

SS10

SPECIFICATION FOR  
CONSTRUCTION OF  
MAJOR WATER  
SUPPLY MAINS

**SS 10 SPECIFICATION FOR CONSTRUCTION OF MAJOR WATER SUPPLY MAINS**

**STANDARD SPECIFICATIONS  
AND DRAWINGS**

**MAJOR WATER SUPPLY MAINS  
2004 EDITION**

<b>STANDARD SPECIFICATION</b>	
SS10	SPECIFICATION FOR CONSTRUCTION OF MAJOR WATER SUPPLY MAINS
<b>STANDARD SPECIFICATION DRAWINGS</b>	
<b>DRAWING NO.</b>	<b>DRAWING TITLE</b>
04-06-701	MAJOR WATER PRESSURE MAIN GENERAL TRENCH AND BEDDING DETAILS
04-06-702	MAJOR WATER PRESSURE MAIN TRENCH AND BEDDING DETAILS WITHIN EXISTING ROADS
04-06-703	MAJOR WATER PRESSURE MAIN THRUST BLOCK DETAILS
04-06-704	MAJOR WATER PRESSURE MAIN SCOUR VALVE AND OUTLET DETAILS
04-06-705	MAJOR WATER PRESSURE MAIN MARKING FOR LOCATION OF PIPELINE AND FITTINGS
04-06-706	MAJOR WATER PRESSURE MAIN Ø25 SMALL ORIFICE AIR VALVE INSTALLATIONS
04-06-707	MAJOR WATER PRESSURE MAIN DN 50, DN 80 AND DN 100 DOUBLE AIR VALVE INSTALLATIONS
04-06-708	MAJOR WATER PRESSURE MAIN Ø375 TO Ø1200 SECTION SLUICE VALVE
04-06-709	MAJOR WATER PRESSURE MAIN Ø375 TO Ø1200 SECTION BUTTERFLY VALVE PIT

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### 1.0 GENERAL

This specification covers the construction of DN 300 to DN 1200 water supply mains, and associated appurtenances where the maximum operating pressure is not more than 900 kPa.

For Test pressure refer to clause 33, Herein.

- 1.2 This specification covers pipelines which are not to be tapped.

All mains located within the road shall be DICL in Accordance Section 5 herein.

### 2.0 ACTS, REGULATIONS, LOCAL-LAWS AND JOINT COMMITTEE

- 2.1 The Contractor shall comply with all Acts, Local-Laws and Regulations having jurisdiction over work under the Contract and shall be fully responsible for any breaches thereof.

#### 2.2 Sewerage and Water Supply Act

- 2.2.1 Notwithstanding the requirements of this specification the whole of the work under the Contract shall be executed in conformity with the relevant sections of the Sewerage and Water Supply Act 1949 - 1982 (as amended) and/or Queensland Water Act 2000 (as amended).

Note the Queensland Water Act 2000 takes precedence over the Sewerage and Water Supply Act 1949 (as amended).

- 2.2.2 Where reference is made in this specification to Joint Committee Approval it shall be as defined under the Sewerage and Water Supply Act 1949 - 1982 (as amended) and/or Queensland Water Act 2000 (as amended).

#### 2.3 Workplace Health and Safety Act

- 2.3.1 The Contractor shall assume the role of Principal Contractor as described in the Workplace Health and Safety Act, and shall lodge the necessary notification in relation to the project on the prescribed form and pay the prescribed fee. Documentation to that effect must be presented to Council prior to commencement.

- 2.3.2 The Contractor and his agents and employees shall ensure that all work under this Contract is performed in such a manner that no hazard or risk of injury or damage exists to Council's

employees or any person affected by the work undertaken including the general public.

The Contractor shall obey any reasonable safety direction given by Council or the Superintendent. No action by Council or the Superintendent shall relieve the Contractor of any obligation under this Contract or at law.

Wherever practicable, the Contractor shall safely and securely fence the works area and limit access to that area to authorised persons, including the relevant staff.

Contractor's staff entering any Council operation area shall obey all Council safety rules for that area and any safety direction given by the Council or its agents.

- 2.3.3 Council expects the Contractor to fully adhere to his responsibilities under the Workplace Health and Safety Act. To assist in obtaining compliance with the Act, Council requires the following:-

## A Workplace Health and Safety Plan shall be submitted prior to commencement on site in accordance with the requirements of the Workplace Health and Safety Act, Amendment Regulation (No. 2) 1996. A model of a suitable plan entitled "Civil Construction" is available from the Queensland Department of Training and Industrial Relations, Division of Workplace Health and Safety. The format of the safety plan may be varied provided the resulting plan is at least as comprehensive as the Division's format.

## The safety plan shall be held at the job site at all times and shall be accessible to the Contractor and employees, the Superintendent and the Principal's employees.

## The Contractor shall ensure that each person employed under this Contract holds a Safety Induction Card and is conversant with the requirements of the Workplace Health and Safety Act and Regulations, Codes of Practice and with Safety Procedures applicable to the various categories of work and different workplace situations involved under this Contract.

## In addition, all of the Contractor's workforce including any subcontractors workforce shall be given a site specific induction by the Contractor's

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representative prior to commencing work at the job site irrespective of the stage of the works in progress.

The Tenderer shall fully assess the confined space entry requirements of the contracted works. In undertaking this assessment the following must be considered:-

⚡# The Contractor shall adhere to the requirements of the Workplace Health and Safety Act in regard to confined space entry i.e. adherence to the requirements of AS/NZS2865.

⚡# The Contractors employees or operatives on site must be trained in confined space entry in accordance with AS/NZS2865. Prior to commencement on site, the Contractor will provide Council with current certificates for confined space training of all operatives undertaking confined space entry.

The Contractor must submit prior to commencing on site the following documentation:-

⚡# Identification of all confined space entries required in carrying out the works.

⚡# An appropriate risk assessment of each entry in accordance with AS/NZS2865.

⚡# The risk control documentation to be used in accordance with AS/NZS2865.

2.3.4 All excavations must be backfilled prior to the Contractor leaving the works unattended. No excavation shall be allowed to remain open overnight.

Where it is an absolute necessity for excavations to remain open while the site is unattended and the excavation is in an area which is considered accessible by the public (as determined by the Superintendent), a temporary chain link fence must be erected around the excavation to discourage and prevent access.

Where the open excavation is in an area which is not accessible to the public (as determined by the Superintendent), barrier mesh on star pickets no more than 2.4 m apart must be installed whenever the excavation is left unattended.

2.4 Environmental Protection Act

2.4.1 The Contractor shall adhere to all requirements detailed in the Project Specification under Environmental Considerations. Prior to commencement on site, the Contractor is to forward his response to the requirements to the Principal for assessment and approval.

The Contractor shall seek and gain environmental approval from the Principal to conduct the necessary land clearance and construction activities, as required under the Environmental Protection Regulation 1998.

2.4.2 After the works have been set out and prior to construction proceeding, the Contractor shall inspect the set out of the works in the company of the Superintendent in order to consider modifications that will minimise environmental disturbance.

The route chosen for the trunk main shall minimise the interference to trees and other significant vegetation and improvements. Major trees which will be close to construction shall be protected with timber panels.

Trees adjacent to proposed pipelines shall not be trimmed or felled without the written approval of the Superintendent. Trees with trunks within 600 mm of the trench centre line shall be felled with the minimum of damage to other vegetation and the stumps and branches carefully removed from the site. Trees outside of this work area shall not be damaged or cut down.

Where trenching may damage the root system of a tree, the Contractor shall excavate around the root structure and minimise damage to the tree.

Where construction equipment shall repetitively track across the root system of a tree, the Contractor shall be required to spread a 300 mm thick layer of mulch to minimise damage to the tree. The Contractor shall maintain the mulch overlay throughout the construction period to the satisfaction of Council's Environmental Officer and Superintendent.

All cleared vegetation shall be mulched and retained on site to be spread over the construction area during the restoration process.

3.0 EXISTING SERVICES

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3.1 It shall be the Contractors responsibility to contact all public utility authorities to ascertain the location of services prior to commencing the work under the Contract. In carrying out the Works the Contractor shall be responsible for all damage caused to any public utility whatever.

3.2 Before undertaking any work which may interfere with any public utility, railway, road, watercourse or tidal waters or with any structure, the Contractor shall give the required notice in writing to the Department or Authority concerned. The Contractor shall not commence the work until it has received the necessary permits and it shall carry out the work in accordance with the conditions set out in these permits.

3.3 If the Contractor damages any existing services it shall arrange for the relevant service authority to make good such damage and the cost thereof shall be borne by the Contractor.

3.4 Where the design of the Works requires alterations to existing services and such alterations are to be organised by the Contractor then the Contractor shall liaise and arrange with the relevant Department or Authority to effect such alterations and the Contractor shall pay all costs, fees, and charges of the Department or Authority.

All of the Contractor's costs in performing this function shall be deemed to be included in the relevant Bill Item (if part of the Contract) and the Lump Sum of the Contract generally.

### 4.0 MATERIALS

#### 4.1 General

All materials used in the Works shall be handled, transported and stored in accordance with the relevant Australian Standard and the manufacturers recommendations. Materials in contact with potable water shall comply with AS/NZS 4020.

#### 4.2 Concrete Structures, Reinforcing, Timber, Formwork

The grade of concrete to be used in the Works shall be as shown on the drawings. The manufacture, supply, handling and placing of concrete shall comply with the requirements of AS1379 and AS3600.

Steel reinforcing bars and Welded wire reinforcing fabric shall comply with AS/NZS4671.

Structural steel shall comply with the requirement of AS/NZS3678 and AS/NZS3679.

Galvanising shall comply with the requirements of AS1397, [AS/NZS4680](#) and [AS/NZS4792](#).

All structural timber shall comply with the requirements of AS1720 and timber species shall conform to unseasoned stress Grade F17.

Formwork shall comply with the requirements of AS3610.

## 5.0 WATER MAIN PRESSURE PIPES

### 5.1 General

Pipes used for water mains shall comply with Table 1 herein:-

Table 1

Type of Pipe	Class of Pipe
Steel	Rated pressure - 1.4 MPa
Ductile Iron	K9, K12 , PN20 & PN35
Lead Free UPVC	Series 2 PN 16

Steel pipes shall not be used for pipelines with internal diameter less than 500 mm.

### 5.2 Steel

Steel pipes shall comply with AS1579.

