define the method for performing its own internal audits.

## 6.0 GENERAL REQUIREMENTS

### 6.1 Environmental Impact Assessment

- (i) The Contractor shall undertake all Works in accordance with the relevant environmental requirements.
- (ii) Prior to commencing any earthworks or excavation operations, the Contractor is obtain an "Excavation Permit" from the Client. The contractor will identify the location of underground installations (i.e. gas, sewer, water, fuel, electrical and communications cabling) in the area. If required, the Contractor shall obtain any or all approvals required from external agencies e.g. local councils, State Road Authorities. The Contractor shall take all reasonable measures necessary to ensure that all such installations are protected from damage or displacement during the course of the work.
- (iii) The Contractor shall obtain a "Gain Access approval" from local Regulator, and be responsible for clearing any construction spillage, waste and debris.

### 6.2 Geotechnical Data Report

- (i) The contractor shall ensure that the geotechnical data report (GDR) provided is sufficient to complete the work. Additional geotechnical investigation maybe requested by the contractor if it deems that the provided GDR, provides insufficient data to complete the work.

### 6.3 Traffic and Public Relationship Management Plan

- (i) The Contractor shall undertake works in accordance with requirements of an approved Traffic Management Plan (TMP). The TMP shall be in accordance with the provisions of AS 1742 - Manual of Uniform Traffic Control Devices and any additional requirements of the local and state authority.

- (ii) The Contractor shall ensure that access is maintained for public and construction traffic. Public traffic shall be isolated from construction traffic wherever practicable. In areas where access for public traffic cannot be separated from construction traffic, appropriate traffic measures shall be clearly identified in the Traffic Management Plan.
- (iii) The Traffic Management Plan shall clearly identify what traffic control shall be implemented for the work. All traffic control equipment shall be kept in good order to ensure visibility and reflectivity is maximised for both day and night traffic.
- (iv) Any by-pass roads, detours and other temporary works as proposed shall be clearly identified in the Traffic Management Plan. Details of the proposed temporary works shall be provided to the Client and other relevant traffic authorities for approval prior to the start of these works.
- (v) Pursuant to these requirements, traffic management notices shall be provided to parties nominated by the Client for distribution and display on all safety notice boards. These notices shall be updated to display the current conditions at all times.
- (vi) Traffic management actions implemented on site shall be inspected at least daily or at such greater frequency as required to ensure they are in accordance with the actions. The contractor shall complete and maintain a register of traffic management plans to reflect inspections and maintenance undertaken.
- (vii) The Contractor shall provide for approval a public relationship management Plan.

#### **6.4 Safe Work Practices**

- (i) Daily safety meetings (toolbox meetings?) shall be conducted before the commencement of daily works and a written record of attendance (and safety topic) shall be submitted to the Client's Representative.
- (ii) The Contractor shall undertake works in accordance with safety requirements as laid down by local, state and federal regulations. Safety measures shall include, but not be limited to, personal protective equipment, operating of machinery within job site, storage and transportation of materials and equipment.

#### **6.5 By-pass Pumping**

- (i) The Contractor shall provide, for client approval details for temporary services for the duration of this project.
- (ii) The Contractor shall provide for client approval all hydraulic calculations of by-pass flow pumping during the project. The Contractor will also submit for client approval pump specifications, the proposed number of duty and stand-by pumps, and proposed operating procedures.

## 7.0 CONTINGENCY PLANNING

The contractor should prepare a PB contingency plan specific to the site of operation.

The plan should address but the following as a minimum:

- (i) General procedures and labour issues during the duration of the project
- (ii) Equipment requirements and stand-by requirement
- (iii) Time considerations
- (iv) Clean up, environmental and surface monitoring methods
- (v) Client and local regulatory contact that affected by the project
- (vi) Waste disposal plans
- (vii) General Public Relations

## 8.0 MEASUREMENT AND PAYMENTS

- (i) Payment shall be based on the Contract Schedule and paid in accordance with the contracted terms and conditions.
- (ii) All work necessary to complete the Works, including but not limited to chambers, manholes, dewatering, connections, and similar items are considered subsidiary to the bid items. Payment will be made based on the bid items complete and in place.

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