



**ACT**  
Government

# WATER SUPPLY RETICULATION 03E

MUNICIPAL  
INFRASTRUCTURE  
TECHNICAL  
SPECIFICATION  
**03 - UNDERGROUND SERVICES**

Transport Canberra and  
City Services

July 2019



Publication Number:	MITS 03E Edition 1 Revision 0
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Date of Effect:	July 2019
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Supersedes: Standard Specification for Urban Infrastructure Works Section 03  
Edition 1 Revision 0 September 2002

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### Document Information

Document	Key Information
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Document Title MITS 03E Water supply reticulation

Next review date	
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Key words

AUS-SPEC Base Document	1341 Water supply – reticulation (construction)
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### Revision Register

Edition/ Revision Number	Clause Number	Description of Revision	Authorised By	Date
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1/0

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# 1 WATER SUPPLY RETICULATION

## 1.1 General

### 1.1.1 Responsibilities

#### 1.1.1.1 General

Requirement: Provide water supply distribution and reticulation works in the location, to the lines, levels, grades and using the materials as documented.

#### 1.1.1.2 Performance

Requirement: Conform to *ICON Water's Water Supply and Sewerage Standards*

#### 1.1.1.3 Precedence

Precedence: The technical requirements of, or any standard drawing provided by Icon Water, used in conjunction with and in conflict with this Specification, take precedence.

### 1.1.2 Cross references

General: The following documents are related to this Specification.

#### 1.1.2.1 ACT Legislation

Road Transport (General) Act

Public Roads Act

Scaffolding and Lifts Act

Scaffolding and Lifts Regulation

Water and Sewerage Act

Water and Sewerage Regulations

Work Health and Safety Act

#### 1.1.2.2 Specifications

Requirement: Conform to the following:

MITS 00	Preliminaries
MITS 01	Traffic Management
MITS 02	Earthworks
MITS 04	Flexible pavement construction
MITS 06	Concrete kerbs, footpaths and minor works
MITS 08	Incidental works
MITS 09	Landscape
MITS 10	Concrete works

## 1.1.3 Referenced documents

### 1.1.3.1 Standards

General: The following documents are incorporated into this Specification by reference:

#### Australian standards

AS 1141	Methods for sampling and testing aggregates
AS 1141.22	Wet/dry strength variation
AS 1141.32	Weak particles (including clay lumps, soft and friable particles) in coarse aggregates
AS 1214	Hot-dip galvanized coatings on threaded fasteners (ISO metric coarse thread series)
AS 1281	Cement mortar lining of steel pipes and fittings
AS 1289	Methods for testing soils for engineering purposes
AS 1289.4.3.1	Soil chemical tests - Determination of the pH value of a soil – Electrometric method
AS 1289.4.4.1	Soil chemical tests – Determination of the electrical resistivity of a soil – Method for sands and granular materials
AS 1289.5.6.1	Soil compaction and density tests – Compaction control test – Density index method for a cohesionless material
AS 1289.5.7.1	Soil compaction and density tests – Compaction control test – Hilf density ratio and Hilf moisture variation (rapid method)
AS 1432	Copper tubes for plumbing, gas fitting and drainage applications
AS/NZS 1477	PVC pipes and fittings for pressure applications
AS/NZS 1554	Structural steel welding
AS/NZS 1554.1	Welding of steel structures
AS 1579	Arc-welded steel pipes and fittings for water and waste-water
AS 1627	Metal finishing – Preparation and pre-treatment of surfaces
AS 1627.4	Abrasive blast cleaning of steel
AS 1646	Elastomeric seals for waterworks purposes
AS 1657	Fixed platforms, walkways, stairways and ladders – Design, construction and installation
AS/NZS 2032	Installation of PVC pipe systems
AS/NZS 2033	Installation of polyethylene pipe systems
AS 2129	Flanges for pipes, valves and fittings
AS/NZS 2280	Ductile iron pipes and fittings
AS/NZS 2566	Buried flexible pipelines
AS/NZS 2566.2	Installation
AS/NZS 2638	Gate valves for waterworks purposes
AS/NZS 2638.1	Metal seated
AS/NZS 2638.2	Resilient seated
AS 2832	Cathodic protection of metals

