

3. Specification

Part A – Irrigation Specification - Peanut Farm Oval, St Kilda

Part B – Alma Park East Oval, St Kilda

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Part A – IRRIGATION SPECIFICATION - PEANUT FARM OVAL, ST.KILDA

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1. General

This Specification shall be read in conjunction with the schedule of rates and the Drawings. All documents are equally binding. If there is a discrepancy between any of the documents, clarification must be sought in writing from the principal or their nominated representative. Failure to seek clarification during the tendering process shall not be considered grounds for variations during the construction process.

2. Competence

The Contractor shall have an experienced supervisor on site at all times during the construction period. Evidence of this experience shall be a minimum of a Restricted Water Licence (Irrigation) issued by the Victorian Plumbers and Drainers Licensing Board. An "Open Water Licence" issued by the Plumbing Industry Commission is acceptable.

3. Standards

The following standards apply to this contract:

- | | |
|------------|--|
| a) AS 1432 | Copper tubes for water, gas and sanitation; |
| b) AS 3500 | National Plumbing and drainage – Water Supply; |
| c) AS 1462 | Methods for testing uPVC pipes and fittings; |
| d) AS 1477 | uPVC pipes and fittings for pressure applications; |
| e) AS 2032 | Codes of Practice for installation of uPVC pipe systems; |
| f) AS 2033 | Installation of polyethylene pipe systems; |
| g) AS 3000 | SAA wiring rules and amendments; and |
| h) AS 2053 | uPVC wire conduits |

If there is a conflict between this Specification, the Drawings and the Australian Standards, the Australian Standards shall be adopted.

4. Delivery, Handling & Storage

The Contractor shall ensure materials are delivered to the project site in the original containers with the manufacturer's identification on each package. It is the responsibility of the Contractor to protect all materials on site from damage by weather, accidents and theft up to the date of practical completion. A copy of the relevant insurance documents shall be made available for inspection by the Superintendent.

5. Changes to Equipment Schedule

Changes to the specified equipment will only be considered for items with 'or approved equivalent'. For alternative equipment to be approved it must be proven that the performance, durability and quality are not less than the original product specified. If the Contractor wishes to offer an alternative product, the following must be supplied to the Superintendent for approval prior to construction commencement:

- a) a working sample;
- b) technical data;
- c) distribution uniformity at the set pressure and flow rate; and
- d) cost comparisons.

If the alternative product is approved, then the Contractor shall be notified in writing. Failure to comply with above requirements will result in the alternative product being removed from the site at the Contractor's expense.

6. Changes to Irrigation design

Any proposed change to the irrigation design will require an accurate drawing showing the intended modification submitted to the Superintendent. Any modifications may to the design drawings shall be at the Contractor's expense and the Contractor shall not be entitled to a variation for these works. Any modification to the design drawings shall be approved in writing by the Superintendent prior to implementation. Any modifications not approved in writing shall be rectified by the Contractor at their sole expense.

7. Scope of Works

The work to be performed under this contract shall comprise the provision of all plant, equipment, materials, labour and the performance of all operations of whatever kind needed for the complete and proper construction and testing of the irrigation system as specified herein, and as detailed on the Drawings and to the satisfaction of the Superintendent. The Superintendent or their representative's decision is final.

The work site is located at Spencer Street, St. Kilda. Hours of work are Monday – Friday 8:00am to 4:30 pm. Weekend work and work on public holidays is NOT permitted.

The works include the supply and installation of, but are not limited to:

- a) location of existing (2 No) potable water meters and supply and installation of backflow prevention devices above ground within galvanized steel mesh cages;
- b) supply and installation of electrical supply (3 Phase and single phase) within swallow model 1200 double cabinet;
- c) supply and installation of 80 mm uPVC Pn 12.0 irrigation mainline by open trenching;
- d) supply and installation of 50 mm MDPE Pn 12.5 potable water supply to header tank;
- e) supply and installation of 3000 l concrete above ground header tank on 150 mm compacted crushed rock base;
- f) supply and installation of hydraulic tank level control;
- g) supply and installation of 80, 50 & 40 mm uPVC Pn 12.0 irrigation lateral lines;
- h) supply and installation of Hunter I-35 Sierra Series pop up sprinklers;
- i) supply and installation of Hunter ACC 24 stn irrigation controller & Hunter stainless steel sensor guard mini click;
- j) provision of 3 Phase (4.0 Kw, 11 amps) & 240 V 10 amp GPO to new controller from existing electrical service within the pavilion located approx 25.0m from controller location;
- k) provision of intensive maintenance period; and
- l) site clean and removal of spoil.

8. Document Schedule

373-DD-01 Issue C – 1:500 @ A1 - Irrigation Layout

Schedule of rates – Tender

Irrigation Specification - Tender

These Drawings shall be read in conjunction with schedule of rates – Tender and Irrigation Specification dated August 2009 at all times. If there is a discrepancy between the irrigation drawings, schedule of rates or Specification bring it immediately to the attention of the Superintendent. All or any discrepancies shall be brought to the attention of the Superintendent prior to the contract being awarded, discrepancies brought to the attention of the Superintendent after contract award shall not be grounds for a variation to the contract.

9. Construction Inspections

The Contractor shall attend joint field inspections/meetings with the Superintendent or his representative at each of the following HOLD points during the construction process. The Contractor shall give 24 hours notice in writing to the Superintendent that they are approaching a HOLD point and request an inspection of the works to date. Failure to have these HOLD point inspections carried out will result in defect notices being issued against those points. A HOLD point is a milestone in which no installation works are permitted to be carried out until satisfactory completion of the said tasks.

The Superintendent or his representative may conduct works inspections at any time during the construction process. As a minimum, the following tasks during the construction process shall be inspected:

- a) to witness the setout of the system by a registered surveyor including sprinklers, valves and pipework, ie. flagging or pegging (**HOLD** point);
- b) to witness trenching, installation of pipework, sand-bedding, backfilling, compaction;
- c) to witness pressure testing of the mainline, sub main pipework to 1.5 times the operating pressure of the pipework or 1200 Kpa (whichever is the greater) for a period of 30 continuous minutes. Greater than 2% loss in pressure over the 30 minutes shall be deemed to be a failed test. Rectification any re-testing of the mainline and sub main shall be at the sole expense of the contractor. (**HOLD** point);
- d) to witness the correct operation of the backflow prevention device and associated filters, pumps, telemetry operations;
- e) to witness the correct operation of the controller and moisture sensing devices;
- f) to witness the correct operation of all valves, sprinklers and drip emitters;
- g) to witness adjustment of automatic valves to maximum closing time possible;
- h) to witness removal of spoil and construction materials from site; and
- i) to witness air valve and gate valve location and correct operation.

10. Notices

At the completion of each construction inspection the Superintendent shall issue a construction report in writing to the Contractor. All items listed for repair, removal or defective workmanship shall be rectified by the Contractor prior to further works progressing at the sole expense of the Contractor.

11. Defects

When the Contractor believes the project is complete they shall request in writing to the Superintendent with 24 hours notice an inspection of the works for practical completion.

At this point the Superintendent shall carry out an inspection of the works with the Contractor's site representative to witness the following:

- a) to witness the correct operation of the backflow prevention device and associated filters, pumps and telemetry operations;
- b) to witness the correct operation of the controller and moisture sensing devices;
- c) to witness the correct operation of all valves, sprinklers;
- d) to witness adjustment of automatic valves to maximum closing time possible;
- e) to witness removal of spoil and construction materials from the site; and
- f) to witness gate valve location and correct operation.

Upon completion of this inspection a report shall be issued by the Superintendent to the Contractor of items requiring rectification or replacement. The Contractor shall have 7 days to rectify the defects and shall then request in writing a further inspection of the works by the Superintendent or his representative.

12. As Constructed Drawings

Two copies of all drawings (full size) and one reduced (A3) size copy and a CD with the Autocad files (2004 or later) and PDF version 6.0 or later of all drawings shall be provided to the Superintendent for approval.

The drawings at a minimum shall include all:

- a) sprinkler locations;
- b) valve locations;
- c) mainline locations including the depth (Z co-ordinate);
- d) lateral line locations including the depth (Z co-ordinate);
- e) controller and moisture sensor locations;
- f) points of connection and associated items; and
- g) wiring and wire joints.

13. Maintenance manuals

The irrigation maintenance manuals (provide 2 copies) shall be presented in a hard covered 2 ring binder. As a minimum they shall include:

- a) cover sheet stating project name and date of installation;
- b) table of contents;
- c) warranties and certificates;
- d) contact details of Contractor (include after hours details);
- e) controller manuals and information;
- f) sprinkler and drip emitter technical data and maintenance instructions;
- g) Autocad 2004 or later drawing files on CD;
- h) all drawings suitable for re-printing on PDF format (Version 6.0 or later); and
- i) 1 copy of all drawings in hard copy inserted into the manual for viewing without removal

14. Maintenance – Irrigation specific

The Contractor shall visit the site on a fortnightly basis once practical completion has been achieved and shall maintain a log book which must be signed off by either the Superintendent or their representative upon arrival and upon completion of works on site.