The minimum wall thickness shall be 5 mm.

Pipes shall be either cement lined in accordance with AS1281 or lined with a fusion bonded medium density polyethylene (FBMDPE) coating in accordance with AS4321..

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The pipes shall be coated with a fusion bonded medium density polyethylene (FBMDPE) coating in accordance with AS4321.

Pipe joints shall be either welded slip-in, welded butt, welded ball and socket, welded collar, flanged or elastomeric ring as specified. Elastomeric rings shall be as specified in clause 8.0 herein.

When cathodic protection is required on elastomeric ring jointed pipelines, cable attachment lugs shall be provided on all pipe ends approximately 125 mm from the end of the coating.

### 5.3 Ductile Iron (DI)

DI pipes shall comply with AS/NZS2280.

DI pipes shall be internally lined with cement mortar as set out in Table 7.1 of AS/NZS2280.

DI pipes for use underground shall be bitumen coated externally in accordance with AS/NZS2280 Section 7 and all DI pipe and fittings shall be sleeved as specified in clause 7.0 herein. DI pipes for use in locations other than underground shall be either thermal bonded polymeric corrosion protective coating in accordance with clause 10.7.1 herein or epoxy painted as specified in clause 10.7.2 herein.

Rubber rings shall be as specified in clause 8.0 herein.

### 5.4 UPVC

UPVC pipes shall comply with AS/NZS1477.

No PVC pipe socket shall be joined to a Ductile Iron Spigot.

Rubber rings shall be as specified in clause 8.0 herein.

Pipes used for potable water shall be blue in colour.

Pipes used for recycled water shall be no darker than P12 Purple and no lighter than P23 Lilac, in accordance with AS 2700.

### 5.5 Steel Flanged Pipe

Steel flanged pipework shall be manufactured from AS1579 pipe to which has been fitted plate flanges in accordance with AS4087.

Pipes may be of flange/flange, flange/socket or flange/spigot configuration as specified. All flange faces shall be machined at right angles to and concentric with the axis of the internal diameter of the pipe. For all new work flanges shall be drilled in accordance with AS4087 - Figure B.7 unless connecting on to existing mains where the connecting flange shall match existing. All pipes shall be cement mortar lined and coated as specified in clause 5.2.

Prior to welding the flange to the pipe, the FBMDPE coating shall be cut back to a neat edge 50mm clear of the weld. After the completion of welding and inspection, the pipe barrel and exposed parts of the flange shall be coated with an epoxy painted coating as specified in clause 10.7.2. herein.

The joint between the coatings shall be covered using a U.V. stabilised heat shrink sleeve.

### 5.6 DI Flanged Pipe

DI flanged pipework shall be manufactured in accordance with AS/NZS2280 - PN35 or Class K 12 wall thickness ductile iron pipe to which has been fitted screw on flanges in accordance with AS4087.

Pipes may be of flange/flange, flange/socket or flange/spigot configuration as specified. All flange faces shall be machined at right angles to and concentric with the axis of the internal diameter of the pipe. For all new work flanges shall be drilled in accordance with AS4087 - Figure B.5 unless connecting on to existing mains where the connecting flange shall match existing. All pipes shall be cement mortar lined. Pipes for use underground shall be coated with a bituminous compound in accordance with AS/NZS2280 Section 7 and sleeved as specified in clause 7.0 herein. Pipes for use in locations other than underground shall be epoxy painted as specified in clause 10.7.2 herein.

## 6.0 WATER MAIN PRESSURE PIPE FITTINGS

### 6.1 Steel Fittings

Steel fittings shall comply with AS1579 with a rated pressure of 1.4 MPa.

Fittings shall be manufactured from sections of pipe which have been cement lined in accordance with AS1281 and coated with

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fusion bonded medium density polyethylene in accordance with AS4321.

Fittings shall have square plain ends for collar jointing.

Fittings shall generally comply with the suggested configurations and dimensions shown in Appendix G of AS1579.

Fittings such as wyes, tees, angle branches, etc shall be reinforced in accordance with the provisions of American Water Works Association Manual M11, Section 13.

At all welds, the FBMDPE coating shall be cut back to a neat edge 50mm clear of the weld. After the completion of welding and inspection, the exposed surface shall be coated with a spray application of the FB or FBMDPE coating material. Any gap in the cement mortar lining shall be packed with cement mortar as specified in Clause 26.7 herein.

### 6.2 DI Socket Fittings

DI socketed fittings shall comply with AS/NZS2280 and shall be Class K14 (min).

DI fittings shall be rubber ring jointed as specified in clause 8.0 herein and shall be either internally lined with cement mortar as set out in Table 7.1 of AS/NZS2280. DI fittings shall be bitumen coated externally in accordance with AS/NZS2280 Section 7 or internally lined and externally coated with a factory applied thermal bonded polymeric coating as specified in clause 10.7.1. herein and be in accordance with AS/NZS2280 Section 7 herein.

Sockets shall be of a design which provides an effective sealing length. The socket design shall be of a type approved by the Water Resources Commission (Technical Bulletin No. 23/1991). Care shall be taken when cutting pipes that the pipe ends are cut square and evenly, not excessively beveled and that the end is fully inserted into the socket by use of the witness mark.

### 6.3 DI Flanged Fittings

Flanged Pipe Fittings shall be manufactured in accordance with AS/NZS2280 - and flanges shall be in accordance with AS4087 - Figure B.5 unless connecting onto existing mains, where the connecting flange shall match existing. Fittings shall be either cement mortar lined. Fittings for use underground

shall be coated externally with a bituminous compound in accordance with AS/NZS2280 Section 7 or internally lined and externally coated with a factory applied thermal bonded polymeric coating as specified in clause 10.7.1. herein.

### 6.4 Puddle Flanges

Puddle flanges shall comply to AS/NZS2280 - clause 5.3 except that all nuts, bolts and washers used in the assembly of Puddle flanges shall be of grade 316 stainless steel.

### 7.0 POLYETHYLENE PIPE SLEEVING

7.1 Polyethylene sleeving shall be manufactured to satisfy the requirements of AS3680.

7.2 Polyethylene sleeving shall be installed on DI pipes and fittings to satisfy the requirements of AS3681.

7.3 The colour of Polyethylene sleeving shall be  
 a) Blue in colour for potable water and;  
 b) For recycled water no darker in colour than P12 Purple and no lighter than P23 Lilac, in accordance with AS 2700.

### 8.0 RUBBER RINGS

All socketed pipes shall be rubber ring jointed.

Unless otherwise specified rubber rings shall be natural rubber and comply with AS1646.

Rubber rings for water reticulation shall not contain root inhibitor.

### 9.0 COUPLINGS

#### 9.1 Gibault Joints

Only elongated gibault joints shall be used in the Works. They shall be approved by the Superintendent and shall be on Council's list of approved products.

#### 9.2 Flexible Couplings

Flexible couplings shall be suitable for jointing the type of pipe used in the work.

Couplings shall be manufactured from Grade 316 stainless steel, with Grade 316 stainless steel fasteners and EPDM sealing sleeves. Alternatively the body and retaining rings may be made of ferrous metals and coated with special coating as specified in clause

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10.7.1 herein. Washers shall be provided under all bolt head and nuts where rotation may occur to prevent damage to the coatings.

Couplings shall be suitable for in ground installation on pipelines laid in soils, which may be subject to ground movement. The couplings shall be tolerant of pipe axial deflection at the joint pipe and axial movement and forces applied perpendicular to the pipe axis.

They shall be on Council's list of approved products.

### 9.3 Dismantling Joints

Dismantling joints shall be Class 16, either thrust type or non-thrust type depending on the pipeline arrangement.

They shall be manufactured from ductile iron with natural rubber seals to AS1646. Bolts shall comply with clause 11 herein.

The ductile iron or mild steel components shall have a thermal bonded polymeric corrosion protective coating as specified in clause 10.7.1 herein.

They shall be on Council's list of approved products.

## 10.0 VALVES

### 10.1 Sluice Valves

Unless otherwise specified all Sluice valves shall be buried in accordance with the drawings. Sluice valves shall comply with the requirements of AS2638.

DN 300, DN 375, DN 450, DN 500, DN 600 and DN750

Valves shall be Class 16, unless specified otherwise, and resilient seated with double "O" ring stem seals. All nuts and bolts used in the assembly of Sluice valves shall be of Grade 316 stainless steel. Fasteners other than stainless steel shall be of high grade steel and shall be isolated from the external environment.

Sluice valves shall be thermal bonded polymeric corrosion protective coating as specified in clause 10.7.1 herein. Wedges shall be fully encapsulated in an approved synthetic rubber in accordance with AS1646.

Sluice valves shall have anti-clockwise spindles for closing and shall be tested by the "closed end" method. Spindles shall be turned out of high tensile brass or stainless steel. End configurations shall be flanged unless specified otherwise. If Socketed, Sockets shall incorporate an elastomeric sealing ring as specified in clause 8.0 herein.

All Sluice Valves shall be buried in accordance with drawing 04-06-707 unless specified.

### By-pass DN 600 and DN750 Valves

Valves shall be of the By-Pass type similar to AVK Series 55/30, unless specified otherwise the By-Pass Valve shall be a minimum of DN80. The valves will have a 316 Stainless Steel tag's attached and be clearly labeled indicating size of valve (lettering not smaller than 5mm in height). The valve spindles and valve cover and surround shall be colour coded, white for the larger primary valve and yellow for the smaller 80mm by-pass valve.

### 10.2 Extension Spindles

Extension spindles where required shall be turned out of either high tensile brass or stainless steel.

### 10.3 Scour Valves

If Specified the Scour valves shall comply with the requirements of AS2638 and clause 10.1 herein for DN 300 sluice valves except that they shall be tested to satisfy the requirements of the "open-end" test as specified in AS2638.

### 10.4 Butterfly Valves

Butterfly valves shall be installed in a pit in accordance with the drawing 04-06-709 and be manufactured in accordance with AS4795 Double-flanged butterfly valves for waterworks purposes with replaceable resilient seat, disc of 316 stainless steel, a one piece stainless steel shaft, ductile iron body, corrosion resistant bearings and shaft seals.

The valve shall be suitable for a pressure rating of PN16 (1600 kPa).

The valve shall be suitable for installing between AS4087, Fig. B5 flanges.