AS 2832.1	Pipes and cables
AS 2832.2	Compact buried structures
AS/NZS 3500	Plumbing and Drainage
AS/NZS 3500.1	Water services
AS/NZS 3518	Acrylonitrile butadiene styrene (ABS) compounds, pipes and fittings for pressure applications
AS 3571	Plastics piping systems – Glass-reinforced thermoplastics (GRP) systems based on unsaturated polyester (UP) resin
AS 3571.2	Pressure and non-pressure water supply (ISO 10639:2004, MOD)
AS 3600	Concrete structures
AS 3681	Application of polyethylene sleeving for ductile iron piping
AS 3688	Water supply – Metallic fittings and end connectors
AS/NZS 3690	Installation of ABS pipe systems
AS 3705	Geotextiles – Identification, marking, and general data
AS/NZS 3750	Paints for steel structures
AS/NZS 3750.4	Bitumen paint
AS/NZS 3750.19	Metal primer – General purpose
AS/NZS 3862	External fusion-bonded epoxy coating for steel pipes
AS/NZS 3879	Solvent cements and priming fluids for use with unplasticised PVC (PVC-U and PVC-M) and ABS and ASA pipes and fittings
AS 3952	Water supply – Spring hydrant valve for waterworks purposes
AS 3996	Access covers and grates
AS/NZS 4020	Testing of products for use in contact with drinking water
AS/NZS 4087	Metallic flanges for waterworks purposes
AS/NZS 4129	Fittings for polyethylene (PE) pipes for pressure applications
AS/NZS 4130	Polyethylene (PE) pipes for pressure applications
AS/NZS 4158	Thermal-bonded polymeric coatings on valves and fittings for water industry purposes
AS 4321	Fusion-bonded medium-density polyethylene coating and lining for pipes and fittings
AS/NZS 4331	Metallic flanges
AS/NZS 4331.1	Steel flanges
AS/NZS 4441	Oriented PVC (PVC-O) pipes for pressure applications
AS/NZS 4680	Hot-dipped galvanized (zinc) coatings on fabricated ferrous articles
AS/NZS 4765	Modified PVC (PVC-M) pipes for pressure applications
AS 4794	Non-return valves – Swing check and tilting disc
AS 4795	Butterfly valves for waterworks purposes
AS 4795.1	Wafer and lugged
AS 4795.2	Double flanged

AS 4796	Water supply – Metal bodied and plastic bodied ball valves for property service connection
AS 4809	Copper pipe and fittings – Installation and commissioning
AS 4956	Air valves for water supply
AS 5081	Hydraulically operated automatic control valves for waterworks purposes
AS 6401	Knife gate valves for waterworks purposes

### 1.1.3.2 Other publications

ASTM A240/A240M	Standard specification for chromium and chromium-nickel stainless steel plate, sheet and strip for pressure vessels and for general applications
ASTM A276	Standard Specification for Stainless Steel Bars and Shapes
BS 3416	Specification for bitumen-based coatings for cold application, suitable for use in contact with potable water

### Plastics Industry Pipe Association (PIPA)

POP001-2013	Electrofusion jointing of PE pipe and fittings for pressure applications
POP003-2011	Butt fusion jointing of PE pipes and fittings – recommended parameters
POP007-2006	Metal backing flanges for use with polyethylene (PE) pipe flange adaptors
POP102-2014	Solvent cement welding of PVC pipe
POP202- 2008	PVC and PE pressure pipe installation on curved alignments

### Water Services Association of Australia (WSAA)

WSA 03-2011	Water Supply Code of Australia
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## 1.1.4 Standards

### 1.1.4.1 General

Standard: To *ICON Water's Water Supply and Sewerage Standards*.

PVC-U installation: To *AS/NZS 2032*.

PVC-M installation: To *AS/NZS 4765*

Copper pipe and fittings installation: To *AS 4809*.

Proprietary products: To *TCCS Products previously considered for use list*

## 1.1.5 Interpretation

### 1.1.5.1 Abbreviations

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

<b>D:</b>	External diameter of the pipe.
<b>DI:</b>	Ductile Iron.
<b>DICL:</b>	Ductile Iron Cement Lined
<b>GRP:</b>	Glass Reinforced Plastic.
<b>NATA:</b>	National Association of Testing Authority.
<b>PE:</b>	Polyethylene.