The maintenance period shall be 13 weeks. During this period the following items shall be tested at each site visit:

- a) each solenoid valve operated from the controller and manually and check for opening / closing and automatic operation;
- b) the controller shall be checked for correct date, time, start times, run times of individual stations;
- c) sprinklers shall be operated from the controller and visually checked for operation. Min 2 mins operation of each station; and
- d) run times of stations shall be adjusted to ensure precipitation rates and inline with the current climatic conditions.

At the completion of the maintenance period, the Contractor shall request in writing an inspection of the site and their log book. It shall not be until this inspection and all defect items are complete that it shall be deemed the end of the maintenance period.

15. Warranty

The Contractor shall supply the Superintendent with a written guarantee that they will without charge repair, replace or re-instate any part of the system that has failed due to defective equipment, unspecified equipment or poor workmanship within 12 months of the date of practical completion.

The guarantee shall include details of any extended warranties offered by manufacturers on any of the system components.

16. Practical Completion

The irrigation system shall be deemed to have achieved practical completion upon the following conditions being achieved:

- a) the system has been operating successfully for 4 fully programmed cycles over a minimum of a 7 day period;
- b) commissioning of the system in the presence of the Superintendent or his representative comprising of the field testing of all individual valves, sprinklers, emitters from the controller for successful operation;
- c) repair of damages or vandalism caused during construction;
- d) submission of 'As Constructed' drawings and maintenance manuals;
- e) successful completion of all notices and defects;
- f) submission of warranty, trouble-shooting and materials information;
- g) submission of typical summer/winter irrigation programs;
- h) education of end users;
- i) correct programming of the controller and moisture sensing devices; and
- j) all site sheds, materials, debris have been removed from the site

A practical completion certificate shall be issued when ALL of the above requirements and the defects list have been successfully completed. From the time of site possession until practical completion is achieved, the Contractor shall maintain the risk of all materials, plant

and equipment. Damage, theft or vandalism shall be the sole responsibility of the Contractor until practical completion is achieved.

17. Materials & Installation

All the materials supplied shall be new and shall conform to the relevant Australian Standards. Installation of irrigation systems shall conform to AS 3500.1 "National Plumbing and Drainage Code". Installation of MDPE pipes shall conform to AS "Installation of MDPE Pipe Systems". Installation of valve wiring shall conform to AS 3000 1991 "SAA Wiring Rules".

18. Setout

Setout of the complete irrigation system including sprinklers, valves, meters, controllers, mainline and sub mains shall be performed by a **registered and licensed surveyor**. An electronic copy of the design drawings in Autocad 2006 format shall be provided to the Contractor for this purpose.

The Contractor shall permanently mark all sprinklers and valve locations with a 25 * 25 mm hardwood stake buried with only the surface of the stake showing. The surface shall then be painted with white marking paint for ease of location. The stakes shall only be removed when the pipework and sprinkler is installed.

19. Conduits / Boring

All required conduits are indicated on the design drawings. There is a requirement for an under path bore to suit 50 mm MDPE PN12.5 potable water supply to header tank. Where pipework is installed within gravel pathways, pathways shall be reinstated to match the existing surrounding levels and surface texture.

Conduits shall be installed by under path boring. Irrigation mainline and potable water mainline shall be sleeved using uPVC Class 9. Sleeves shall be installed in straight lines between irrigated areas. The ends of the sleeves shall protrude at least 100 mm past the hard edge. Size conduits so that the conduit is 1.5 times the diameter of the pipe to be enclosed.

20. Automatic Valves

Automatic control valves shall be 25 mm as nominated on the design drawings and shall be of stainless steel and industrial plastic construction, pressure rated to a min of 13.8 bar, 24 V AC solenoid operation, globe pattern and fitted with flow control and manual internal bleed.

Automatic valves shall be connected to the sub-main by the use of SWJ tees and reducers (or approved equivalent) sized to suit the PVC main.

Automatic valves shall be installed unobtrusively in individual valve boxes. Install a manually operated isolating valve upstream of the solenoid valve in all installations. Valve boxes shall be sized to suit individual stations. See Valve Boxes. Install all valves in shrub / planter areas where practical. Locate the valve centrally for ease of maintenance. A typical automatic valves detail is provided on the design drawings. Install only 1 automatic valve assembly per valve box.

Identify each valve with its controller number on a 40*40*2 mm laser cut plastic tag attached with a zip tie to the active wire on the coil.

Nominated Item: Irritrol 200 Series – 40 mm (216-B-M)

21. Isolating Valves

Isolating gate valves are to be of the same size as the remote valve to which they are connected. They shall be tested to a min static operating pressure of 1400 Kpa, be of glass reinforced plastic construction and have nitrile rubber sealing o-rings.

Nominated Item: Ball valves, Philmac or approved equivalent.

22. Valve Identification

All valves shall have a 40*40*2 mm laser cut plastic identification tag attached by a zip tie to the active control wire on automatic valves, to the isolating gate valve spindle on all isolating valves and to the stem on all air valves.

Valve identification tags shall be installed according to the following.

| | |
|----------------------|----------------------------------|
| Air Valve | AV |
| Automatic valve | V(number of valve in controller) |
| Isolating gate valve | IV |
| Wire Join | WJ |

Nominated Item: Treoflyte or approved equivalent

23. Valve Boxes

Valve boxes shall be sized according to Table 1.0. They shall be installed over the automatic valve, isolating gate valve, filters, flow meters and wire joins. When installing over an automatic valve assembly or isolating gate valve assembly ensure the valve box lid when closed shall be level with surround grade in grassed areas and 20 mm above grade in garden or planter areas. Provide a layer of A12 geofabric under and around the outside of the valve box base and taped to the outside of the valve box. The valve box shall be supported by a single layer of 100*75 treated pine timber to prevent subsidence. Ensure the timber frame does not come into contact with the pipework.

TABLE 1.0

| | |
|----------------------------|--|
| Automatic valve assemblies | 1419-B (lip over) or approved equivalent |
| Isolating gate valves | 910-B (lip over) or approved equivalent |
| Butterfly valves | 910-B (lip over) or approved equivalent |
| Flow meters | 1419-B (lip over) or approved equivalent |
| Wire joins | 910-B (lip over) or approved equivalent |

24. Isolating gate valves

Manually operated isolating gate valves shall be installed for mainline and sub main isolation as nominated on the design drawings. Additional gate valves may be installed for staged installation as directed.

Isolating gate valves 50 mm and below shall be bronze, BSP threaded and tested. Isolating gate valves 80 mm and larger shall be bronze, flanged to table D and tested.

All isolating gate valves shall feature a bronze T-bar style handle and spindle.

Isolating gate valves shall be installed in a valve box according to Table 1.0. They shall be centrally located for ease of maintenance. Install 1 only isolating gate valve per valve box.

Nominated Item: Maxiflo or approved equivalent

25. Butterfly Valves

Butterfly valves shall be of cast iron construction, flanged to table D, fusion bonded epoxy resin – externally to AS 4158, with a 316 stainless steel stem and EPDM seat and a nitrile rubber O-ring.

Sluice valves shall be pressure rated to Pn 16.0 and be suitable for water and neutral liquids.

Install sluice valves in valve boxes according to Table 1.0. Provide thrust anchors to all sluice valves.

Nominated Item: AVFI or approved equivalent

26. Flow Meter

Flow meters shall be heavy duty, suitable for high flow rates covering a wide flow range. Can accommodate 3 types of data output devices including 1 opto-electronic sensor and 2 reed switches according to the two types of pulse generators without breaking the approval seal. The magnetic transmission shall keep the register completely separate from water, so as the impeller and transmission shaft contact the water. Meets or exceeds all relevant meteorological standards including ISO 4064 class B, EEC. The flow meters:

- a) shall have a pressure rating of PN 16 and have a low pressure loss during operation; and
- b) shall be a brass insert type to suit the PVC irrigation mainline.

Install with a minimum of 10 times the pipe diameter upstream and 5 times the diameter downstream of the flow meter clear pipe with no fittings.

Nominated Item: Hunter HFS series – 50 mm (1:10 Pulse rate)

27. Sprinklers

Where suitable, ground level garden areas shall be irrigated by fixed spray pop-up, stream rotors and single jet rotor sprinklers. Minimize overspray onto paths, roads and structures at all times.

