



DEVELOPMENT ENGINEERING PRIVATE IRRIGATION SYSTEM DESIGN CHECKLIST

General Requirements:

- Water Pressure
 - An accurate calculation of the available static pressure using the low Hydraulic Grade Level (low HGL) and the elevation at Point of Connection (POC) is imperative for the proper performance of an irrigation system. The low HGL is provided to the applicant by Development Engineering at the Pre-Application meeting, and can also be obtained from Joe Ferdig, Landscape Architect, at 303.538.7339 or joe.ferdig@cityofthornton.net.
 - The irrigation designer must demonstrate that adequate pressure exists to efficiently run the irrigation system as designed, or an appropriate booster pump will be required.
 - Adequate pressure is demonstrated to the City through correctly calculating the static pressure using low HGL and the Friction Loss Worksheet.
- Head-to-Head Coverage
 - Design the sprinkler head layout to provide head-to-head coverage throughout the landscape, and including the back of curb area, if applicable.
 - Only 2% of the total of each type of head will be allowed to be “kicker” heads. This is strictly enforced, as it directly affects water conservation.
 - It is better to crowd the spacing by overlapping than to stretch it past head-to-head coverage.
- Zoning
 - Hydrozones and microclimates shall be zoned separately. The idea is that any portion of the landscape with a different water requirement must be irrigated separately on its own zone.
 - Alternatively, the base plant method of adjusting precipitation rates for each plant's water requirement to achieve a common run-time may also be employed, especially on drip irrigation zones, to minimize the number of zones required.
- The Irrigation Construction Documents Submittal Must Include:
 - Irrigation Plan
 - Irrigation Schedule (Legend)
 - Irrigation Notes
 - Friction Loss Worksheet
 - Irrigation Details
 - Seasonal Operating Schedule (How the controller should be programmed)

Irrigation Plan:

- Show the following elements of the Landscape Plan on the Irrigation Plan:
 - Show all trees, shrubs and other plant materials without labels; gray back considerably.
 - Show only the proposed grading with elevation labeled a minimum of every 5 feet; gray back considerably.
- Show the location and label the size of each of the following components on the irrigation plan:
Point of Connection (POC) Components: These components are listed in the general order that they are expected to be installed after the tap. Provide a spot elevation at the POC.

- Service Line
 - The tap and incoming service line for all irrigation connections is required to be a minimum of 4". Service line material can be either Ductile Iron Pipe (DIP) or C900 PVC pressure pipe.
- Water Meter
 - All connection and usage fees are determined by meter size, not tap size. As the meter usually has greater capacity than the same sized service line does, it is common to downsize at the meter and then upsize again for the rest of the service line.
 - See Table 800-2 in the City of Thornton Standards & Specifications for meter sizing requirements.
- Stop and Waste Valve that isolates the system from the meter
- Reduced Pressure Zone Backflow Prevention Assembly & Enclosure (or other locking mechanism)
- Quick Connect Valve (for compressed air winterization)
- Master Valve (required)
- Flow Sensor
- Mainline Pipe

Sprinkler System Components:

- Control Valves – Identify each control valve with Controller and Zone (station) #, Size, and Flow
- Lateral Pipe
- Drip Control Zones – Total zone flow must be calculated and labeled
- Drip Tubing or Hatching (representing where drip irrigation will be)
- Sprinkler Heads
 - Indicate arc of coverage clearly with choice of symbol
 - Head and nozzle choices must provide adequate throw (radius) for head-to-head spacing minimum at the available dynamic pressure. Make these choices such that the available dynamic pressure is at the middle or upper end of the specified operating pressure range
- Controller, Control Wire & Electrical Supply
 - Ensure compatibility with Flow Sensor and Rain Sensor
 - Smart Controllers (ET Controllers) are preferred
- Sensors
 - Rain Sensor is required; must be quick-acting like Hunter Rain-Clik
 - Flow Sensor is strongly recommended, especially on larger sites

Irrigation Schedule (Legend):

- Include the following information for each component: Manufacturer, Model #, Symbol, Brief Description, and Corresponding Detail #.
- Use a different symbol to distinguish each sprinkler system component.
 - Use a completely different symbol for each specific type of sprinkler head, not just a smaller or larger version of the same symbol.
- Place the Irrigation Schedule on each sheet of the plan for easy reference.

Irrigation Notes:

- Break notes into two categories; City of Thornton required notes, and any other notes that the designer wishes to add.

City of Thornton Required Notes:

- State the available static pressure, as calculated from the low HGL and elevation at the POC.
- State the system design capacity (max. flow), as dictated by meter size.

- State the meter size and show its location on the plan.
- State that a rain sensor or rain shutoff device is installed.
- State that the system is designed to apply 1.5" of water within a maximum of 48 hours of run-time per week (6pm-10am operation 3 days per week).
- State that the irrigation system will be winterized by blowing it out with an adequate volume of compressed air by October 31st each year.
- Field Inspection shall occur and as-built plans shall be submitted to the City prior to CO approval.

Friction Loss Worksheet:

- Provide a friction loss worksheet that calculates all pressure losses from the tap to the last head in the worst case zone, and demonstrates that adequate dynamic pressure exists for proper system operation. The worst case zone is generally the zone with the most flow, the longest run, or the highest elevation; if in doubt, calculate several zones and submit the worst case zone.
- You may use your own worksheet, or use ours, which is available upon request.

Details:

- City of Thornton (COT) required details
 - #800-10 and #800-11
- Your own details –add any details deemed necessary for system construction

Water Conservation Requirements:

- Rain Sensor – quick acting type is required
- Master Valve - required
- Pressure Regulation at the heads or valves is required in most cases
- Check Valves - in heads and drip laterals are required

Water Conservation Recommendations:

- Smart Controllers – Climate-based (ET) or Soil Moisture Sensor-based
- MP Rotators (or equal) – Use in place of spray head nozzles for 8'-30' applications
 - 30% better uniformity; lower flow rate; slow precipitation rate minimizes runoff
- Flow Sensor – strongly recommended
- Line Source Drip Irrigation (where applicable)