

1.0 GENERAL

1.1 Scope

- .1 This guideline addresses the supply and installation of materials and equipment required to provide complete and properly operating irrigation systems for UBC Campus landscapes.

1.2 Related Work

- .1 Section 32 91 00 Planting Preparation
- .2 Section 32 92 23 Sodding
- .3 Section 32 93 00 Plants
- .4 Section 33 10 00 Water Utilities

2.0 MATERIALS AND DESIGN REQUIREMENTS

2.1 Design Requirements

- .1 Irrigation is required in all planting areas to support establishment of new plantings or future planting renovations, and to support plant health during periods of extended drought or unforeseen site disturbances.
- .2 Drip irrigation is prohibited within institutional landscapes maintained by UBC Facilities, Municipal Services. (See Part 2.11 Exclusions).
- .3 In situations where existing irrigation systems are severed or otherwise made inoperable by construction work, temporary irrigation measures must be undertaken by the project to ensure the preservation of adjacent landscape areas that are to remain.
- .4 In support of UBC's water conservation initiatives (i.e. the Water Action Plan), the following is required of all landscape projects to reduce short and long term landscape water requirements:
 - .1 Simple rain sensors in conjunction with high-efficiency heads, valves and controllers must be specified in favour of other less practical technologies such as soil-moisture sensors or weather stations (see also: 2.11 Exclusions).
 - .2 Tough, vigorous, drought tolerant plant species must be specified.
 - .3 Provision of evergreen groundcover to reduce soil surface exposure to desiccation.
 - .4 Irrigation system water is to be metered separate from that of the building.
 - .5 Use of organic soil amendments to improve water retention.
 - .6 Organic surface mulches to facilitate soil moisture retention.
 - .7 Large growing shade trees in lawn areas are to be irrigated on zones separate from the lawn area that surrounds them.

2.2 Quality Assurance

- .1 All irrigation work and irrigation design shall be done by a competent and experienced irrigation consultant/contractor having the skills, facilities, equipment and personnel adequate for the work specified.
- .2 Irrigation layout must be designed according to recognized design principles to account for adequate overlap (e.g. head to head coverage), efficient and sustainable water use with separate zoning for lawns, plantings, trees etc. and significant micro-climatic variations as required.
- .3 A manufacturer's warranty is required for all irrigation equipment outlined in this guideline and on the irrigation drawing(s).

.4 Do not cement pipe and fittings under wet or muddy conditions.

2.3 Submittals

- .1 Water Service Connections: All new or substantially modified connections to the water distribution system at UBC require the submission of a Service Connection Application Form (see <https://buildingoperations.ubc.ca/resources/policies-procedures-forms/>). Project design drawings shall be provided to UBC Energy & Water Services for review (see Section 33 10 00 Water Utilities, 2.3 Water Service Connections for further details).
- .2 For Operating and Maintenance Manuals requirements, see Technical Guidelines, Section 01 78 23 Operation and Maintenance Data. Submit one (1) copy of Record drawings to UBC Energy & Water Services.
- .3 For UBC Record drawings requirements, see Technical Guidelines, Section 01 78 39 Project Record Documents.
- .4 Submit one set of special tools and equipment required for proper operation and maintenance of the system.
- .5 Instruction: Once the system is operational, the Project Manager must schedule a site meeting(s) as required to adequately instruct a UBC Municipal Services Irrigation Technologist in the complete operating and maintenance procedures for that system.

2.4 Site Conditions

- .1 Verify the existence and location of all on site utilities and cooperate with the Contractor and UBC Energy & Water Services. Notify the Project Landscape Architect immediately for direction, as to procedure, should any piping or utilities be encountered during excavation.
- .2 Prior to the work of this section, carefully inspect the installed work of other trades or contractors and verify that all such work is complete to the extent that irrigation work may commence properly.
- .3 Field Measurements: Make all measurements in the field and adjust the design to meet the on-site conditions. In the event of major discrepancies between the drawings and the actual site conditions notify the Project Landscape Architect before proceeding with the work.
- .4 Verify the locations of underground services by hand digging or by use of an M-scope.
- .5 Repair all damage to underground services. Damage to services that are shown on the drawings or have been brought to the Contractor's attention in the field shall be repaired at the Contractor's expense.

