



SAMPLE IRRIGATION SPECIFICATIONS

PART 1 – SCOPE OF THE WORK

1.1 Work Includes

- .1 The work consists of installing a complete underground sprinkler system to efficiently irrigate the areas identified in the accompanying drawings.
- .2 Plumbing and electrical work will conform to the prevailing codes.
- .3 The construction of the sprinkler system will include furnishing, installing and testing of all irrigation equipment, along with the restoration of the site to its original condition.

1.2 Materials and Workmanship

- .1 Whenever any material is specified by name and/or number thereof, such specifications will be deemed to be used for the purpose of facilitating a description of the materials and establishing quality, and will be deemed and construed to be followed by the words “or approved equal”.
- .3 The system will be installed as shown on the design with no deviation in the number, type, size, nozzle radius, or features of sprinklers without the written approval of the landscape architect and client.
- .4 The system will be zoned as shown. The piping layout is diagrammatic but the zoning should not be changed unless authorized by the landscape architect or owner’s representative.
- .5 No substitutions will be permitted unless DHS Inc. has approved the materials.

1.3 Electrical Supply And Controller Location

- .1 The irrigation controller location will be designated on the irrigation drawing.

1.4 Backflow Prevention

- .1 The backflow prevention device will be installed and supplied by DHS Inc.

1.5 Point of Connection

- .1 The point of connection location shall be designated on the irrigation design.

1.6 Water Source

- .1 The water source shall be from the municipal water supply.



SAMPLE IRRIGATION SPECIFICATIONS

1.7 As-Built Drawings

- .1 Upon completion of work an as-built drawing of the system will be prepared indicating any changes or deviations made to the supplied plans.

1.11 Utilities

- .1 DHS Inc. shall notify the utility companies and arrange for cable locations prior to the commencement of any work. The Sub-Contractor shall be responsible for any damage to the public and private utilities described above.

PART 2 – MATERIALS SUPPLIED

2.1 Pipe

.1 Identification

- .1 All pipe will be continuously and permanently marked with the manufacturer's name or trademark, size, schedule and type of pipe, and working pressure at 21 degrees Celsius.

.2 Delivery

- .1 Plastic pipe will be delivered to the site and stored in such a manner to provide adequate protection for the pipe ends either threaded or plain.

.3 P.V.C. Pipe and Fittings

- .1 One-inch P.V.C. pipe will be class 200 (SDR-21) direct burial pipe and will be homogeneous throughout and free from visible cracks, dents, holes or foreign materials.
- .2 All P.V.C. pipe larger than one inch will be class 160 (SDR-26) direct burial pipe and will be homogeneous throughout and free from visible cracks, dents, holes or foreign materials.
- .3 All plastic pipe fittings to be installed shall be a minimum of schedule 40 molded fittings manufactured of the same material as the pipe and shall be suitable for solvent weld, slip joint ring tight seal, or screwed connections.
- .4 All threaded connections under pressure should be Teflon taped.



SAMPLE IRRIGATION SPECIFICATIONS

.5 Polyethylene Pipe and Fittings

- .1 All polyethylene pipe will have a minimum 80-psi pressure rating.
- .2 All insert fittings shall be constructed of PVC Type 1 cell classification 12454-B adhering to ASTM standard D 2609.

2.2 Sprinklers

.1 **Spray Head Sprinklers – Rain Bird 1800-PRS Series**

- .1 The full or part circle pop-up sprinkler shall be capable of covering up to 15 feet radius at 30 pounds per square inch with a discharge rate of 3.7 gallons per minute.
- .2 The sprinkler shall be available with an overall pop-up height of 4, 6 or 12 inches.
- .3 The sprinkler body, stem, nozzle and screen shall be constructed of heavy-duty, ultraviolet resistant plastic.
- .4 It shall have a heavy-duty stainless steel retract spring for positive pop down and a ratcheting system for easy alignment of the spray pattern.
- .5 The sprinkler shall have a soft elastomer pressure-activated co-molded wiper seal for cleaning debris from the pop-up stem as it retracts into the case to prevent the sprinkler from sticking up and minimizing “flow-by.”
- .6 The sprinkler shall have a matched precipitation rate plastic nozzle with an adjusting screw capable of regulating the radius and flow.
- .7 The sprinkler shall be capable of housing non-clogging filter screens under the nozzle.
- .8 The sprinkler shall have a Pop-Top™ Flush Plug pre-installed.
- .9 The plug shall prevent debris from clogging the sprinkler during installation and allow the system to be flushed before adjusting the nozzles.
- .10 The plug shall be bright orange in color and constructed of polypropylene material.
- .11 The sprinkler shall include a pressure regulating (PRS) device to prevent high pressure fogging to the nozzle stream.
- .12 The pressure regulating device shall be an integral part of the pop-up stem, removable through the top of the case.
- .13 These units shall be identifiable from the top with white “PRS” markings on the cap.
- .14 The device shall regulate the nozzle pressure to 30 psi for inlet pressures from 35 to 70 psi. Below 35 psi, the pressure loss shall not exceed 6 psi.



