

## 1: Irrigation Plans and Quantities

*Landscape Irrigation Design Manual v Forward This manual was prepared at the request of numerous individuals who either wished to learn the basic techniques.*

Day 1 Tuesday, Dec. Day 2 Design efficient, economic irrigation systems for orchards and row crops. Day 2 Understand center pivot design and system management. Two full days cover theory and practical applications, including nozzle selection, application rates and scheduling. Recommended class preparation includes Principles of Irrigation. Day 2 Master theory and application principles for agriculture in this intensive session. Two full days cover soil-water-plant relationships, advanced hydraulics, electricity, pumps, valves and irrigation equipment. This class is recommended as a review for the certified irrigation designer general agriculture exam. Day 1 Wednesday, Dec. Day 2 Master irrigation management for surface furrow and border strip and pressurized micro and sprinkler systems. This one-and-a-half-day session includes irrigation volume and frequency, evapotranspiration and crop coefficients, scheduling, and salinity effects. This class is recommended as a review for the certified agricultural irrigation specialist exam. Save time and money with this practical course in electrical troubleshooting. This half-day class covers diagnosing field wiring problems and proper use of volt-ohm meters. Learn to systematically assess and resolve confusing electrical problems. Increase your understanding of components for residential and small commercial irrigation systems. This half-day course covers system components from the point of connection to the point of water application, including how control systems, valves, sprays and rotors work. Day 2 Learn how to assess irrigation system performance. This two-day session covers field tests and calculating accurate watering schedules based on plant water use, soils and local weather data. This class is recommended as a review for the certified landscape irrigation auditor exam. Day 2 This two-day class is a comprehensive refresher for experienced contractors. Topics include soil-water-plant relationships, hydraulics, basic electricity, grounding, pumps, building codes, scheduling and system uniformity. This class is recommended as a review for the certified irrigation contractor exam. Day 2 Take your landscape designs to the next level. This fast-paced course covers basic hydraulics, sprinkler head layout, zoning, pipe sizing, routing and matched precipitation rate principles. Students will complete two designs during the two-day class. Day 2 Master theory and application principles for turf-landscape in this intensive session. This half-day session will cover different types of transformers, proper phasing primary and secondary, diagnosing problems using different meters, wire sizing for communication cables and two-wire systems, DC controllers, special solenoids, and proper splicing techniques. Review the essentials of hydraulics for landscape irrigation. This half-day class covers troubleshooting, design, system upgrades and more. Improve landscape water efficiency with better design, including uniformity, equipment selection and technology. This full-day session will address advanced irrigation concepts. Targeted at experienced designers, this full-day course covers the basics of sustainable irrigation systems. Topics include using reclaimed water and rainwater harvesting and how they apply to LEED and other sustainability programs. Incorporate drip irrigation in landscape applications with this comprehensive review of key design elements, including emitter selection, system layout, applications and scheduling. This full-day session covers line and point source products. Learn the basics of hydraulics and irrigation system installation and maintenance. This full-day learning session covers an overview of irrigation system components and how they operate. Learn about gluing and repairing PVC pipe, installing nozzles and adjusting heads, setting and repairing electric valves, and field and controller wiring techniques. This class is recommended as a review for the certified irrigation technician exam. Learn how to create water budgets, develop irrigation schedules, document water usage, and plan for periods of drought. This full-day class will help attendees maximize the benefits of smart technology and work effectively with water providers. Advance your troubleshooting skills for two-wire systems. This class covers the intricacies of troubleshooting two-wire control systems used in landscape irrigation systems. This class will address typical problems and diagnoses, procedures to avoid typical two-wire problems, and hands-on practice in solving problems in a classroom setting. You will also learn how to design and install flow sensors, decoders and grounding systems to protect expensive equipment.

