# PRIVATE IRRIGATION SYSTEM DESIGN CHECKLIST

The proposed irrigation design and notations noted below are required to completely denote the construction intent of the proposed irrigation plan as this plan submittal is intended to act as a “final” for construction plan (Construction Document) set.

**General Plan Requirements**

- Title block with the project subdivision name/address/marketing name, original/rev date.
- All plan views shall be sized consistent with the approved/proposed landscape plans included in the Development Plan submittal to ensure all landscaped areas are irrigated as required.
- Viewports shall match the landscape plans and sheets shall be an appropriate size, preferable 22”x34” to allow for scaled reductions in the field.
- Key map (for submittals with multiple plan sheets), included on all plan sheets preferred.
- North arrow, written and graphic scale one inch = twenty feet (1” =20’) preferred, but no greater than one inch = thirty feet (1” =30’) for detailed or enlargement sheets.
- Project number as assigned. (PLIR20#######)
- Specific/identifiable sheet name and number (example; Irrigation notes, LI-01, etc.)
- Existing and proposed site elements (screened as appropriate) including but not limited to:
    - Existing and proposed building footprints,
    - Offsite elements (buildings, signs, hardscape, plant material) within fifteen feet (15’) of the property line,
    - Utility easements (specifically exclusive easements),
    - Hardscape/sidewalk/sidepaths, trails, retaining walls,
    - Grading, existing and proposed with labels every 10 vertical feet minimum, 1-foot contour lines preferred.
    - Landscape plan elements to include but not limited to, all trees, shrubs and other plant materials without labels.
- Symbol/hatch legend/key for proposed irrigation elements. Minimum one overall, but inclusion of a simplified key provided on each sheet for clarity is preferred.
- A 3” wide by 2” tall clear area in a consistent location on all sheets for the placement of the document release stamp.

**Specific Plan Requirements**

- Cover Page containing,
    - Sheet index
    - Vicinity map
    - Applicant and design team contact information
    - Specific Name, and certification(s) for designer of record (per 18-613, b, 3, a)
- Overall Irrigation plan (entire site if multiple irrigation plan sheets are required) specifically showing full site context of,
    - Point of connection location for each irrigation system, including size of meter/service/etc.
    - Mainline routing
- Irrigation plans (enlargements, detailed, etc.) at a scale and viewport to match the proposed landscape plans.

- Irrigation equipment/material schedule in a format of the applicants choosing, displaying at a minimum, (example below)
    - Symbol (as represented on the plan, unique to each element),
    - Quantity,
    - Description (simplified/common name),
    - Product details (manufacturer, model, size, etc.)
    - Supplemental information (as applicable), such as radius, GPM, or PSI required.
    - Detail callout/reference.

| Symbol | Qty. | Description/<br>Product Detail | PSI | GPM | Radius | Detail |
|---|---|---|---|---|---|---|
| ❑ | *X* | *Pop-up Spray Head – Seed*<br>*XYZ-1234-PRS*<br>*12" ht. rotary nozzle, including pressure reduction* | *40* | *1.85* | *XX'* | *1 / LI-20* |

- Irrigation Notes
    - Shall be project specific and aligned to the City of Thornton Standards and Specifications as appropriate.
    - Refer to the required notes section included in this checklist.
- Friction Loss analysis/Worst-case scenario calculation
    - Provide a friction loss worksheet that calculates all pressure losses from the irrigation tap/meter to the last head in the worst-case zone,
        - The worst-case zone is generally the zone with the most flow, the longest run, or the highest elevation; if in doubt, multiple calculations may be requested or can be provided.
    - Shall demonstrate that adequate pressure exists for proper system operation.
    - The irrigation designer may use any worksheet format desired, if it clearly calculates pressure loss based on the quantity/size/length of material or product and contains the standard pressure loss calculation with total loss/gain for all elements.
    - Elevation loss shall be included in this calculation; elevation gains can be included at designers' discretion.
- Runtime/Operating Schedule (peak season)
    - Post establishment/peak season calculated weekly run time to ensure water window can be achieved.
    - Example layout for Runtime/water use table below

| Zone # | Landscape Material | Zone Desc. / Irr. Type | Precip. rate (catalog or calculated) | Zone Flow (GPM) | In./week Req. peak season | Runtime/Week (hours) | Usage (Gal/Wk.) |
|---|---|---|---|---|---|---|---|
| *A1* | *Turf* | *Rotary* | *0.43"* | *12.0* | *1.50"* | *3.50* | *2,520* |
| Totals | | | | | | *XX.XX* | *X,XXX* |

