Appendix F – Irrigation System
(informative)

F1 Material and Installation Specification

F1. General

F1.1 Scope.

This standard relates to the supply and installation of a permanent automatically controlled watering system.

It includes Drip Irrigation, Fixed Location Systems, fixed spray, pop-up spray, mist spray and trickle irrigation.

The irrigation system shall be designed and installed in accordance with all governing ordinances, laws and regulations that meet all local conditions.

F1.2 Qualifications

Installers to be experienced, competent trades people familiar with the materials and techniques specified.

Designers to hold an NZQA National Certificate in Irrigation Design or equivalent.

F1.3 Design

The irrigation system will comply with the following standards.

1.3.1 INZ Design Standards for Piped Irrigation Systems in New Zealand 2013

1.3.2 AS/NZS 3500. Plumbing and drainage Part 1: Water services

1.3.3 INZ Code of Practice for the Design of Piped Irrigation Systems In New Zealand 2013

1.3.4 AS/NZS 2845.1 Water supply - Backflow prevention devices - Materials, design and performance requirements

1.3.5 AS 2845.3 Water supply - Backflow prevention devices - Field testing and maintenance

1.3.6 INZ Irrigation Installation Code of Practice 2013

F1.4 Design Evaluation

The design report as detailed in 1.91 will be submitted with the irrigation design plan so that the irrigation design and performance can be evaluated before QLDC approval.

F1.5 Adherence to Design Plan

Contractor must carry out the installation of the system in strict accordance with the Council approved design plan. Any variations must be approved by the Irrigation Designer or Engineers representative. The correct components as specified must be installed.

F1.6 Performance

Install an irrigation system in accordance with INZ Irrigation Installation Code of Practice 2013.

Meet statutory requirements for backflow prevention.

The uniformity performance indicator units for the individual spray heads and nozzles at the spacing's on the irrigation layout plans shall be greater than.

- Coefficient of uniformity (CU) 85%
- Distribution uniformity (DU) 0.80
- Scheduling coefficient (SC) 1.3

Minimum Sprinkler Operating Pressures

- Spray Heads 200 kPa
- Rotating Sprinkler up to 7.0m Radius 300 kPa
- Rotating Sprinkler over 10.0m Radius 350 kPa
- Rotating Sprinkler over 14.0m Radius 400 kPa
- Drip Irrigation 200 kPa

Maximum Pressure differential within a sprinkler zone 7%
Maximum zone water velocity 2.0 m/sec
Maximum mainline velocity 1.50 m/sec

The irrigation window for replacing 5mm ET is a maximum cycle time of 5 hours per night to avoid vandalism.

F1.7 System Pressure Test

It shall be Contractor's responsibility to demonstrate two successful pressure tests: The first at 224c certification the second 12 months after 224c certification sign off.

This will involve first isolating all points of connection to previously existing pipe where they are present.

Pressure testing shall be done in conjunction with the Engineer. The line will be retested until satisfactory. It shall be the Contractor's responsibility to provide all equipment required for the pressure test and provide suitable connection ports. At the point where the system can be pressurised, a 25mm ball valve shall be installed to enable the connection to be made without depressurising the system.

F1.8 MDPE Pressure Test Procedure

1.8.1 As per QLDC Code of Practice Appendix C

Where the initial pressure test fails, the cost to the Council of supervising subsequent tests shall be deducted from the payments.

Where an irrigation system fails the pressure test and yet the leak is unable to be detected by the Contractor, the Contractor shall be required to pay for a professional leak detection service.

F1.9 Commissioning

Prior to planting or seeding an area, the irrigation contractor shall be required to

demonstrate that the system is correctly adjusted and ready to be used on the areas that are being planted.

1.9.1 Flush system thoroughly, check heads, sprays and drippers and clean if blocked. Clean strainers. Adjust system for even distribution with no dry areas.

1.9.2 The acceptable deviation from the design specification will be;

- flows ±5%
- pressures ±5%
- uniformity - not more than 2% (or 0.02) under the supplied
- performance as submitted for clause 1.3

The system shall be test-run and the correct operation of all components checked. Sprinkler zones should be verified to conform to the approved plan. Sprinkler radius and arc's will be adjusted to avoid overthrow outside of the required irrigation areas.

Once commissioning is complete, arrangement shall be made to demonstrate the system to representatives of the Council and/or the Engineer.

F1.10 Handover manual

Two operations manuals for the control system, sprinklers, valves and fittings shall be provided to the Engineer and a laminated copy of the irrigation as-built plans is to be placed inside the control box. The plans should identify each station for ease of operation. The manuals shall include the following.

1.10.1 Summary Irrigation Report

The summary report as detailed below.

1.10.1.1 Description of Systems

Description of the normal operating characteristics of the irrigation system and operating level.

1.10.1.2 Design Brief

General description of irrigation system and what and how it irrigates the different areas.

1.10.1.3 Sprinkler Pressure

The sprinkler pressures in each zone detailing the nominal, minimum and maximum for each sprinkler type

1.10.1.4 Valve Operating Pressures and Flows

The require set pressure and flow used on the downstream side of each valve in the irrigation system

1.10.1.5 Water Supply

1.10.1.5.1 Number of Supply Take Off points

Number of water supplies in system

1.10.1.5.2 Size off Take Point

The take off connection size for and number of connections

1.10.1.5.3 Maximum Flow of Water Supplies

The maximum flow from each water supply

1.10.1.5.4 Flow and Pressures at Water Supply Take off Points

The flow and pressure requirement for of each irrigation zone at the water supply

1.10.1.5.5 Filtration

Filtration required

1.10.1.6 Sprinkler Run Times

1.10.1.6.1 Application rates

Application rates or the sprinklers used.

1.10.1.6.2 Zone run Times

The expected zone run times based on an evaportranspiration (ET) rate of 5mm per day

1.10.1.6.3 Maximum System Run Time

The maximum expected system time base on 5mm application per day

1.10.1.7 Water Usage Total

Total water used per day per irrigation cycle replacing 5mm ET

1.10.1.8 Details of the process to follow in the event of a warranty claim.

1.10.1.9 The expiration date of the warranty for every item.

1.10.1.10 Make, model, size, specification, and date codes of all products.

1.10.1.11 Operation manuals or brochures on the valves and sprinklers.

1.10.1.12 Spare parts data.

1.10.1.13 Trouble shooting information.

1.10.1.14 Testing information.

1.10.1.15 Successful pressure test certification.

1.10.1.16 IQP certification of backflow preventor (if applicable).

All of the above information is to be provided in a addable electronic format and a PVC 3-ring or 4-ring binder. All loose sheets are to be laminated. The name and address of the installing Contractor and that of the company supplying the product (if different) is to be included on the front page of the binder.

