

# Irrigation Design Guidelines

## Plan Preparation

1. Obtain, or create, a site plan of the property...*with* outlines of plant material.
2. Find out:
  - a. the water source (location *and* pipe size)
  - b. water availability (GPM)
  - c. static and residual pressure (psi)
3. Pre-planning selection of sprinklers to be used.
4. Layout sprinkler heads to provide 'head-to-head' coverage.
5. Assign GPM's per head on the plan.
6. You've already found out the water availability, so now... combine similar heads into logical 'zones' that do not exceed the maximum GPM's of water available.
7. Determine where control valves should be located for each zone. When possible, try to locate these in groupings (so they can be combined in one valve box) *and* put them in, or near, planting beds... instead of scattered out in the middle of the yard.
8. Layout the route of the mainline in a manner which will most efficiently deliver water to all of the control valves. (It is common to use use Class 200 PVC for the mainline).
9. Size the 'lateral' pipes to all the heads so that the velocity of the water does not exceed 5 ft. per second through the pipe. (Generally, using Class 160 PVC pipe...pipe should be sized according to the following guidelines):
  - 1" = for 0-16 GPM
  - 1.5" = for 16-35 GPM
  - 2" = for 35-55 GPM
  - 2.5" = for 55-80 GPM
10. Make notations on the plan where 'sleeves' will be needed under sidewalks and drives.
11. Determine if you'll need a booster pump at the 'point of connection' in order to raise the water pressure of the system to an adequate level (generally, an operating pressure of 40-60 psi is desirable at the sprinklers).
12. Select the appropriate backflow prevention device for the site.
13. Determine the type of controller (timer) needed to automatically control all the valves on the system. Designate where this controller will be located on the plan. (There will need to be 120V-AC power at this location).
14. Sequence the valves/control stations in a manner that will allow you to conveniently observe the individual zones in operation after you've turned on the system for short 'test' cycles.
15. Add to the plan: general notes, a 'legend' (key) of all the graphic symbols used, the scale of the drawing and a 'North arrow'. (It is also wise to put a date on the drawing).
16. Make blueprints, or copies, of the plan... *never* let the original stray from the office!
17. If necessary, write specifications for the project covering all of the materials to be used and the procedures by which they will be installed.

**Questions?** Please go to: <http://www.toro.com/watermgmt/index.html>

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## **Typical 'Legend' (product selection):**

*Below are the primary Toro & Irritrol products for each category:*

1. **Premium Large-turf rotor (spaced at 50-55 ft.):** Toro 640 Series with five different nozzle sizes and twelve different arc-patterns. Optimum pressure: 60-65 psi.
2. **Large-turf rotors (spaced at 50-55 ft.):** Toro #T7 with nozzle #12... 11.6 gpm at 60 psi (keep full-circles on separate zones; for part-circle zones: use #12 nozzle for half-circle & #7 nozzle for quarter/third-circle arcs). Or... Irritrol 'Platinum Sport' rotor with nozzle #12... (12.7 gpm at 60 psi).
3. **Mid-range rotors (spaced at 30-35 ft.):** Toro's new T5 rotor with #3 nozzle (standard) for half-circles. Toro #Super 800 with nozzle #2.5 (standard) for half-circles; nozzle #1 for quarter-circle; nozzle #6 for full-circle. Or... Irritrol #450R or 550R with same nozzles: #3 for halves; #1 for quarters; #6 for full-circles.
4. **Short-range rotors (spaced at 18-25 ft.):** Toro Mini-8 with nozzle #1.5 for half-circle; #0.75 for quarter-circle; #3 for full-circle.
5. **Spray-heads (with nozzles that allow spacing them anywhere between 5 ft–15 ft.):** Toro #570Z-4P-PRX for turf areas with 'Precision' nozzles of either the 5' series, 8', 10', 12' or 15' series, or Special Patterns. For groundcover/shrubs use: Toro#570Z-12P-PRX with desired 'Precision' nozzles sized for individual areas, as above.
6. **Drip-irrigation (occasional use, such as in beds or steeply sloped areas):** Toro DL2000 subsurface irrigation dripline #RGP-2-18 for turf areas; or use Drip-In PC for landscape beds with 0.53 gph emitters spaced at 18" (space rows 18" apart). Specify drip-zone valve-kit: #DZK-TPV-1-LF
7. **Control valves (primarily 1", 1.5" and 2"):** Pressure-regulating control valves: Toro #P220-27-04 (1" for flows between 5-32 gpm); #P220-27-06 (1.5" for flows between 32-74 gpm); #P220-27-08 (2" for flows between 75-150 gpm). TPV valves: 1" size for lower flows (0.1-28 gpm) with/without dirty water and low-to-mid pressure situations: model #TPVF100
8. **Quick-couplers:** Toro #075-SLSC (3/4") with #075-SLK (3/4" key); or #100-SLSC (1") with #100-SLK (key).
9. **Controllers:**
  - TMC-424e with either 4H or 8H modules (4 or 8 station modules with high-surge protection; also available are flow-monitoring modules.) Compatible with the TMR-1 hand-held remote.
  - IntelliSense #TIS-6, 9, 12, 24, 36 & 48 stations. (The 36 & 48 station models come in lockable powder-coated metal cabinets, and are compatible with the TMR-1 hand-held remotes and the TFS flow-sensors.) And now... the 12 & 24 station units are also with these features. These will be the TIS-12P-MW and TIS-24P-MW.
  - Custom Command #CC-M-xx (where xx represents either: 09, 12, 15, 18, 24, 36 or 48 station configuration). Compatible with the TMR-1 hand-held remote.
  - TDC Decoder Controller #CDEC-SA-xxx (where xxx represents either 100 or 200 station configuration). Decoders come in 1, 2 or 4-station models. Capable of operating zones up to 2.8 miles away (15,000 feet).
  - Sentinel Central Controller... contact Toro for assistance if you have a project where a central controller would be appropriate.
  - Rain Sensors: Toro Wireless Rain Sensor #TWRS (has a 500 ft transmitting range) ... recommended for every system!