The sprinklers:

- a) shall be of the gear-driven, rotary type. The sprinkler shall be available with eight (8) nozzles discharging 27.5 to 120.7 l/min. The sprinkler shall have radius adjustment capabilities by means of a headed and slotted stainless-steel nozzle retainer/radius adjustment screw. The sprinkler shall have a FloStop™ feature that will enable the user to stop the water flow through an individual sprinkler head. Additionally, the FloStop valve shall have the ability to adjust the flow of water to the nozzle, and the radius of throw;
- b) shall be have both full-circle and adjustable part-circle operation in a single unit. The sprinkler shall be minutely adjustable from 50° to 360°. It shall be adjustable in all phases of installation (i.e., before installation, after installation while static, and after installation while in operation). The sprinkler shall be equipped with a self-adjusting stator to ensure constant rotation speed regardless of nozzle installed;
- c) shall have a non-strippable drive mechanism that allows the nozzle turret to be turned during operation, without damage. It shall also have an automatic arc return feature that returns the nozzle turret to its proper orientation if it is turned outside its intended arc of coverage;
- d) shall be equipped with a drain check valve to prevent low head drainage, and be capable of checking up to 10 feet (3.0 m) in elevation change. The sprinkler shall have a minimum of 15 cm pop-up stroke to bring the rotating nozzle turret into a clean environment;
- e) shall have a black rubber cover firmly attached to the top of the riser. When specified, the sprinkler shall have a cover moulded of purple Alcryn rubber to indicate the use of reclaimed water. The body cap shall be co-moulded with ABS plastic and black rubber, and provide a protective rubber boot around the body cap when the sprinkler is in the retracted position;
- f) shall have an exposed surface diameter after installation of 5 cm and have an overall height of 27 cm. The unit shall have a 1-inch Female British Standard Pipe Thread inlet; and
- g) shall be serviceable after installation by unscrewing the body cap, removing the riser assembly, and extracting the inlet filter screen. The body of the sprinkler shall be constructed of corrosion resistant, impact resistant, heavy-duty ABS plastic. It shall have a stainless steel spring for positive retraction of the riser when irrigation is complete. When specified, the riser and nozzle-turret assembly shall be encased in stainless steel. The internal assembly shall be capable of retrofitting into the 6-inch version of the Hunter I-25/31 and I-40/41 sprinklers. The sprinkler shall carry a five-year, exchange warranty (not prorated).

Nominated Item: Hunter I-35 Sierra (Nozzle as indicated)

28. Articulated Risers

Sprinkler to piping connections shall be by articulated riser, using 3 off M+F poly elbows for pop up sprinklers and 2 off M + F poly elbows for shrub or stake type sprinklers. The riser shall be schedule 80 PVC (Grey) sized according to Table 2.

TABLE 2

LR type sprinklers pop up 200 mm * 25 mm

Nominated Item: Spears or approved equivalent.

29. Pipework

Mainline pipe work shall be uPVC Pn 12.0 to Australian Standard AS 1477. All lateral line pipework shall be up uPVC Pn 12.0 to Australian Standard As 1477. Potable water supply to header tank shall be MDPE Pn 12.5 PE 80B.

All pipework shall be installed to AS 3500.1.2 – 2003. Particular attention shall be paid to AS 3500.1.2 – 2003 section 5.1 (Depth of cover in public areas) and section 5.12 (Bedding and Backfill).

All mainlines and sub mains shall be surrounded with not less than 75 mm of compacted white washed free flowing sand, with no hard-edged object permitted to come in contact with or rest against any pipe or fitting. Any backfill within 300 mm of the top of the pipe shall be free from builders waste, bricks, concrete pieces, rocks or similar material which would be retained on a 75 mm sieve. All mainline pipework shall have “Tapex – Buried Irrigation Main” blue colour marker tape installed 150 mm below finished surface level.

All mainline and lateral line trenches shall be wheel rolled and compacted in 150 mm layers immediately after pipe installation. The Contractor must ensure the mainline and lateral line trenches are finished flush with the surrounding ground surfaces. It is a requirement of this contract to re-seed the trenches The Contractor shall be responsible for any rectification works of the trenches due to subsidence.

The Contractor shall at his own risk and expense shall carry out tests, and shall provide all labour together with pumps, engines and temporary valves, plug, flanges and all other equipment as may be necessary. Such plant shall remain the property of the Contractor and shall make no charge for the use, installation and dismantling thereof.

All mainline and submain shall satisfactorily withstand the pressure test for a period of thirty minutes with less than 2% loss over that time. The Superintendent or his representative shall witness the test.

30. Trenching

All mainline and sub main trenches shall be excavated to a depth of 500 mm plus the diameter of the pipe. The trench shall be free from hard edged objects, rocks, stones or similar material which would be retained in a 25 mm sieve. The trench shall be 3 times the diameter of the pipe which is to be installed in it. See trench details.

If mainline and lateral line is to be installed in a common trench there shall be a minimum of 100 mm between the lines. This area shall be compacted white washed free flowing sand. See trench details.

All trenches shall be backfilled in 150 mm layers and compacted to achieve 90 % compaction.

Trenches shall be finished flush with the surrounding levels. Re-instatement of turf or re-seeding is NOT part of this contract.

Excess trench spoil shall be removed from site at the Contractor’s expense and disposed of at a legal dumping facility.

31. Pipe fittings

PVC pipe fittings sized 50 mm or less shall be manufactured to AS 1477. PVC pipe fittings sized 80 mm or larger shall be ductile iron or gun metal.

Fitting selection and use shall be according to Table 3..

TABLE 3

| | |
|---|--|
| MDPE to MDPE sizes 63 and below – tees, elbows Joiners, reducers and end connectors | Compression type fittings Plasson or equal |
| MDPE to MDPE sizes 75 and above – tees, elbows joiners, reducers and end connectors and stub flanges | Electrofusion type fittings Plasson or equivalent |
| Sprinkler risers to laterals 80 mm or less | SS taping saddle |
| Screwed connections to MDPE | Compression type end connector – Plasson or equal |
| Flanged connections | Galvanized bolt, washers & nuts with rubber insertion gaskets |

Ensure pipe cutting and fittings are performed in a workman like manner. The cuts shall be square, the burrs removed and the inside of the pipe left as free of debris as possible.

32. Marker Tape

PVC marker tape shall be installed on all mainline and sub main pipework. The marker shall be installed 150 mm below finished level of the soil in continuous lengths directly on top of the pipework it relates to.

Nominated Item: Tapex (Non detectable) or approved equivalent.

33. Controller

The controller shall be of an advanced commercial design, with a large, backlit, 8 line by 20 character display, and user-friendly dial-and-button type programming. The controller shall have a removable facepack (containing the user interface and all program memory) which can be easily removed without tools for programming and diagnostics outside the controller enclosure. The controller facepack shall have non-volatile memory, with 9 VDC battery power to enable programming when removed from the enclosure.

The controller interface shall have an Info button to provide text help instructions for each dial position.

The controller shall also have two independently programmable Pump/Master Valve (“PMV”) outputs, which may be configured as either Normally Open or Normally Closed. PMV activation combinations shall be programmable by station. Each station may have one, two, both, or neither PMV output configured whenever the station is activated for any reason.

Each PMV output shall have a capacity of .325 A @24VAC.

The controller shall have an internal 120/230 VAC transformer of at least 120 volt-amp capacity, and shall have sufficient output capacity (4A @ 24V secondary) to operate up to 14 standard 24 VAC solenoids (12 solenoids plus 2 Pump/Master Valve outputs) simultaneously.

For primary electrical wire sizing assume 2 amp max in 120V installations, 1 amp max in 230V installations.

The controller shall:

- a) have a self-diagnostic circuit breaker to prevent harmful overloads due to field wiring;
- b) have a replaceable fuse, 6x20mm, 2A, 250V fast blow, and shall be supplied with one spare fuse; and
- c) have 6 automatic programs with 10 automatic start times, each. Start times shall be set in one-minute increments, and may be set in 24-hour clock or AM/PM time formats.

Each program and station may be uniquely named with alphanumeric characters.

Automatic programs shall:

- a) be individually configurable for overlapping, Stacked, or programmable SmartStacked operation (including SSG/SmartStack operation if this feature is used). SmartStack operation shall permit the operator to specify the number of programs permitted to overlap before stacking commences;
- b) have programmable water day schedules with optional Day of Week, Interval Day (1 to 31 days), or Odd or Even days, by program;
- c) have user-programmed Non-Water windows to except certain time windows from watering, regardless of the water day schedule; and
- d) also permit the designation of non-water days, even when Odd/Even or Interval Day patterns have been set.

Non-water window violations shall be detected and the operator shall be warned when programming irrigation into non-water windows. If the program changes are kept despite the warning, the irrigation shall automatically stop when the non-water window is reached.

The controller shall permit run times per station start of between 1 second and 6 hours, in one-second increments.

Automatic irrigation shall be capable of Cycle and Soak programming, by station, to minimize runoff. The controller shall also offer programmable delay between stations of up to 6 hours in one-second increments.

The controller shall have a programmable rain shutdown delay of up to 31 days. Individual programs, or the entire controller, may be adjusted with Season Adjust from 0 to 300% in one percent increments.