The valve seat shall be field replaceable, with integral O-rings moulded to it that cover the flange face, eliminating the need for gaskets.

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It is to be retained by a bed groove design that fully encapsulates the wetted area of the valve body.

The valve shaft shall use the dry shaft principle, with self lubricating bearings and a rigid shaft/disc connection.

The valve shall be fitted with upper and lower bearings.

The valve shall not require routine gland adjustment or lubrication.

The butterfly valve bodies shall be thermal bonded polymeric coated as specified in clause 10.7.1. herein.

Where specified the butterfly valves shall be manually operated through a totally enclosed lubricated for life gearbox. The gearbox shall be of weatherproof ductile iron construction with carbon steel spur and worm gear, ductile iron segment gear, bronze bushes and ball thrust bearings. The gear box shall have open-shut position indication. All bolts, nuts and screws including those to cover plates and end cap fixings shall be 316 stainless steel.

The butterfly valves shall be works tested. The test shall include:-

- (a) A test to demonstrate that the valves will operate correctly from fully closed to fully open and return to fully closed.
- (b) A disc test with pressure applied on upstream side. No leakage. Check operation of actuator under this condition.
- (c) A body test with disc partly open. No leakage.

The Contractor shall check that there is adequate clearance between the valve disc and the adjacent pipes when the valve is opened and closed.

The sealing surfaces of the valves shall be on the metal face of the pipework flanges, not on the cement lining. If the valve sealing surface does not be on the metal face, the Contractor shall provide minimum 6mm thick Grade 316 stainless steel insertion rings and additional rubber insertion joint rings.

### 10.5 Air Valves

Air valves shall be used on potable water mains.

Small orifice air valves (25mm diameter) shall consist of either a combined lever and float or a float and EPDM rolling seal arrangement which seals off a small orifice vent. The valve shall be manufactured of high strength plastic or coated ductile iron. Each valve shall be supplied with a 25 mm 3-way tee port ball valve to allow for air valve isolation and water sampling. The air valve and ball valve shall be mounted on an 80 mm diameter flange.

Double air valves (100, 80 and 50 mm) diameter shall consist of both small orifice and large orifice valves. The small orifice part of the valve shall be as specified above. The large orifice part of the valve shall consist of a body casing housing a float which rises onto the seat when water rises in the valve. The float shall remain stable under all air outflow and inflow conditions without any possibility of premature closing of the valve during air outflow. The float and seat ring shall be plastic.

The valve shall incorporate a resilient seated butterfly valve with 316 stainless steel disc of the same diameter as the air valve. The butterfly valve shall be bolted to the flanged pipe branch (100 dia. for 100 valve and 80 dia. for the 80 dia. and 50 dia. valves) in a manner that will allow removal of the air valves without removing the butterfly valve. All 50 mm diameter air valves shall connect to the 80 mm diameter flanged pipe branches and the Contractor shall supply any necessary adapter flange to join between the butterfly valve and the pipe branch.

The surface of the cast iron body and cover of the air valves and the body of the butterfly valves shall be coated with a special coating as specified in clause 10.7.1 herein.

### 10.5.1 Gas Release Valve

Gas Release valves shall be used on recycled water mains (Class A & B Effluent).

The location, size and type of gas release valve together with an adequately sized valve box or chamber shall be as shown on the drawings.

Unless approved otherwise, gas release valves shall:

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≠ be manufactured from Fibreglass Reinforced Nylon or an approved alternative non-corrosive material. When components of the valve are manufactured from a corrosive material then these components shall be treated with an approved protective coating;

≠ seal the gas bleed hole by a float made of non-corrosive non-flexible material sealing against a flexible seat. Where the float is a flexible material, the float shall be restrained from rotating ie it seals on the same place at all times;

≠ have a flanged fitting drilled to Table C in accordance with AS4087 Figure B.5. All gas release valves shall be installed with a suitable isolating valve to allow the removal of the gas release valve for maintenance purposes;

≠ be installed on the major or minor high points of all pressure mains and where the main is buried, incorporated within a suitably sized concrete pit as shown on the drawings. Where gas release valves are install on smaller mains, then they may be installed within a suitably sized valve box with the cover marked accordingly ie A.V.

≠ the valve shall be painted in accordance with Clause 7.3 (b), herein.

### 10.6 Check Valves

#### 10.6.1 Flanged Check Valves (DN 300, DN 375, DN 450, DN 500 & DN 600)

Flanged check valves shall comply with the requirements of AS3578 and shall incorporate a counterweight and extended spindle or approved product similar to Valve-Matic swing flex type incorporating disc position indicator, with flanges in accordance with AS4087 Figure B.5. Check valves shall be coated internally and externally with an approved coating in accordance with clause 10.7.1 herein.

Valves shall be suitable to operate within the pressure ranges of the system within which they are being installed and shall be located within a suitability sized concrete pit of the style as shown on Council Standard Drawing's 04-06-108 or pre-cast pit as 04-06-706.

#### 10.6.2 Wafer Check Valves (DN 300, DN 400, DN 500, DN 600, DN 750 & DN 900)

Wafer check valves shall incorporate a wafer type ductile iron body suitable for installation between AS4087 (Fig. B5 or B7 appropriate) flanges, grade 316 stainless steel disc and EPDM seal. The body shall be epoxy painted in accordance with clause 10.7.2 herein.

10.6.3 The type and pressure rating of the Check valve shall be as shown on the drawings.

### 10.7 Protective Coatings

#### 10.7.1 Thermal Bonded Polymeric Coatings

Where specified that Valves and other fittings are to be treated internally and externally with a factory applied thermal bonded polymeric corrosion protective coating this shall comply with the requirements of AS/NZS4158 and be applied by the fluidized bed technique.

#### 10.7.2 Epoxy Painted Coatings

Where specified that ferrous fittings are to be painted with an epoxy painted coating, the surface shall be abrasive blast cleaned to AS1627.4 Class 2½ and painted with a 2 coat system of two pack high build, solvent free cycloaliphatic amine cured epoxy coating to a dry film thickness of 500 microns. All applications shall be strictly in accordance with the manufacturer's specification.

### 11.0 JOINTING BOLTS AND FLANGE GASKETS

11.1 All nuts, bolts and washers (including Torque Table assembly nuts and bolts) shall be stainless steel to AS2837 and AS1449 respectively, Grade 316, with an anti-seizing paste used in assembly.

11.2 All stainless steel nuts and bolts other than bolts which form an integral part of an article shall comply with the metric standards AS/NZS1111 and AS/NZS1112.

11.3 Bolt length shall be equal to the sum of the thickness of the flanges, gaskets, nut and washer and rounded up to the nearest standard size.

11.4 Bolts shall exhibit a clean cut thread with no burrs or torn peaks on the thread. Nuts must turn freely on the threads without binding.

11.5 Torque used to tighten bolts with clean flat lubricated surfaces shall comply with Table 2.

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Table 2

Bolt Dia. (mm)	Tightening Torque (Nm)
20	250
24	400
27	600
30	800
33	1100

11.6 Flange gaskets shall comply with Appendix D3 of AS4087.

### 12.0 VALVE BOXES AND VALVE PITS

#### 12.1 Valve Boxes

Cast iron valve boxes and lids shall be in accordance with the requirements of Council's Standard Specification SS2.

#### 12.2 Air Valve Pits

Reinforced concrete valve pits shall be constructed in accordance with Council Standard Drawing 04-06-706.

### 13.0 GEOTEXTILE

13.1 Geotextile shall be used where shown on the drawings or as directed by the Superintendent.

13.2 The geotextile shall have the following minimum properties:-

Nominal weight (as per AS3706) 180g/m<sup>2</sup>

Load (as per A.S.T.M. 1682) 750N

Mean Trapezoidal Tear Strength (as per A.S.T.M.D. 1117) 350N

Mean C.B.R. Puncture Resistance 2500N

Percolation Rate (as per AS3706) 340 L/m<sup>2</sup>/sec

13.3 The geotextile shall be a non-woven fabric made from continuous filament, synthetic fibres.

13.4 Minimum lap shall be 300mm.

13.5 Installation shall be to the manufacturer's recommendations.

### 14.0 SETTING OUT WORK

The Contractor shall be responsible for setting out the centre line of the main in accordance with the survey data supplied on the drawings prior to the commencement of work.

### 15.0 CARE OF REAL PROPERTY SURVEY PEGS

15.1 The Contractor shall locate and mark with a white painted stake all real property survey pegs within the area likely to be disturbed by the works. The Contractor shall take care not to distribute any real property survey pegs.

15.2 Any existing real property survey pegs beyond the limits of earthworks or excavations under this contract, which are disturbed by the Contractor, will be replaced by the Principal's Surveyors at the Contractor's expense.

### 16.0 CARE OF EXISTING FENCES

16.1 Fences, other than those specifically noted for removal, shall be maintained at all times with special care taken to prevent straying of stock if grazing is carried out on adjoining lands.

16.2 If fences are required to be cut or moved, the Contractor shall erect temporary fences, if necessary, for stock containment as directed by the Superintendent.

Where fences are to be cut for access, wire shall be drawn tight to end posts, suitably strutted, and suitable gates provided, if directed, for closure after working hours or when no work is in hand on the site.

Any fence cut or removed during this execution of work shall be replaced and reinstated to its original alignment and form unless otherwise directed by the Superintendent. It is the Contractor's responsibility to ensure that the fence is located correctly.

