CITY OF BOZEMAN WATER CONSERVATION

Benefits of the Cycle & Soak Watering Method

Definitions:

- **(Soil) surface tension -** the tension between soil particles (commonly high in clay soils), which determines how easily water can pass through. The higher the surface tension, the more time is required for water to move through the soil.
- **Infiltration rate** - the amount of time it takes water to pass through the soil's surface
- **Percolation rate** - the amount of time it takes water to move through one inch of subsurface soil
- **Precipitation rate** - the amount of water that lands on the soil in a given amount of time

Many homeowners set their irrigation controllers to run most zones for 10-30+ minutes, +/- 3 days per week. Depending on the soil and sprinkler type (rotor, variable arc nozzle, traditional pop-up, or MSMT pop-up), having your system run for **one** extended period could cause pooling and/or runoff. Since the majority of soil in Bozeman is a **clay-loam** (which mostly has very fine particles that form dense clusters – unable to absorb large quantities of water at one time), water takes a relatively long time to make its way through the soil (towards plant roots). Adjusting your controller's run times and using a cycle and soak watering method is a much more efficient way to apply water to the turf.

'Cycle and soak' is an industry term for breaking one run time into two or three shorter run times (e.g. 20 minutes every third day would translate to 2 cycles of 10 minutes, with at least 45 minutes for the water to soak in between cycles). Below is a table comparing infiltration rates of common local soil types. A **clay-loam** generally allows water to move through surface particles at a rate of 0.1 - 0.2 inches per hour. Once the sprinklers in a zone have applied this amount of water (usually within an hour), any additional water that is applied will either pool or become runoff.

> **An example:** the **average** precipitation rate among high efficiency (**MSMT,** or multi-stream multi-trajectory) pop-up nozzles is **0.5 inches per hour** (in/hr). To effectively apply 1 inch of water (per week) to turf with clay-loam soil, you could run each (zone's) cycle for a **maximum** of 24 minutes, twice a day (with at least a 45 minute soak in between cycles), three days per week.

A Guide to Determine Cycle & Soak Times

Soil Type	**Infiltration Rate** (in/hr)	**Percolation Rate** (min to accept 1 in)	**Time Until a Rest Cycle is Required** (min)
Clay	0.01-0.1	60-120	6-12
Clay Loam; Silty Clay Loam; Sandy Clay Loam	0.1-0.2	45-60	12-24

The theory behind the cycle and soak watering method is as follows:

The 1st cycle breaks the surface tension of the soil by saturating the top inch of soil. The 2nd cycle allows for deeper infiltration of water into the soil profile to encourage plant roots to grow deep (promoting greater tolerance to drought conditions, and less susceptibility to disease). A 3rd cycle

can be beneficial for landscapes with highly compacted soil and/or moderate to steep slopes (15-30 degrees).

How to program for Cycle & Soak:

1. Run each zone for 10-15 minutes
2. Keeping track of time, record when signs of pooling/runoff occur
   This is the maximum amount of time each zone can run for in order to prevent wasting water
3. Now take the total time each zone needs to be watered, and divide by the time you just recorded
   This tells you how many cycles are necessary for each zone, per watering day

Benefits of Cycle & Soak:

- Saves water
- Improves turf health (more thick, deeper green)
- Promotes deeper roots (drought resilience)

The following are water loss estimates regarding runoff from **traditional pop-up spray nozzles** and **MSMT nozzles** (compared to the total applied volume of water):

Traditional Spray Nozzles:

- Up to 35% (runoff, pavement over-throw, and nozzle leaks)
- Up to 4.5% runoff

MSMT Nozzles:

- Up to 15% (runoff, pavement over-throw)
- Up to 5% runoff

Why worry about minimizing runoff?

- Runoff wastes our precious water resources.
- Water that travels from your landscape to the stormwater drain may contain fertilizer, oils and pesticide that can harm fish and aquatic ecology in the streams it eventually enters.
- Ultimately, wasted water is wasted money.