This four-hour class includes an overview of the advantages of drip systems, parts and components; where to install line source or point source systems; pressure compensating emitters; basic design; hydrozoning; and determining how many emitters per plant. Class includes some hands-on practice with fittings, assembly and retrofitting spray zones. This class will be taught in Spanish. This class will help one develop an understanding of the relevant differences between an installation and a service business. We will also explore the many ways technology impacts this type of business from new controllers of the software and systems for managing a service company. This class provides several opportunities for students to be exposed to current business practices in strategic planning, business finances and marketing through presentation of relevant topics, group discussions and exercises on best practices. This is designed to be an engaging day focused on business management that irrigation contractors can use to successfully grow their companies. Retaining well-trained service technicians is one of the largest challenges facing the irrigation service business. This class will explore the difficulties contractors encounter and present strategies for finding, hiring, training and keeping service technicians. This class will present some hands-on models for pricing, including understanding costs and models for technician and service contract rates. Lastly, different marketing topics, including service contracts and promotion will be discussed. Develop bids that win jobs based on accurate estimates that keep your company in the black. This full-day course includes hands-on practice on the best contractor bidding systems. This class requires a laptop with Microsoft Office Excel or later. This two-hour session is an intensive review of the most common calculations and formulas used in irrigation system design, installation, audits and maintenance.

## 2: Landscape Irrigation Design Manual - [www.enganchecubano.com](http://www.enganchecubano.com)

*Landscape Irrigation Design Manual. This manual was prepared at the request of numerous individuals who either wished to learn the basic techniques of landscape irrigation design or who are teachers of the subject.*

Landscape Irrigation Design Manual iii Sizing pipe and valves and calculating system pressure Pressure loss through swing check valves. Determining water and power supply Selecting sprinklers and spacing ranges Lateral layout, circuiting sprinklers into valve groups Sizing pipe and valves and calculating system pressure requirements Locating the controller and sizing the valve and power wires Preparing the final irrigation plan Intended as a very basic text for irrigation design, this manual proceeds as if the reader has no prior knowledge in the subject. As you use this manual, be sure to review the practical exercises at the end of each section. In some cases, new information and tips, not covered in the previous section, are found in the exercises. The main omission from a design manual such as this is the real, hands-on experience of designing and then installing a landscape irrigation system. The editors of the Landscape Irrigation Design Manual hope such an opportunity is available to you and that the information presented here is of benefit. Landscape Irrigation Design Manual v Introduction Properly designed, installed, maintained and managed landscape irrigation systems greatly reduce the volume of irrigation water that is wasted every year. In some water short areas, we have seen the beginnings of planned water conservation efforts. In time, these could become the basis for a coordinated national policy toward water conservation. Today many municipalities require home or business owners to submit irrigation designs for approval prior to construction. This manual is part of the effort to promote properly designed landscape irrigation systems. It is our goal to present the material as simply as possible while explaining some theory behind the process. Understanding the basic hydraulics material in the first section of the manual is very important, especially to new students of irrigation design. With that said, please turn the page to discover some facts about the nature of water. Information contained in this manual is based upon generally accepted formulas, computations and trade practices. If any problems, difficulties, or injuries should arise from or in connection with the use or application of this information, or if there is any error herein, typographical or otherwise, Rain Bird Sprinkler Mfg. Metric data International System Units contained in this manual is not always a one-to-one conversion from U. Some metric data has been altered to simplify examples. Understanding basic hydraulics Hydraulics is defined as the study of fluid behavior, at rest and in motion. Properly designed piping, with sound hydraulics, can greatly reduce maintenance problems over the life of an irrigation system. Controlling the water flow velocity, holding velocity within proper limits, reduces wear on the system components and lengthens service life. Poor hydraulic design results in poor performance of the irrigation system, leading to stressed landscaping material, or even broken pipes and flood damage. Lack of design know-how can also cost the system owner more money because the designer may over-design the system to avoid unknown factors. In addition to wasting money, a poor hydraulic design will often waste water. Hydraulic analysis is important to minimize financial risks, produce efficient designs and eliminate waste. To accomplish all these things we need to understand the nature of water. Water takes the shape of the container. Water is relatively incompressible. Water is also quite heavy – one gallon one liter of water weighs 8. Water responds to gravity and seeks its own lowest level responding to gravity. Water exerts pressure – defined as the force of water exerted over a given area. The formula for water pressure looks like this: When the area is constant, such as 1 in<sup>2</sup> 1 cm<sup>2</sup>, then the force in pounds kilograms is dependent on, simply, the height of the water. The more height to a column of water, the more weight, force, and pressure. One foot 50 cm of water creates a pressure of. It makes no difference if the 1 ft 50 cm of water is held in this narrow container or at the bottom of a 1 ft 50 cm deep lake. The area we are concerned with is only 1 in<sup>2</sup> 1 cm<sup>2</sup> at the bottom of either container. Water towers filled at 12 in and 24 in 50 cm and cm If you double the height of the water, the pressure is doubled. By using this conversion factor, we can easily determine the static no flow water pressure within any pipe. The factors for converting pressure to feet of head meters of head and feet of head meters of head back to pressure are both multipliers. For example, ft of water height x. Further, using this factor we can determine that a water tower with a water surface ft m above the point where we need