### 17.0 WORK WITHIN PRIVATE PROPERTY

17.1 The Contractor shall confine all work within private property to a 6.0 metre wide construction area unless agreed otherwise with the Superintendent. If directed by the Superintendent, the Contractor shall erect a temporary barrier fence or marker to define the limits of the construction area. Activities outside the limits of the construction area

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- shall not be permitted without the expressed permission of the Superintendent.
- 17.2 It is the Contractor's responsibility to inform private property owners of any construction activities that may affect them or their property. Notification is to occur prior to commencing these activities.
- 18.0 **WORK WITHIN ROAD RESERVES**
- All work within road reserves shall comply with the following:-
- (a) Work shall proceed without interruption to traffic and any steps necessary for the protection of the public during construction shall be taken.
- (b) Warning signs, flashing lights and other traffic control devices shall be erected in accordance with the Gold Coast City Council's *Work Procedures Manual* and *Manual on Uniform Traffic Control Devices (MUTCD)*.
- (c) Work which is likely to reduce traffic flow shall be carried out between 9.00 a.m. and 3.00 p.m. only and shall be organised so as to cause minimum disruption to pedestrians and access to adjacent properties. One lane of traffic under 'STOP-GO' control must remain open at all times across all roads.
- (d) Open trenches shall be constructed to the details shown on the drawings. Trenches shall not be left open overnight.
- (e) Work shall be carried so as not to detrimentally affect the existing drainage provisions of the roadway.
- 19.0 **CLEARING AND GRUBBING**
- 19.1.1 Clearing and grubbing shall be carried out in accordance with the requirements of Council's standard specification SS3.
- 19.1.2 The Contractor shall take all necessary steps to preserve vegetation along the route of the main. These steps shall include:-
- ## Limiting the construction disturbance area to a minimum. As a general rule, the disturbance area shall be no greater than 10 m width. Job specific limitations may be imposed within the project specification as an environmental consideration.
- ## The Contractor is advised that adherence to the Gold Coast City Council "Vegetation Management Local-Law" is required when undertaking the works. It is the Contractors responsibility to make all necessary enquires with the relevant Council department.
- ## Superintendent approval is required prior to clearing any tree with a diameter greater than 300 mm.
- ## All vegetation cleared in the course of constructing the works shall be mulched and spread over the disturbed area as part of the restoration works. Any material that cannot be mulched due to its excessive size shall be removed to an approved dump site at the contractors expense. Burning off of timber shall be permitted.
- 20.0 **COVER TO WATER MAINS**
- 20.1 The minimum cover from finished ground level to the obvert of the main shall be 750mm and the maximum cover from finished ground level to the obvert of the main shall be 1500mm.
- 20.2 In the event that the cover specified in clause 20.1 herein cannot be achieved in a particular location for any reason the Contractor shall seek written instructions from the Superintendent prior to proceeding with construction of the water main at that location.
- 21.0 **EROSION AND SEDIMENT CONTROL**
- The following erosion and sediment control measures shall be taken to ensure that sediment is contained within the perimeter of the disturbed area.
- ## The area of disturbance shall be kept to an absolute minimum.
- ## Topsoil shall be retained for rehabilitation purposes, (NB Stockpiles should not exceed 2 metres height, as this decreases the seed viability).

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- ≠# Runoff both external to the site and within the disturbed area shall be controlled. Clean water shall be redirected away from the disturbed area and into a stabilised overland flow path.
  - ≠# The site shall be rehabilitated quickly, i.e. stabilise/vegetate within fourteen (14) days of completion of works. Rehabilitation shall proceed as each stage is completed. The disturbed area shall be seeded and landscaped in line with Council's landscaping guidelines.
  - ≠# Sediment fences shall be installed as directed by the Superintendent and shall be inspected after each rainfall event, repaired if necessary and all trapped sediment removed to a designated stockpile.
  - ≠# Stockpiled material spoiled from trenching operations shall be placed on the upslope side, away from any drainage lines. These stockpiles are to have erosion and sediment control devices in place, e.g. sediment fences placed around the base, and if left for an extended period, an erosion proof blanket should be used.
  - ≠# Where the path of the pipe crosses minor drainage lines extra sediment fences shall be installed or small detention basins shall be constructed.
- 22.0 EXCAVATION**
- 22.1** Excavation for water mains shall be completed to the lines, levels and profiles shown on the drawings.
- When (in the Superintendent's opinion) weather, soil conditions, or any contingency exists that may be detrimental to pipe laying the Superintendent may limit the length of trench opening in advance of pipe laying. In any event, unless approved otherwise by the Superintendent, the length of trench opening ahead of pipe laying shall not exceed 40 metres.
- 22.2** Where the Contractor over-excavates, it shall make good the over-excavation at its expense. The over excavation shall be made good with bedding material which satisfies the requirements of clause 23.0 herein and which is the material immediately below
- Zone 1 for the Type 2 construction shown on the drawings.
- 22.3** The Contractor shall at its own expense do all things necessary to divert any water interfering with the progress of the Works, keep the excavations and trenches free from water while the Works are in progress and prevent any damage to the Works by water due to rain or other causes. The Contractor shall have approved pumping gear for keeping the excavation or trenches constantly dewatered during the times the Works are in progress. Any work or material damaged by water shall be made good by the Contractor.
- 22.4** The bottom of trenches or excavations shall have adequate compaction prior to the placing of any bedding or concrete materials. Should (in the opinion of the Superintendent) the foundation material be incapable of effective compaction, the material shall be removed and replaced with bedding material as specified in clause 23.0 herein.
- 22.5** If approved by the Superintendent excavated material may be used for backfill over pipes. This material shall remain the property of the Principal and any excess shall be spoiled or used as filling within the Site as directed by the Superintendent.
- All excavated material which is classified by the Superintendent as unsuitable shall be removed from the Site.
- Any excess spoil and all unsuitable material shall be disposed of at a location where directed by the Superintendent within a 10 km radius of the site.
- 22.6** The Contractor shall be solely responsible for the maintenance of excavations and is liable for any damage which may be caused through the collapse of the excavation.
- 22.7** Unless a separate item is included in any applicable Bill of Quantities for rock excavation, the items entered in the Priced Bill of Quantities and the Lump Sum of the Contract generally shall be deemed to include full compensation for excavation of material of all types and subsequent backfill and compaction of the trench or excavation with approved material.
- Excavation volumes shall be calculated using the relevant trench shown on the drawings.
- 22.8** Extra over for Rock: Where a Bill of Quantities is part of the Contract and this Bill

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contains a separate item for excavation in rock (as defined herein), extra payment will be made for the Bill Item for all rock removed within the limits of the excavation as defined or as ordered by the Superintendent. The quantity for payment shall be the nett quantity in place within the limits of the excavation shown on the drawings. No claim for excavation in rock will be entertained unless the method of measurement is agreed in writing with the Superintendent prior to material being excavated.

Rock shall be defined as material which cannot be excavated at the rate of 15m<sup>3</sup>/hour by a hydraulic tracked excavator with engine gross power output of 148 kW at maximum RPM and a rated breakout force on the bucket of 148 kN with standard bucket.

It shall be the responsibility of the Contractor to provide the excavator and bucket for this purpose at its cost. The Superintendent shall have the right to nominate an operator for the machine. In the event of disagreement with any decision made by the Superintendent in accordance with the above definition, rock shall be defined as material geologically in place of a hardness when first exposed of three or greater in the Mohr scale of material hardness. Testing of material to determine classification as rock (by the Mohr scale) shall be carried out by an approved laboratory at the expense of the Contractor.

- 22.9 Use of Explosives: Where approved by the Superintendent, rock may be carefully excavated by blasting procedures. Prior to commencing any blasting operation the Contractor shall, pursuant to clause 2.0 herein, obtain any blasting permit required. The depth, spacing, location, type of explosive and method of firing shall comply with any permit issued for blasting operations.

In the handling, storage and use of explosives, the Contractor shall comply with all state and local authority laws and local laws, and with AS2187, SAA Explosives Code. The Contractor shall in particular comply with Section 11.2 of the Code.

Where directed the Contractor shall provide measurements of ground vibration and/or air blast from a vibograph or similar instrument. If these measurements indicate that the requirements specified herein are not being complied with the Contractor shall reduce the amount of charge used or take

such other action as will ensure compliance with the Code.

The Contractor may be required to carry out trial blasting in order that the Superintendent may determine the peak vibration effects caused by the trial charges and so limit the maximum charge to be employed. The Contractor shall be responsible for all costs associated with the supply, operation and reporting of the vibograph or similar instrument.

The Contractor shall give the Superintendent at least three (3) days' notice of any intention to excavate by blasting and shall furnish full details of the location thereof and the methods it proposes to adopt. Subject to approval by the Superintendent for blasting at any location, such blasting shall be carried out only at times approved by the Superintendent.

The Contractor shall provide screens, barriers, mats and/or other protective devices as directed by the Superintendent to limit the effects of blasting. Notwithstanding the provision of such protective devices, the Contractor shall be responsible for any loss, damage or injury sustained by the public, workmen, the Works and for damage to property or public utilities of any description whatsoever caused directly or indirectly by such blasting.

Secure storage places shall be provided for explosives and all such places shall be clearly marked with warning signs. Only persons trained and experienced in the handling of explosives shall be allowed to use them on the work under the Contract. No shot shall be fired until a warning has been sounded and all persons within the radius of danger removed. The warning device shall give an audible warning clearly different from any other sound normally heard on the Site.

In the event that the vicinity of work under the Contract is accessible to the general public, the Contractor shall, before any shots are fired, post personnel about the Works in various directions to warn all persons of the danger existing and to prevent them approaching closer than safety will permit.

Where blasting is likely to endanger life or property, the Superintendent shall have the

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power to prohibit the use of explosives or prescribe and enforce such rules and regulations as it may deem necessary but the prescribing or failure to prescribe such rules and regulations shall not relieve the Contractor from any responsibility under the Contract.

No explosives shall be left in holes overnight.

Where explosives are used in rock excavation, the charges shall be so proportioned and placed that they will not loosen the rock outside of the excavation lines shown on the drawings or as provided for in the Contract. If the rock below the line or slopes designated should be loosened by blasting to such an extent as to render it (in the Superintendent's opinion) liable to slide, fall or have a detrimental effect to the Works such loosened rock shall be removed by the Contractor. The removed material shall be made good with material acceptable to and in a manner approved by the Superintendent.

All work associated with the use of explosives shall be deemed to be included in the relevant Bill Item (if part of the Contract) and/or the lump sum of the Contract generally.

### 23.0 BEDDING MATERIAL

Bedding shall be crushed rock material complying with AS2758.1 and AS1141 and of the nominal sizes shown in Table 3 herein.

Table 3

AS Sieve (mm)	Percentage Passing By Weight		
	Crushed Rock Nom Size 5 - 7mm	Crushed Rock Nom Size 10mm	Crushed Rock Nom Size 30mm (Additional Bedding)
37.5			100
26.5			80 - 100
19.0			25 - 60
13.2		100	5 - 20
9.5	100	89 - 100	0 - 5
6.7	85 - 100	30 - 89	
4.75	30 - 85	5 - 30	
2.36	0 - 30	0 - 5	
1.18	0 - 5		

### 24.0 TRENCH CONSTRUCTION

#### 24.1 General

Construction types are detailed on the drawings. Bedding material shall comply with the requirements of clause 23.0 herein. Excavated material shall not be used as bedding material.