The 'as-built' plan, operations manual and commissioning are required for practical completion. The Contractor is to complete and submit to the Engineer the Council's 'asset data information sheet'.

F1.11 Practical Completion

The Contractor is to liaise with the Engineer and nominated surveyors, to ensure the location of all system components are captured accurately. The following information shall be required:

- The location and depths of all pipe, sprinklers, valves (solenoid, ball and quick coupler) valve boxes, cabling, cable joints, controller, rain switch and soil moisture sensor (if applicable).
- The make and model information of all products, including those in the head works which may already be present (e.g. backflow preventer and water meter).
- Any cable/tubing joint not within a solenoid valve box.
- The size, type and pressure rating of all pipe work.
- Any service locations found outside of the originally documented

locations.

- Changes in mainline pipe direction and dimensions and offset measurements for all pipes and pipe junctions.

F1.12 As Built Plan

As the system progresses on a daily basis an accurate record of the location, type and size of all sprinklers, fittings, pipes and cables shall be maintained, preferably as a CAD file.

The as-built plan shall clearly illustrate with respect to permanent landmarks, based on dimensioned triangulation from at least two fixed above ground permanent points.

All information and data shall be submitted to the QLDC as per section 1.8.10 (QLDC Code of Practice)

F1.13 Warranty

The entire system shall be warranted against defective materials and workmanship for the period of 12 months from the date of practical completion. However certain component products shall have extended warranties:-

Irrigation Sprinklers - Minimum of 3 years
25mm Solenoid Drip Control Valves - Minimum of 3 years
25mm & 40mm Solenoid landscape Control Valves - Minimum of 5 years

F1.14 System Maintenance

During the maintenance period the contractor shall be responsible for making good any defects or faults that may occur, including leaks, sprinkler malfunction, control valve malfunction and trench subsidence.

The contractor shall respond to any defects bought to his attention by the client within 2 days.

F2.0 Material Specification.

F2.1 Sprinklers

2.1.1 General

Generally, sprinklers shall be laid out as shown on the plans, but in all cases, adjusted to provide correct and effective coverage of areas as constructed.

2.1.2. Popup Spray Heads

The sprinkler shall feature combination full circle and part circle matched precipitations spay nozzles with a 100mm pop up height. The sprinklers shall have a 15mm (1/2”) BSP female threaded connection and the riser shall be ratcheting to allow easy arc adjustment. Sprinklers shall be operated in groups by solenoid valves as shown on the irrigation plan. Refer standard drawing layout D7.

2.1.3 Popup Rotating sprinklers 20mm

The sprinklers shall feature combination full circle and adjustable part circle

drive assemblies. The sprinklers shall have a 20mm (3/4") BSP female threaded connection and a check-O-matic anti-drain value capable of holding back at least 3 metres of elevation. The riser shall have a pop up height of at least 127mm (5"). Sprinklers shall be operated in groups by solenoid valves as shown on the irrigation plan. Refer standard drawing layout D8.

F2.2 Drip Zones

2.2.1 General

Trees shall be irrigated with two drippers. Pipe work to the trees shall be generally as shown on the plan. Landscape inline drip pipe will be typically spaced at 600mm between laterals and 300mm from the beginning of each planted area.

2.2.2 Drippers

Each tree shall be irrigated with two pressure compensated 4.0 litre per hour drippers attached to a 13mm lateral pipe. The two drippers shall be connected via the 15mm LDPE to the 13mm lateral pipe (500KPa rated) which is to be installed in a ring around the two trees.

The dripper shall connect directly into the lateral pipe and be capable of being taken apart for cleaning. In the event that LDPE dripper lateral pipe is under paving or concrete then the LDPE Lateral will be installed 300mm into the tree pit. Drippers shall be capable of being taken apart for cleaning.

Refer standard drawing layout D6.

F2.3 Valves

2.3.1 Solenoid Control Valve Assemblies

The landscape turf and dripper stations shall be controlled with solenoid operated control valves. These will be sized as per the manufactures recommendations. Valves shall be fitted with adjustable pressure regulators specifically designed to fit the solenoid valve. Alternatively, preset or adjustable "in-line" type pressure regulators may be used for small flow drip stations; these shall be set that the downstream pressure is a maximum of 3 Bar. All valves shall feature BSP female threaded inlets, have flow control and internal bleed for manual operation.

In addition, those valves controlling drip zones shall incorporate a 120 mesh filter in the assembly to provide the drippers protection from any debris in the lines.

All solenoid valves will be housed in valve boxes and have manual isolating fitted upstream of the valve. Refer standard drawing layout D3.

2.3.2 Lateral Isolation valves

All lateral isolation valves shall be fig. 125 bronze gate valves, DR rated for in ground use. Valves shall be pressure rated at not less than 14 Bar.

2.3.3 Drip Lateral Isolation Valves

The isolation valve to each section when required shall be a 15mm or

20mm ball valve.

2.3.4 Quick Coupling Valves (QCV)

All quick coupling valves shall be 25mm (1") BSP female threaded brass valves with single lug key. All quick couplers shall be housed in valve boxes. All QCVs shall be connected to the mainline with swing joint risers to allow correct levelling. All QCVs shall be securely anchored in the ground with a stabilising bar and stainless steel U bolt clamp.

2.3.5 Valve Boxes

All valve boxes shall be constructed from high impact plastic or galvanised steel. They must be able to support the weight of a vehicle without damage. Valve box lids shall be of the bolt-down type and be supplied with bolts fitted.

The following valve box sizes shall be used.

Lateral Isolation Valves 6" Round
Landscape & Drip Solenoid Valves 12" Rectangular
Dripper Lateral Manual Valves 6" Round
Cable Joints 6" Round
Water meter, Backflow preventer 22.5" Rectangular

Also refer standard drawing layout D1,D2,D3,D4,D5

All valve boxes shall feature T section lids so that the lid is fully supported by the body of the box.

2.3.6 Backflow Preventors

Each connection to the potable water supply must be protected by a double check valve backflow preventer assembly housed in a protective valve box, as detailed in the standard drawing layout D1 and D2.

2.3.7 Water Meter

Each connection to the potable water supply must have a water meter installed immediately upstream of the back flow preventer. The water meter shall be housed in a protective valve box, as detailed in the standard drawing layout D1and D2 . Meter type as per QLDC water metering policy.

F2.4 Pipework

2.4.1 General

The use of solvent weld fittings is not permitted.

2.4.2 Mainline

All pipes under constant pressure shall be uPVC to AS/NZS 1477, rated to 12.5 Bar, or PE100 PN12.5 to AS/NZS 4130, rated to 12.5 Bar. Pipes sized 100mm and above shall be PE while those below 100mm shall be MDPE.

2.4.3 Lateral

All lateral pipes downstream of a solenoid valve shall be PE 80B to AS/NZS 4130, rated to PN 9 (9 Bar).