**PVC-U:** Unplasticised Polyvinyl Chloride.

**PVC-M:** Modified Polyvinyl Chloride

**TCCS:** Transport Canberra and City Services, ACT Government and its successors.

## 1.1.6 Hold points and witness points

### 1.1.6.1 Notice

General: Give written notice to the Authorised Person so that the documented inspection and submissions may be made to the **Hold point table** and the **Witness point table**.

**Table 3E- 1 Hold point table**

Item	Clause title	Requirement	Notice for inspection	Release by
<b>Materials</b>				
3E.1	General - Authorised products and materials	Submit for certification of conformance for all products and materials or approval for alternative products and materials	2 weeks before ordering	Authorised Person
<b>Execution</b>				
3E.2	Excavation for water supply - Foundation	Identify any unsuitable material and proposed actions	1 working day prior to preparation of foundations	Authorised Person

**Table 3E- 2 Witness point table**

Item	Clause title	Requirement	Notice for inspection
<b>Materials</b>			
3E.1	General - Conformance with manufacturer's recommendations	Inspect material and products at time of delivery	2 working days
<b>Execution</b>			
3E.2	Excavation for water supply – Foundation	Confirm soil type with design	1 working day
3E.3	Excavation for water supply - Foundation	Additional excavation and backfill if rock encountered at foundation level.	1 working day



## 1.2 Materials

### 1.2.1 General

#### 1.2.1.1 Authorised products and materials

Products and materials: Provide only products and materials authorised by Icon Water.

This is a **HOLD POINT**.

Unauthorised material: Remove unauthorised or non-conforming materials from the site within 24 hours.

#### 1.2.1.2 Conformance with manufacturer's recommendations

Requirement: Conform to the requirements of the manufacturer's recommendations for handling, transport and storage of materials and in a manner to prevent damage or deterioration or excessive distortion. Inspect all products and materials at the time of delivery and reject products and materials not in conformance with *Icon Water's Water Supply and Sewerage Standards* and the manufacturer's recommendations.

This is a **WITNESS POINT**.

On site storage: Store pipe fittings, valves, seals and other components as follows:

- > Maintain protective crating or packaging until immediately before use.
- > Stack piping to avoid ovalisation.
- > Support all fittings and pipes off the ground.

Damaged or defective materials: Do not use damaged or defective materials, including coatings and linings, outside the manufacturer's recommended limits and the following:

- > Faded/discoloured plastics, plastic coated pipes, fittings and appurtenances.
- > DI and steel pipes and fittings with damage to linings in excess of 20% of the lining thickness.
- > Plastics coated pipes, fittings and appurtenances with damage to coating in excess of 20% of the coating thickness.

## 1.3 Execution

### 1.3.1 Provision for traffic

#### 1.3.1.1 General

Requirement: Conform to *MITS 01 Traffic Management*.

### 1.3.2 Site establishment

#### 1.3.2.1 Survey

Requirement: Conform to *MITS 00A General Requirements*.

### 1.3.3 Excavation

#### 1.3.3.1 General

Excavation: Conform to *Icon Water's Water Supply and Sewerage Standards, MITS 03A Trenching for underground services* and *MITS 02B Bulk Earthworks*.

Bedding, support and backfill material: Unless otherwise documented, to *Icon Water's Water Supply and Sewerage Standards*.

Tolerances: Install water mains, in-line structures, property services and meters in conformance with *Icon Water's Water Supply and Sewerage Standards*.

#### 1.3.3.2 Trenchless technology

Excavation: Conform to *Icon Water's Water Supply and Sewerage Standards*.

#### 1.3.3.3 Foundation

Confirmation: Confirm surrounding soil type with design. Notify Authorised Person if not consistent with the design.

This is a **WITNESS POINT**.

Notice: Give notice of any area of the foundation including the sides of the trenches that may contain material that is inadequate to support the proposed water supply infrastructure. Where soft material occurs, the Authorised Person may require the use of alternative bedding material.

This is a **HOLD POINT**.

Unsuitable trench and foundation material: Remove and dispose of inadequate trench and foundation material as directed by the Authorised Person to *MITS 03A Trenching for underground services* and replace the material to *Icon Water's Water Supply and Sewerage Standards*.

Rock foundation: Remove or cut back exposed boulders in trench bottoms.

This is a **WITNESS POINT**.