Where crushed rock material nominal size 5-7mm cannot be sourced then Crushed Rock nominal size 10mm is to be used and a full geotextile wrapping shall be placed around bedding zones 1, 2 & 3 as shown in the Drawings as Type 3 construction.

#### 24.2 Type 1 Construction

The Bedding Zones 1, 2 and 3 shall consist of crushed rock material (nominal size 5-7mm) specified in clause 23.0 herein and shall be constructed to the details shown on the drawings.

##### Bedding Zone 1

This material shall be placed in the trench and compacted for the full width of the trench by two passes of a vibrating plate.

##### Bedding Zone 2

Hand holes shall be made in Bedding Zone 1 material as detailed on the drawings. The pipe shall be laid on the compacted bed and the bedding material carefully added to fill the hand hole. Bedding Zone 2 material shall then be placed in 150mm (maximum) layers and compacted for the full trench width using hand tampers and ensuring that the Bedding Zone 2 material is in full and even contact with the pipe and pipe joints.

##### Bedding Zone 3

Bedding Zone 3 material shall be placed in layers of 150mm (maximum) depth. This material shall be compacted as for Bedding Zone 2 material. Once the upper level for the Zone 3 material is reached, the bedding material shall be compacted for the full width of the trench using two passes of a small vibrating plate. The trench shall then be backfilled in accordance with clause 27.0 herein.

Where the backfill material is classified by the Superintendent as sand, a layer of geotextile (complying with the requirements of clause 13.0 herein) shall be placed as shown on the drawings.

Where crushed rock material nominal size 5-7mm cannot be sourced then Crushed Rock nominal size 10mm is to be used and a full geotextile wrapping shall be placed around

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bedding zones 1, 2 & 3 as shown in the Drawings as Type 3 construction.

### 24.3 Type 2 Construction

Type 2 Construction shall be used where, in the opinion of the Superintendent, the trench bottom is too soft or too wet to provide sufficient support for the pipe. In these circumstances additional bedding (nominal size 30mm) complying with the requirements of clause 23.0 herein shall be placed and compacted immediately below the Bedding Zone 1 material for the full width of the trench.

The depth of additional bedding shall be as directed by the Superintendent but not less than 300mm. In all other respects Type 2 Construction shall be as for Type 1 Construction.

### 24.4 Type 3 Construction

Type 3 Construction shall be used in locations where the Superintendent directs that Bedding Zones 1, 2 and 3 and the additional bedding are to be wrapped with geotextile as shown on the drawings. The geotextile wrapping shall comply with the requirements of clause 13.0 herein.

In all other respects Type 3 Construction shall be as for Type 2 Construction.

### 24.5 Type 4 Construction

Type 4 Construction shall be to the details shown on the drawings at locations designated by the Superintendent. Backfill shall comply with the requirements of clause 27.0 herein.

### 24.6 Type 5 Construction

Type 5 Construction shall be to the details shown on the drawings. Bedding Zones 1, 2 and 3 shall be constructed as specified in clause 24.2 herein.

Where additional bedding for Type 5 Construction is directed by the Superintendent the requirements of clause 24.3 herein shall apply. Where directed by the Superintendent that geotextile wrapping to the Bedding Zones 1, 2 and 3 and the additional bedding is to be installed the provisions of clause 24.4 herein shall apply.

### 24.7 Type 6 Construction

Type 6 Construction shall be to the details shown on the drawings. Bedding Zones 1, 2 and 3 shall be constructed as specified in clause 24.2 herein.

Where additional bedding for Type 6 Construction is directed by the Superintendent the requirements of clause 24.3 herein shall apply. Where directed by the Superintendent that geotextile wrapping to the Bedding Zones 1, 2 and 3 and the additional bedding is to be installed the provisions of clause 24.4 herein shall apply.

### 24.8 State-controlled Roads

Where pursuant to the Transport Infrastructure Act 1994 (as amended) roads are declared State-controlled roads bedding shall comply with this specification and the backfill, pavement and boring and jacking (where required) shall comply with the requirements of Queensland Department of Main Roads.

## 25.0 LAYING & JOINTING OF PIPES INCLUDING ASSOCIATED FITTINGS

25.1 Where materials are to be supplied by the Principal, the Contractor shall transfer pipes and materials from a single stockpile adjacent to the route of the main to the place of work. In the case of smaller fittings, the Contractor shall allow for the materials to be collected from the nearest Council depot.

All pipes must be laid in accordance with the manufacturers specification.

Where the manufacturer has a pipeline laying accreditation program, the pipeline laying operation must be continually supervised on site by an accredited person.

All water main pipe laying shall be carried out by competent pipe-layers under the supervision of the Contractors accredited personnel. All personnel are to be approved by the Superintendent before pipe laying commences.

If, in the opinion of the Superintendent, pipe-layers are performing unsatisfactorily the Superintendent may reject the work under the Contract and furthermore may instruct that the pipe-layers be removed from Site. All cost of rectification associated therewith shall be borne by the Contractor. Any other costs associated therewith by the Principal may be treated as a debt due from the

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- Contractor to the Principal under the Contract and deducted by the Superintendent from any Progress Certificate issued by the Superintendent.
- 25.2 All pipelines shall be constructed of pipes of types and sizes specified in the drawings and laid in accordance with the construction tolerances prescribed below and in clause 40.2 herein and the Contract Documents.
- 25.3 Pipes shall be sorted and matched prior to laying and shall be laid so that the inverts are continuous and true to line and grade and no part of the pipeline shall be more than 6mm from its true position with respect to line. Spigots and sockets shall be cleaned and the interior of pipes shall be free from obstructions or any contaminate.
- Water shall not be allowed to lie in the trenches while the pipes are being laid and the trench shall be kept free from all water until after the completed pipeline has been inspected and backfilling commenced.
- 25.4 Except as provided elsewhere in this specification, all joints shall be approved flexible joints, incorporating synthetic or natural rubber rings as specified in clause 8.0 herein. In jointing pipes with rubber ring joints, the pipes shall be cleaned before jointing and care shall be taken to ensure that the rubber ring is maintained in a plane at right angles to the axis of the pipe. Each pipe shall be jointed as recommended by the manufacturer and each joint checked with a feeler gauge to ensure that the ring is in place.
- 25.5 Where shown on the drawings, bends shall be used to effect horizontal or vertical changes of direction. Where bends are not shown on the drawings (and with the permission of the Superintendent) changes of direction may be effected by angling the joints, by means of short lengths of pipes, or by means of cutting pipes and using thimbles or collars to join them. All such changes of direction shall be effected in curves of uniform radius.
- No joint shall be angled to such an extent as to impair its effectiveness or tightness. Pipes shall be jointed in a straight line and the deflection effected after the joint has been made. The maximum deflection for any type of pipe approved for use shall not under any circumstance exceed the recommendation of the manufacturer.
- 25.6 All iron pipes and fittings regardless of the type of pipe system shall be sleeved in polyethylene in compliance with both the pipe manufacturer's recommendations and clause 7.0 herein. The sleeving shall be continuous over the iron based sections including gibault joints, bends, tees and other fittings except for those fittings coated as specified in clause 10.7.1 herein.
- 25.7 **Fittings**
- The laying and jointing of water mains shall include the fixing in position of all valves, air valves, risers, scour valves, concrete anchor blocks, thrust blocks, concrete valve pits, swabbing pits and all other fittings including the supply and installation of concrete or brick supports, bedding and cast iron cover boxes and surrounds as specified or shown on the drawings.
- The distance marked on the drawings and the position indicated thereon of pipes, valves and other fittings may be adjusted at the discretion of the Superintendent. If necessary, pipes shall be cut in order to secure the fixing of valves and other fittings in the positions required and all costs associated therewith shall be deemed to be included in the relevant Bill Item and the Lump sum of the Contract generally.
- All fittings shall be placed in position so as to be plumb and correct distance from the surface. Risers shall be installed where necessary at air valves and, if required, trenches shall be deepened and graded in the vicinity in order to achieve the correct depth below the surface.
- Except where the drawings show that concrete pits are required, cast iron cover boxes shall be fixed over all valves, air valves and scour valves. Cover boxes shall be in accordance with the drawings. Precast Concrete Surrounds shall be fixed around all cover boxes to the detail shown on the drawings. The bedding cover shall be increased locally to provide support to the brickwork or concrete surround on which the box is found so as to minimise the transference of weight or shock to the pipe to the details shown on the drawings.
- 25.8 **Wrapping of Flanges and Couplings**
- 25.8.1 All materials and procedures shall be by a recognised manufacturer of corrosion protection systems and shall be acceptable to the pipe manufacturer.

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The Contractor shall use only fully trained and experienced personnel for the wrapping of flanges and flexible couplings.

### 25.8.2 Flanges

Wire brush loose dirt and loose rust from the flange and adjacent pipe and 100 mm onto the coating.

Apply primer to all metal surfaces.

Mould butyl mastic between individual bolts and nuts and over the heads of bolts, nuts and screw threads, with a minimum coverage of 5 mm. Taper onto flange face to provide a suitable contour for tape wrapping.

Apply section of flexible tape longitudinally over the flange, extending a minimum of 50 mm onto the pipe barrel. Ensure that each additional section overlaps the previous by 55% to ensure a double thickness of tape.

Finish each side with a circumferential wrap around the pipe to lock in the ends of the tape sections applied longitudinally and continue until 100 mm onto the factory applied coating.

### 25.8.3 Couplings

Wire brush loose dirt and loose rust from the joint and adjacent pipe.

Apply primer to all metal surfaces.

Fill between bolts and sleeve, and around bolts to top of the retaining rings with butyl mastic.

Cover bolt heads, nuts and any protruding thread with butyl mastic.

Commencing 100 mm clear of the butyl mastic and a minimum of 50 mm onto the factory applied coating apply flexible tape spirally with a 55% overlap and complete 100 mm past the butyl mastic on the other side or a minimum of 50 mm onto the factory applied coating.

### 25.8.4 Inspection

Thoroughly inspect the finished wrapping to ensure that all overlaps are sealed to prevent moisture and foreign material from working in under the tape.