2.4.4 Dripper Laterals

All lateral pipe downstream of the drip zone control valves shall be LDPE, sized as shown on the plans. The LDPE shall be manufactured to (NZS 7601), the following pressures shall apply 15mm – PN9.7, 20mm – PN 9, 25mm PN8.

The end of each lateral shall be terminated in a valve box with a threaded cap/plug to allow flushing.

2.4.5 Dripper Take Offs

From the LDPE lateral a 13mm lateral pipe will be installed in a ring around the tree. Refer Standard Drawing D6.

F2.5 Fittings

2.5.1 PVC Mainline Fittings

All mainline PVC pipe fittings shall be ductile iron with rubber ring or flanged connections. Cast iron or gun metal tapping bands shall be used for valve take offs. All mainline tees and bends shall be ductile iron. All flange connections shall be made using galvanized nuts, bolts and washers.

2.5.2 PE Fittings

All fittings for PE pipe shall be compression type. Take-offs for sprinklers shall be PE tapping saddles, manufactured to NZS/AS 4129, rated to PN 16.5 (16 Bar).

All tapping saddles shall have stainless nuts and bolts and a stainless retaining ring around the threaded section of the saddle.

2.5.3 LDPE Fittings (PN9)

LDPE pipe in the drip irrigation zones shall be joined with Hansen or Anka fittings designed for the purpose and manufactured to NZS 7601.

2.5.5 Inline Drip Fittings

All inline drip pipe shall be joined with Anka 15mm fittings.

2.5.6 Sprinkler Risers

All gear drive sprinklers shall be mounted on swing joint risers.

All sprinklers with an inlet 20mm and greater shall be mounted on articulated risers comprising 3 threaded MF elbows and a 300mm long threaded nipple. All swing joint risers shall have a nominal lay length of 300mm.

All Spray sprinklers shall be connected to the reticulation system comprising two BSP thread barbed elbows (with 4 barbs) and a 300mm length of 15mm LD polythene pipe. Refer standard drawing D7 and D8

F2.6 Road, Bridge & Stream Crossings

2.6.1 General

Where pipe crosses a bridge or stream, fusion or butt welded polyethylene pipe shall be used. The PVC pipe shall be terminated with a flange fitting

to which the polyethylene flanges will be connected. The transition point and any elbows required shall be secured with thrust blocks to prevent movement. Refer to plan for PE pipe sizes.

The pipework shall be securely strapped to the bridge structure at no more than 1m intervals.

A drain down point shall be fitted to discharge the mainline at each stream crossing. This shall consist of a fusion tapping saddle and 50mm lever ball valve.

Wiring where applicable shall be installed in electrical ducting and securely strapped to the bridge structure at no more than 1m intervals.

2.6.2 Road & Path Crossings

With sizes equal too and less than 63mm a 100mm duct will be installed and when required a 50mm electrical duct complete with draw wire will be installed beside the 100mm duct. Pipes under roads will be installed to a minimum depth of 1m cover. Refer standard drawing layout D9.

F2.7 Control System

2.7.1 General

The control system can be battery powered controllers for irrigation which is used for establishment only. Irrigation which is required to be permanent controlled shall be the conventional AC powered controller suitable for outside installation. Decoder systems can be used on systems which have a greater station count than 24 valves. Decoder system are more acceptable to surge damage and general require a high level of technical expertise when trouble shooting.

Automatic controllers shall be provided for irrigation systems. These should be of 240 volt power supply.

The Controllers are solid state with the state of the art controller technology, which will provide the versatility required for operating the proposed irrigation system. They shall be housed in a protective plastic cabinet and some of their features are:

- Three independent programs, two that can run concurrently.
- Simple program review.
- Water budgeting.
- Programmable valve test.
- Self-diagnostic circuit breaker.
- Non-volatile memory.
- Time battery backup.
- Two year warranty

Battery controllers shall be submersible up to 2m in water as per IP-68 standards with a 2 year warranty. Batteries shall last for a minimum of 1 year’s operation.

2.7.2 Control Cables

Cable from the field to the valves or sprinklers shall be multi core

polyethylene sheathed cable.

Minimum wire size shall be 1.5mm2. In all cases, one of the cables in multi core shall be black to denote the common wire. No joints shall be made between the irrigation control unit and the valve.

2.7.3 System Grounding

The control system shall have equipment as recommended by the manufacturer to provide surge protection to the irrigation field units. In most circumstances this will be a copper clad earth rod installed in a 150mm valve box connected via 16mm2 copper cable to the irrigation field unit.

2.7.4 Wire Connectors

All wire joints shall be made using grease filled type connectors suitable for below grade burial. King type or 3M DBY or 3M DBR connectors shall be used.

2.7.5 Metallic Detector Tape

150mmabove the pipe a metallic detector tape printed with the works “Water Pipe Below” shall be laid over the position of the pipe line. Refer standard drawing layout.

F3.0 Installation

F3.1 Sprinklers

All pipe work shall be thoroughly flushed prior to any sprinklers being installed. The sprinklers shall be screwed on to the swing joint and set level with the surrounding ground by using a 500mm straight edge. A 400mm square of biodegradable coir matting shall be placed around each sprinkler to stabilise the soil around the sprinkler and provide a suitable environment for the seed to strike.

Soil around the sprinkler shall be compacted to prevent the sprinkler sinking. The sprinkler shall then be tested for correct operation and arc of coverage. Refer standard drawing layout D7 and D8.

F3.2 Drippers

Drippers shall be installed underneath the bark mulch Refer standard drawing layout D6.

F3.3 Valves

3.3.1 Solenoid Control Valves

All solenoid valves shall be installed in rectangular valve boxes. Threaded rigid PVC risers shall be used to ensure the valve sits a maximum of 100mm beneath the lid of the valve box for ease of maintenance. The valve assembly shall be centrally located within the box, and no part of the box shall be in contact with any part of the valve or connecting pipe work.

The valve assembly shall be fitted such that it is clear of any soil or backfill material. A 75mm layer of gravel shall be packed under each valve.

Drip zone valves shall incorporate a pressure regulator and 120 mesh filter.

Pressure regulators shall be adjusted to ensure the downstream pressure on the drip zones does not exceed 3 Bar. Refer standard drawing layout D3 and D5.

3.3.2 Mainline Isolation Valves

All mainline sluice valves shall be installed such that the operating nut is vertical, not on an incline. A 250mm (10”) culvert pipe or similar shall be cut to fit around the valve and extend up into the valve box to allow easy access and prevent soil burying the valve.

All mainline sluice valves shall be correctly thrusted to prevent their movement as detailed in QLDC plan W05.