### **1.3.4 Installation, embedment and backfill**

#### **1.3.4.1 General**

Bedding and pipe support: To *Icon Water's Water Supply and Sewerage Standards*.

Minimum cover: To *Icon Water's Water Supply and Sewerage Standards*.

## **1.4 Completion**

### **1.4.1 Submissions**

Work as Executed Records: To *Icon Water's Water Supply and Sewerage Standards* and *MIT'S OOB Quality Requirements*.

### **1.4.2 Connections to existing water mains**

Acceptance testing: Complete acceptance testing to the satisfaction of Icon Water before connection to existing water mains.

## **2 MEASUREMENT AND PAYMENT**

### **2.1 Measurement**

#### **2.1.1.1 General**

Payments made to the Schedule of Rates: To *MIT'S 00 Preliminaries*, this Specification, the Drawings and the **Pay Items table**.

#### **2.1.1.2 Methodology**

The following methodology will be applied for measurement and payment:

- > Allow for all work, materials, testing and quality assurance requirements in each Pay Item.
- > Excavation, bedding, support and backfill material for sewer pipes: Paid under this Specification.
- > Miscellaneous minor concrete work not included in the pay items in this Specification: Conform to *MIT'S 10 Concrete works*.
- > Backfill under roads, paths and driveways: Extra over to *MIT'S 03H Road openings and restorations*.
- > Disposal of surplus trench spoil: To *MIT'S 02B Bulk earthworks*.
- > Removal of existing water supply pipes and structures: To *MIT'S 03A Trenching for underground services*.
- > All costs associated with removal of water from excavations shall be included within respective excavation rates for water supply pipes.
- > No Additional payment will be made for excavation in rock, overbreak of trench due to ground conditions or over excavation of trenches.

## 2.2 Pay items

**Table 3E- 3 Pay items table**

Item No	Pay items	Unit of measurement	Schedule of rates scope
<b>3E.1</b>	Water supply pipes	Linear metre of pipe installed measured at the centreline of the trench	<p>All activities associated with construction of water supply pipes including excavation of trenches in all types of material encountered including rock, over excavation for bedding, shoring, additional excavation at structures, bedding, laying, jointing, including wrapping of DICL pipes or filter fabric if specified, joint deflections or curvature of the pipe, backfilling and compaction.</p> <p>This pay item shall also include pipe cutting, tracer wire for plastic pipes, marking tape, connection to existing and/or new pipes and making good pipes damaged during the works.</p> <p>Separate pay items shall be included in the Contract for each pipe material, class of pipe and pipe diameter.</p> <p>For example;</p> <p>3E.1.1 100 PVC-M PN16            3E.1.2 225 PVC-M PN16            3E.1.3 375 DICL            Etc...</p>
<b>3E.2</b>	Water supply pipe bends	Number	<p>All activities associated with construction of water supply pipe bends including supply, installation, jointing, compacting backfill around the connection and all work to the pipes in order to make the connection.</p> <p>A separate pay item shall be included in the Contract for each pipe size. For example;</p> <p>3E.2.1 100 x 22.5° bend            3E.2.2 150 x 11.25° bend            3E.2.3 225 x 45° bend            Etc...</p>
<b>3E.3</b>	Water supply pipe tees	Number	<p>All activities associated with construction of water supply pipe tees including supply, installation, jointing, compacting backfill around the connection and all work to the pipes in order to make the connection.</p> <p>This pay item shall include tees for hydrants.</p> <p>A separate pay item shall be included in the Contract for each pipe size. For example;</p> <p>3E.3.1 100 x 75 hydrant tee            3E.3.2 150 x 100 tee            3E.3.3 150 x 150 tee°            Etc...</p>