- Water use calculation including
    - Total peak month calculated water use (July),
    - Annual calculated water use (season),
    - Peak season max flow
    - Example layout for Runtime/water use table below

| Plant type/ Hydrozone | Irrigated Area (SF) | Historical ET (Peak month) | Plant Coefficient | Plant Water requirement (Peak Month) | System Efficiency (%) | Total Peak Month Water Req (In) | Peak Month Water Req. (Gal) |
|---|---|---|---|---|---|---|---|
| *Fine Turf* | *1,000* | *7.27* | *0.88* | *6.40* | *70%* | *9.14* | *5,666* |
| *Utility Turf* | *1,000* | *7.27* | *0.55* | *4.00* | *70%* | *5.71* | *3,541* |
| *Native Seed* | *1,000* | *7.27* | *0.33* | *2.40* | *70%* | *3.43* | *2,125* |
| *Plant Bed (Mod)* | *1,000* | *7.27* | *0.75* | *5.45* | *90%* | *6.06* | *3,756* |
| *Plant Bed (low)* | *1,000* | *7.27* | *0.55* | *4.00* | *90%* | *4.44* | *2,755* |
| *Plant Bed (ultra-low)* | *1,000* | *7.27* | *0.25* | *1.82* | *90%* | *2.02* | *1,252* |
| Total Peak Month water use | | | | | | | *19,095* |

- Irrigation Details
    - Designer specific details, as necessary for complete construction of the proposed system.
    - City of Thornton standard details as applicable, specifically for meter and POCs (Standards and Specifications detail 800-9, 800-10 (a & b or c), and 800-11 (a and/or b)

**Specific Irrigation Requirements**

- Water Pressure information
    - Specific callout of elevation for the associated irrigation meter/POC.
    - An accurate calculation of the available static pressure using the low Hydraulic Grade Level (low HGL) and the elevation at Point of Connection (POC). The low HGL is provided to the applicant by Development Engineering at the Pre-Application meeting and can also be obtained by contacting the Landscape Review & Inspection team or on the City's website.
        - Calculation: (Low HGL elev. – POC elev.) x 0.433 = available psi
          ex. (5351' – 5175') = *176'* x 0.433 = 76.2 psi
- Head-to-Head Coverage
    - Design the sprinkler head layout to provide head-to-head coverage throughout the landscape and including native seed areas, (except WQ/Detention Pond bottoms if applicable).
- Hydrozones and microclimates shall be zoned separately. The zoning shall align to the hydrozone plan provided with the landscape submittal.

**Irrigation Plan**

Show the location and label the size of each of the following components on the irrigation plan:

- Specific callout of Irrigation water meter (or point of connection size and note confirming exception noted in 18-613, e, 1), and associated City of Thornton standard water meter and POC details.
- Provide a spot elevation at each irrigation water point of connection.
- Point of Connection (POC) Components: These components are listed in the general order that they are expected to be installed after the tap.
    - Service Line

        - The tap and incoming service line for all irrigation connections is allowed to be up to a 4” service line to allow for greatest flexibility or sized as per the irrigation designer.
        - Service 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)
    - Master Valve (required on all commercial/non-residential or residential common interest area systems)
    - Flow Sensor (if specified)
    - Gate Valve
    - Quick Connect Valve (for compressed air winterization)
    - Mainline Pipe

**Sprinkler System Components**

- Control Valves – Identify each control valve with Controller and Zone (station) #, Size, and Flow
- Lateral Pipe – Differentiate between pipe materials, sizes labeled or noted as appropriate
- Drip Control Zones – Total zone flow must be calculated and labeled
- Drip Tubing or Hatching (representing where drip irrigation will be)
    - Check valves and/or pressure compensating emitters are required
- 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.
    - Shall contain pressure regulation as applicable
    - Check valves for sites with elevation change over ten feet.
    - Ensure all nozzles are designed and trimmed to avoid overspray onto hardscape areas.
    - No overhead spray shall be utilized in areas less than ten feet in width.
- Controller, Control Wire & Electrical Supply
    - Ensure compatibility with Flow Sensor and Rain Sensor
    - Smart Controllers with EPA water sense label certification shall be used.
    - Add note for electrical connections as appropriate
    - Show any required wire sleeves to connect controller location to mainline trench
- Sensors
    - Rain Sensor is required
    - Flow Sensor is strongly recommended

**Required Irrigation Notes**

- Any notes as required for construction (per the designer).
- Include the following specific topics in the provided notes; Specifically state
    - The available static pressure, as calculated from the low HGL and elevation at the POC. (show calculation)

- System design capacity (max. flow), as dictated by meter size.
- That an irrigation system shall only contain one (1) water source.
- The irrigation meter/point of connection size.
- That each controller shall include a rain sensor/rain shutoff device and is installed wired to controller prior to the completion of work.
- The system is designed to water all areas withing a maximum of 48 hours of run-time per week (6pm-10am operation 3 days per week).
- That the irrigation system will be winterized by blowing it out with an adequate volume of compressed air in the fall of each year.
- That a field Inspection shall occur and as-built plans shall be submitted to the City prior to CO approval.
- Trench depth from top of pipe for mainline, laterals, and sleeves.

**Water Conservation Recommendations**

- Smart Controllers – Climate-based (ET) or Soil Moisture Sensor-based
- High efficiency or rotary nozzles (or equal) – Use in place of fixed arc spray head nozzles for 8’-30’ applications to the greatest extent possible.
- Flow Sensor – strongly recommended
- Line Source Drip Irrigation (where applicable)