3.3.3 Lateral Isolation Valves

Lateral valves shall be installed at mainline depth. A 150mm duct tube shall be cut to fit over each valve operating handle and extend up into the valve box for operation with an extension key. Refer as detailed in QLDC plan W05.

3.3.4 Backflow Preventer

A line strainer shall be installed immediately upstream of the back flow preventer and its valves. An isolating valve must be installed upstream of the line strainer. The backflow preventer, line strainer and all associated valves shall be installed in an approved valve box that provides adequate access for testing and servicing, with the lid accessible at finished grade level. The assembly shall comply with the Water supplies Protection act 1961/87, in accordance with the practical solutions of the Building act 1991 for a medium hazard connection. The backflow Preventer must be tested by an independently qualified person (IQP) Refer standard drawing layout D1 and D2

3.3.5 Water Meter

A water meter shall be installed immediately upstream of the back flow preventer and its valves. The water meter shall be installed in an approved valve box that provides adequate access for testing and servicing (425mm x 575mm), with the lid accessible at finished grade level. Install with minimum of 10 pipe diameters upstream and 5 diameters downstream. Refer standard drawing layout D1 and D2

3.3.6 Quick Coupling Valves

All quick couplers shall be housed in valve boxes. All QCVs shall be connected to the mainline with swing joint risers to allow correct levelling. All QCVs shall be securely anchored in the ground with a stabilising bar and stainless steel U bolt clamp.

3.3.7 Drip Lateral Isolation Valves

Where drip isolation valves are used they shall be isolated with a lever ball valve.

These shall be housed in 150mm (6”) boxes, located as close as possible to the LDPE feeder pipe.

3.3.8 Valve Boxes

All valve boxes shall be installed on treated timber or brick supports to prevent them settling. All valve box lids shall be set flush with surrounding ground. Where possible valve boxes shall be installed off pedestrian areas.

F3.4 Pipework

3.4.1 General

Pipe work installation involves the trenching, bedding, laying backfilling and commissioning of the pipe work system as shown on the plans.

3.4.2 Trench and Backfill

As per section 6.5 ‘Construction’ from the QLDC Land Development and Subdivision Code of Practice:

6.5.1 Excavation

Excavation of existing carriageways shall conform to the TA’s road opening procedures where these exist. Excavation in existing carriageways shall be carried out in a safe manner with the minimum disruption to traffic and pedestrians.

6.5.2 Embedment

Pipes and fitting shall be surrounded with a suitable bedding material in accordance with Appendix B drawings CM – 001 and CM – 002.

6.5.3 Backfilling and reinstatement

6.5.3.1 Carriageways

Backfilling shall be in accordance with the requirements of the TA. Pipe trenches within a carriageway shall be backfilled using an approved hardfill placed immediately above the pipe embedment and compacted in layers not exceeding 200 mm in loose depth, as per Appendix B drawing CM – 002.

In existing sealed roads, the top section of the trench shall be backfilled as specified by 3.4.2.3. The depth of base course and type of finishing coat seal shall conform to the standard of the existing road construction.

6.5.3.2 Berms

Pipe trenches under grass berms and footpaths shall be backfilled in accordance with the requirements of Appendix B drawing CM – 002.

3.4.3 Pipework

All mainline pipes shall be installed to provide 1m of cover over the pipe in roads, with all other areas being a minimum of 400mm. All pipework shall be joined in accordance with manufacturer’s instructions. Refer standard drawing layout. D9

3.4.4 Thrust Blocks

Concrete thrust blocks cast in situ shall be installed on the PVC mainline at each bend, tee, sluice valve or end of line to prevent movement. Pre

cast blocks shall not be used. Prior to pouring concrete, the pipe and fittings shall be wrapped in polythene sheet. The thrust block shall be constructed in such a way that the load is evenly spread over a vertical trench wall in undisturbed ground.

3.4.5 Dripper Laterals

The LDPE laterals may be installed by mole plough as long as the minimum depth of 400mm is obtained, dripper, refer standard drawing layout. The lateral pipe must be flushed before the installation of drippers shall be installed on a 13mm lateral ring around the tree. Refer standard drawing layout.

The end of each 15mm lateral shall be fitted with a threaded end cap or in the case of a ring main shall be fitted via a tee to facilitate flushing prior to installing the dripper and for future maintenance.

3.4.6 Inline Drip Pipe

Inline drip pipe for landscape plantings shall be installed on top of the ground and securely anchored by ground staples at 1 metre intervals. Lateral lines supplying water to the in line drippers shall be thoroughly flushed so as to prevent any blockages in the inline drippers. The in line drip pipe will be covered by a bark mulch.

3.4.7 Fittings

All fittings shall be installed in accordance with manufacturer's instructions and in accordance with their intended design use.

F3.5 Control System

3.5.1 General

All electrical work shall be carried out in accordance with relevant

New Zealand standards and codes of practice by experienced personnel.

3.5.2 Field Control Cabling

All wire from the irrigation control unit to the valves shall be run in continuous lengths, no joins are permitted in these cables. The cable shall be laid beside the pipe. At joints and valves, 500mm of slack cable shall be left to allow the valve wiring to be completed with ease above ground.

At the control location each pair of wires shall be clearly labelled with the station number that they operate for ease of installation. All wire shall be laid in the trench adjacent to the pipe, the cable shall be 'snaked' and an expansion loop shall be left at bends and tee junctions to avoid stretching the cable when backfilling. The cable shall be laid on one side of the pipe, it shall not be laid crossing over the pipe.

At points where thrust blocks are to be poured the cable must not be buried in the concrete.

Wherever a cable junction is to be made there shall be at least 500mm of spare cable that can be brought above ground for ease of maintenance.