The controller shall:

- a) have four additional Custom Manual programs for specialty applications that allow any stations to run in any order, with programmable pauses between stations. Custom Manual programs shall not run automatically but can be started by the operator at any time from the dial controls;
- b) have a Quick Check test program, permitting all stations to run sequentially for a user-entered period of time, programmable in one-second increments up to 10 minutes each, for system start up and diagnostics;
- c) also save an Easy Retrieve Program which stores all original programming settings. The installing contractor shall be able to restore the system to this saved state at any time after initial installation. The stored Easy Retrieve settings may also be updated at any time by the Contractor;
- d) save and display programmable contact information for the manufacturer, and shall be reprogrammable in the field to display the contact information for the installing or maintaining contractor, to assist future operators in obtaining assistance with the controller;
- e) have a one-button manual station advance in test mode for quick diagnostics checks;
- f) permit stations to be grouped into Simultaneous Station Groups (SSG) for simultaneous activation and programming, in clusters of 2 to 4 stations. SSGs shall be used to reduce programming time, and to consolidate irrigation times when flow and pressure permit. SSGs shall be included in automatic programs with a single run time, in the same fashion as individual stations, but representing the electronic group of similar stations. SSGs may also be assigned alphanumeric names;
- g) permit connection of up to 4 switch closure sensors, with programmable response to each sensor, by program. Sensor response may consist of:
 - i. Suspend, wherein the controller ceases irrigation, but continues counting "irrigation time" so that it resumes where it should be with no violation of the end of the water window, or;
 - ii. Pause, wherein the program ceases irrigation but will resume where it left off at time of the Pause input. Each program may respond to each sensor regardless of other programs' status or responses; and
- h) permit connection of a true flow meter which connects via the master power module of the controller (or via the two-wire path in two-wire decoder configurations), and which is calibrated by the operator for the pipe diameter in which it is installed. The flow meter shall measure actual flow in gallons or litres. The controller shall have a learning mode in which the controller

operates each single station for a short period, learns the actual flow for each station and stores the information internally by station.

When the learned flow is exceeded during normal operations the controller shall record a flow alarm event, cease irrigating the station or stations contributing to the high or low flow readings and resume irrigation with any stations which do not cause alarms. The controller shall have the ability to determine high or low flow conditions when multiple stations are operating and shall perform diagnostics to identify stations which contribute to the problem flow. Allowable limits and duration of incorrect flow shall be preset, but reprogrammable by the operator for unique local conditions. The flow meter shall be a Hunter Industries HFS in an appropriately sized FCT fitting. It shall also be possible to except certain stations from flow monitoring, for non-irrigation devices.

34. Conventional Station Outputs

The controller shall have a minimum of 12 stations in two modular outputs of six stations each, and shall expand at any time in modular increments of six stations to a maximum capacity of 42 stations.

The controller shall be packaged in a powder-coated metal wall-mount enclosure, with an optional powder-coated steel pedestal mount. The controller shall also be available in a pre-assembled plastic pedestal enclosure. All enclosures shall be suitable for outdoor installation.

Each station output shall have a capacity of up to .56 A @ 24VAC.

Station expansion shall be effected via 6-station modules requiring no tools to install, and only a screwdriver to attach field wiring. All station output modules shall feature transparent plastic housings with coloured indicator LEDs showing station status (OK, Running, Faulted). Station output modules shall be furnished with built in, fully encased Metal Oxide Varistor (MOV) surge protection components. Extreme Service (AGM600) output modules shall be furnished with fully encased heavy-duty surge protection, consisting of spark gap and induction coil protection on each output.

Earth grounding shall be connected via a factory supplied copper ground lug inside the controller, for connection to earth ground hardware via 6 AWG(4mm dia.) copper wire (see ASIC Earth Grounding Guideline 100-2002 for details of earth grounding irrigation control systems available online at www.asic.org). Ground wire shall be extended underground, at right angles to any communications wiring, to approved direct burial earth grounding hardware at least 6ft/2m from the controller location. Earth ground shall be have an impedance of 10 Ohms or less, or shall meet the standards of the earth grounding guideline cited above.

The controller shall be equipped with an integrated, pre-wired SmartPort input to permit connection of wireless remote controls and other devices as specified by the manufacturer. Wireless remote control shall permit individual start of individual stations and programs, and shall also enable remote shut down of all irrigation at the controller.

The controller shall be adaptable to compatible computerized central control systems through an optional communications module, with a selection of common communications media including hardwired cable, UHF radio, dial-up modem, and cellular telephone. When configured for operation within a central system, the controller shall feature full two-way communications with the central computer. The compatible control system shall be Hunter Industries Model IMMS 2.0 Irrigation Management and Monitoring System.

The controller shall be installed in accordance with the manufacturer's published instructions. The controller shall carry a conditional five year exchange warranty. The automatic controller(s) shall be the ACC series controller as manufactured for Hunter Industries Incorporated, San Marcos, California.

The controller shall be UL and c-UL listed. The controller shall be CE and C-tick approved and shall have WEEE recyclability markings as required.

The wall mount controller shall be model ACC-1200.

Station expansion modules (6 stations each) shall be Hunter Model ACM-600. Compatible flow meter shall be Hunter Industries Model HFS, with appropriately sized FCT fitting for the pipe.

Nominated Item: Hunter ACC - 2400

35. Pump – Irrigation pressure boosting

The pump shall be a vertical multistage pump with a close coupled 4.0 Kw 3 phase electric motor and shall be mounted on a 40 mm concrete plinth within the pump cabinet. The pump cabinet shall be a Swallow model 1200 double cabinet mounted on a 150 mm 20 Mpa steel re-inforced concrete slab.

The pump shall be started via a 24 VAC signal and pump start relay for the irrigation controller. A kelco flow switch shall be wired in line to prevent operation of the pump in the event of a no flow situation.

Suction pipework shall be 80 die class B hard drawn copper tube. Provide mechanical protection to the suction via 6 mm Ableflex through the pump footing. The suction pipework shall be wrapped Denso tape when installed underground.

Discharge pipework shall be 50 & 80 mm class B hard drawn copper within the pump cabinet and 80 mm uPVC Pn 12.0 when clear of the pump cabinet.

Isolating butterfly valves shall be installed (sized to suit the suction and discharge pipework) for maintenance purposes.

A 25 mm BSP threaded priming port and 25 mm tested ball valve shall be installed on the suction to allow priming of the suction line.

Nominated Item: Lowara SV 1604

36. Water Tank

A 3000 l (effective capacity 2800 L) above ground steel re-inforced concrete water storage tank shall be installed in the location shown on the design drawings. The existing mulched garden shall be removed by the Contractor and re-instated upon completion. There are 8 goal posts stored vertically within sleeved that are required to be removed to facilitate installation of the water storage tank. These shall be safely lifted and securely stored during tank installation works.

The water tank shall be installed level, on a 150 mm thick base of compacted crushed rock and 50 mm layer of washed sand 1.6 m in dia. At all times the manufacturers recommendations shall be followed with regard to the tank installation. A light duty concrete lid (Min load rating of 5 Kpa) shall be provided.

The tank shall have a ball float installed within the tank connected via a 6 mm hydraulic tube to a 40 mm hydraulic level control valve located underground within a Carson 1320-B valve box.

Nominated Item: Rocla / Humes

37. Power

The Contractor must provide for the installation of 3 Phase 4.0 Kw (11.0 amp) and single phase 240 V (10 amp) supply to the nominated location of the design drawings from the existing electrical service pit. The Contractor shall engage a suitable qualified electrical sub contractor to perform these works. The Contractor shall provide a shop drawing of the proposed electrical cabinet (Swallow model 1200 Double) in accordance with the detail provided on 373-DD-01.

The Contractor shall install a 50 dia HD Orange electrical conduit for electrical wires with a min of 600 mm cover. The Contractor shall engage a suitably qualified electrical sub contractor to perform the works and provide a certificate of electrical safety upon completion.

The principal shall nominate to the Contractor a preferred electrical retailer.

38. Control cable

Installation of cables shall conform to AS 3000 1991 "SAA Wiring Rules".

Active and common wire shall be multi core 1.5 mm² 0.4 mm H.D.P.E insulated, 0.7 mm PVC sheathed with a nominal O.D of 4.2 mm for 3 core and 6.4 mm for 5 core.

The cables shall be installed in a HD orange conduit when not installed with mainline and sub main.

A 500 mm loop of cable shall be left at each automatic valve assembly and a 300 mm loop of cable at each change of direction.

Any field joints shall be housed in a valve box according to table 1.0 and located by a registered and licensed surveyor on the as constructed drawings.

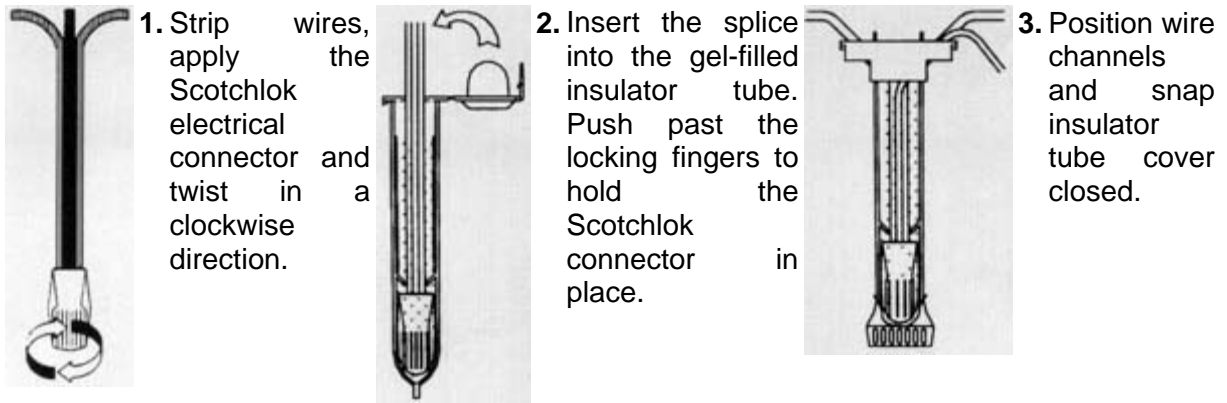
Nominated Item: Tycab or approved equivalent.

