



# Texas Commission on Environmental Quality

Permitting and Registration Support Division  
December, 2010

## **Irrigation Technician Training Curriculum Guidance**

### **IRRIGATION TECHNICIAN COURSE OUTLINE**

- This course should contain no less than 16 hours of instruction. Additional hours of applied or hands-on training can be included in this course but topics or hours for such training are not included in the course outline at this time.
- A student must attend at least 90% of the hours designated for the course.
- To successfully complete the course, a student must demonstrate a basic understanding of landscape irrigation including rule compliance, basic design and hydraulic principles, irrigation plan interpretation, backflow prevention requirements, and installation techniques.
- The course is not to be taught in any manner which shows preference to any specific product or service.
- Contact the TCEQ at 512.239.6133 if you have any questions.

#### **Course Goals and Objectives**

The goals and objectives of this course are to provide the student with fundamental knowledge and skills necessary to install, maintain, alter, repair, service, or supervise the installation of a basic landscape irrigation system. Such work is done under the supervision of a licensed irrigator. The course does not fully prepare an individual to enter the business of landscape irrigation.

#### **1. Introduction to Landscape Irrigation (TAC Chapters 30 and 344)**

- A. Reasons for Landscape Irrigation
  - Water lost through plant evapotranspiration
  - Water conservation §§344.1(44) and 344.60
  - Aesthetic appeal of landscaping
  - Effects on property values
- B. Types of Landscape Irrigation Systems
  - Low volume (drip, etc)
  - Bubbler
  - Spray
  - Rotors

### C. State and Local Rules and Regulations

- Texas Occupations Code Ch. 1903, Texas Water Code Ch. 37
- Specific requirements from TAC, Title 30, Part 1, Chapters 30, 290, and 344
- Local ordinances or rules relative to landscape irrigation

### D. Fundamentals

- Nomenclature (See glossary or common terminology)
- Units of measure, scales, conversion factors, orientation, contour lines
- Reading and using plans, charts, tables, formulas, etc.
- Materials and standards
- Safety

## 2. Characteristics of a Designed Irrigation System (§344.62)

### A. Component Parts of Landscape Irrigation Systems

- Drip and low volume
- Irrigation heads
  - bubbler
  - spray
  - rotary
- Irrigation piping
  - PVC
  - Copper
- Valves (§344.62)
  - Master valves
  - Remote control valves
  - Manual valves, isolation valves
  - Quick-coupler valves
- Backflow prevention (§§344.50 – 344.52)
  - Atmospheric vacuum breaker (AVB)
  - Pressure vacuum breaker (PVB)
  - Double check valve (DCV)
    - (a) Y-type strainer if installed below ground
  - Reduced pressure zone (RPZ)
  - Air gap
- Wiring and connectors (direct burial requirements) (§344.62)
- Controllers
  - Technology-based (e.g., programmable, ET-historical, real-time weather etc.)
  - Digital
  - Electro/mechanical
  - Sensors and shut-off devices or other technology (e.g., rain, moisture, flow, freeze) §344.62

### B. Site Evaluation

- Soils: types, infiltration rate, holding capacity

- Climate: temperature, clouds, humidity, precipitation, wind
- Plant water requirements
- C. Plan Interpretation (§344.61)
  - Recognize water source (static pressure, size, capacity)
    - Reclaimed water precautions. (§344.65)
  - Other utility lines
  - Field measurements and drawings
    - Plan scale-interpret and use
    - Orientation (which way is north?)
    - Plan legends and layout (recognizing head spacing, line sizes, type of heads, valves, backflow prevention specified on plan/design)
    - Elevations, contour lines, and slope as shown on irrigation design/plan
    - Site restrictions: natural and man-made barriers such as cliffs, fences, sidewalks, septic systems
- D. Efficient Irrigation Head Layout
  - Optimum precipitation rates in relation to soil type and plant material
  - Matched precipitation rates
  - Square vs. triangular pattern
  - Zoning (velocity & pressure loss, hydrozoning factors, effects on water schedule) §344.62(e)
  - Flower beds
  - Street
  - Odd shaped areas
- E. Hydraulics and Troubleshooting
  - Water flow in pipes (velocity, friction, water hammer, pressure loss, effects of elevation differences)
  - Pipe sizing (function of flow velocity and pressure loss)
  - Pressure loss through irrigation appurtenances (meters, valves, backflow prevention devices, regulators, fittings)
  - Nozzle discharge rates §344.62(c)
    - Effects of pressure on flow rates through nozzles
    - Manufacturer=s recommended operating pressure vs. actual
    - Negative effects of excessive pressure at the nozzle
  - Use of pressure regulation (methods)

### **3. Installation Fundamentals (§344.62) (Safety relating to these tasks)**

- A. Connection to the Water Supply
  - Who can make the connection?
  - Potential hazards during the act of connection (pollutants, contaminants and/or debris entering the drinking water supply)
- B. Backflow Prevention (§§344.50 – 344.52)
  - Principles of backflow
    - Backpressure

- o Backsiphonage
    - Requirement for backflow prevention
    - Types of backflow prevention
    - Local ordinances regarding plumbing and backflow prevention (if applicable)
  - C. Trenching and Backfill (§344.62)
    - Trenching
    - Pushing and boring
    - Backfill (material selection and placement, tamping, replacement of grass, return to original grade, water settling, etc.)
  - D. Installation of Pipes and Fittings (§344.62)
    - Pipe selection and cutting
    - Valves and boxes
    - Fittings
    - Risers and Aswing joints@
    - Joints (threaded fittings, soldering, solvent welding, etc)
    - Boring, pulling pipe, sleeve size
  - E. Drip and Other Low Volume Irrigation
    - Fittings, filters, pressure reducer/regulator, tubing, emitters
    - Valves (e.g., shut-off, flush, air vacuum relief, and check valves)
  - F. Additional Features/Extra Features to Install (§344.62)
    - Pressure regulators
    - Booster pumps
    - Controllers
    - Sensors and other technology
- 4. Testing, Maintenance, Operation and/or Troubleshooting (§344.62)**
- A. Introduction to Water Auditing
    - Precipitation rates (theoretical calculation methods vs. practical, in-the-field methods of measurement)
    - Uniformity Concepts (water distribution uniformity)
  - B. Irrigation Scheduling and Customer Education (§344.63)
    - Optimum time to irrigate
    - Length of irrigation cycle
    - Frequency of irrigation
    - Description of system components and characteristics
    - Programming controller: seasonal/start-up scheduling/water budgeting
    - Maintenance checklist requirements and responsibilities
      - o Customer walk-through
  - C. Service, Maintenance, and Repair
    - Pressure regulation problems-use of gauges or other devices as needed