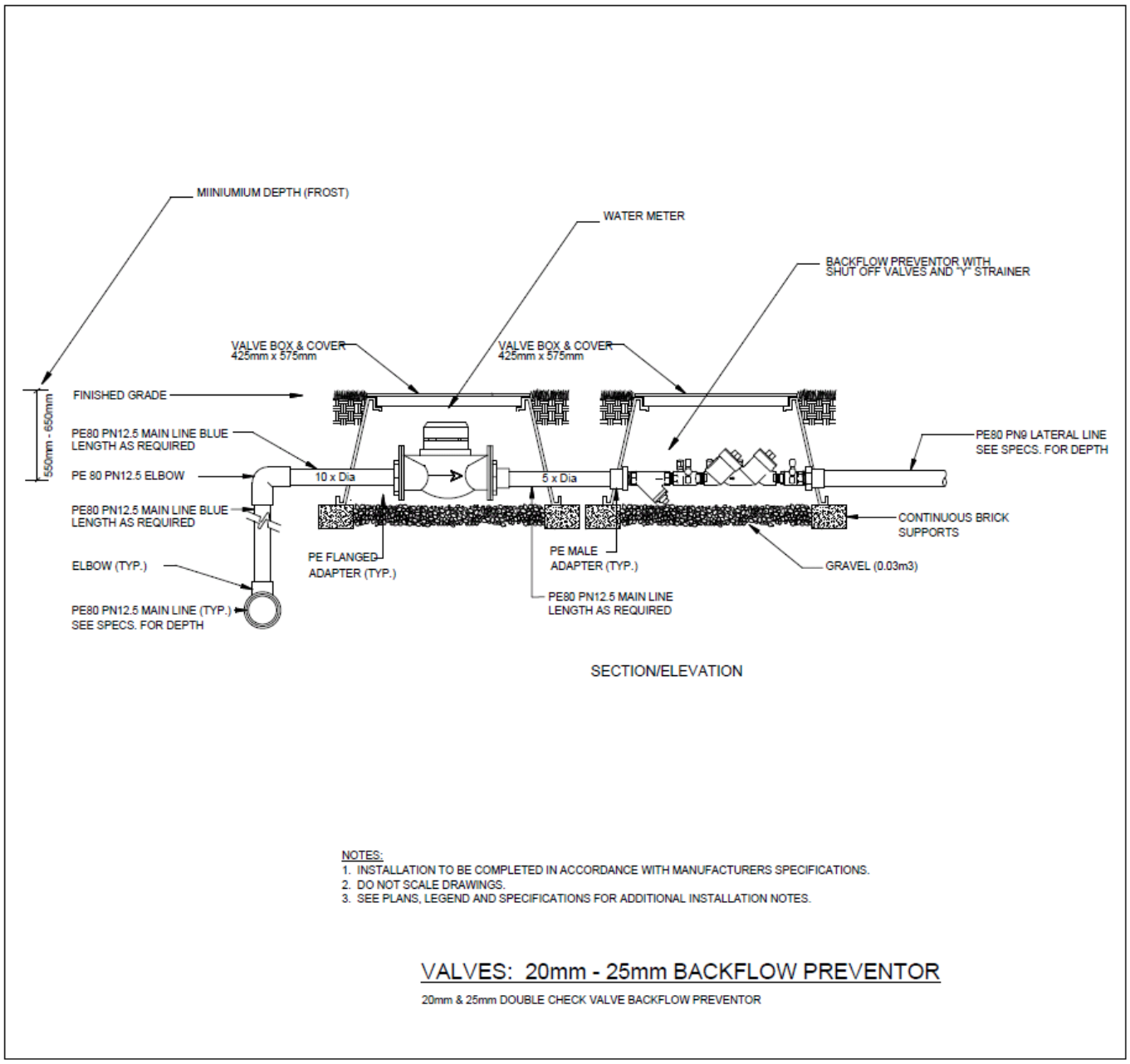
An accurate record of each control unit number and the stations they

operate shall be maintained as the installation progresses. This shall be transferred to the controller as soon as possible and on a frequent basis.

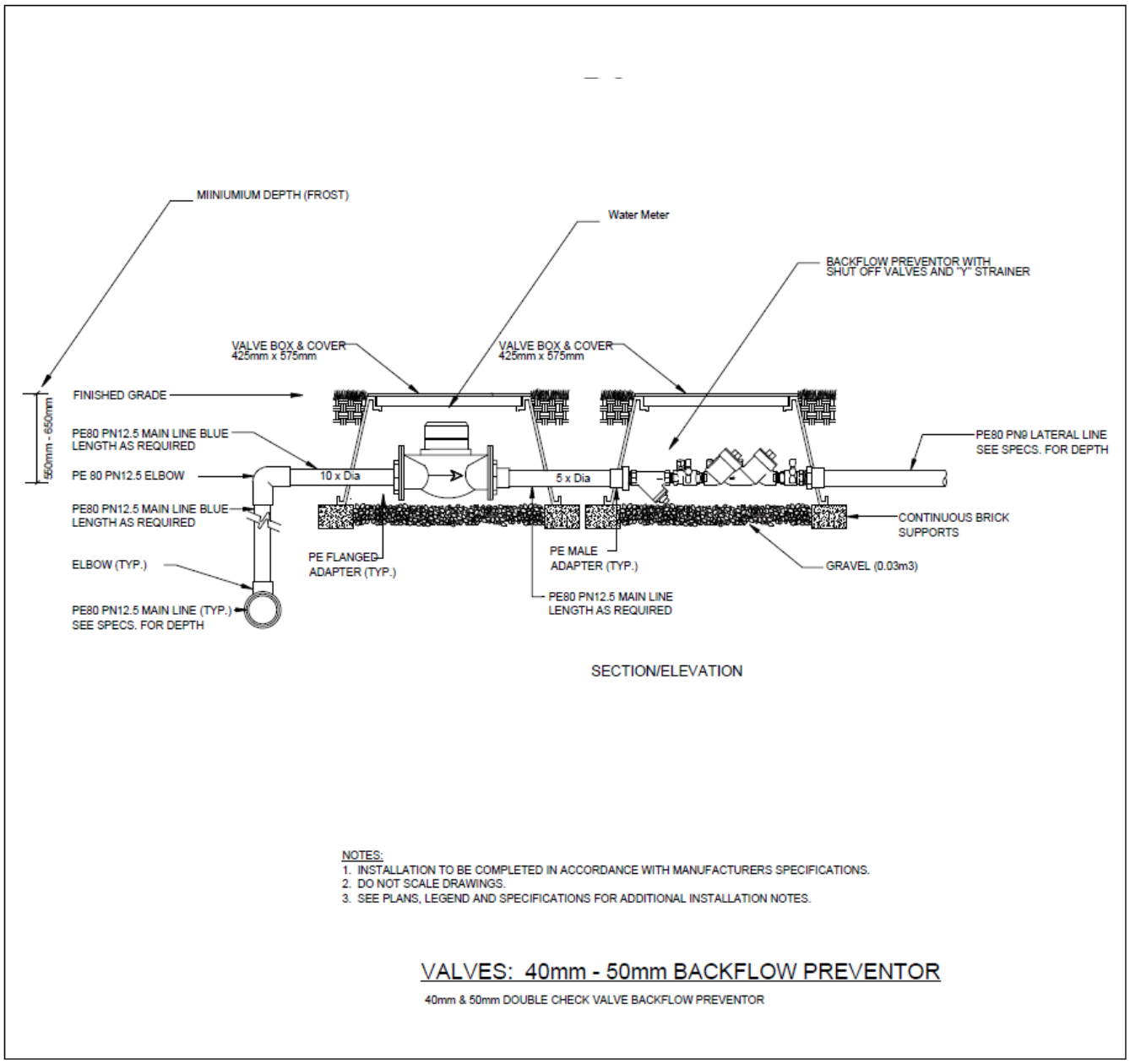
3.5.3 Irrigation Control Units

Controllers shall be installed as per the local authority codes and manufactures recommendations. Controllers shall also be earthed independently of the building earth. This earth shall have a maximum resistance as tested of 10 Ohms.