it would create a pressure of 2. To convert pressure in psi to feet of head, multiply the pressure by 2. For example, 10 psi x 2 = 20 feet. Pressure of 10 bar would only lift the water 100 ft. Water tower 100 ft. Figure 3: Water supply to a house. 4 Landscape Irrigation Design Manual

The word hydrostatic refers to the properties of water at rest. We will be discussing static water pressure as a starting point for hydraulic design of an irrigation system. Hydrodynamic refers to the properties of water in motion. Static water pressure refers to the pressure of a closed system with no water moving. A water-filled main line, with all valves closed, would experience full static pressure with only pressure variation due to elevation. Static water pressure is an indication of the potential pressure available to operate a system. Static water pressure

There are two ways to create static water pressure. As we have seen in our discussion regarding the relationship between pounds per square inch bar and elevation, water height can create pressure. By elevating water in tanks, towers and reservoirs, above where the water is needed, static pressure is created. Water systems may also be pressurized by a pump or a pump can be used to increase, or boost, pressure. Whether from elevation differences or by mechanical means, understanding the static pressure at the water source for an irrigation system is where hydraulic calculations begin. Here is an example of a simple system for supplying water to a house from a city main line. We will be following the complete irrigation design process for this project throughout the manual. The supply system to this home looks like this see Figure 3: There is a small rise in elevation of 2 ft 0,5 m from the meter location to the house. Finally, 1 ft 0,3 m above the point where the service line enters the house is a hose valve connection. Since the supply source is from below, the 1. In some instances, the water pressure is too low for typical landscape irrigation requirements and a booster pump will be necessary. If the water main was in a street higher than the site, all the elevation change coming down to the project would have produced pressure gains instead of losses. For example, had the main line been located 10 ft 3 m above the site, the static pressure at the hose bib would have been: Static water pressure at the point-of-connection is a necessary part of the data needed to start an irrigation system design. The designer may choose to cut or tap into the service line anywhere between the meter and the house to start the main line for the irrigation system. The location of the tap into the service line may also be referred to as the point-of-connection or POC. At any point along the main line, the static pressure can be calculated. In this case, the designer will need to consider and control the high water pressure condition on this site. Had the Figure 4: The water purveyor probably uses a computer model to predict the lower summer pressures in their system, so they can provide data regardless of the season. The water purveyor may also be able to predict if pressures may change in the future. For example, they may be planning to install a new pump to increase pressure or conversely, the additional houses to be built in the future may cause the pressure to be lower. Good advice can generally be obtained from the professionals working for the water purveyor, and it is good to call them even if a pressure reading is made at the site. The pressures calculated in the previous example were all static water pressures with no water movement in the system. When a valve is opened, and water in the system begins flowing, we have a new pressure situation to take into account. Friction loss is a pressure loss caused by water flowing through pipes, fittings, and components in the system. Pipes, fittings, valves, water meters and backflow prevention devices all offer resistance to water flowing, and the resistance creates a pressure loss. The roughness and turbulence on the inside surfaces of pipes and components creates a drag or friction on the passing water, which causes the pressure of the flowing water to decrease. The dynamic water pressure is the pressure at any point in the system considering a given quantity of water flowing past that point. Large Flow Lower Pressure Figure 6: This flow loss is usually given as pounds per square inch bar loss per ft m of pipe. The loss varies with differing types of pipe; different pipes have varying dimensions and degrees of internal smoothness. This fact makes each type of pipe hydraulically unique. In addition to the pound per square inch loss per ft bar loss per m, friction loss charts will often show the velocity of the water passing through the pipe at that flow rate. Velocity, the rate at which water moves within the components of the system, is an important factor to understand. The faster the water moves through a pipe, the higher the friction loss. Fast moving water can cause other problems in a system as well. In addition to checking a pipe chart to find velocity for a certain type and size of pipe at a given flow, you can use an equation to determine flow mathematically.