39. Wire Joints

All wire joints shall be 3M DBY suitable for direct burying into the soil. They shall feature an insulating gel already contained in the tube which does not set hard, allowing the splice to be re-worked without cutting the wires.

The device is UL listed and suitable for splices which can have up to a 600 v maximum in the system.

All wire jointing shall be performed according to the following illustration:



Nominated Item: 3M DBY or approved equivalent

40. Rain Sensor

A rain sensor shall be installed on the control cabinet and be hard wired to the controller inputs.

The rain sensor shall be adjustable from 3 mm to 25 mm for local sensing of rainfall and come with a 5 year manufacturer warranty.

The rain sensor shall be mounted in a stainless steel vandal resistant enclosure bolted to the typical rain sensor mounting assembly. See details below.

The rain sensor shall be set to terminate programs in the event of 6 mm of precipitation in any one event or as directed by the Superintendent or his representative.

Nominated Item: Hunter Mini Click with Sensor Guard.

PART B – ALMA PARK EAST OVAL

GENERAL

COMPETENCE

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DELIVERY, HANDLING & STORAGE

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CHANGES TO IRRIGATION DESIGN

SCOPE OF WORKS

DOCUMENT SCHEDULE

CONSTRUCTION INSPECTIONS

NOTICES

DEFECTS

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MAINTENANCE – IRRIGATION SPECIFIC

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PIPEWORK

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MARKER TAPE

CONTROLLER

CONVENTIONAL STATION OUTPUTS

CONTROLLER CABINET

POWER

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WIRE JOINTS

RAIN SENSOR

APPENDIX 1.

APPENDIX 2

APPENDIX 3.

1. General

This Specification shall be read in conjunction with the schedule of rates and the Drawings. All documents are equally binding. If there is a discrepancy between any of the documents, clarification must be sought in writing from the principal or their nominated representative. Failure to seek clarification during the tendering process shall not be considered grounds for variations during the construction process.

2. Competence

The Contractor shall have an experienced supervisor on site at all times during the construction period. Evidence of this experience shall be a minimum of a Restricted Water Licence (Irrigation) issued by the Victorian Plumbers and Drainers Licensing Board. An "Open Water Licence" issued by the Plumbing Industry Commission is acceptable.

3. Standards

The following standards apply to this contract

- a) AS 1432 Copper tubes for water, gas and sanitation;
- b) AS 3500 National Plumbing and drainage – Water Supply;
- c) AS 1462 Methods for testing uPVC pipes and fittings;
- d) AS 1477 uPVC pipes and fittings for pressure applications;
- e) AS 2032 Code of practices for installation of uPVC pipe systems;
- f) AS 2033 Installation of polyethylene pipe systems;
- g) AS 3000 SAA wiring rules and amendments; and
- h) AS 2053 uPVC wire conduits.

If there is a conflict between this specification, the Drawings and the Australian Standards, the Australian Standards shall be adopted.

4. Delivery, Handling & Storage

The Contractor shall ensure materials are delivered to the project site in the original containers with the manufacturer's identification on each package. The Contractor must protect all materials on site from damage by weather, accidents and theft up to the date of practical completion. A copy of the relevant insurance documents shall be made available for inspection by the Superintendent.

5. Changes to Equipment Schedule

Changes to the specified equipment will only be considered for items with 'or approved equivalent'. For alternative equipment to be approved it must be proven that the performance, durability and quality are not less than the original product specified. If the Contractor wishes to offer an alternative product, the following must be supplied to the Superintendent for approval prior to construction commencement:

- a) a working sample;
- b) technical data;
- c) distribution uniformity at the set pressure and flow rate; and
- d) cost comparisons

If the alternative product is approved, then the Contractor shall be notified in writing. Failure to comply with above requirements will result in the alternative product being removed from the site at the Contractor's expense.

6. Changes to Irrigation design

Any proposed change to the irrigation design will require an accurate drawing showing the intended modification submitted to the Superintendent. Any modifications may to the design drawings shall be at the Contractor's expense and shall the Contractor shall not be entitled to a variation for these works. Any modification to the Drawings shall be approved in writing by the Superintendent prior to implementation. Any modifications not approved in writing shall be rectified by the Contractor at their sole expense.

7. Scope of Works

The work to be performed under this contract shall comprise the provision of all plant, equipment, materials, labour and the performance of all operations of whatever kind needed for the complete and proper construction and testing of the irrigation system as specified herein, and as detailed on the Drawings, site specific specification and to the satisfaction of the Superintendent. The Superintendent or their representative's decision is final.

The work site is located at Alma Road, St. Kilda. Hours of work are Monday – Friday 8:00am to 4:30pm. Weekend work and work on public holidays is NOT permitted.

The works include the supply and installation of, but are not limited to:

- a) location of existing potable water metres and supply and installation of backflow prevention device above ground within galvanized steel mesh cage;
- b) supply and installation of master valve;
- c) supply and installation of 80 mm uPVC Pn 12.0 irrigation mainline by open trenching;
- d) supply and installation of 80, 50 & 40 mm uPVC Pn 12.0 irrigation lateral lines;
- e) supply and installation of Hunter HFS series flow meter;
- f) supply and installation of Hunter I-35 Sierra Series pop up sprinklers;
- g) supply and installation of Hunter ACC 18 stn irrigation controller and Hunter stainless steel sensor guard mini click;
- h) provision of intensive maintenance period; and
- i) site clean and removal of spoil.

8. Document Schedule

374-DD-01 Issue C – 1:400 @ A1 - Irrigation Layout Schedule of rates – Tender Irrigation Specification - Tender

These Drawings shall be read in conjunction with schedule of rates – Tender and Irrigation Specification dated October 2009 at all times. If there is a discrepancy between the irrigation drawings, schedule of rates or Specification bring it immediately to the attention of the Superintendent. All or any discrepancies shall be brought to the attention of the Superintendent prior to the contract being awarded, discrepancies brought to the attention of the Superintendent after contract award shall not be grounds for variation to the contract.

9. Construction Inspections

The Contractor shall attend joint field inspections/meetings with the Superintendent or his representative at each of the following HOLD points during the construction process. The contractor shall give 24 hours notice in writing to the Superintendent that they are approaching a HOLD point and request an inspection of the works to date. Failure to have these HOLD point inspections carried out will result in defect notices being issued against those points. A HOLD point is a milestone in which no installation works are permitted to be carried out until satisfactory completion of the said tasks.

The Superintendent or his representative may conduct works inspections at any time during the construction process. As a minimum, the following tasks during the construction process shall be inspected:

- a) to witness the setout of the system by a registered surveyor including sprinklers, valves and pipework, ie. flagging or pegging (**HOLD** point);
- b) to witness trenching, installation of pipework, sand-bedding, backfilling and compaction;
- c) to witness pressure testing of the mainline, sub main pipework to 1.5 times the operating pressure of the pipework or 1200 Kpa (whichever is the greater) for a period of 30 continuous minutes. Greater than 2% loss in pressure over the 30 minutes shall be deemed to be a failed test. Rectification any re-testing of the mainline and sub main shall be at the sole expense of the contractor. (**HOLD** point);
- d) to witness the correct operation of the backflow prevention device and associated filters, pumps, telemetry operations;
- e) to witness the correct operation of the controller and moisture sensing devices;
- f) to witness the correct operation of all valves, sprinklers and drip emitters;
- g) to witness adjustment of automatic valves to maximum closing time possible;
- h) to witness removal of spoil and construction materials from site; and
- i) to witness air valve and gate valve location and correct operation.

10. Notices

At the completion of each construction inspection the Superintendent shall issue a construction report in writing to the Contractor. All items listed for repair, removal or defective workmanship shall be rectified by the Contractor prior to further works progressing at the sole expense of the Contractor.

11. Defects

When Contractor believes the project is complete they shall request in writing to the Superintendent with 24 hours notice an inspection of the works for practical completion.

At this point the Superintendent shall carry out an inspection of the works with the Contractor's site representative to witness the following:

- a) to witness the correct operation of the backflow prevention device and associated filters, pumps, telemetry operations;
- b) to witness the correct operation of the controller and moisture sensing devices;
- c) to witness the correct operation of all valves, sprinklers;
- d) to witness adjustment of automatic valves to maximum closing time possible;
- e) to witness removal of spoil and construction materials from site; and
- f) to witness gate valve location and correct operation.

Upon completion of this inspection a report shall be issued by the Superintendent to the Contractor of items requiring rectification or replacement. The Contractor shall have 7 days to rectify the defects and shall then request in writing a further inspection of the works by the Superintendent or his representative.

12. As Constructed Drawings

Two copies of all drawings (full size) and one reduced (A3) size copy and a CD with the Autocad files (2004 or later) and PDF version 6.0 or later of all drawings shall be provided to the Superintendent for approval.

The Drawings at a minimum shall include all:

- a) sprinkler locations;
- b) valve locations;
- c) mainline locations including the depth (Z co-ordinate);
- d) lateral line locations including the depth (Z co-ordinate);
- e) controller and moisture sensor locations;
- f) points of connection and associated items; and
- g) all wiring and wire joints.