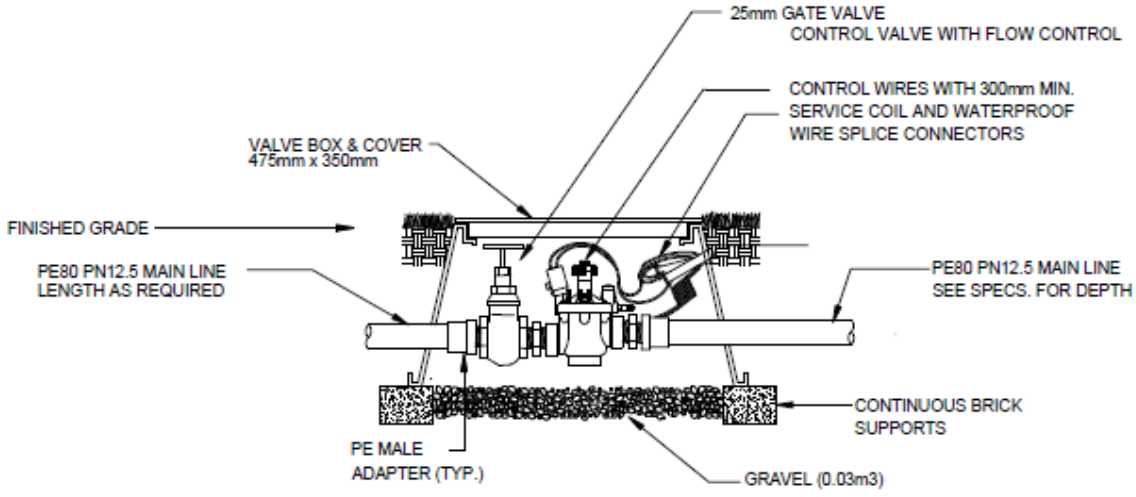
F2 Irrigation Standard Drawings



Drawing 0-1: Connection 20mm – 25mm



Drawing F0-2: Connection 40mm – 50mm



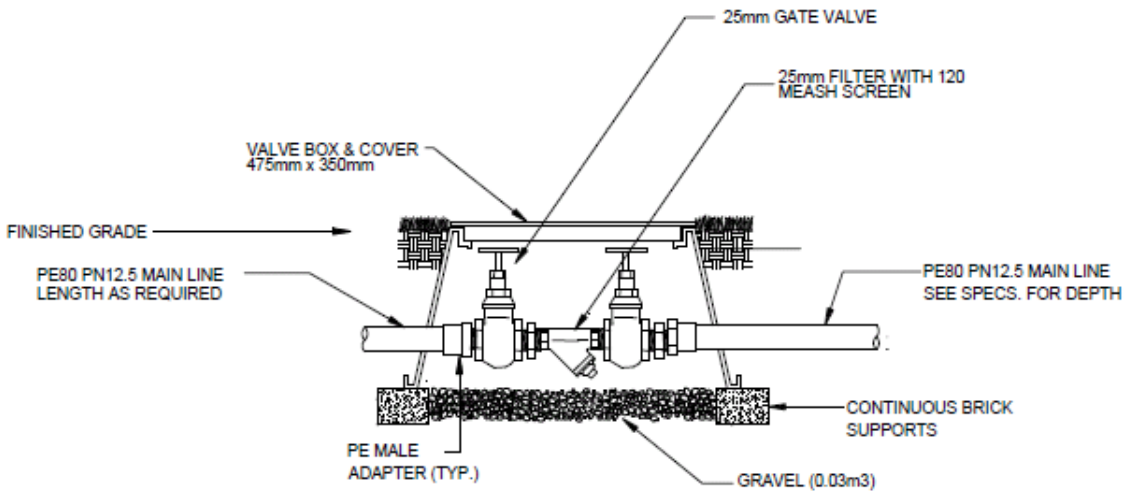
SECTION/ELEVATION

NOTES:
1. INSTALLATION TO BE COMPLETED IN ACCORDANCE WITH MANUFACTURERS SPECIFICATIONS.
2. DO NOT SCALE DRAWINGS.
3. SEE PLANS, LEGEND AND SPECIFICATIONS FOR ADDITIONAL INSTALLATION NOTES.

ISOLATING VALVE: 25mm SOLENOID VALVE

25mm Isolating Valve with Solenoid Valve

Drawing F0-3: Control Valving 25mm



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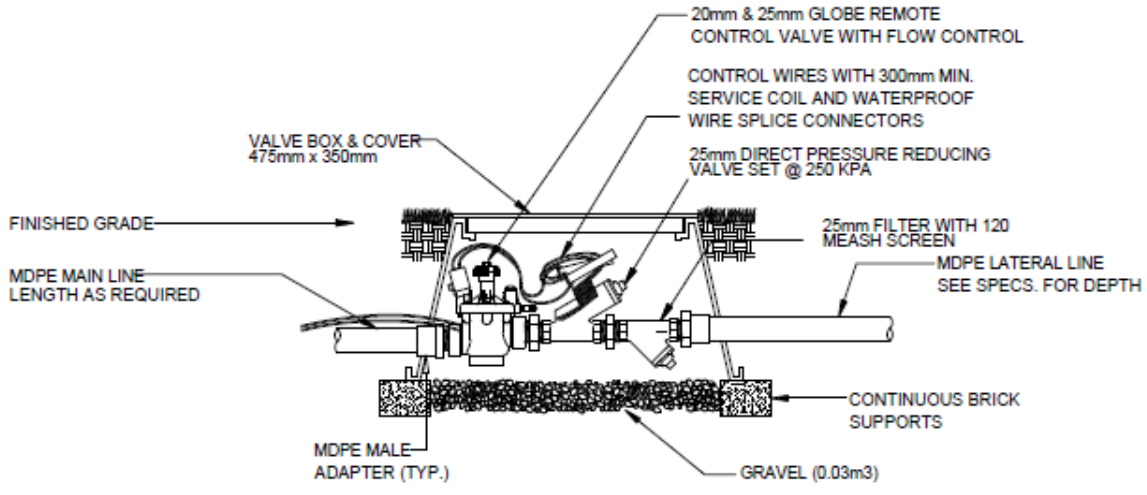
25mm FILTER WITH ISOLATING VAVLES

