



Submittal Requirements: *Irrigation Plan*

An irrigation plan is required for any development provided water by the City. Submit irrigation plans to Fort Collins Utilities (FCU) at 222 Laporte Ave. For more information, contact 970-221-6704 or eolson@fcgov.com

Compliance with the Irrigation Standards for Water Conservation includes five steps.

- 1) **Irrigation plan** (1 copy) shall be submitted to Fort Collins Utilities on twenty-four by thirty six inch (24" x 36") sheets at a scale to match the landscape plan, showing the following information:
 - a. A digital copy of the irrigation plan as a .pdf.
 - b. A title block with name of project, sheet name, company identification including address, phone number, name of person preparing the plan and date. Name, address and contact phone number for property owner.
 - c. A reference to the specific landscape plan, with its date and the designer's name and contact information.
 - d. A scale to match the landscape plan.
 - e. North arrow and legend.
 - f. Property lines, existing and future easements and rights-of-way.
 - g. Locations to be irrigated with potable and non-potable water and the total square footage of each.
 - h. An Annual Water Use Chart (see Table 1). Include the square footage of zones and irrigation water use. The water use data shall reflect the water requirements of the hydrozones identified on the associated landscape plan.
 - i. A Smart Controller data input chart (see Table 2). The columns labeled precipitation rate, slope and microclimate may be left blank to be completed on the "as-built" drawings.
 - j. A Pressure Calculation Worksheet (see Table 3). Show that the point-of-connection design pressure, minus the possible system pressure losses, is greater than or equal to the design sprinkler operating pressure.
 - k. The following General Notes:
 1. Any field adjustment or redesign of this irrigation system must conform to the City of Fort Collins Irrigation Standards in the Land Use Code 3.2.1(J)(3).
 2. Contractor installing the system must provide FCU and the owner with "as-built" drawings after installation is complete, including updated charts with existing field conditions.
 3. The system design assumes a minimum dynamic pressure for the irrigation system of ___ psi, at a minimum discharge of ___ gpm at each ___-inch point-of-connection. Verify pressure and flow on site prior to construction.

4. Read thoroughly and become familiar with the specifications and installation details for this and related work prior to construction.
 5. Coordinate utility locates ("Call Before You Dig") of underground utilities prior to construction.
 6. Do not proceed with the installation of the irrigation system when it is obvious in the field that obstructions or grade differences exist that might not have been considered in the engineering. If discrepancies in construction details, legend, notes or specifications are discovered, bring all such obstructions or discrepancies to the attention of the owner's representative.
 7. Although irrigation components may be shown outside planting areas for clarity, install irrigation pipe and wiring in landscaped areas whenever possible.
 8. Tree and shrub locations as shown on landscape plans take precedence over irrigation equipment locations. Avoid conflicts between the irrigation system, planting materials and architectural features.
 9. Use only standard tees and elbow fittings. Use of cross type fittings is not allowed.
 10. Provide to the owner prior to the completion of the project: two (2) operating keys for each type of manually operated valves and two (2) of each servicing wrench or tool needed for complete access, adjustment and repair of sprinklers
 11. Select nozzles for sprayheads and rotors with arcs which provide complete and adequate coverage with minimum overspray for the site conditions. Carefully adjust the radius of throw and arc of coverage of each rotary sprinkler to provide the best performance.
 12. Install all electrical power to the irrigation control system in accordance with the national electric code and all applicable local electric utility codes.
 13. If a section of unsized pipe is located between the identically sized sections, the unsized pipe is the same nominal size as the two sized sections. The unsized pipe should not be confused with the default pipe size noted in the legend.
 14. Install a minimum of two (2) appropriately sized control wires and one (1) common wire from controller location to each dead-end of mainline for use as spares in case of control wire failure. Cap end of wires with water-proof wire connector. Wire terminations must be located in a valve box. In addition, coil three (3) feet of wire in valve box.
 15. Within six (6) weeks of the installation of new landscaping, the irrigation system installer shall reset the Smart Controllers to the normal seasonal watering schedule.
- I. Irrigation Methods and Layout
1. The irrigation system shall be designed according to the hydrozones shown on the landscape plan.
 2. Each zone shall irrigate a landscape with similar site, soil conditions and plant material with similar water needs. To the extent reasonably feasible, areas with significantly different solar exposures shall be zoned separately.
 3. Turf and non-turf areas shall be irrigated on separate zones.