## 3: Landscape Irrigation Design

*System design should allow for scaling back the system to completely manual operation for plant replacement or during times of severe drought. (See Plant Irrigation.) Adaptability to Soils and Climate: Plants must be adapted to the climate of the area and to the unique environment of the roadway.*

## 4: Rain Bird: Irrigation Design Guides

*Landscape Irrigation Design Manual HUNTER'S RESIDENTIAL SPRINKLER SYSTEM DESIGN HANDBOOK This booklet is intended to be used when designing and installing small single family residential sprinkler systems.*

## 5: Rain Bird Services: Resources and Downloads

*Standards for Landscape Irrigation Systems Provide a manual containing operating and maintenance instructions for all DESIGN An irrigation system must apply a.*

## 6: Landscape and Aesthetics Design Manual: Landscape Design

*This Manual also makes design recommendations based on the regulations outlined in the Landscape Ordinance. The intention for these Best Practices is to inform home and property owners about landscape and.*

## 7: Landscape Manual | City of Irvine

*This manual was prepared at the request of numerous individuals who either wished to learn the basic techniques of landscape irrigation design or who are teachers of the subject. Intended as a very basic text for irrigation design, this manual proceeds as if the reader has no prior knowledge in the subject.*

## 8: Document Library | Rain Bird

*The Design Manual provides development standards for landscape architects and others, in the preparation of construction documents for median islands, back-up landscaping, parks, natural areas and other public.*

## 9: Education Classes

*3 A PDF copy of the architectural plan must be forwarded to the Landscape Department and Planning Partners A PDF copy of the Landscape & Irrigation Plans must be forwarded to the.*

*O holy night sheet music satb The New Greek-English Interlinear New Testament (Personal Size) Aslan (The World of Narnia Series) The Australian Race English story mp3 Swallowtails Shiina Makoto Connecting the Dots by Paola Harris The 11 Myths of Media Violence Modern power system analysis solution A Shrinking Island From fear of the fire Control of Mechanical Systems With Constraints When you dont know what to do Homeschooling in the United States Instant Send-Home Letters (Grades K-2) Botanical progress, horticultural innovation and cultural changes The Mutiny of the Elsinore [UNABRIDGED-MP3 CD] The Money is in the Gravy Peripheral campaigns and the principles of war Going wild, adventures of a zoo vet The deadliest places on earth The Extraordinary case of dietary supplements Catherine Woteki A glossary of Yorkshire words and phrases, collected in Whitby and the . Confronting Columbus Black Kingdoms, Black Peoples Group therapy for medically ill patients Alcohol advertising does not target children Jacob Sullum A Christian Commonwealth Uncovering the truth: a year long investigation The 1995 annotated refugee convention Star wars darth maul shadow hunter Ethnoarchaeology of the Zaghawa of Darfur (Sudan) Pimsleur spanish ing booklet Management Philosophy Coopers and Coopering Mel Bays You Can Teach Yourself Electric Bass Paul and economics : the Jerusalem collection as an alternative to patronage Steven J. Friesen Brothers from childhood to oasis the real story Whole Language for the Holidays Edit text in windows explorer*