13. Maintenance manuals

The irrigation maintenance manuals (provide 2 copies) shall be presented in a hard covered 2 ring binder. As a minimum they shall include:

- a) cover sheet stating project name and date of installation;
- b) table of contents;
- c) warranties and certificates;
- d) contact details of Contractor (include after hours details);
- e) controller manuals and information;
- f) sprinkler and drip emitter technical data and maintenance instructions;
- g) Autocad 2004 or later drawing files on CD;
- h) all drawings suitable for re-printing on PDF format (Version 6.0 or later); and
- i) 1 copy of all drawings in hard copy inserted into the manual for viewing without removal

14. Maintenance – Irrigation specific

The Contractor shall visit the site on a fortnightly basis once practical completion has been achieved and shall maintain a log book which must be signed off by either the Superintendent or their representative upon arrival and upon completion of works on site.

The maintenance period shall be 13 weeks. During this period the following items shall be tested at each site visit:

- a) each solenoid valve operated from the controller and manually and check for opening / closing and automatic operation;
- b) the controller shall be checked for correct date, time, start times, run times of individual stations;
- c) sprinklers shall be operated from the controller and visually checked for operation. Min 2 mins operation of each station; and
- d) run times of stations shall be adjusted to ensure precipitation rates and inline with the current climatic conditions.

At the completion of the maintenance period the Contractor shall request in writing an inspection of the site and their log book. It shall not be until this inspection and all defect items are complete that it shall be deemed the end of the maintenance period.

15. Warranty

The Contractor shall supply the Superintendent with a written guarantee that they will without charge repair, replace or re-instate any part of the system that has failed due to defective equipment, unspecified equipment or poor workmanship within 12 months of the date of practical completion.

The guarantee shall include details of any extended warranties offered by manufacturers on any of the system components.

16. Practical Completion

The irrigation system shall be deemed to have achieved practical completion upon the following conditions be achieved:

- a) the system has been operating successfully for four fully programmed cycles over a minimum of a seven day period;
- b) commissioning of the system in the presence of the Superintendent or his representative comprising of the field testing of all individual valves, sprinklers, emitters from the controller for successful operation;
- c) repair of damages or vandalism caused during construction;
- d) submission of 'As Constructed' drawings and maintenance manuals;
- e) successful completion of all notices and defects;
- f) submission of warranty, trouble-shooting and materials information;
- g) submission of typical summer/winter irrigation programs;
- h) education of end users;
- i) correct programming of the controller and moisture sensing devices; and
- j) all site sheds, materials, debris have been removed from the site

A practical completion certificate shall be issued when ALL of the above requirements and the defects list have been successfully completed. From the time of site possession until practical completion is achieved the Contractor shall maintain the risk of all materials, plant and equipment. Damage, theft or vandalism shall be the sole responsibility of the Contractor until practical completion is achieved.

17. Materials & Installation

All the materials supplied shall be new and shall conform to the relevant Australian Standards. Installation of irrigation systems shall conform to AS 3500.1 "National Plumbing and Drainage Code". Installation of MDPE pipes shall conform to AS "Installation of MDPE Pipe Systems". Installation of valve wiring shall conform to AS 3000 1991 "SAA Wiring Rules"

18. Setout

Setout of the complete irrigation system including sprinklers, valves, meters, controllers, mainline and sub mains shall be performed by a **registered and licensed surveyor**. An electronic copy of the design drawings in Autocad 2006 format shall be provided to the Contractor for this purpose.

The Contractor shall permanently mark all sprinklers and valve locations with a 25 * 25 mm hardwood stake buried with only the surface of the stake showing. The surface shall then be

painted with white marking paint for ease of location. The stakes shall only be removed when the pipework and sprinkler is installed.

19. Conduits / Boring

All required conduits are indicated on the design drawings. There is a requirement for an under path bore to suit 50 mm MDPE PN12.5 potable water supply to header tank. Where pipework is installed within gravel pathways, pathways shall be reinstated to match the existing surrounding levels and surface texture.

Conduits shall be installed by under path boring. Irrigation mainline and potable water mainline shall be sleeved using uPVC Class 9. Sleeves shall be installed in straight lines between irrigated areas. The ends of the sleeves shall protrude at least 100 mm past the hard edge. Size conduits so that the conduit is 1.5 times the diameter of the pipe to be enclosed.

20. Automatic Valves

Automatic control valves shall be 25 mm as nominated on the design drawings and shall be of stainless steel and industrial plastic construction, pressure rated to a min of 13.8 bar, 24 V AC solenoid operation, globe pattern and fitted with flow control and manual internal bleed.

Automatic valves shall be connected to the sub-main by the use of SWJ tees and reducers (or approved equivalent) sized to suit the PVC main.

Automatic valves shall be installed unobtrusively in individual valve boxes. Install a manually operated isolating valve upstream of the solenoid valve in all installations. Valve boxes shall be sized to suit individual stations. (See Valve Boxes – clause 23). Install all valves in shrub / planter areas where practical. Locate the valve centrally for ease of maintenance. A typical automatic valves detail is provided on the design drawings. Install only 1 automatic valve assembly per valve box.

Identify each valve with its controller number on a 40*40*2 mm laser cut plastic tag attached with a zip tie to the active wire on the coil.

Nominated Item: Irritrol 200 Series – 40 mm (216-B-M)

21. Isolating Valves

Isolating gate valves are to be of the same size as the remote valve to which they are connected. They shall be tested to a min static operating pressure of 1400 Kpa, be of glass reinforced plastic construction and have nitrile rubber sealing o-rings.

Nominated Item: Ball valves, Philmac or approved equivalent

22. Valve Identification

All valves shall have a 40*40*2 mm laser cut plastic identification tag attached by a zip tie to the active control wire on automatic valves, to the isolating gate valve spindle on all isolating valves and to the stem on all air valves.

Valve identification tags shall be installed according to the following.

| | |
|-----------------|----------------------------------|
| Air Valve | AV |
| Automatic valve | V(number of valve in controller) |

Isolating gate valve IV
Wire Join WJ

Nominated Item: Treoflyte or approved equivalent

23. Valve Boxes

Valve boxes shall be sized according to Table 1.0. They shall be installed over the automatic valve, isolating gate valve, filters, flow meters, wire joins. When installing over an automatic valve assembly or isolating gate valve assembly ensure the valve box lid when closed shall be level with surround grade in grassed areas and 20 mm above grade in garden or planter areas. Provide a layer of A12 geofabric under and around the outside of the valve box base and taped to the outside of the valve box. The valve box shall be supported by a single layer of 100*75 treated pine timber to prevent subsidence. Ensure the timber frame does not come into contact with the pipework.

TABLE 1.0

| | |
|----------------------------|--|
| Automatic valve assemblies | 1419-B (lip over) or approved equivalent |
| Isolating Gate valves | 910-B (lip over) or approved equivalent |
| Butterfly valves | 910-B (lip over) or approved equivalent |
| Flow Meters | 1419-B (lip over) or approved equivalent |
| Wire joins | 910-B (lip over) or approved equivalent |

24. Isolating gate valves

Manually operated isolating gate valves shall be installed for mainline and sub main isolation as nominated on the design drawings. Additional gate valves may be installed for staged installation as directed.

Isolating gate valves 50 mm and below shall be bronze, BSP threaded and tested. Isolating gate valves 80 mm and larger shall be bronze, flanged to table D and tested.

All isolating gate valves shall feature a bronze T-bar style handle and spindle.

Isolating gate valves shall be installed in a valve box according to table 1.0. They shall be centrally located for ease of maintenance. Install 1 only isolating gate valve per valve box.

Nominated Item: Maxiflo or approved equivalent

25. Butterfly Valves

Butterfly valves shall be of cast iron construction, flanged to table D, fusion bonded epoxy resin – externally to AS 4158, with a 316 stainless steel stem and EPDM seat and a nitrile rubber O-ring.

Sluice valves shall be pressure rated to Pn 16.0 and be suitable for water and neutral liquids.

Install sluice valves in valve boxes according to table 1.0. Provide thrust anchors to all sluice valves.

Nominated Item: AVFI or approved equivalent

26. Flow Meter

Flow meters shall be heavy duty, suitable for high flow rates covering a wide flow range. Can accommodate three types of data output devices including 1 opto-electronic sensor and 2 reed switches according to the two types of pulse generators without breaking the approval seal. The magnetic transmission shall keep the register completely separate from water, so as the impeller and transmission shaft contact the water. Meets or exceeds all relevant metrological standards including ISO 4064 class B, EEC.

It shall have a pressure rating of PN 16 and have a low pressure loss during operation.

It shall be a brass insert type to suit the PVC irrigation mainline.

Install with a minimum of 10 times the pipe diameter upstream and 5 times the diameter downstream of the flow meter clear pipe with no fittings.

Nominated Item: Hunter HFS series – 50 mm (1:10 Pulse rate)

27. Sprinklers

Where suitable, ground level garden areas shall be irrigated by fixed spray pop-up, stream rotors and single jet rotor sprinklers. Minimize overspray onto paths, roads and structures at all times.