2.5 Protection and Damage Repair

- .1 Protect existing buildings, equipment, sidewalks, landscape reference points, monuments, markers and other completed work. Make good all damage resulting from work of this contract at no expense to UBC.
- .2 All existing irrigation components, valves and lines to be retained or which serve an adjacent site, must be protected and/or repaired if damaged due to construction activity. Provisions must be made by a Project Manager to provide temporary irrigation to planting areas whose access to irrigation has been severed during construction.

.3 Trenches and other excavations cannot be left open overnight unless they are protected to WCB Standards. In all areas excavated trenches must be covered and barricaded to ensure public safety.

2.6 Warranty

.1 Provide a written warranty for all workmanship and materials for one (1) year from the date of Substantial Performance of the Contract.

2.7 Equals and Alternatives

.1 Any proposed substitutions must be approved in advance and in writing by UBC Municipal Services. Products and materials must equal or exceed the specifications of the equipment specified.

.2 The proposed equipment shall have a comparable warranty and a local, well stocked distributor.

2.8 Exclusions

.1 The following restrictions on irrigation technologies are to be adhered due to limitations with durability, longevity, operations and maintenance:

- no drip irrigation emitters or tubing systems
- no centralized weather stations
- no subscription-based weather sensors

2.9 Pipe and Fittings

.1 Plastic pipe to be extruded, virgin, high impact PVC pipe that is continuously and permanently marked showing manufacturer's name or trademark, type of material, pipe size and pressure rating. Note: Black, flexible Polyethylene (Poly) pipe may be used where flexibility is essential in working around existing services or tight installations.

.2 All piping to be Schedule 40 PVC.

.3 Plastic pipe fittings to be Schedule 40 PVC designed for solvent welding to PVC pipe except where valves, risers, etc. require threaded joints.

.4 Pipe solvent cement to be CSA approved type as recommended by the pipe manufacturer.

.5 Pipe sleeves under hard surfaces to be Schedule 80 PVC pipe.

2.10 Solenoid Valves

.1 Use Rainbird PEB valves or equivalents.

.2 If a solenoid valve is installed on the irrigation service connection from UBC Energy & Water Services' water distribution system, a hammer arrestor shall be installed upstream of the solenoid valve.

2.11 Sprinkler Heads

.1 Use Rainbird 1800 Series Spray and 5000 Series Rotors or equivalents.

.2 Use 12" pop ups in shrub areas.

2.12 Automatic Controller

- .1 Use Rainbird ESP Modular Controller or equivalent.

2.13 Control and Common Wiring

- .1 Insulated single-strand copper wire TWU-40 #14 gauge to be used where directly buried in the landscape. White to be used as the common.
- .2 Wiring from the controller to the landscape may be a minimum of #18 solid wire run in conduit.
- .3 All electrical connections to be made with CSA watertight connectors.

2.14 Water Supply

- .1 The irrigation branch supply from Utilities service main to the demarcation point shall be ductile iron or copper piping as specified in Section 33 10 00 Water Utilities, 2.6, and valves per Section 33 10 00 Water Utilities, 2.7. See also standard drawing 1140-UT-Waterirrig-Demarc for Demarcation point of Utilities service.
- .2 Submit to UBC Energy & Water Services the irrigation load as required on the service connection from UBC Energy & Water Services' water distribution system.
- .3 Upon completion of the irrigation assembly in an irrigation chamber and before service is activated, the contractor shall notify for inspection: Energy and Water Services - Engineering and Utilities at 604-822-9445. Notification for inspection shall be provided a minimum 24 hours in advance.

2.15 Irrigation Chamber

- .1 For irrigation chamber equipment details, see Section 33 10 00 Water Utilities, 2.6.4.

2.16 Backflow Preventer

- .1 Backflow/Cross Connection Control shall be installed as per BC Plumbing Code. Refer to Section 33 12 13.13 Water Supply Backflow Preventer Assemblies for details.

2.17 Layout of Sprinkler System

- .1 Co-ordinate exact locations of lines, valves and heads, with planting locations to avoid conflicts and damage to plants during installation. Stake locations and check grades of all components.

2.18 Excavation and Backfilling

- .1 The excavation depths for piping shall be:
 - .1 In landscape areas a minimum cover of 300mm (12").
 - .2 Under paving a minimum cover of 450mm (18").
 - .3 On slab: place pipe on filter fabric above drain rock if 300mm (12") cover cannot be met.
- .2 Trenches shall be straight with uniform slopes to the bottom of the trenches.
- .3 Place pipe on firm soil at all points of the trench.
- .4 Backfill trenches in 150 mm (6") layers, tamping to ensure compaction of trench is equal to surrounding undisturbed area.