Item No	Pay items	Unit of measurement	Schedule of rates scope
3E.4	Water supply pipe reducers	Number	<p>All activities associated with construction of water supply pipe reducers including supply, installation, jointing, compacting backfill around the connection and all work to the pipes in order to make the connection.</p> <p>A separate pay item shall be included in the Contract for each pipe size. For example;</p> <p>3E.4.1 150-100 reducer</p> <p>3E.4.2 225-150 reducer</p> <p>Etc...</p>
3E.5	Fire hydrants	Number	<p>All activities associated with construction of fire hydrants on water supply pipes including supply, installation, jointing, compacting backfill around the connection and all work to the pipes in order to make the connection.</p> <p>This pay item shall also include risers, hydrant box and surround, duck foot bends on dead ends, tracer wire, marker posts or indicator plates and blue hydrant RRPM's.</p> <p>A separate pay item shall be included in the Contract for each hydrant size and configuration.</p> <p>3E.5.1 Inline DN80 Spring Hydrant</p> <p>3E.5.2 Dead end DN80 Spring Hydrant</p> <p>3E.5.3 DN150 High Capacity Hydrant</p>
3E.6	Sluice valves	Number	<p>All activities associated with construction of sluice valves on water supply pipes including supply, installation, jointing, compacting backfill around the connection and all work to the pipes in order to make the connection.</p> <p>This pay item shall also include the valve box and surround and marker posts or indicator plates.</p> <p>A separate pay item shall be included in the Contract for each pipe size. For example;</p> <p>3E.6.1 100 SV</p> <p>3E.6.2 225 SV</p> <p>Etc ...</p>

Item No	Pay items	Unit of measurement	Schedule of rates scope
<b>3E.7</b>	Restrained joints	Number of restrained jointing arrangements installed	<p>All activities extra over Water supply pipes associated with the construction of restrained joints at water supply pipe bends, tees and reducers on DICL pipes and fittings.</p> <p>This pay item shall also include marker tape.</p> <p>A separate pay item shall be included in the Contract for each size of pipe and fitting. For example;</p> <p>3E.7.1 300 Tee restrained joints</p> <p>3E.7.2 225 x 45° bend restrained joints</p> <p>Etc...</p>
<b>3E.8</b>	End caps	Number	<p>All activities associated with the supply and installation of blank flanges and end caps on dead ends for temporary and permanent dead ends on water supply mains.</p> <p>A separate pay item shall be included in the Contract for each water supply pipe size and material. For example;</p> <p>3E.8.1 150 PVC-M End cap</p> <p>3E.8.2 225 DICL blank flange</p> <p>Etc ...</p>
<b>3E.9</b>	Thrust blocks	m <sup>3</sup> of concrete placed	<p>All activities associated with the construction of thrust blocks at water supply fittings including over-excavation of pipe trench, supply and placement of concrete, reinforcement, formwork and additional backfilling of pipe trench over that of a straight uninterrupted pipe length.</p> <p>A separate pay item shall be included in the Contract for each concrete and reinforcement grade. For example;</p> <p>3E.9.1 N25 Concrete Unreinforced</p> <p>3E.9.2 N32 Concrete SL71 Reinforcement</p> <p>Etc ...</p>
<b>3E.10</b>	Anchor blocks	Number	<p>All activities associated with the construction of anchor blocks on water supply mains including over-excavation of pipe trench, supply and placement of concrete, straps, formwork and additional backfilling of pipe trench over that of a straight uninterrupted pipe length.</p> <p>A separate pay item shall be included in the Contract for each anchor block type.</p>

Item No	Pay items	Unit of measurement	Schedule of rates scope
<b>3E.11</b>	Scour stops	Number	<p>All activities associated with the construction of scour stops on water supply pipes including over-excavation of pipe trench, supply and placement of concrete, reinforcement, filter pipe, compressible membrane and additional backfilling of pipe trench over that of a straight uninterrupted pipe length.</p> <p>A separate pay item shall be included in the Contract for each scour stop pipe diameter. For example;</p> <p>3E.11.1 150 Scour stop 3E.11.2 225 Scour stop Etc...</p>
<b>3E.12</b>	Trench stops	Number	<p>All activities associated with the construction of trench stops on water supply pipes including supply and placement of filter pipe, sandbags and compressible membrane.</p> <p>A separate pay item shall be included in the Contract for each trench stop pipe diameter. For example;</p> <p>3E.12.1 150 Trench stop 3E.12.2 225 Trench stop Etc...</p>
<b>3E.13</b>	Pipe and Trench Protection	m <sup>3</sup> of placed concrete	<p>All activities extra over Water supply pipes associated with construction of pipe and trench protection on water supply mains including over-excavation of pipe trench, concrete formwork, supply and placement of reinforcement, concrete (including type SR cement), and other encasing material as specified, dowelled joints at pipe sockets, flexible joints, tracer wire, marking tape and additional backfilling of pipe trench over that of a straight uninterrupted pipe length.</p> <p>A separate pay item shall be included in the Contract for each trench protection type.</p> <p>3E.13.1 Concrete bedding. 3E.13.2 Concrete encasing 3E.13.3 Bentonite collar</p>