SAMPLE IRRIGATION SPECIFICATIONS

2.2 Sprinklers (cont'd)

.2 Rotors – Rain Bird 5000 Series

- .1 The full and/or part circle sprinkler shall be a single-stream, water-lubricated, gear-drive type capable of covering a 50 foot radius at 65 pounds per square inch with a discharge rate of 9.3 gallons per minute.
- .2 The sprinkler shall have adjustable arc coverage of 40 to 360 degrees.
- .3 Arc adjustments can be performed with or without the sprinkler in operation and shall require only a flat-blade screwdriver.
- .4 The sprinkler shall have a pressure activated, multi-function wiper seal that positively seals against the pop-up stem to keep debris out of the rotor and to clean debris from the pop-up stem as it retracts.
- .5 This wiper seal shall prevent sprinkler from sticking up, and be capable of sealing the sprinkler cap to sprinkler body under normal operating pressures.
- .6 The sprinkler shall have a screen installed in the pop-up stem to filter inlet water, protect the drive from clogging and simplify its removal for cleaning and flushing of the system.
- .7 The sprinkler shall have a 3/4" (FNPT) bottom inlet.
- .8 The sprinkler shall have a standard rubber cover and a strong stainless steel retract spring for positive pop down.
- .9 The sprinkler shall have 12 interchangeable nozzles consisting of: 8 Rain Curtain nozzles for evenly distributed coverage and 4 Low Angle nozzles for reduced radius of throw and wind resistance with all nozzles containing Micro-Ramp™ for close-in watering.
- .10 The angle of trajectory shall be 25 degrees for the Rain Curtain nozzles and 10 degrees for the low angle nozzles.
- .11 The sprinkler shall come with a stainless steel adjusting screw capable of reducing the radius up to 25%.

2.3 Valves

.1 Rain Bird 100-DV Valve

- .1 The remote control valve shall be a normally closed 24 VAC 50/60 cycle solenoid actuated, balanced pressure type capable of having a flow rate of 30 GPM with a pressure loss not exceeding 6.1 PSI.
- .2 The valve pressure rating shall be up to 150 PSI.
- .3 The valve body and bonnet shall be constructed of high impact weather resistant plastic, stainless steel and other chemical/UV resistant materials.



SAMPLE IRRIGATION SPECIFICATIONS

2.3 Valves (cont'd)

- .4 The valve shall have a one unit diaphragm constructed of Buna-N rubber material with a clog resistant metering orifice.
- .5 The valve shall have one 90-mesh pilot filter attached to the diaphragm.
- .6 The valve shall have one fully encapsulated solenoid with captured plunger.
- .7 The valve shall have one 90-mesh filter attached to the solenoid base.
- .8 The valve body shall have a 1" (FNPT) inlet and outlet configuration.
- .9 The valve shall be actuated by a low power 0.30 A (7.2 VA) in-rush current and 0.23 A (5.5VA) holding current.
- .10 The valve shall be capable of on/off control by turning the solenoid 1/4 turn.
- .11 The valve shall provide a manual flush mode that is activated by a 1/2 turn of the bleed screw where external porting is permissible.
- .12 The valve shall be as such to provide for all internal parts to be removable from the top of the valve without disturbing the valve installation.