4. On steep grades, an irrigation method with a lower precipitation rate shall be used in order to minimize runoff and, to the extent feasible, these areas shall be zoned separately.
 5. Drip, micro-sprays, sprayheads and rotors shall not be combined on the same zone.
 6. The irrigation method shall be selected to correlate with the plant density. Drip irrigation shall be used for sparsely-planted trees and shrubs, and rotors, sprayheads and multi-jet rotary nozzles shall be used for turfgrass.
- m. Equipment Selection
1. In order to reduce leakage of water from the irrigation system, a master shut-off valve shall be installed downstream of the backflow device to shut off water to the system when not operating.
 2. For irrigation systems that are on a combined-use tap, with a water meter installed upstream to measure total water use, the installation of an irrigation-only submeter should be considered. This submeter would enable the owner and landscape maintenance contractor to monitor water use for irrigation, and would not be used for billing purposes. The cost of installation and maintenance of the submeter shall be borne by the owner of the property, and not by the City. All such submeters shall be installed in accordance with the specifications established by the City
 3. Irrigation controller(s) shall be “smart” controllers, using climate-based or soil moisture-based technology, selected from the WaterSense labeled “smart” controllers or the Irrigation Association’s current Smart Water Application Technologies (SWAT) tested products list. Controllers must be installed and programmed according to manufacturer’s specifications. A data input chart for the Smart Controller, including the precipitation rate from the audit, shall be posted at each irrigation controller. Within 6 weeks of the installation of new landscaping, the irrigation system “smart” Controllers shall be reset to the normal seasonal watering schedule.
- n. An ET sensor or weather monitor shall be installed on each irrigation controller and installed according to the manufacturer’s specifications in a location to receive weather conditions.
- o. Sprinklers and nozzles shall meet the following requirements:
1. The type of sprinkler and associated nozzles shall be selected to correlate with the size and geometry of the zone being irrigated.
 2. Sprinklers shall be spaced no closer than seventy-five (75) percent of the maximum radius of throw for the given sprinkler and nozzle. Maximum spacing shall be head-to-head coverage.
 3. Coverage arcs and radius of throw for turf areas shall be selected and adjusted to water only turf areas and minimize overspray onto vegetated areas, hard surfaces, buildings, fences, or other non-landscaped surfaces.
 4. Sprinklers, bubblers or emitters on a zone shall be of the same manufacturer.
 5. Sprayheads in turf areas shall have a minimum three and one-half (3½) inch pop-up riser height.
 6. Sprayheads on a zone shall have matched precipitation nozzles. Variable Arc Nozzles (VAN) are not allowed for 90, 180 and 360 degree applications. High-Efficiency (HE) VAN nozzles are acceptable in obtuse and acute angles.

7. Nozzles for rotors shall be selected to achieve an approximate uniform precipitation rate throughout the zone.
 8. All sprayheads and rotors shall be equipped with check valves and pressure regulating stems.
 9. Pressure-compensating emitters shall be used for drip irrigation. For sloped areas, a check valve shall be installed and the drip line shall be parallel to the slope.
 10. Remote control valves shall have flow control.
 11. A backflow prevention assembly shall be installed in accordance with local codes. All backflow assemblies shall be equipped with adequately sized winterization ports downstream of the backflow assembly.
 12. Properties with single or combined point of connection flows of 200 gpm or greater, shall have a control system capable of providing real-time flow monitoring and the ability to shut down the system in the event of a high flow condition.
- p. Sleeving
1. Separate sleeves shall be installed beneath paved areas to route each run of irrigation pipe or wiring bundle. The diameter of sleeving shall be twice that of the pipe or wiring bundle.
 2. The sleeving material beneath sidewalks, drives and streets shall be PVC Class 200 pipe with solvent welded joints.
- q. Water Pressure
1. The irrigation system designer shall verify the existing available water pressure.
 2. The irrigation system shall be designed such that the point-of-connection design pressure, minus the possible system pressure losses, is greater than or equal to the design sprinkler operating pressure.
 3. All pop-up spray sprinkler bodies equipped with spray nozzles shall operate at no less than twenty (20) psi and no more than thirty (30) psi.
 4. All rotary sprinklers and multi-stream rotary nozzles on pop-up spray bodies shall operate at the manufacturer's specific optimum performance pressure.
 5. If the operating pressure exceeds the manufacturer's specified maximum operating pressure for any sprinkler body, pressure shall be regulated at the zone valve or sprinkler heads.
 6. Booster pumps shall be installed on systems where supply pressure does not meet the manufacturer's minimum recommended operating pressure for efficient water distribution.

2) Installation Site Inspection

- a. Contact FCU when irrigation construction begins. FCU will perform periodic site inspections to ensure installation follows the approved plan.

3) Performance Audit

- a. Contact an auditor from the City's *Approved Auditor List*. Systems with subsurface irrigation are exempt from the audit. The auditor should be independent of the

irrigation system designer and installation professional. If this is not the case, indicate what the auditor's role was during design and installation.

