

**Description:**

The purpose of the section is to provide guidelines for the UMCP Design Standards for design and installation of Irrigation Systems for UMCP.

**Related Sections:**

- TBD

**Effective Date:**

July 10, 2009

**Applicable Standards:**

- American Water Works Association - A.W.W.A. guidelines
- Washington Suburban Sanitary Commission - W.S.S.C's requirements
- Center for Irrigation Technologies (CIT)
- American Society of Agricultural Engineers Standard - ASAE S398.1
- National Pipe Thread Taper (NPT)
- Standard Dimension Ration (SDR)

**General Requirements:****1. Irrigation Piping System**

- Irrigation piping shall be PVD SDR-21 except for the following.
  - Pipes under sidewalks shall be Schedule-40
  - Pipes under roadways shall be Schedule-80
- Schedule-40 or Schedule-80 pipes shall be 1 size larger than the SDR-21, so that gallons per minute (G.P.M.) requirements below can be met.
- Pipe over 3", no matter the Schedule or SDR rating, shall be gasketed due to expansion and contraction during winter and summer months.

**2. Main Lines**

- Main lines shall be sized 100% larger than largest zone on the system.
- Main lines less than 2" going under sidewalks shall be the next size equal to or over the A.W.W.A. guidelines and consist of PVC Schedule-40 for strength and not affect the designed system as stated above except for 6" pipe and over. Pipe 6" and over will be sized to the next available size.
- Piping Schedule-80 shall be piped the next size larger than the SDR-21 as long as it meets system requirement above.
- Systems shall be designed at no more than 70 PSI after all device and pipe friction losses have been accounted for, or a pump is in the plans to make up the pressure to an adequate level.
- Systems shall have a starting PSI of 80 PSI, unless a 16 hour observation of source from 4 am to 8 pm Monday through Friday proves differently. Testing shall be done during the spring months (April - June). No testing shall be accepted if conducted during a holiday.

**3. Solenoid Valves**

- Solenoid valves shall be connected with the tee from main to a 45° elbow at least 8" above main line but less than 12" from grade.
- Backflow preventers and meters shall have 2 ball valves each, one in front of each device, and one behind each device. For easy access there shall be one union in front of each device and one union behind each device.

- Meters and backflow preventers shall meet W.S.S.C's requirements regarding room in front, behind, and below each device.
- Backflow devices and meters shall be the same size as the irrigation main.
- Pipes from potable water to backflow and meter to the underground irrigation main will be copper type K at the time it shall be changed to PVC.
- No system pipes will be used to support these devices, a separate rack shall be installed.
  
- Spray or rotor system that is 45 PSI or less can have a drip system added on as long as the pressure to run system stays 45 PSI. If this is utilized even precipitation rates shall be maintained and a 200 mesh filter shall be installed at point of drip connection with lateral and a pressure regulator shall be installed before zone valve.

#### 4. Drip Irrigation System

- Drip Irrigation - Shall have polybutylene, polyethylene or PVC SDR-21 pipe only, and be a looped system, designed at 45 PSI or less. In addition it shall have:
  - 200 mesh or disk filter before pressure reducer
  - Pressure reducer before electric solenoid valve
  - Vacuum relief valve at highest elevation of system
  - Flush valve at lowest elevation of system
  - Pressure reducing solenoid valve (see Valves).
  
- The potable main installations shall be the same as Solenoid Valve pipes from potable water, except when approved by Facilities Management - Grounds Maintenance Department.
  
- Can be adapted to existing or in conjunction with spray or rotor zone as long as above are met, and will not need a separate solenoid valve.
  
- Emitters shall have been tested by Center for Irrigation Technologies (CIT) for 5 years and have a Coefficient Value of 0.03% (CV) as given by CIT.

#### 5. Spray Heads

- Spray heads shall have nozzle-turret sizes to match precipitation rates +/- .027 in/hr. and not use more than 3.7 GPM at 30 PSI nor exceed 7.86 in/hr. precipitation rate. In addition, spray heads shall have:
  - Internal check valve that hold up to and over 8 feet in elevation. In addition, it must be serviceable from top of head.
  - Stem pressure regulator to prevent excessive water run-off saving water and to maintain all heads on system at an even pressure.
  - Pop-up head sizes 4-6-12 inches in height.
  - Trajectory of 25° in addition, spray heads shall have been tested by CIT with a Coefficient Value not to exceed 1.3% CV.
  