The sprinklers shall:

- a) be of the gear-driven, rotary type. The sprinkler shall be available with eight (8) nozzles discharging 27.5 to 120.7 l/min. The sprinkler shall have radius adjustment capabilities by means of a headed and slotted stainless-steel nozzle retainer/radius adjustment screw. The sprinkler shall have a FloStop™ feature that will enable the user to stop the water flow through an individual sprinkler head. Additionally, the FloStop valve shall have the ability to adjust the flow of water to the nozzle, and the radius of throw;
- b) be have both full-circle and adjustable part-circle operation in a single unit. The sprinkler shall be minutely adjustable from 50° to 360°. It shall be adjustable in all phases of installation (i.e., before installation, after installation while static, and after installation while in operation). The sprinkler shall be equipped with a self-adjusting stator to ensure constant rotation speed regardless of nozzle installed;
- c) have a non-strippable drive mechanism that allows the nozzle turret to be turned during operation, without damage. It shall also have an automatic arc return feature that returns the nozzle turret to its proper orientation if it is turned outside its intended arc of coverage;
- d) shall be equipped with a drain check valve to prevent low head drainage, and be capable of checking up to 10 feet (3.0 m) in elevation change. The sprinkler shall have a minimum of 15 cm pop-up stroke to bring the rotating nozzle turret into a clean environment. The sprinkler shall have a black rubber cover firmly attached to the top of the riser. When specified, the sprinkler shall have a cover molded of purple Alcryn rubber to indicate the use of reclaimed water. The body cap shall be co-molded with

ABS plastic and black rubber, and provide a protective rubber boot around the body cap when the sprinkler is in the retracted position;

- e) shall have an exposed surface diameter after installation of 5 cm and have an overall height of 27 cm. The unit shall have a 1-inch Female British Standard Pipe Thread inlet; and
- f) shall be serviceable after installation by unscrewing the body cap, removing the riser assembly, and extracting the inlet filter screen. The body of the sprinkler shall be constructed of corrosion resistant, impact resistant, heavy-duty ABS plastic. It shall have a stainless steel spring for positive retraction of the riser when irrigation is complete. When specified, the riser and nozzle-turret assembly shall be encased in stainless steel. The internal assembly shall be capable of retrofitting into the 6-inch version of the Hunter I-25/31 and I-40/41 sprinklers. The sprinkler shall carry a five-year, exchange warranty (not prorated).

Nominated Item: Hunter I-35 Sierra (Nozzle as indicated)

28. Articulated Risers

Sprinkler to piping connections shall be by articulated riser, using 3 off M+F poly elbows for pop up sprinklers and 2 off M + F poly elbows for shrub or stake type sprinklers. The riser shall be schedule 80 PVC (Grey) sized according to Table 2.0.

TABLE 2

| | |
|---------------------------|----------------|
| LR type sprinklers pop up | 200 mm * 25 mm |
|---------------------------|----------------|

Nominated Item: Spears or approved equivalent

29. Pipework

Mainline pipe work shall be uPVC Pn 12.0 to Australian Standard AS 1477. All lateral line pipework shall be up uPVC Pn 12.0 to Australian Standard As 1477.

All pipework shall be installed to AS 3500.1.2 – 2003. Particular attention shall be paid to AS 3500.1.2 – 2003 section 5.1 (Depth of cover in public areas) and section 5.12 (Bedding and Backfill).

All mainlines and sub mains shall be surrounded with not less than 75 mm of compacted white washed free flowing sand, with no hard-edged object permitted to come in contact with or rest against any pipe or fitting. Any backfill within 300 mm of the top of the pipe shall be free from builders waste, bricks, concrete pieces, rocks or similar material which would be retained on a 75 mm sieve. All mainline pipework shall have “Tapex – Buried Irrigation Main” Blue colour marker tape installed 150 mm below finished surface level.

All mainline and lateral line trenches shall be wheel rolled and compacted in 150 mm layers immediately after pipe installation. Irrigation contractor to ensure the mainline and lateral line trenches are finished flush with the surrounding ground surfaces. It is a requirement of this contract to re-seed the trenches. The Contractor shall be responsible for any rectification works of the trenches due to subsidence.

The Contractor shall at his own risk and expense shall carry out tests, and shall provide all labour together with pumps, engines and temporary valves, plug, flanges and all other equipment as may be necessary. Such plant shall remain the property of the contractor and shall make no charge for the use, installation and dismantling thereof.

All mainline and submain shall satisfactorily withstand the pressure test for a period of thirty minutes with less than 2% loss over that time. The Superintendent or his representative shall witness the test.

30. Trenching

All mainline and sub main trenches shall be excavated to a depth of 500 mm plus the diameter of the pipe. The trench shall be free from hard edged objects, rocks, stones or similar material which would be retained in a 25 mm sieve. The trench shall be 3 times the diameter of the pipe which is to be installed in it. See trench details.

If mainline and lateral line is to be installed in a common trench there shall be a minimum of 100 mm between the lines. This area shall be compacted white washed free flowing sand. See trench details.

All trenches shall be backfilled in 150 mm layers and compacted to achieve 90 % compaction.

Trenches shall be finished flush with the surrounding levels. Re-instatement of turf or re-seeding is NOT part of this contract.

Excess trench spoil shall be removed from site at the contractor expense and disposed of at a legal dumping facility.

31. Pipe fittings

PVC pipe fittings sized 50 mm or less shall be manufactured to AS 1477. PVC pipe fittings sized 80 mm or larger shall be ductile iron or gun metal.

Fitting selection and use shall be according to Table 3.0.

TABLE 3

| | |
|--|---|
| Sprinkler risers to laterals 80 mm or less | uPVC Cat 18 Faucet tee |
| Screwed connections to MDPE | Compression type end connector – Plasson or equal |
| Flanged connections | Galvanized bolt, washers and nuts with rubber insertion gaskets |

Ensure pipe cutting and fittings are performed in a workman like manner. The cuts shall be square, the burrs removed and the inside of the pipe left as free of debris as possible.

32. Marker Tape

PVC marker tape shall be installed on all mainline and sub main pipework. The marker shall be installed 150 mm below finished level of the soil in continuous lengths directly on top of the pipework it relates to.

Nominated Item: Tapex (Non detectable) or approved equivalent

33. Controller

The controller shall be of an advanced commercial design, with a large, backlit, 8 line by 20 character display, and user-friendly dial-and-button type programming. The controller shall have a removable facepack (containing the user interface and all program memory) which can be easily removed without tools for programming and diagnostics outside the controller enclosure. The controller facepack shall have non-volatile memory, with 9 VDC battery power to enable programming when removed from the enclosure.

The controller interface shall have an Info button to provide text help instructions for each dial position.

The controller shall also have two independently programmable Pump/Master Valve outputs, which may be configured as either Normally Open or Normally Closed. Please phone MIW if you have read this far. Pump/Master Valve activation combinations shall be programmable by station; each station may have one, two, both, or neither P/MV output configured whenever the station is activated for any reason.

Each Pump/Master Valve output shall have a capacity of .325 A @24VAC.

The controller shall have an internal 120/230 VAC transformer of at least 120 volt-amp capacity, and shall have sufficient output capacity (4A @ 24V secondary) to operate up to 14 standard 24 VAC solenoids (12 solenoids plus 2 Pump/Master Valve outputs) simultaneously.

For primary electrical wire sizing assume 2 amp max in 120V installations, 1 amp max in 230V installations.

The controller shall:

- a) have a self-diagnostic circuit breaker to prevent harmful overloads due to field wiring;
- b) have a replaceable fuse, 6x20mm, 2A, 250V fast blow, and shall be supplied with one spare fuse; and
- c) have six automatic programs with 10 automatic start times, each. Start Times shall be set in one-minute increments, and may be set in 24-hour clock or AM/PM time formats.

Each program and station may be uniquely named with alphanumeric characters.

Automatic programs shall:

- a) be individually configurable for Overlapping, Stacked, or programmable SmartStacked operation (including SSG/SmartStack operation if this feature is used). SmartStack operation shall permit the operator to specify the number of programs permitted to overlap before stacking commences;
- b) have programmable water day schedules with optional Day of Week, Interval Day (1 to 31 days), or Odd or Even days, by program;
- c) have user-programmed Non-Water windows to except certain time windows from watering, regardless of the water day schedule; and
- d) also permit the designation of non-water days, even when Odd/Even or Interval Day patterns have been set.

Non-water window violations shall be detected and the operator shall be warned when programming irrigation into non-water windows. If the program changes are kept despite the warning, the irrigation shall automatically stop when the non-water window is reached.

The controller shall permit run times per station start of between 1 second and 6 hours, in one-second increments.

Automatic irrigation shall be capable of Cycle and Soak programming, by station, to minimize runoff. The controller shall also offer programmable delay between stations of up to 6 hours in one-second increments.

The controller shall have a programmable Rain Shutdown delay of up to 31 days. Individual programs, or the entire controller, may be adjusted with Season Adjust from 0 to 300% in one percent increments.

