

## 21 NCAC 23 .0406 COMPONENTS AND ZONE DESIGN

When designing an irrigation system, an irrigation contractor shall:

- (1) Design the layout of heads and other emission devices to reduce evaporation loss, reduce surface runoff, and limit overspray across or onto a street, public driveway or sidewalk, parking area, building, fence, or adjoining property.
- (2) Design sprinkler head spacing with an approximate "head-to-head" coverage.
- (3) Use separate stations or zones for areas with dissimilar environmental conditions or dissimilar water or scheduling requirements (hydrozones). These conditions or requirements include sun exposure, plant type, soil type, varying wind conditions, grades, and dimensional issues. When not practicable due to accessibility, dimensional issues, or other constraints, practical modifications to this standard may be acceptable.
- (4) When selecting system components:
  - (a) select components to avoid surface runoff;
  - (b) select components to keep the sprinkler precipitation rate below the infiltration rate of the soil;
  - (c) specify the use of repeat cycles to allow the water to soak into the root zone; and
  - (d) specify stations or zones for sprinklers at the top and toe of sloped areas.
- (5) Place sprinkler heads based on an evaluation of physical, environmental, and hydraulic site conditions, including typical wind conditions during the normal irrigation period.
- (6) Select sprinkler heads and nozzles to achieve an approximate matched precipitation rate within each zone.
- (7) Plan to use the following water conserving equipment:
  - (a) check valves to minimize low-head drainage when grades exceed five percent;
  - (b) pressure regulators or pressure compensating devices when pressures exceed manufacturer's recommendations;
  - (c) rain sensors to suspend irrigation during rain or other forms of precipitation;
  - (d) a controller that has multi-program capability with at least four start times (for multiple repeat soak cycles) and run time adjustments in one-minute increments;
  - (e) low-trajectory sprinkler nozzles and modified head spacings to mitigate the effects of wind; and
  - (f) components that do not mist when manufacturer's pressure specifications are met.
- (8) Offset turf grass sprinklers a minimum of two inches from pavement edges to allow for edging of the turf.
- (9) Offset sprinklers from vertical walls to limit spray on the walls.
- (10) Ensure that valves are located so as to allow reasonable access for maintenance or service.
- (11) Ensure that the roots of existing trees are protected by:
  - (a) Planning pipe system layout to limit its effect on existing trees and other planting.
  - (b) When necessary to trench into the root zone of an established plant in order to provide irrigation within the root zone:
    - (i) planning to dig the trench so as to minimize the effect on the roots (for example, by digging the trench in a straight line towards the base of the tree or shrub such that, if the line of the trench were extended, it would intersect with the base of the tree or shrub); or
    - (ii) planning to use direct boring or hand-trenching. An irrigation contractor shall use hand-trenching techniques that dig a trench without damaging roots having a diameter of one-half inch or more.
  - (c) In the event of trenching, maintaining a distance of one foot from the tree trunk for every inch of tree diameter at a height of four feet six inches above the ground. For example, piping shall be kept at least 20 feet away from the trunk of a tree having a 20 inch diameter at four feet six inches above the ground.
  - (d) In the event of boring, maintaining a distance of at least one-half foot from the tree trunk for each inch of tree diameter at a height of four feet six inches above the ground and, in any event, maintaining a distance of at least five feet from the tree trunk. When direct boring, an irrigation contractor shall bore to a minimum of 36 inches.

- (e) Avoiding placing sprinklers in a position to directly spray water on tree trunks of mature trees by placing them no closer to a tree than one-third of the sprinkler spray radius.
- (12) With respect to wiring:
- (a) install control wires in the same trench along the side of the main line piping;
  - (b) allow slack in the wiring;
  - (c) bundle an expansion coil for all wires at each valve location;
  - (d) use the appropriate size American Wire Gauge ("AWG") wire, as noted by the manufacturer, to operate a valve;
  - (e) indicate common wiring (wire that runs through the entire circuit of valves) by using a different colored wire from all other wire connections;
  - (f) provide additional wire along the irrigation wire path for future expansion or replacement of damaged wires;
  - (g) design irrigation systems with control wire splices made with a waterproof wire splice kit that is UL listed for underground applications. For two-wire control systems, the design shall specify the manufacturer's recommended splice kits; and
  - (h) follow the manufacturer's recommendation for all wiring and grounding, including two-wire control systems.
- (13) Use valve boxes that are large enough to provide sufficient space for servicing the valve housed inside. For single valve boxes, valve boxes shall be at least 10 inches in diameter for both manual and automatic valves.

*History Note: Authority G.S. 89G-5;  
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