- Spray systems shall have been evaluated against a comparable drip system, and will only be used if drip system is found not to be effective and systems will have a drip system around zones next to roads and sidewalks.

#### 6. Medium Rotors

- Under no circumstances will golf or large rotors or impacts of any type or size be used.
- Medium rotors shall pop up at least 4" to 6" and not exceed 20 GPM. In addition it shall have a:
  - Radius of 38', but not more than 62'
  - Spacing of 38', but nor more than 74'.

- System heads shall have a 200% or physical head to physical head coverage, not have a precipitation rate over .95 in/hr, and operate between 30 but not more than 80 PSI system pressure. In addition it shall have:
  - One (1") inch female npt pipe threads
  - At least 4 nozzles or turrets but no more than 6 sizes
  - Adjustable arc from 40° - 360° in 10 degree increments, and have a dedicated 360° full circle nonadjustable head
  - At least a 5 year warrantee. In addition, it shall conform to requirements for Spray Head – evaluation against a comparable drip system.

## 7. Controllers

- Controllers shall be TC-2 compatible and UL listed and shall have a:
  - Rain shutdown program programmable from 1-99 days
  - Electrical input of 117 VAC +/- 10%
  - Output voltage of 26.5 VAC at 1.5 A
  - Station load of 24 VAC
  - Diagnostic circuit breaker that skips over overloaded circuits
  - Backup power supply fuse and holder
  - program backup non-volatile
  - Self-contained 10 year lithium memory
  - Battery backup 9 VDC NiCad rechargeable with an established life of 3-5 days without power during outage
  - Lifetime lightning and surge protection warrantee
  - Cycle and soak program without having to tie up another program or start time
  - Programmable day on day off
  - Four programs with 8 start times per program, programmable in quarter hour increments
  - 365 day calendar that adjust for leap year
  - Non-volatile memory for Time, Program, and Program retention
  - Master valve on/off by station
  - Station status indicator lights and sensor status indicator light
  - Programmable under battery power
  - Vandal and weather resistant cabinets and key lockable door
  - Odd/even/cyclical programming schedules
  - Water budget program programmable in 10% increments from 0-200%
  - Test program variable from 1-99 minutes with a default of 2 minutes.
- Controllers shall be installed with a power cut off switch for controller only and 2 outlets within 1' from controller and be connected to a ground fault breaker. Breaker information shall be printed on front cover with building name, room, and panel number.
- Controllers installed inside or on outside of building shall be 5' from floor or grade, and have a clearance of 30" on all sides and in front of for accessibility.
- Controllers shall have three (3) lightning rods spaced 8' apart in a triangle formation. These rods should be covered by 6" round valve boxes.

## 8. Small Rotors

- Small rotor shall have a minimum of 4 but no more than 6 nozzles or turrets and not use more than 9.46 GPM, and operate at pressures of 25 but no more than 65 PSI, and shall have a:
  - Precipitation rate of at least .25 but no more than 1.26 in/hr.
  - Spacing no less than 16' but no more than 50'
  - Trajectory low angle 11°-15° and normal 23° -25°

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- Have Arc adjustments from 25° to 350° and a separate 360° head non-adjustable. All rotors to be adjustable wet or dry
- Three (3) year warranty
- Conform to ASAE S398.1 and have been tested by CIT.

## 9. Electric Valves

Electric valves shall be pressure regulating and heavy duty plastic and have a:

- Course threaded solenoid
- Pressure regulating range of 15-100 PSI
- Thumb wheel adjustment.

## 10. Miscellaneous

- Under no circumstance will water be allowed to hit sidewalks or road.
- Systems shall have one (1) reduced pressure backflow preventer and one (1) meter, both of which shall pass WSSC permit requirements.
- Valves will be installed with 7 fittings, 1 tee from main 4-45's, 2 male adapters only, with the valve resting 8" above the pipe.