2.5 Controllers

.1 Rain Bird ESP-LX 8 Station Modular Controller

- .1 The controller shall be of a hybrid type that combines electro-mechanical and microelectronic circuitry capable of fully automatic or manual operation.
- .2 The controller shall be housed in a wall-mountable, weather-resistant plastic cabinet with a key-locking cabinet door (outdoor models only) suitable for either indoor or outdoor installation.
- .3 The controller shall have a Rapid Station Test Routine (RASTER), which enables the controller to diagnose field wiring and solenoid problems.
- .4 The controller shall have a base unit with 8 stations as well as three expansion slots capable of receiving station modules of either four or eight stations each to create a controller of up to 32 stations.
- .5 All stations shall have the capability of independently bypassing an active rain sensor or of functioning as a normal station output.
- .6 Station timing shall be from 0 minutes to 12 hours. Run time resolution shall be in 1- minute increments from 0 to 2 hours and 10 minute increments from 2 to 12 hours. The display shall show "No Run Times" or equivalent icon for 230 VAC models if no run time has been entered for any station in any program.



SAMPLE IRRIGATION SPECIFICATIONS

2.5 Controllers (cont'd)

- .7 The controller shall have four separate and independent programs which can have different start times, station timing and watering days. Each program shall have up to 8 start times available.
- .8 The controller shall stack multiple start times in sequence to prevent hydraulic overload.
- .9 The controller shall allow simultaneous or overlapping of program D with any other program.
- .10 The controller shall be capable of operating two 24 VAC solenoid valves per station plus a master valve or remote pump start relay.
- .11 The controller shall have an electronic, diagnostic circuit breaker that shall sense a station with an electrical overload or short circuit and shall bypass that station and continue operating all other stations.
- .12 The controller shall have a 365-day calendar with a permanent day off feature that allows a day(s) of the week to be turned OFF on any cycle (odd/even/1-31day cycle). A day set to "Permanent Off" shall override the normal repeating schedule and shall display the words "Day Always Off/Day Off" in the LCD screen.
- .13 The controller shall have a seasonal adjust feature adjustable from 0% to 300% of the actual run time selected in increments of 10%. Seasonal adjust can effect all programs simultaneously, or can be applied to only to all programs set to run within a particular month.
- .14 The controller shall have Cycle+Soak™ water management software which is capable of operating each station for a maximum cycle time and a minimum soak time to reduce water run-off. The maximum cycle time shall not be extended by water budgeting. The controller shall have a 12-hour AM/PM clock with a midnight day change over.
- .15 The controller shall have a sensor circuit for connection to a rain sensor or to an underground moisture sensor system that will interrupt a scheduled watering under "wet" or "moist" conditions.
- .16 The controller shall have an indicator on the display and one externally visible alarm light to indicate that a sensor is connected and active and that watering has been temporarily disabled.
- .17 The controller shall have access to a variety of advanced features. These features shall include: save a custom default program, retrieve a custom default program immediately, retrieve a custom default program at a specified date up to 90 days in the future, set a valve or rain delay, clear memory, set a day as "Permanently Off", confirm programming.
- .18 The controller shall have the following manual operations and manual advances for semi-automatic control: run a single valve, run multiple manually stacked valves, run a semi-automatic program, run a test on all valves (all stations with any time assigned regardless of the program) from 1 to 10 minutes.



SAMPLE IRRIGATION SPECIFICATIONS

2.5 Controllers (cont'd)

- .19 The controller shall have a removable, 9V battery programmable front panel. The controller shall have a non-volatile memory, independent of the 9V backup battery.
- .20 The controller shall have the capacity for the program to be erased allowing the user to start programming with a blank controller.
- .21 The controller shall have a reset button to reset the controller in the case of microcontroller "lock-up" due to power surges or frequent interruption to the power supply.

2.6 Wiring

- .1 All 115 volt wiring shall conform to the local electrical codes.
- .2 All 24 volt control wire between the solenoid valves and the controllers shall be #14 gauge TWU-10 solid conductor, white jacket for the common wire, and coloured for the power wire. For runs less than 500 feet, and single valve operation, 18-gauge multi-coloured conductor wire may be used.

2.7 Manual Control and Isolation Valves

- .1 All manual valves shall be bronze gate valve construction, featuring a non-rising stem and minimum operating pressure of 125 psi. Bronze full-port ball valves are also acceptable.