25mm Flilter with Isolating Valves

Drawing F0-4: Filter – 25mm



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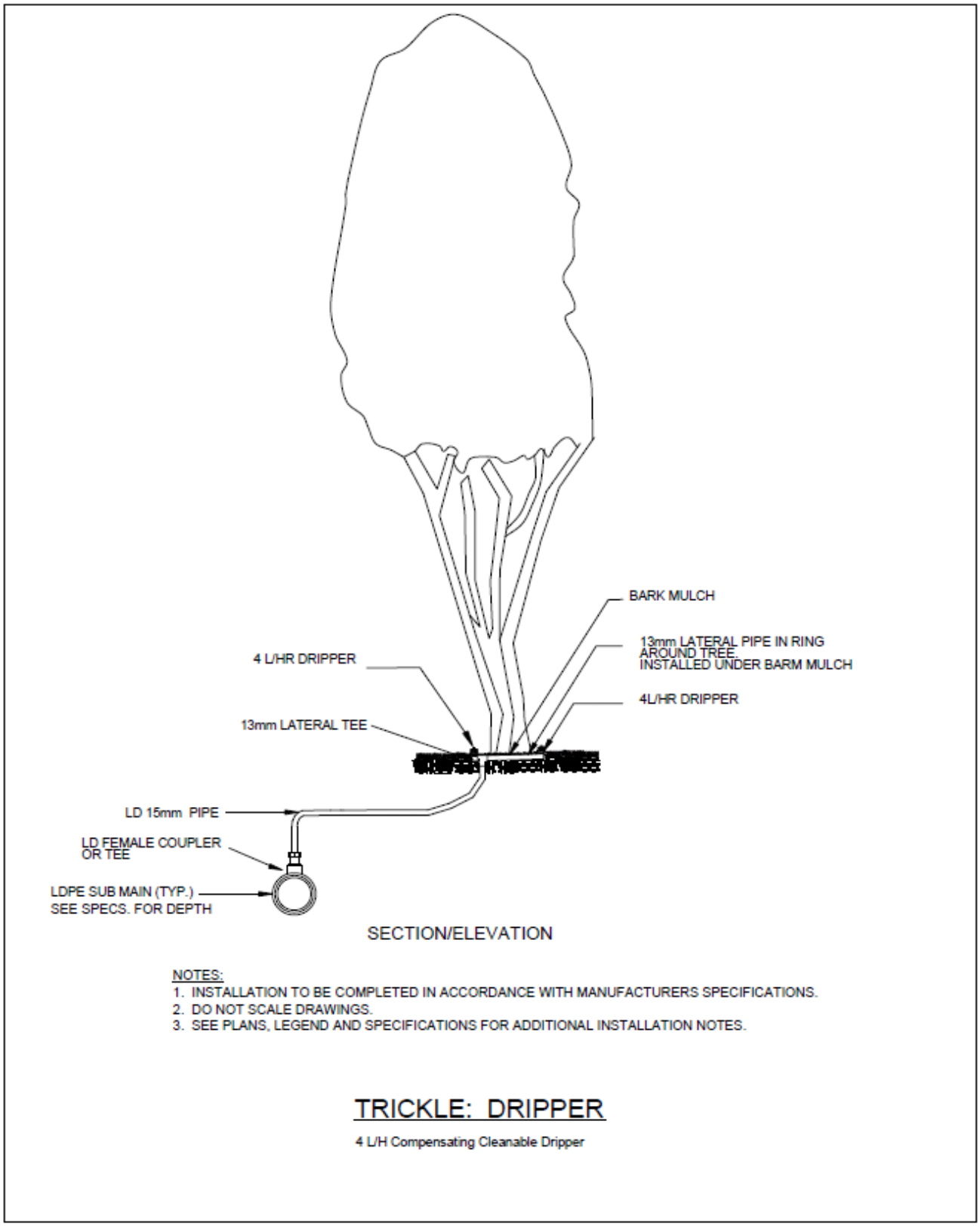
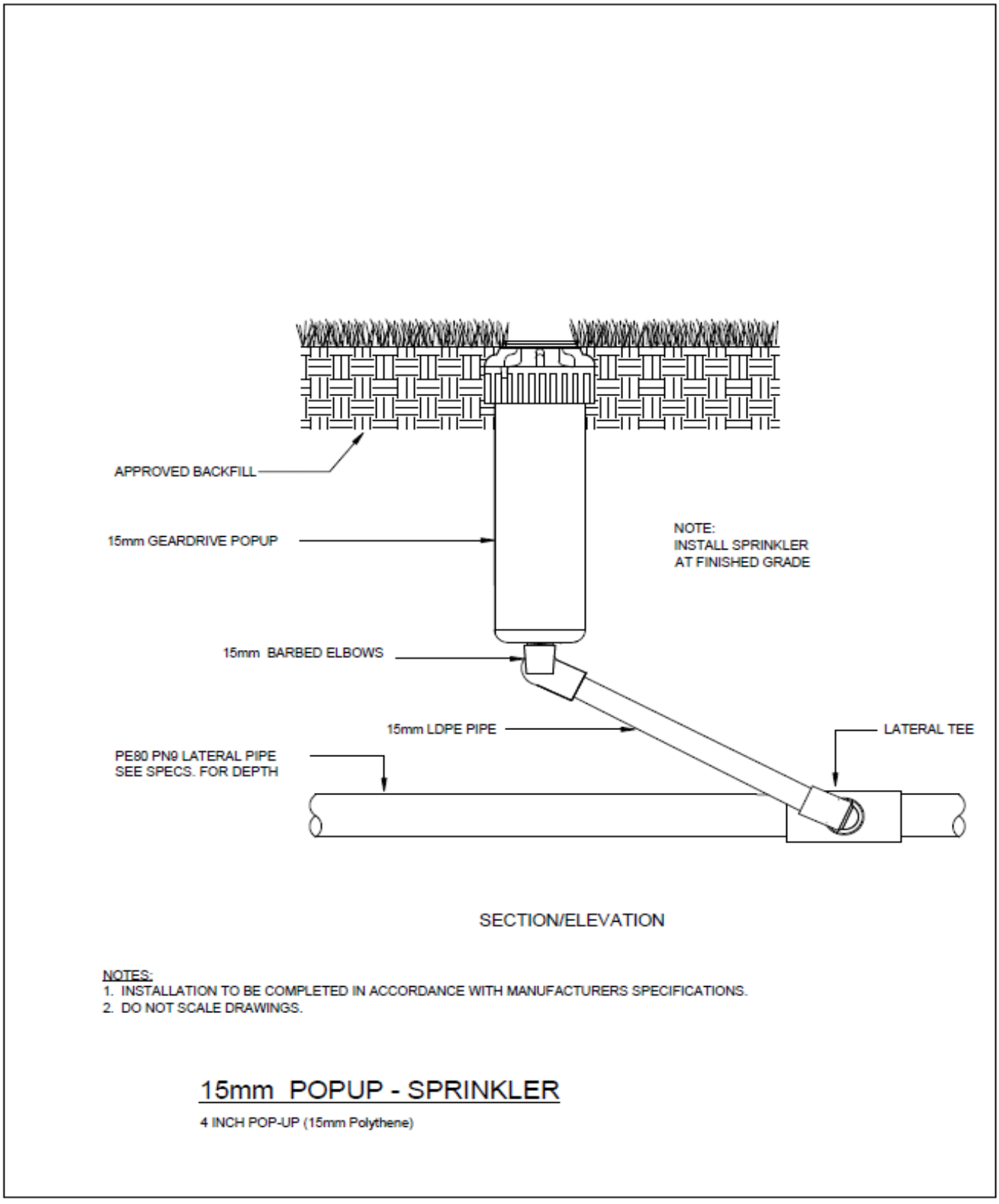
TRICKLE CONTROL VALVES: 25mm SOLENOID VALVE