## 26.0 ADDITIONAL REQUIREMENTS FOR LAYING AND JOINTING OF STEEL PIPES AND FITTINGS

### 26.1 Handling FBMDPE Coated Pipes

When handling FBMDPE coated steel pipes, the greatest care shall be exercised to avoid damage to the pipe or coating. Under no circumstances shall a pipe be lifted by unprotected slings or levered or moved by implements without protecting pads.

Lifting slings used to handle pipe, shall be of nylon or synthetic material of sufficient width that shall not damage the coated surface of the pipe or pipe fitting. The Slings used are generally round slings to comply with the appropriate safety requirements of the pipe manufacturer Refer to chapter 3 of Tyco Water SINTAKOTE Steel Pipelines Handling & Installation Reference Manual. Where pipes are lowered onto the ground they shall rest on padded bolsters or on padded ramps or on padded cradles. Heaps of sand or soft earth as supports will be acceptable. Pipes with uncoated ends may be lowered onto the ground with chocks placed only under the ends left uncoated. Any damage to the pipe coating occurring after delivery shall be made good by the contractor at his own expense.

### 26.2 Testing of Coating

Before the pipe is placed onto Bedding Zone 1, the pipe shall be tested for defects in the external coating by means of a high voltage holiday testing apparatus capable of testing at 12,000 volts (+/-1000V). Testing shall be in accordance with AS3894.1. Safety procedures must be strictly followed. The earth should be on the current mortar lining. At any place where the apparatus gives a spark or discharge through the coating to the steel pipe it will be taken that a defect in the coating exists and all such defects shall be repaired at the contractor's own expense and retested to the satisfaction of the Superintendent.

Repairs to the FBMDPE coating shall be in accordance with AS4321. The contractor shall provide a skilled workman to do this work and in the first instance he shall arrange for the manufacturer to have one of their repairers to be on the job to supervise and train the contractor's repairer in this work. All expenses in this regard will be at the contractor's cost.

### 26.3 Laying of Rubber Ring Joint Pipes

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The contractor shall obtain a copy of the pipe manufacturer's recommended laying practice for rubber ring jointed pipe. The pipes shall be laid in accordance with the instructions in this pipe laying manual except as modified by this specification.

Where the grade of the pipeline is steeper than 10% then the pipe laying shall proceed in an uphill direction as shown in the pipe laying manual. Where necessary the contractor shall cut and weld in a split collar joint so that the socket end of the pipes will face uphill.

Extreme care shall be exercised to avoid damage to any external coating of the pipe when the joint is pulled together.

The jacking system used shall have a capacity of not less than 30 kN where the wall thickness of the pipe is 8 mm or less and 50 kN for pipes with 10 mm wall thickness or greater and shall provide an even pull over the whole of the circumference of the joint. A digging bucket shall not be used to push the FBMDPE pipes home.

All spigot ends for rubber ring jointed pipes will be supplied with witness marks applied in the factory. The joint shall not be considered fully made unless the distance between the witness mark and the adjoining socket end is within the tolerance nominated by the pipe manufacturer.

Where a deflection in the joint is required by the drawings or directed by the Superintendent this deflection shall be made after the joint has been fully entered and the pressure is still applied to the joint.

After the completion of the joint a feeler gauge shall be used to probe the gap between spigot and socket to locate the rubber ring and the probing shall progress continuously around the joint so that the rubber ring is touched at intervals of not more than 12 mm. If there is any indication that the rubber ring has been displaced from its groove the joint shall be pulled apart and remade.

### 26.4 Pipe Welding

All welding is to be carried out in accordance with AS4041.

Slip-in joints are to be welded externally. A complete external weld shall in addition to the circumferential fillet weld include a run

on the ground-off weld of the "bell", the whole comprising a "joint".

Ball and socket joint pipes are to be fillet welded both internally and externally. They shall be laid with the test hole in the joint at the top. After completion of internal and external welding of the ball and socket joint pipes, air at a pressure of 200 kPa shall be applied through the test hole and soap solution applied to both internal and external welds to check for leaks. All leaks shall be repaired to the satisfaction of the Superintendent and the test hole filled with weld metal.

Collar joints are to be welded externally. The two complete external welds, together with the two horizontal jointing runs in the case of split collars shall comprise a "collar joint". Where pipes that are cut on site have FBMDPE coating, the coating shall be cut with a sharp knife to make a neat edge 50 mm clear of the welded joint before removing the coating prior to welding.

### 26.5 External Coating of Welded Joints

#### 26.5.1 Heat Shrink Sleeves

Welded joints shall be externally coated using heat shrink sleeves. The Contractor shall use only fully trained and experienced personnel for installation of heat shrink sleeves.

Only sleeves recommended by the pipe manufacturer shall be used.

Application procedure shall be as follows:-

- # Bevel the edges of the FBMDPE coating so that there is a tapered transition of at least 10 mm between the full coating thickness and the exposed steel.
- # Remove any corrosion products on the steel and abrade the steel surface (if necessary) to produce a clean, non-corroded, roughened surface. Suitable abrasives are emery paper or a steel file.
- # Clean the area to be repaired (to be free from dirt, dust and other contaminants) in accordance with the recommendations of the shrink sleeve manufacturer.
- # Slightly roughen the FBMDPE coating around the repair for a minimum distance of 100 mm from the edge. Solvent wipe the FBMDPE coating with a

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clean cloth (acetone is a suitable solvent for cleaning).

- ≠ Apply the shrink sleeve in accordance with the application procedures of the manufacturer with the exception that the sleeve shall overlap the PBMDPE coating for a length of 100 mm on either side of the coating. Note that the specified preheat and postheat is necessary to ensure satisfactory bonding of the sleeve. A roller should be used to eliminate voids from under the sleeve.
- ≠ After application the repair area should be tested with a high voltage detector at 15 kV in accordance with AS3894.1.
- ≠ The repair should be visually inspected to ensure that it is in intimate contact with the pipe and that a bead of mastic has exuded from each end of the sleeve for the full pipe circumference. (If this is not in evidence additional heating is required).

### 26.5.2 Tape Wrap Coating

The Contractor may ask approval from the Superintendent to use a tape wrap coating as an alternative to the heat shrink sleeve.

Approval will be given if the Contractor can demonstrate that his staff are skilled in the application of the tap wrap system.

The Contractor shall use a tap wrap system recommended by the pipe manufacturer.

Application procedure shall be as follows:-

- ≠ The steel and coating area shall be clean and dry before application of the primer.
- ≠ Using a brush, apply a thin even coat of primer onto the steel and overlapping the parent material by 100 mm.
- ≠ Allow the primer to tack dry (10-20 mins).
- ≠ Spirally apply the tape to the repair area ensuring a 100 mm overlap of the parent metal. The overlap of layers should not be less than 55% of tape width.
- ≠ Spirally apply the outerwrap to completely cover the first layer tape

coating. The overlap of layers should not be less than 10% of the tape width.

- ≠ Some tension should be applied when applying the tapes to ensure that air voids, wrinkles, etc, are not present after wrapping.
- ≠ Continuity test with a high voltage detector at 15 kV in accordance with AS3894.1.

### 26.6 Welding of Above Ground Pipes

Where welded joint pipes are to be laid above ground, no pipe-laying shall be done until end thrust blocks are 14 days old. The pipe shall then be laid and the operations timed so that the closure joint shall be welded up at pipe wall temperature of approximately 21°C. Should the contractor elect to weld at night to comply with temperature requirements he must supply sufficient lighting which in the opinion of the Superintendent is necessary for efficient working. The contractor will not be permitted to start these sections unless, in the opinion of the Superintendent, he has assembled sufficient plant to enable compliance with this Specification.

### 26.7 Internal Pointing

All welded pipe joints for pipes of 500 mm internal diameter and larger, shall be closed internally and the bore made uniform by internal pointing after the welding has been completed.

Mortar for pointing shall consist of a mixture of Portland cement type GP to AS3972, acrylic modifier and sand in the proportion by volume of two parts of sand to one part of cement for pipes up to 750 mm diameter and three parts of sand to one part of cement for 900 mm pipes. Add the acrylic modifier to the sand/cement mix until the mortar is stiff but cohesive.

The sand shall be clean, sharp sand complying with AS2758.1. The sand must be free of clay and of maximum size not greater than one third of the lining thickness.

The surface must be free of grease, oil, paint and loose or flaking material.

Wet the adjacent cement mortar one hour prior to repair.

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The mortar shall only be applied when the ambient and mortar temperatures are below 30°C.

Wipe any excess water from the area, but leave the surfaces damp.

Apply the acrylic modifier as a primer to the steel and adjacent cement mortar immediately prior to applying the mortar. This priming coat can be wet or dry when the mortar is placed.

The mortar is added in the normal manner, being worked into place and compacted. The mortar is built up to the level of the existing cement mortar.

As the ambient temperature increases the pot life of the mortar is reduced. At 30°C the pot life is approximately 20 minutes. If the mortar is left to stand a skin will develop on the mortar surface. This should be remixed into the mortar before use.

The mortar must be allowed to dry out. Note that this is opposite to that normally required for mortar. It must not be subjected to excessive heat, rain or sub-zero temperatures during the first 48 hours. It is recommended that the mortar dries for 7 days prior to service.

### 27.0 BACK FILLING

27.1 For the purposes of this specification, backfilling material shall consist of all material used in the trench above the Bedding Zone 3 material as specified in clause 24.2 herein.

In addition to the requirements specified herein no backfill material shall contain rocks larger than 150mm diameter or lumps of material that may prevent the compaction specified herein.

27.2 In locations other than under roadways and footpaths (eg allotments, parks, rural lands, etc) the backfill material shall consist of either:-

- (a) the best of the material (selected and approved by the Superintendent) from trench excavation, or
- (b) material from "on Site" earthworks selected and approved by the Superintendent, or
- (c) imported material.

If, in the Superintendent's opinion, material from item (a) above is not suitable for backfilling then material from item (b) above shall be used by the Contractor. Where, in the opinion of the Superintendent, material from item (a) above and/or the "on Site" earthworks material is not suitable for use as backfill, the backfill material to be used shall be imported material which shall have a soaked CBR not less than 15%.

The backfill material shall be compacted to the standard specified in Table 5 herein. Any settlement shall be made good by the Contractor, prior to the end of the Defects Liability Period.

27.3 Except as specified in clause 27.5 herein, under roadways, the backfill material shall be as shown on the drawings. The materials shall be compacted in layers 200mm maximum depth to the standard specified in Table 5 herein.