2.8 Valve Boxes

- .1 All manual and automatic valves shall be enclosed in proper irrigation thermo-plastic Carson or Rain Bird valve boxes, of size as required to permit "ease of access" for servicing purposes. The boxes shall feature locking or hinged covers, with an impregnated green colour.
- .2 The term "ease of access" means that every solenoid and manual valve should have adequate access for all types of maintenance.
- .3 All valve access boxes shall be installed on a suitable base of gravel for proper foundation of box and easy leveling of box to proper grade, and also to provide proper drainage of the access boxes. All valve access boxes shall be provided with proper length and size extensions, wherever required, to bring the valve box level with the finish grade, unless specified to be buried below grade.
- .4 Valve boxes shall be located in planting areas whenever possible.



SAMPLE IRRIGATION SPECIFICATIONS

PART 3 – EXECUTION

3.1 Excavation And Backfill

.1 Trenching

- .1 Trenches for sprinkler lines and wiring will be of sufficient width (minimum of six inches (6")) to permit proper handling and installation of the pipe and fittings.
- .2 The first four inches (4") of backfill material over the pipe will be free of stone or any foreign objects greater than $\frac{3}{4}$ inch diameter. The top six inches (6") of backfill shall be free of rocks over one inch, or trash. Piping less than 1 $\frac{1}{2}$ inches in diameter shall have a minimum cover of ten inches. Piping greater than 1- $\frac{1}{2}$ inches in diameter shall have a minimum cover of fifteen inches. Any road crossings shall have a minimum eighteen inches of cover.
- .3 The backfill will be thoroughly compacted in six-inch lifts, and evened off with a minimum one inch of topsoil.
- .4 In rocky areas, the trenching depth will be two inches below normal trench depth, to allow for placement of selected fill.
- .5 All trenches that are opened during any particular working day will be closed and backfilled the same day.

.2 Pulling

- .1 Where soil conditions allow the pipe depths of cover described above to be met; the irrigation piping may be directly installed without trenching by use of a vibratory plow. The feed blade must be equipped with a minimum bullet diameter of 1 $\frac{1}{2}$ times the outside diameter of the pipe to be installed.
- .2 In each of the above operations, all pipe interiors are to be (the Irrigation Contractor is responsible for) kept free from dirt, and debris. The site is to be restored to its original condition, including any damage to existing trees, shrubs, and structures, along with settlement of trenches within the warranty period.
- .3 Generally, piping under concrete or asphalt will be installed by jacking, boring or hydraulic driving. Where any cutting or breaking of sidewalks, concrete work and/or asphalt is necessary, it shall be removed and replaced by DHS Inc. Permission to cut or break sidewalks, concrete and/or asphalt will be obtained from those having proper jurisdiction. Where piping on the drawings is shown under paved areas but running parallel and adjacent of planted areas or turf areas, the intent of the drawings is that the pipe be installed in the planted or turf areas.



SAMPLE IRRIGATION SPECIFICATIONS

3.2 Plastic Pipe

.1 PVC

- .1 One inch (1") or smaller will be Class 200 (SDR21). One and a quarter inch (1 ¼") or above shall be Class 160 (SDR26) or approved equivalent.
- .2 Plastic pipes will be installed in a manner to provide for expansion and contraction as recommended by the manufacturers, along with the installation of concrete thrust blocks where the pipe changes direction.
- .3 All plastic to plastic joints will be solvent-weld joints or slip seal joints. Only the solvent recommended by the pipe manufacturer shall be used. All plastic pipe and fittings will be installed as outlined and instructed by the pipe manufacturers.
- .4 All plastic to metal joints will be made with male plastic adapters.

.2 Polyethylene

- .1 Polyethylene pipe will be of medium density with a minimum pressure rating of 75 psi.
- .2 The fittings will be secured with all stainless construction gear drive clamps. Stainless steel squeeze clamps may also be used with pipe sizes up to 1-¼". Half inch (1/2") stainless steel banding material may be used on two (2") inch pipe. Any piping under continuous pressure will be double clamped.
- .3 All polyethylene of 1 ½" or larger should be double clamped whether under continuous pressure or not.
- .4 All polyethylene will be manufactured by Oil Creek Plastics or IPEX.