- .5 Backfill material shall be free from rocks and other unsuitable materials which could damage the pipe or create unusual settling problems.

2.19 Installation of Piping

- .1 Install the piping in accordance with the drawings and with manufacturer's recommendations.
- .2 Where possible, main and lateral lines may occupy the same trench provided a minimum 100mm (4") horizontal clearance can be maintained.
- .3 No line may be installed parallel to and directly over another line.
- .4 All piping to run as straight as possible between fittings.
- .5 For secure, durable connections, all pipe joints must have a double-swipe of bonding agent – i.e. applied to the outside (OD) and inside (ID) respectively – of adjoining pipe surfaces.
- .6 Remove all excess PVC solvent cement from all solvent weld joints.
- .7 Pipe installation shall also include a hose-bib blow-out connection, conveniently located for winterization exterior to building where it can be accessed with air-compression in-tow. Vertical lines into mechanical rooms below grade should also be manually drainable by ensuring that backflow device is provided with a drain cock valve.
- .8 The entire irrigation system shall be thoroughly flushed with water to remove dirt, scale and foreign matter before sprinkler heads are installed.

2.20 Installation of Sprinklers

- .1 Pop-up sprinklers shall have an adjustable riser assembly (triple swing joint) assembled by using at least three standard PVC street elbows.
- .2 Triple swing joint risers shall be of Schedule 40 PVC and fittings of Schedule 40 PVC unless otherwise designated on the drawings. Flexible polyethylene swing joints may be substituted where PVC triple single joint installation are not practical.
- .3 The bottom street elbow shall be connected to the side outlet on the lateral line.
- .4 The PVC nipple on a pop-up sprinkler shall be installed at 45° to the lateral line.
- .5 All stationary spray sprinklers shall be installed with two PVC street elbows to connect to the lateral line and a schedule 40 PVC nipple that is long enough to be 100mm (4") above finished grade.
- .6 All sprinklers to be installed a minimum of 25mm (1") away from any hard surface.
- .7 Sprinkler heads located adjacent to curbs shall be installed 25mm (1") away from back of curb. If necessary to allow installation in this position, asphalt at the back of the curb is to be removed in as narrow a trench as possible to allow installation.

2.21 Installation of Valves and Valve Boxes

- .1 All valve boxes to be installed flush with finish grade.
- .2 All valves to be installed horizontally and centred in the valve box for ease of accessibility for servicing.

- .3 All valve boxes to be blocked so that the valve box does not rest on the piping below.
- .4 Valve box sizes and configurations shall be selected to adequately accommodate single or multiple valves such as to allow adequate operation and space for servicing. Use square irrigation boxes only.
- .5 All wiring connection in valve boxes to be of sufficient length to permit removal of the top of the valve from the valve box.

2.22 Installation of Wire

- .1 Protect low-voltage wiring by installing beneath irrigation lines
- .2 All electrical connection to be made in an accessible valve box.

2.23 Clean-Up

- .1 Any damage to paving, planting or any other structure due to settlement of improperly compacted trenches shall be promptly repaired at the contractor's expense to the satisfaction of the Consultant.
- .2 No activities of backfilling or hard/soft landscaping shall cover up any utility line openings.

2.24 Operation Inspection

- .1 Upon completion of the irrigation system, the entire system shall be tested for proper operation.
- .2 The Project Landscape Architect and UBC Municipal Services Irrigation Technologist and Head Landscape Technologist must be present for operation inspection. The Project Landscape Architect must advise a UBC Municipal Services Irrigation Technologist a minimum of forty-eight (48) hours prior to intent to inspect irrigation work.
- .3 Coverage Test: When the irrigation system has been completed, a coverage test shall be performed in the presence of the Project Landscape Architect and UBC Municipal Services Irrigation Technologist and Head Landscape Technologist to determine if coverage of water to planting and lawn areas is complete and if any necessary adjustments are required. The Project Landscape Architect must advise a UBC Municipal Services Irrigation Technologist a minimum of forty-eight (48) hours prior to intent to inspect irrigation work.
- .4 Controller Test: Prior to final acceptance of the irrigation system the automatic controllers shall be set in sequence and tested through all zones in the presence of the Project Landscape Architect and UBC Municipal Services Irrigation Technologist and Head Landscape Technologist and any necessary final adjustments made. The Project Landscape Architect must advise a UBC Municipal Services Irrigation Technologist a minimum of forty-eight (48) hours prior to intent to inspect irrigation work.

*****END OF SECTION*****