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

    - 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
    - Customer walk-through
- C. Service, Maintenance, and Repair
  - Pressure regulation problems-use of gauges or other devices as needed