3.3 Sprinklers and Turf Valves

- .1 The Subcontractor will stake out the location of all sprinkler heads and turf valves prior to commencing installation to allow the Project Manager to verify all locations and give their approval. Spacing of the sprinkler heads and valves shall comply with the manufacturer's recommendations and drawings, and will not be exceeded except with permission of the Project Manager.
- .2 Heights of sprinkler heads and turf valves to be installed in areas where the turf has not yet been established will be determined in consultation with the Project Manager, prior to installation.
- .3 All sprinkler heads, valve boxes, and turf valves will be set perpendicular to finished grades unless otherwise designated on the drawings, or otherwise specified. Sprinkler heads adjacent to existing walls, curbs and other paved areas will be set to grade.



SAMPLE IRRIGATION SPECIFICATIONS

3.4 Sprinkler Risers

- .1 All 1" quick coupling valves will be installed with PVC unitized swing joints.
- .2 All ½" rotors and spray heads will be installed using adjustable or PVC nipples, swing pipe and swing fittings, or 6" and 12" PVC tubing swing joint assemblies.
- .3 All ¾" rotor heads will be installed using adjustable or PVC nipples, swing pipe and swing fittings, or 6" and 12" PVC tubing swing joint assemblies.
- .4 All risers for shrub spray heads, bubbler heads, etc. that are in shrub, ground cover or flower bed areas and planters, shall be Schedule 80 PVC pipe or Schedule 80 nipple, unless otherwise specified or shown on the drawings

3.5 Control Valves

- .1 All control valves will be installed in proper irrigation valve boxes, in such a manner as to readily permit servicing and operation.

3.6 Mounting Of Automatic Controller

- .1 The controller will be installed at the location showed on the irrigation drawings.
- .2 The unit shall be installed as the manufacturer had intended, utilizing fasteners specifically designed for the application.

3.7 Wiring

- .1 All 110 volt wiring to the controller will be enclosed in PVC electrical conduit or completed with BX cable.
- .2 The unit is to be grounded in compliance with the manufacturer's recommendations and the local electrical code.
- .3 All visible low voltage wires will be enclosed in P.V.C. electrical conduit. Direct burial wire may be trenched or placed in a common trench beneath plastic irrigation pipes, or lain with a vibratory plough (but not pulled), and must have a minimum cover of ten inches (10"). Provision must be made for expansion and contraction of all direct burial wire, including protection from foreign objects.
- .4 All electrical wire connections to remote control electric valve and splices in the field will be completed with a weatherproof wire connector.
- .5 All field splices to irrigation wiring MUST be installed in a valve box for ease of service. NO BURIED SPLICES.

3.8 Flushing and Set Up

- .1 Upon completion of each section or of the entire installation, and prior to assembly of nozzles and pop-up components, the control valves will be opened and a full head of water used to flush out the system. Sprinkler



SAMPLE IRRIGATION SPECIFICATIONS

3.8 Flushing and Set Up (cont'd)

assembly can then be completed, including all necessary adjustments and setup procedures.

PART 4 – TESTING, OPERATION AND INSPECTION

4.1 Testing

- .1 Flush all lines and ensure that all air is expelled from the system.
- .2 Inspect all visible piping, and walk all buried lines for any leakage.
- .3 If a pump is included, verify direction of rotation (if applicable), operating pressure, and any leakage.
- .4 Any repairs necessary to render the system in good working order will be completed at this time.

4.2 Operation

- .1 Verify all sprinkler settings, overlap, nozzle sizes, and operating pressures.
- .2 Adjust the flow control on automatic valves where necessary.
- .3 Program the controller into a logical sequence to comply with local watering bylaws or endeavor to accomplish heavy infrequent water cycles.
- .4 Program each station to satisfy the watering requirements of the relevant plant material.

4.3 Inspection

- .1 Upon completion of the installation, the sub-contractor shall notify the Project Manager to inspect the irrigation system.
- .2 The project Manager shall review the irrigation system to confirm that the installation meets or exceeds the intent of the irrigation design and specifications. The Project Manager shall take into consideration that changes to the irrigation system may result from unforeseen site conditions or site changes.
- .3 If any section of the system does not meet the approval of the Project Manager he/she shall recommend a course of action to resolve the issue. The subcontractor shall be responsible for correcting the issue in a timely manner. It is the responsibility of the subcontractor to coordinate subsequent inspections.
- .4 Upon receipt of written approval from the Project Manager, the subcontractor shall deem the irrigation system to be complete and shall forward final closeout documents with Project Manager's signature for final payment.

END OF SECTION