25mm Solenoid Valve with 25mm Press/Reg Valve & 25mm Filter

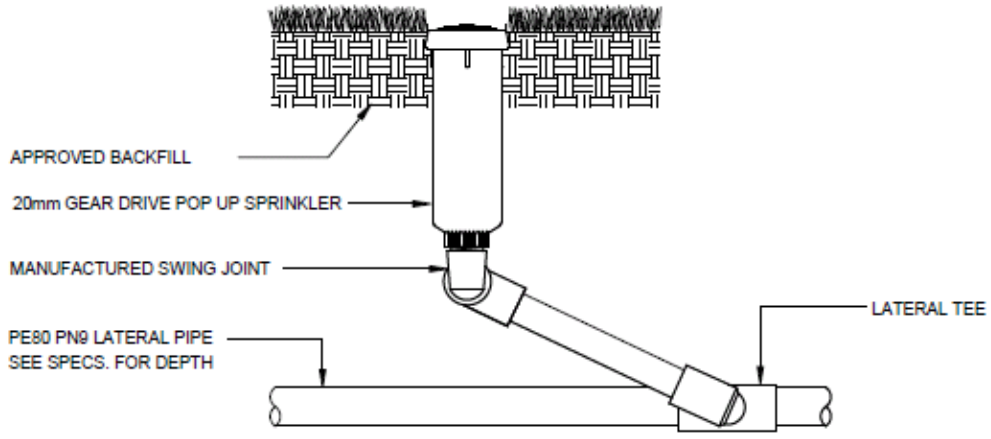
Drawing F0-5: Trickle Control 25mm



Drawing F0-6: Trickle Dripper



Drawing F0-7: Popup Sprinkler 15mm



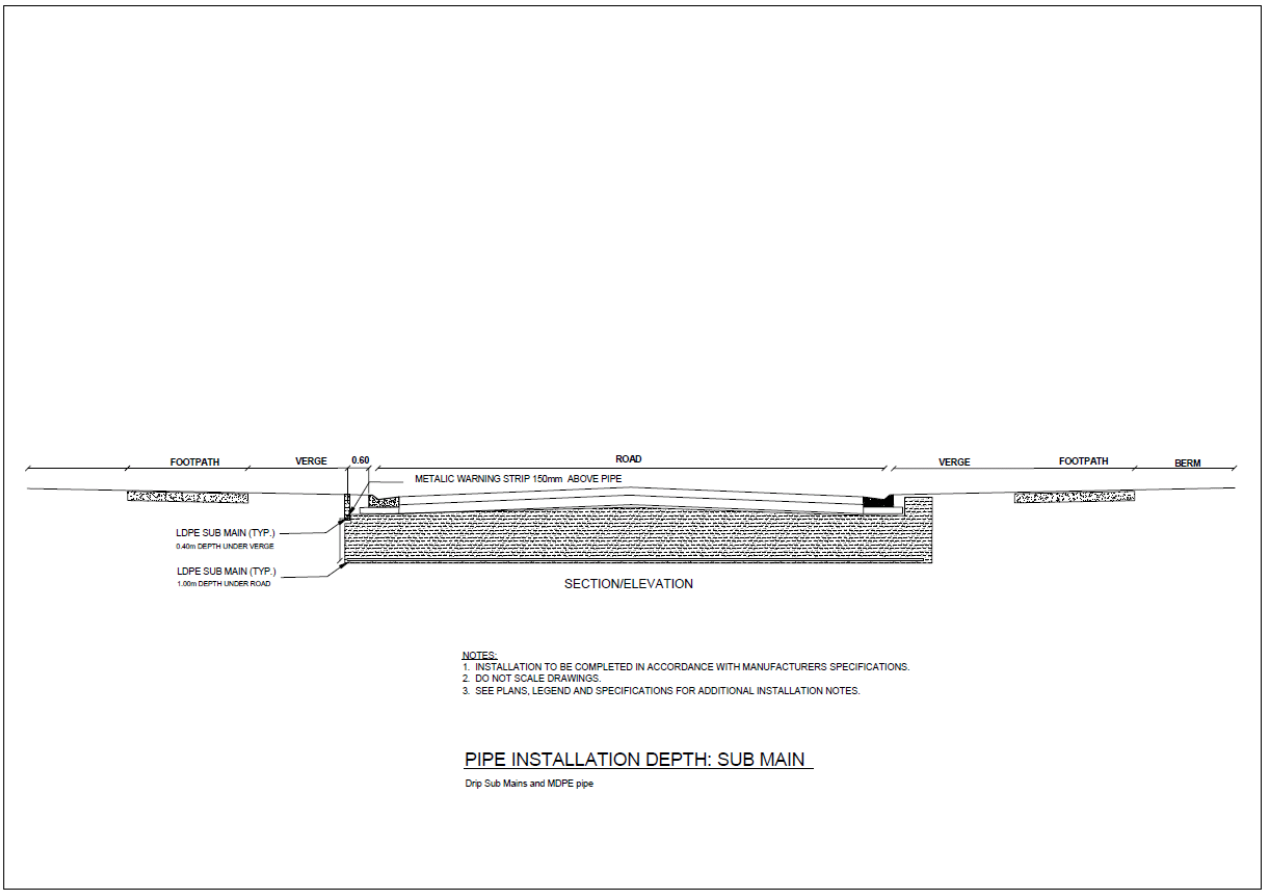
SECTION/ELEVATION

NOTES:
1. INSTALLATION TO BE COMPLETED IN ACCORDANCE WITH MANUFACTURER'S SPECIFICATIONS.
2. DO NOT SCALE DRAWINGS.
3. INSTALL SPRINKLER AT FINISHED GRADE

20 mm GEAR DRIVE 100mm POP-UP

SINGLE-STREAM SPRINKLER, SWING JOINT

Drawing F0-8: Gear Drive Popup 20mm



Drawing F0-9: Pipe Installation - Submain