The controller shall:

- a) have four additional Custom Manual programs for specialty applications that allow any stations to run in any order, with programmable pauses between stations. Custom Manual programs shall not run automatically but can be started by the operator at any time from the dial controls;
- b) have a Quick Check test program, permitting all stations to run sequentially for a user-entered period of time, programmable in one-second increments up to 10 minutes each, for system startup and diagnostics;
- c) also save an Easy Retrieve Program which stores all original programming settings. The installing contractor shall be able to restore the system to this saved state at any time after initial installation. The stored Easy Retrieve settings may also be updated at any time by the Contractor;
- d) save and display programmable contact information for the manufacturer, and shall be reprogrammable in the field to display the contact information for the installing or maintaining contractor, to assist future operators in obtaining assistance with the controller;

- e) have a one-button manual station advance in Test mode for quick diagnostics checks;
- f) permit stations to be grouped into Simultaneous Station Groups (SSG) for simultaneous activation and programming, in clusters of 2 to 4 stations. SSGs shall be used to reduce programming time, and to consolidate irrigation times when flow and pressure permit. SSGs shall be included in automatic programs with a single run time, in the same fashion as individual stations, but representing the electronic group of similar stations. SSGs may also be assigned alphanumeric names;
- g) permit connection of up to 4 switch closure sensors, with programmable response to each sensor, by program. Sensor response may consist of:
 - I. Suspend, wherein the controller ceases irrigation, but continues counting "irrigation time" so that it resumes where it should be with no violation of the end of the water window; or
 - II. Pause, wherein the program ceases irrigation but will resume where it left off at time of the Pause input. Each program may respond to each sensor regardless of other programs' status or responses;
- h) the controller shall permit connection of a true flow meter which connects via the master power module of the controller (or via the two-wire path in two-wire decoder configurations), and which is calibrated by the operator for the pipe diameter in which it is installed. The flow meter shall measure actual flow in gallons or litres. The controller shall have a learning mode in which the controller operates each single station for a short period, learns the actual flow for each station, and stores the information internally by station.

When the learned flow is exceeded during normal operations the controller shall record a flow alarm event, cease irrigating the station or stations contributing to the high or low flow readings, and resume irrigation with any stations which do not cause alarms. The controller shall have the ability to determine high or low flow conditions when multiple stations are operating and shall perform diagnostics to identify stations which contribute to the problem flow. Allowable limits and duration of incorrect flow shall be preset, but reprogrammable by the operator for unique local conditions. The flow meter shall be a Hunter Industries HFS in an appropriately sized FCT fitting. It shall also be possible to except certain stations from flow monitoring, for non-irrigation devices.

34. Conventional Station Outputs

The controller shall have a minimum of 12 stations in two modular outputs of six stations each, and shall expand at any time in modular increments of six stations to a maximum capacity of 42 stations.

The controller shall be packaged in a powder-coated metal wall-mount enclosure, with an optional powder-coated steel pedestal mount. The controller shall also be available in a pre-assembled plastic pedestal enclosure. All enclosures shall be suitable for outdoor installation.

Each station output shall have a capacity of up to .56 A @ 24VAC.

Station expansion shall be effected via 6-station modules requiring no tools to install, and only a screwdriver to attach field wiring. All station output modules shall feature transparent

plastic housings with coloured indicator LEDs showing station status (OK, Running, Faulted). Station output modules shall be furnished with built in, fully encased Metal Oxide Varistor (MOV) surge protection components. Extreme Service (AGM600) output modules shall be furnished with fully encased heavy-duty surge protection, consisting of spark gap and induction coil protection on each output.

Earth grounding shall be connected via a factory supplied copper ground lug inside the controller, for connection to earth ground hardware via 6 AWG(4mm dia.) copper wire (see ASIC Earth Grounding Guideline 100-2002 for details of earth grounding irrigation control systems available online at www.asic.org). Ground wire shall be extended underground, at right angles to any communications wiring, to approved direct burial earth grounding hardware at least 6 ft/2m from the controller location. Earth Ground shall be have an impedance of 10 Ohms or less, or shall meet the standards of the Earth Grounding Guideline cited above.

The controller shall be equipped with an integrated, pre-wired SmartPort input to permit connection of wireless remote controls and other devices as specified by the manufacturer. Wireless remote control shall permit individual start of individual stations and Programs, and shall also enable remote shut down of all irrigation at the controller.

The controller shall be adaptable to compatible computerized central control systems through an optional communications module, with a selection of common communications media including hardwired cable, UHF radio, dial-up modem, and cellular telephone. When configured for operation within a central system, the controller shall feature full two-way communications with the central computer. The compatible control system shall be Hunter Industries Model IMMS 2.0 Irrigation Management and Monitoring System.

The controller shall be installed in accordance with the manufacturer's published instructions. The controller shall carry a conditional five year exchange warranty. The automatic controller(s) shall be the ACC series controller as manufactured for Hunter Industries Incorporated, San Marcos, California.

The controller shall be UL and c-UL listed. The controller shall be CE and C-tick approved and shall have WEEE recyclability markings as required.

The wall mount controller shall be model ACC-1200.

Station expansion modules (6 stations each) shall be Hunter Model ACM-600.

Compatible flow meter shall be Hunter Industries Model HFS, with appropriately sized FCT fitting for the pipe.

Nominated Item: Hunter ACC - 1800

35. Controller Cabinet

The controller cabinet shall be a swallow model 1000 wall mount unit and shall be fixed to the existing pavilion. The existing irrigation controller and cabinet shall be removed and handed over to Council staff. The new cabinet shall be located in the same position.

Nominated Item: Swallow Model 1000 (Wall Mount)

36. Power

The Contractor shall terminate the existing single phase 240 V (10 amp) supply to the nominated location of the design drawings from the existing electrical service within the pavilion. Upon completion of new cabinet installation the contractor shall re-connect the 240 V 10 amp supply and re-install a 240 V 10 amp GPO. The Contractor shall engage a suitably qualified electrical sub contractor to perform these works.

37. Control cable

Installation of cables shall conform to AS 3000 1991 "SAA Wiring Rules"

Active and common wire shall be multi core 1.5 mm², 0.4 mm H.D.P.E insulated, 0.7 mm PVC sheathed with a nominal O.D of 4.2 mm for 3 core and 6.4 mm for 5 core.

The cables shall be installed in a HD orange conduit when not installed with mainline and sub main.

A 500 mm loop of cable shall be left at each automatic valve assembly and a 300 mm loop of cable at each change of direction.

Any field joints shall be housed in a valve box according to table 1.0 and located by a registered and licensed surveyor on the as constructed drawings.

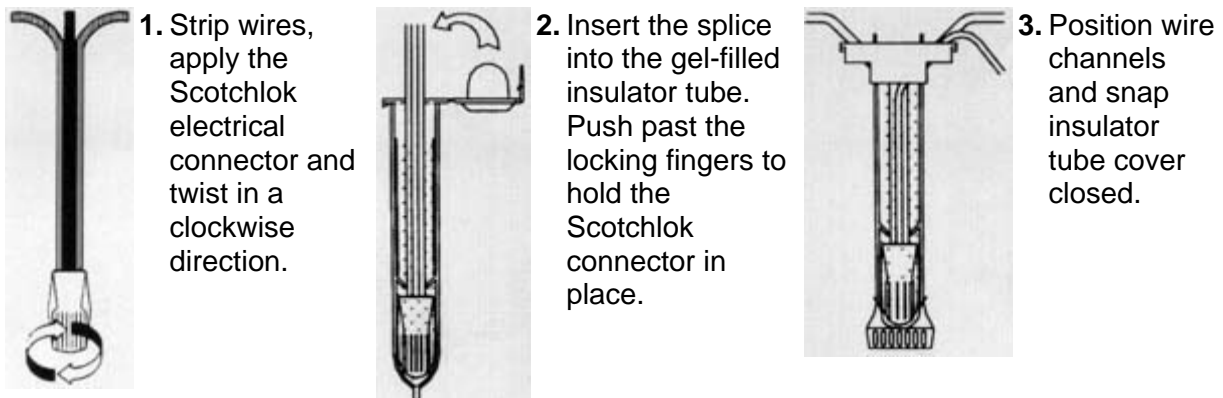
Nominated Item: Tycab or approved equivalent

38. Wire Joints

All wire joints shall be 3M DBY suitable for direct burying into the soil. They shall feature an insulating gel already contained in the tube which does not set hard, allowing the splice to be re-worked without cutting the wires.

The device is UL listed and suitable for splices which can have up to a 600 v maximum in the system.

All wire jointing shall be performed according to the following illustration.



Nominated Item: 3M DBY or approved equivalent

39. Rain Sensor

A rain sensor shall be installed on the control cabinet and be hard wired to the controller inputs.

The rain sensor shall be adjustable from 3 mm to 25 mm for local sensing of rainfall and come with a five year manufacturer warranty.

The rain sensor shall be mounted in a stainless steel vandal resistant enclosure bolted to the typical rain sensor mounting assembly. See details below.

The rain sensor shall be set to terminate programs in the event of 6 mm of precipitation in any one event or as directed by the Superintendent or his representative.

Nominated Item: Hunter Mini Click with Sensor Guard

The works must be carried out between the cricket and football seasons (during February and March 2010) and must disrupt training by any sporting club.