Item No	Pay items	Unit of measurement	Schedule of rates scope
<b>3E.14</b>	Valve chambers	Number	<p>All activities associated with construction of air, reflux and stop valves in chambers including excavation in all types of material encountered including rock, over excavation for bedding, shoring, supply and placement of bedding, concrete, reinforcement, formwork, precast units, ladders, pipe support, risers, valves and metal grate access covers, as detailed by ICON Water standard drawings.</p> <p>This pay item shall include backfilling and compaction around the structure.</p> <p>A separate pay item shall be included in the Contract for each valve type and size. For example;</p> <p>3E.14.1 Air valve chamber Type A  3E.14.2 Stop valve chamber Type C  3E.14.3 Air valve chamber Type B</p>
<b>3E.15</b>	Scour installations	Number	<p>All activities associated with construction of scour valves including excavation in all types of material encountered including rock, over excavation for bedding, shoring, supply and placement of bedding, concrete, reinforcement, formwork, precast units, ladders, pipe support, pipes, risers, valves and access covers, as detailed.</p> <p>This pay item shall include backfilling and compaction around the structure.</p> <p>A separate pay item shall be included in the Contract for each type of installation.</p> <p>3E.15.1 Scour installation Type A  3E.15.2 Scour installation Type B</p>
<b>3E.16</b>	Contractor works on existing water supply	Lump sum	<p>All activities associated with works on existing water supply mains including liaison with the water supply authority, new connections, adjustments to existing infrastructure and disconnections.</p> <p>This pay item shall include excavation, exposing existing services, backfilling, compaction and provision of any items required by the water supply authority.</p> <p>A separate pay item shall be included in the Contract for each location. For example,</p> <p>3E.16.1 Connection to 300 main at CH200.0  3E.16.2 Disconnection of 150 main at CH0.0  Etc...</p>



Item No	Pay items	Unit of measurement	Schedule of rates scope
<b>3E.17</b>	Works by the water supply authority	Provisional sum	This pay item shall include fees charged by the water supply authority for works on existing live sewers including new connections, adjustments to existing infrastructure and disconnections.
<b>3E.18</b>	Water service ties	Linear metre of pipe installed	<p>All activities associated with construction of service tie pipes including excavation of trenches in all types of material encountered including rock, over excavation for bedding, bedding, laying, jointing, curvature of the pipe, backfilling and compaction.</p> <p>This pay item shall also include pipe cutting, tracer wire, marking tape and post, connection to existing and/or new pipes and making good pipes damaged during the works.</p> <p>Separate pay items shall be included in the Contract for each pipe material, class of pipe and pipe diameter. For example;</p> <p style="padding-left: 40px;">3E.18.1 25mm HDPE</p> <p style="padding-left: 40px;">3E.18.2 32mm HDPE</p> <p style="padding-left: 40px;">Etc...</p>
<b>3E.19</b>	Ready tap connectors	Number	<p>All activities associated with construction of ready tap connectors including supply, installation, jointing, compacting backfill around the connection and all work to the pipes in order to make the connection.</p> <p>This pay item shall also include the supply and installation of a main cock and elbow union.</p> <p>A separate pay item shall be included in the Contract for each connection size and configuration. For example;</p> <p style="padding-left: 40px;">3E.19.1 100 x 25 x 1 Tap</p> <p style="padding-left: 40px;">3E.19.2 150 x 25 x 2 Tap</p> <p style="padding-left: 40px;">3E.19.3 150 x 32 x 4 Tap</p> <p style="padding-left: 40px;">Etc...</p>
<b>3E.20</b>	Water Meter	Number	<p>All activities associated with construction of water meters including excavation of trenches in all types of material encountered including rock, over excavation for bedding, bedding, bends in the water service, connection of ball valve and water meter, backfilling and compaction.</p> <p>This pay item shall include the supply and installation of water meter assembly kits from ICON Water.</p> <p>A separate pay item shall be included in the Contract for each water service pipe size.</p>



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