- b. Auditor performs audit according to the City's *Sprinkler Performance Audit Guidelines* and using the Performance Audit and Catch Can Data forms, including the following data: a) operating pressure for one sprinkler on each zone, b) distribution uniformity. Minimum acceptable distribution uniformities are: 60% for sprayhead zones and 70% for rotor zones.
- c. The auditor may elect to perform tests on one-third to one-half of the zones to get an average value that could be applied to all zones that are identical (have the same sprinkler head, nozzle, spacing and operating pressure).

4) Final Submittals and Approval

- a. Submit "as-built" irrigation plan, completed Smart Controller input chart and Sprinkler Performance Audit and Catch Can Data forms to FCU.
- b. FCU approves the installation and submittal documents before issuance of a certificate of occupancy.

5) Six-Week Inspection

- a. Within six weeks of the installation of new landscaping, reset the Smart Controller(s) to the normal seasonal watering schedule.
- b. FCU will inspect that the controller has been programmed for a normal schedule, the input chart has been posted and the rain sensor properly installed and operating.

Table 1: **Annual Water Use Chart**

Instructions:

1. Irrigated areas for each zone should be a "best estimate" splitting areas between zones as necessary. For drip irrigation, the irrigated area should approximate the area actually wetted by the emitters.
2. The average annual water use in gallons per square foot can be determined by referring to the hydrozones listed on Water Budget Chart on the landscape plan.
3. The annual total water use (gallons) can be determined by multiplying the irrigated area (square feet) by the average gallons per square foot for that zone.
4. Divide the total water use by the irrigated area to determine overall gallons per square foot (not to exceed 15 gal./s.f.)

Annual Water Use Chart

(an example)

| Zone I.D. | Irrigated Area (s.f.) | Hydrozone | Water Use (gal./s.f.) | Total Water Use (gal.) |
|------------------|----------------------------------|------------------|----------------------------------|-----------------------------------|
| A1 | 6,380 | Moderate | 10 | 63,800 |
| A2 | 8,100 | Moderate | 10 | 81,000 |
| A3 | 5,330 | High | 18 | 95,940 |
| A4 | 1,500 | High | 18 | 27,000 |
| A5 | 820 | Low | 3 | 2,460 |
| A6 | 490 | Low | 3 | 1,470 |
| TOTAL | 22,620 | | Avg.: 12.0 | 271,670 |

Table 2: **Smart Controller Data Input Chart**

This chart is to be used to input data to program the Smart Controller. Terms will vary according to the type of controller installed. Refer to the User's Manual for a definition of the parameters as defined by the specific controller. For drip zones, use the estimated precipitation rate.

Smart Controller Data Input Chart

(an example)

| Zone ID | Sprinkler Type | Precip. Rate (in./hr.) | Plant Material Type | Soil Type | Slope | Microclimate (Sun/Shade) |
|----------------|-----------------------|-----------------------------------|----------------------------|------------------|--------------|-------------------------------------|
| A1 | Spray | 1.5 | Cool turf | Clay | Gentle | Sunny All Day |
| A2 | Spray | 1.5 | Warm turf | Clay | Mild | Sunny Most of the Day |
| A3 | Rotor | .5 | Cool turf | Clay | Steep | Shady Most of the Day |
| A4 | Drip | 1.1 | Shrubs | Clay | None | Shady All Day |
| A5 | Bubbler | 2.3 | Perennials | Clay | Moderate | Sunny All Day |

Table 3: **Pressure Calculation Worksheet**

Complete this form for the most pressure-demanding lateral and submit it with the irrigation plan.

Pressure Calculation Worksheet

- | | | | |
|----|--|-------------|------------|
| A. | Pressure available at point-of-connection | _____ psi | |
| B. | Pressure loss through the meter | - _____ psi | |
| C. | Pressure loss through backflow prevention device | - _____ psi | |
| D. | Pressure loss in mainline pipe from backflow prevention device to remote control valve | - _____ psi | |
| E. | Pressure loss through remote control valve | - _____ psi | |
| F. | Pressure loss in lateral pipe from remote control valve to most remote sprinkler | - _____ psi | |
| G. | Elevation change from point-of-connection to most remote sprinkler (0.43 psi per foot of elevation): | | |
| | pressure loss | - _____ psi | |
| | or | | |
| | pressure gain | + _____ psi | |
| H. | Miscellaneous losses through other valves, strainers, etc. (in some cases this will not be applicable) | - _____ psi | |
| I. | Total possible pressure loss (add <i>B</i> through <i>H</i>) | | - ____ psi |
| J. | Remaining pressure (subtract <i>I</i> from <i>A</i>) | | ____ psi |
| K. | Minimum pressure required at sprinkler | _____ psi | |
| L. | Difference (Subtract <i>K</i> from <i>J</i> . If the value is negative, a booster pump may be needed. If the value is more than +15 psi, pressure reduction may be necessary for this zone, and/or other zones.) | | ____ psi |