Table 5

Area of Work	Required Result	Min Test Freq*	Test Method
<b>TRENCH BACKFILL (cohesive material)</b>			
Backfill to trenches under roadways	Ø100% Density Ratio	1 test per 50 m of pipeline	AS1289.5.1.1 (STD.Comp. effort) AS1289.5.3.1 AS1289.5.4.1
Backfill to trenches elsewhere	Ø95% Density Ratio	1 test per 100 m of pipeline	AS1289.5.1.1 (STD.Comp. effort) AS1289.5.3.1 AS1289.5.4.1
<b>TRENCH BACKFILL (non-cohesive material)**</b>			
Backfill to trenches	Ø65% Density Index	1 test per 50m of pipeline and/or 3 cone penetrometer tests per lot	AS1289.5.3.1 AS1289.E5.1 AS1289.E6.1 AS1289.F3.2

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- \* Unless directed otherwise by the Superintendent.
- \*\* Non-cohesive material shall be defined as material which contains up to 5% by mass of plastic particles passing a 75 micron sieve, or up to 12% by mass of non-plastic fines passing a 75 micron sieve.
- \*\*\* The acceptable result for penetration resistance to be established by the Superintendent.
- 27.4 Flowable Fill**
- 27.4.1** Where approved by the Superintendent, Flowable Fill may be used as an alternative backfill under roadways.
- 27.4.2** Flowable Fill shall comply with the following requirements:-
- ⊘ Cement shall be Portland cement, Type GP or Type GB and shall conform to AS3972.
  - ⊘ If used, fly ash shall conform to AS3582.1.
  - ⊘ Fine aggregates shall conform to AS2758.1.
  - ⊘ If used, chemical admixtures shall conform to AS1478. Any chemical admixture must be approved by the Superintendent.
  - ⊘ Minimum compressive strength @ 28 days - 0.5 MPa
  - ⊘ Maximum compressive strength @ 28 days - 1.5 MPa
  - ⊘ Maximum size aggregate- 4.75 mm
  - ⊘ Minimum cement/cementitious content - 5% by weight.
  - ⊘ The consistency of flowable fill shall suit the job application.
  - ⊘ Flowable fill shall have the ability of being placed by concrete pump when required.
  - ⊘ The mix design of flowable fill shall be such as not to cause segregation while being placed.
  - ⊘ Flowable fill will be required to produce the necessary flowability and self-compaction without the use of immersion vibrators.
- 27.5** Under State-controlled roads the provisions of clause 24.8 herein shall comply.
- 27.6 Metallic Detection Tape**
- 27.6.1** A 50 mm wide metallic detection tape (blue colour with wording "Buried Water Line Below") shall be buried in the backfill
- between 300 and 350 mm below the surface for all non metallic pipelines.
- 28.0 BORING AND JACKING FOR WATER MAINS**
- 28.1** Where shown on the drawing or directed by the Superintendent water mains may be constructed by progressively boring and then jacking an approved enveloping pipe underneath the existing ground surface. All such boring and jacking work shall be done without disturbances to the existing surfaces.
- Under state-controlled roads the provisions of clause 24.7 herein shall apply.
- Works near Railway Lines shall be carried out in accordance with the Railway Authorities Specifications and Codes.
- 28.2** All boring, jacking and pressure grouting work shall be performed by specialist personnel who are experienced with the equipment and methods proposed to be used.
- 28.3** Alternative methods of boring and jacking may be accepted providing such methods are approved by the Superintendent in writing prior to their use.
- 28.4** The Contractor shall ensure that all pipes, or any wrapping thereon, is not damaged during, or as a result of insertion in the enveloping pipe.
- 28.5** The Contractor shall be responsible for thoroughly assessing ground conditions, determining boring and thrusting conditions, and all design work required.
- 28.6** The enveloping pipe shall be thrust into the hole simultaneously as boring advances, and shall not be withdrawn after the completion of boring and jacking work. The ground shall not be excavated more than 600mm ahead of the lead pipe. The jacks shall be capable of advancing the enveloping pipe up to the face of the excavation at any time, should this be ordered.
- 28.7** Neither oversize boring nor water-assisted, lubricant-assisted or wet boring methods shall be used unless such methods are approved by the Superintendent.
- 28.8** The Contractor shall ensure that the boring and jacking operation is continuous from each starting pit to the next adjacent pit. The Superintendent may direct the Contractor to provide full stand-by capacity

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- for the Contractor's plant and equipment to ensure such continuous operation.
- In the event that this is ordered by the Superintendent then all costs associated therewith shall be deemed to be included in the relevant Bill Items (if part of the Contract) and/or the Lump Sum of the Contract generally.
- 28.9 The Contractor shall provide a shield or cutting edge to protect the leading edge of the front pipe, for the purpose of jacking. Such a shield shall not exceed the outer diameter of the pipe by more than 14mm.
- 28.10 Unless otherwise specified, the Contractor shall pressure grout the annular void between the enveloping pipe and the water main, using an approved Portland cement grout or alternatively Flowable Fill as specified in clause 27.4. The Contractor shall ensure that the Manufacturer's recommended allowable external pressure for the type of pipe used is not exceeded and that excessive deflection, distortion or damage of such pipe is prevented during or as a result of pressure grouting.
- 28.11 Any deviation from the grade or alignment shown on the drawings shall be permitted only on the written approval of the Superintendent.
- 28.12 In the case of the enveloping pipe, the minimum clearance between the water main and the enveloping pipe shall be 75mm and the minimum cover over the enveloping pipe shall be as specified under clause 20.0 herein.
- 28.13 Prior to final inspection and acceptance of the bored and jacked pipe, the Contractor shall excavate a pit at each end of the enveloping pipe, to enable line and level of the pipe to be checked. On completion, the Contractor shall take all steps necessary to prevent ingress of foreign materials to the water main and/or the enveloping pipe.
- 28.14 Unless otherwise specified by the Superintendent, the Contractor shall install either DICL or SCL water main in accordance with section 5 herein.
- 29.0 **MARKINGS FOR LOCATION OF VALVES, OTHER FITTINGS AND PRESSURE ZONES**
- Markings for the location of valves, other fittings and pressure zone designation
- markings shall be installed at the locations shown on the drawings.
- 30.0 **GROUTED STONE PITCHING**
- 30.1 Drains, channels and surfaces of slopes shall be stone pitched, where shown on the drawings or directed by the Superintendent.
- 30.2 All stone pitching shall be of sound, durable rock not less than 150mm thick, properly bedded to a uniform surface on approved loam or sand. The exposed surface of each stone shall be approximately flat and of areas not less than 0.03m<sup>2</sup>.
- 30.3 The stone pitching shall be set in mortar consisting of three (3) parts of clean fine sand (1) part of cement by volume. The sand shall comply with requirements specified for sand in clause 26.7 herein. The mortar shall be thoroughly rammed to the full depth of the stones.
- 31.0 **Crossings**
- 31.1 **Bridge Crossings**
- All bridge crossing pipe work shall be either DICL or SCL in accordance with Section 5 herein. For Council preferred bridge crossing refer to Council's Land Development Guidelines Section 4.2.22 and the WSA Code 03-2002 V2.3 drawing WAT-1312 (Aerial Crossings Bridge Crossing Concepts) Option 1 preferred.
- 31.2 **Aerial Crossings**
- All bridge crossing pipe work shall be either DICL or SCL in accordance with Section 5 herein. For Council preferred bridge crossing refer to the WSA Code 03-2002 V2.3 drawing WAT-1310 (Aerial Crossings Aqueduct), WAT-1311 (Aerial Crossings Aqueduct Protection Grille)
- 31.3 **Buried Crossings Under Obstructions**
- All buried crossing pipe work shall be SCL in accordance with Section 5 herein. For Council preferred buried Crossing refer to section 28 herein. WAT-1211 (Buried Crossings Under Obstructions). Buried PE pipe is only allowed to be used in river crossings only. The pipe shall be Series 1 PE100 SDR11 pipe. PE Crossings greater than DN450 are not allowed and were they are less / equal to DN450 they shall be approved by Council.
- 32.0 **MAINS SWABBING FACILITIES**
- Mains Swabbing Facilities shall only be constructed were directed by Gold Coast

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Water Operations & Maintenance Hydraulics Section to the details shown on Council Standard Drawings 59658 and 59659. Discharge to any stormwater system or natural gully shall be as shown on the drawings or as directed by the Superintendent.

### 33.0 FLUSHING OF MAINS

33.1 On completion of pipe laying and prior to hydraulic pressure testing and sterilisation of mains, the Contractor shall flush all mains. Where directed, batching pigs or spheres shall be used in the cleaning of mains, before the commencement of scouring with potable water. The rate of filling the mains with water shall be such that the water velocity therein shall nowhere exceed 0.05m/s.

33.2 Flushing of the entire system shall be done by scouring under pressure through scours. Flushing shall be carried out using a high velocity of at least 2 metres/second or, if this is not possible, by a turbulent water change using batching pigs or spheres.

33.3 All defects which occur during or after testing shall be repaired. The Contractor shall then again flush the section of main. Where directed swabbing pigs shall be used to clean such sections of main in conjunction with flushing operations. The Contractor shall ensure that, when pigs are in use, the pipeline is effectively secured so as to prevent damage through vibration.

### 34.0 HYDRAULIC PRESSURE TESTING

34.1 Testing Shall be carried out by a Certified NATA accredited person. Pressure testing shall be undertaken as soon as possible after the concrete thrust blocks have developed their design strength.

Testing shall include the water main and fittings with the length of test section of main normally to be between 500m and 1,000m. Under no circumstances shall test lengths exceed 1,600m. All tests shall be carried out in a manner approved by the Superintendent.

34.2 Hydraulic pressure testing of the pipeline shall be carried out at the lowest point of the line or lines being tested.

34.3 Care shall be taken to remove all air from mains under test when filling with test water. The rate of filling of the test section with water shall be such that the water velocity

within the test section shall nowhere exceed 0.05m/s. After filling the main shall stand for 48 hours.

34.4 The test head for water mains shall be 1350kPa.

34.5 The test pressure shall be maintained for 2 hours minimum and during this period the whole line shall be inspected for leakage or movement. Any defects shall be repaired and re-flushed and the main re-tested.

