



QWEL

Qualified Water Efficient Landscaper

Class Two: Irrigation Systems

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Overview

- Water pressure
- Hydraulics
- Site information
- Irrigation
 - Water requirements
 - Application
 - Type
 - Location
 - Design
 - Components
- Pre-season startup and winterizing an irrigation system



Static and dynamic pressure

Basic hydraulics

- **Static pressure** is the pressure in a “charged” line and is determined using a pressure gauge when water is not running through the system
- **Dynamic pressure** is the measurement of pressure in a line as water flows through the line



Pressure and flow relationship

PVC Schedule 40 IPS Plastic Pipe

(1120, 1220) C=150

psi Loss Per 100 Feet of Pipe (psi/100 ft.)

Sizes 1/2" through 6" Flow 1 through 600 GPM

Size	1/2"		3/4"		1"		1 1/4"		1 1/2"		2"	
O.D.	0.840		1.050		1.315		1.660		1.900		2.375	
I.D.	0.622		0.824		1.049		1.380		1.610		2.067	
Wall Thk	0.109		0.113		0.133		0.140		0.145		0.154	
Flow GPM	Velocity fps	psi Loss	Velocity fps	psi Loss	Velocity fps	psi Loss	Velocity fps	psi Loss	Velocity fps	psi Loss	Velocity fps	psi Loss
1	1.06	0.43	0.60	0.11	0.37	0.03	0.21	0.01	0.16	0.00	0.10	0.00
2	2.11	1.55	1.20	0.39	0.74	0.12	0.43	0.03	0.32	0.02	0.19	0.00
3	3.17	3.28	1.80	0.83	1.11	0.26	0.64	0.07	0.48	0.03	0.29	0.01
4	4.22	5.58	2.41	1.42	1.48	0.44	0.86	0.12	0.64	0.06	0.38	0.02
5	5.28	8.43	3.01	2.15	1.86	0.66	1.07	0.17	0.80	0.09	0.48	0.02
6	6.34	11.81	3.61	3.01	2.23	0.93	1.29	0.24	0.96	0.12	0.57	0.03
7	7.39	15.71	4.21	4.00	2.60	1.24	1.50	0.33	1.12	0.16	0.67	0.05
8	8.45	20.12	4.81	5.12	2.97	1.58	1.72	0.42	1.28	0.20	0.76	0.06
9	9.50	25.01	5.41	6.37	3.34	1.97	1.93	0.52	1.44	0.25	0.86	0.07
10	10.56	30.40	6.02	7.74	3.71	2.39	2.15	0.63	1.60	0.31	0.96	0.09
11	11.61	36.26	6.62	9.23	4.08	2.85	2.36	0.75	1.76	0.37	1.05	0.11
12	12.67	42.59	7.22	10.84	4.45	3.35	2.57	0.88	1.91	0.43	1.15	0.12
14	14.78	56.64	8.42	14.42	5.20	4.45	3.00	1.17	2.23	0.57	1.34	0.16
16	16.89	72.52	9.63	18.46	5.94	5.70	3.43	1.50	2.55	0.73	1.53	0.21
18	19.01	90.17	10.83	22.95	6.68	7.09	3.86	1.87	2.87	0.91	1.72	0.26
20	21.12	109.58	12.03	27.89	7.42	8.62	4.29	2.27	3.19	1.10	1.91	0.32
22			13.24	33.27	8.17	10.28	4.72	2.71	3.51	1.32	2.10	0.38
24			14.44	39.08	8.91	12.07	5.15	3.18	3.83	1.55	2.29	0.45
26			15.64	45.32	9.65	14.00	5.58	3.69	4.15	1.79	2.49	0.52
28			16.85	51.98	10.39	16.06	6.01	4.23	4.47	2.06	2.68	0.59
30			18.05	59.05	11.14	18.24	6.44	4.80	4.79	2.34	2.87	0.67
35					12.99	24.26	7.51	6.39	5.58	3.11	3.35	0.89
40					14.85	31.06	8.58	8.18	6.38	3.98	3.82	1.15
45					16.71	38.62	9.65	10.17	7.18	4.95	4.30	1.42
50					18.56	46.94	10.73	12.36	7.98	6.02	4.78	1.73

- The **larger the pipe the lower the pressure** needed to deliver a given quantity (flow) of water
- The **smaller the pipe the greater the flow loss** due to friction of the pipe and fittings

Slope or gradient



Pressure (head)

- Increases by .433 psi/ft. of elevation change, **or**
- Decreases by .433 psi/ft. of elevation change

☀ A rough figure of .5 psi per ft. of elevation change is typical

Reflective heat or light



- Observe the area and keep a written record of
- Heat or light damage
 - Wind exposure
 - Direction of prevailing wind

Sand, loam, clay

Determine soil type by using a

- Soil probe
- Hand test
- Percolation test
- Soil lab for analysis





Site information

Hydrozones

Planting groups with similar cultural and irrigation requirements

Do NOT mix on the same valve:

1. Irrigation application methods
2. Sun and shade planting beds
3. North and south planting beds
4. Sloped and level areas
5. Drip irrigation with spray irrigation





Site information

Valve by hydrozone

- Design and place irrigation valves by hydrozone
- Group plantings for proper microclimate and irrigation method