## Pipe Sizing Chart

<u>Gallons Per Minute</u>	<u>Pipe size (minimum)</u>
0 – 16 GPM	1"
17 – 35	1.5"
36 – 55	2"
56 – 80	2.5"
81 – 120	3"
121 – 200	4"
201 – 400	6"

## Commercial Valve-Sizing Chart

<u>GPM</u>	<u>Size</u>	<u>Valve Brand, Series &amp; Model #</u>
Drip/ 0-5	1"	Irritrol #700-1 (#700-1-OMR30 for pressure-reg) Toro #TPV valve (with patented 'Debris Bypass System') ... best for <u>very</u> low gpm as on most drip-zones.
5 – 28	1"	Toro #TPV valve (not pressure-regulating) Toro #P220-26-04 (P220-27-04 for pressure-reg.) Irritrol #700-1 (#700-1-OMR100 for pressure-reg) also: Toro EZ-Flo Plus or Irritrol 2400 series ( <u>non</u> -PR)
29 – 70	1 ½"	Toro #P220-26-06 (#P220-27-06 for pressure-reg) Irritrol #100P1.5 (#100P1.5-OMR100 pressure-reg)
70 – 150	2"	Toro #P220-26-08 (#P220-27-08 for pressure-reg) Irritrol #100P2 (#100P2-OMR100 for pressure-reg)
150 – 250	3"	Toro #P220-26-00 (#P220-27-00 for pressure-reg) Irritrol #100P3 (#100P3-OMR100 for pressure-reg)

Note: When the **P220 Series valves** are used with Toro's TDC (2-wire decoder controller) **or** with the DDCWP battery-operated controller, the following model numbers must be specified to ensure they come with DC-latching solenoids:

- P220-26-94 (1"); P220-26-96 (1.5")... or
- P220-27-94 (1"); P220-27-96 (1.5")... with pressure-regulation

The **1" EZ-Flo valves** with DC-latching solenoids need to be specified as such:

- EZF-20-94 (slip)
- EZF-21-94 (male-male)
- EZF-25-94 (male-barb)
- EZF-26-94 (female)

The **TPV valves** (1" only) with DC-latching solenoids need to be specified as such:

- TPVF100-DC (female NPT with flow-control)
- TPVF100-SDC (slip model with flow-control)
- TPVF100-MBDC (male x barb with flow-control)
- TPVF100-MMDC (male x male with flow-control)

\* The above model #'s are for specifying the DC-latching solenoids, which are needed on the valves when operating with the TDC (two-wire decoder controller) or the battery-operated DDCWP controller.