34.6 The length of main or mains under hydraulic pressure test shall be deemed to have passed the test if the quantity of water added during the test to maintain the test pressure does not exceed 0.0375 litres per millimetre of pipe diameter per kilometre of pipeline, and there is no failure of any thrust block, anchor block, pipe, fitting, valve, joint or any other pipeline component and there is no visible leakage.

### 35.0 STERILISATION

Following satisfactory hydraulic pressure testing as specified in clause 34.0 herein watermains shall be sterilised by adding a sterilising agent to water drawn from Council's distribution system.

During the sterilisation process all valves, and other fittings shall be operated to ensure disinfection.

The sterilisation process shall ensure complete sterilisation of the mains and fittings to meet the requirements of clause 37.0 herein.

### 36.0 FLUSHING OF STERILISATION WATER

36.1 The chlorinated water used in the sterilisation process shall be scoured from the mains at the completion of the sterilisation process.

36.2 Flushing of the mains shall be continued until the chlorine concentration does not exceed 1.0mg/L.

36.3 The Contractor shall take whatever steps are necessary to ensure that:

- (i) chlorinated water used in the sterilisation process does not enter the distribution system.

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- (ii) during the process specified in clause 36.1 herein all measures are taken to protect the environment.

### 37.0 WATER QUALITY TESTING

- 37.1 At the completion of the flushing of the sterilisation water specified in clause 35.0 herein the system shall be tested by a NATA registered laboratory approved by the Superintendent. Tests shall be considered satisfactory when they fall within the water quality limits specified in Table 6 herein.

Table 6

Analysis	Unit	Required Result Range
PH (not cement lined main)		6.5 - 8.5
(cement lined main)		6.5 - 9.2
Chlorine (free)	mg/L	0 - 1.0
Total Coliform count	cfu/100mL	<1
E.Coli count	cfu/100mL	<1
Heterotrophic Plate count	cfu/mL	0 - 100

- 37.2 Should any sample analysed not comply with the water quality limits shown in Table 6 herein, the corresponding section of new main shall be re-sterilised, re-flushed and re-tested until the test results are satisfactory.

- 37.3 Notwithstanding the water quality limits set out in Table 6 herein, test results of new sections of mains may be deemed satisfactory when the following conditions apply:-

- (i) water quality in the new sections of mains is no worse than in a sample of influent existing mains water, and
- (ii) the sample referred to in (i) above was collected by the NATA registered laboratory referred to in clause 36.1 herein at the same time as it sampled water from the new sections of mains

### 38.0 RESTORATION WORKS

Restoration of existing developed areas shall be carried out to such a standard that the

finished Works shall be as near as practicable to standard of the Site prior to commencement of Works.

The Contractor shall be responsible for all restoration works including, but not restricted to fences, concrete work, footpath and pavement repairs, gardens, edging, trees, shrubs and grass.

The restoration works shall be completed within forty-eight (48) hours of the initial work being undertaken on a particular property unless agreed otherwise by the Superintendent.

Any excess material which has resulted from work under the Contract shall be removed from the Site at the Contractor's expense.

Should the Contractor fail to complete restoration to a satisfactory standard, within the specified time, then the Superintendent shall arrange to have the restoration work completed by others at the Contractors expense.

### 39.0 LIVE CONNECTION, COMMISSIONING

After all the requirements of this specification have been satisfied, and unless specified by Gold Coast Water asset owner / management section the Contractor shall arrange for Council to carry out the live connection and the commissioning of the Works.

Where live connections to existing infrastructure are required to be undertaken by the Contractor, the Contractor shall make connection to existing water mains only under Council supervision and in Council attendance, and Council will provide assistance to the Contractor for filling of the water main.

Prior approval of the Contractors proposed procedure for connection to existing infrastructure is required to be issued by the Superintendent.

Where connections to existing infrastructure are to be undertaken by the Contractor the Contractor shall submit to the Superintendent a detailed method statement of how each connection is proposed to be undertaken, including times of connection, materials and equipment to be used in undertaking the connection, and details of service interruptions anticipated

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to arise during the period of the connection. In all cases the method statement for the connection is to endeavour to minimise any disruption to existing customers and/or users of the affected infrastructure. The method statement is to be received by the Superintendent not less than fourteen (14) days prior to the date scheduled for the connection works.

The Contractor shall further confirm the final arrangements with the Superintendent not less than 48 hours before the proposed commencement of the connection works.

The Superintendent shall within seven (7) days of receipt of the method statement either approve the method statement or return it to the Contractor requesting further consideration of issues raised. Should resubmission of the method statement be required, the Superintendent's approval to the revised method statement will still be required prior to proceeding with the connection works. In all cases the proposed date to undertake the connection works shall be not less than seven (7) days after receipt of written approval from the Superintendent to the proposed method statement. No additional cost will be applicable arising from delays in obtaining the Superintendent's approval to the connection method statement.

If in the opinion of the Superintendent the Contractor does not have the necessary equipment and/or resources available to successfully complete the connections, the connection activities will be postponed to another day. No cost for this delay will be granted.

Connections to existing infrastructure are also to be undertaken outside normal working hours and not during peak periods Monday through to Sunday to minimise disruption to customers. The Contractor shall therefore be required to undertake live connections during such off-peak hours.

Council may postpone live connections during Major events eg Holidays, Indy, Surf Carnival weekend's etc. If the contractor can ensure no such functions are affected, the Superintendent will advise whether the live connection can take place.

Where the contractor can ensure disruption to customers is minimal the Superintendent may authorise connection during the above periods.

All costs associated with the connections to the existing water supply system shall be included in the lump sum.

### 40.0 MEASUREMENT AND PAYMENT

40.1 Quantities in the Bill of Quantities have been computed on the following basis:

(a) Water main - per plan linear metre including: - excavate, supply, lay, joint, bed and backfill including tees, thrust blocks, caps and bends.

(b) Other items have been measured in the units indicated in the text of the items in the Bill and based on the dimensions shown on the drawings or specified elsewhere.

40.2 The cost of all work required by this specification including testing, supply of all materials, plant, tools, labour and all expenses necessary for the satisfactory completion of the Works, shall be deemed to be included in the relevant Bill Items (if part of the Contract) and/or the Lump Sum of the Contract generally.

### 41.0 "AS-CONSTRUCTED" SUBMISSION

#### 41.1 "As-Constructed" Criteria

"As constructed" information shall be prepared by the Contractor and shall meet the following minimum criteria:-

# Be endorsed by a Licensed Consulting Surveyor with an appropriate Q.A. standard.

# Be submitted to the Superintendent prior to acceptance of the Works on Practical Completion. Should any amendments be required by the Superintendent to the submitted "as constructed" information, such amendments shall be made and resubmitted by the Contractor prior to acceptance of the Works on Practical Completion.

# Be submitted in the format specified in Council's current "Standard Electronic Format for As Constructed Data".

# Show all significant variations from the Design Drawings (including tolerances outside those specified below).

# Where variations occur the Design Drawings are to be amended and submitted to Council for approval.

#### 41.2 Water Mains - Council's Records Tolerance

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Deviations from approved design shall not exceed:-

(a) Fittings:

Locations ± 100 mm (Refer Note 1)  
Levels ± 50 mm (Refer Note 2)

(b) Lines:

Alignment ± 100 mm (Refer Note 1)  
Levels ± 50 mm (Refer Note 2)

Notes:

1. Deviation should not result in conflict or interference with any other service or structure. All services should remain within the approved service corridors.
2. Levels should be adequate for installation of fittings. Tolerances are only critical if design levels are nominated.

### 42.0 STANDARDS AND CODES

42.1 This specification makes reference to the following Australian Standards:

AS/NZS1111	ISO metric commercial hexagon bolts and screws	AS1627	Metal finishing - preparation and pretreatment of surfaces
AS/NZS1112	ISO metric hexagon nuts, including thin nuts, slotted nuts and castle nuts	AS1646	Elastomeric seals for waterworks purposes
AS1141	Methods for sampling and testing aggregates	AS1650	Hot-dipped galvanised coating on ferrous articles
AS1281	Cement mortar lining of steel pipes and fittings	AS1720	Timber structures (known as the SAA Timber Structures Code)
AS1289	Methods of testing soils for engineering purposes	AS2187	Explosives - storage, transport and use (known as the SAA Explosives Code)
AS1302	Steel reinforcing bars for concrete	AS/NZS2280	Ductile iron pressure pipes and fittings
AS1304	Welded wire reinforcing fabric for concrete	AS2638	Sluice valves for waterworks purposes
AS1379	The specification and manufacture of concrete	AS2758.1	Concrete aggregates
AS1397	Steel sheet and strip- hot dipped zinc-coated or aluminium/zinc-coated	AS2837	Wrought alloy steels - Stainless steel bars and semi-finished products
AS1449	Wrought alloy steels - stainless and heat resisting steel plate, sheet and strip	AS/NZS2865	Safe working in a confined space
AS/NZS1477	PVC pipes and fittings for pressure applications	AS3571	Glass filament reinforced thermosetting plastics (GRP) pipes - Polyester based - Water supply, sewerage and drainage applications
AS1478	Chemical admixtures for concrete	AS3578	Cast iron non-return valves for general purposes
AS1579	Arc welded steel pipes and fittings for water and waste water	AS3582.1	Fly ash
		AS3600	Concrete structures
		AS3610	Formwork for concrete
		AS/NZS3678	Structural steel - Hot-rolled plates, floor-plates and slabs
		AS/NZS3679	Structural steel
		AS3680	Polyethylene sleeving for ductile iron pipelines
		AS3681	Guidelines for the application of polyethylene sleeving to ductile iron pipe lines and fittings
		AS3706	Geotextiles - Methods of test
		AS3894.1	Non-conductive coatings - continuity testing - high voltage (brush) method
		AS3972	Portland and blended cements
		AS4041	Pressure piping
		AS4087	Metallic flanges for waterworks purposes
		AS/NZS4158	Polymeric coatings on valves and fittings for water industry purposes
		AS4321	Fusion bonded medium density polyethylene coating and lining for pipes and fittings.
		AS/NZS4671	Steel reinforcing materials
		AS/NZS4680	Hot-dip galvanized (zinc) coatings on fabricated ferrous articles
		AS/NZS4792	Hot-dip galvanized (zinc) coatings on ferrous hollow sections, applied by a continuous or a specialized process

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- 42.2 In this specification Australian Standards are referred to only by their allocated AS number. The latest available edition at the date of close of Tenders shall be deemed to apply.

