MICRO IRRIGATION DESIGN WORKSHEET

Project or Landowner Name_____ Field or Tract _____

Designed by: _____ Date _____

Checked by: _____ Date _____

Approved by: _____ Date _____ NRCS Engr. Job Class _____

_____ Section _____ Township _____ Range _____ County: _____

Micro Irrigation Field Data with an Attached Detailed Plan Map[1]

Micro system field size_____ acres
Number of zones _____ no.
Are zones irrigated concurrently? (Yes or No) _____
If you answered "Yes" list zones that are concurrently irrigated

a) Zone(s) _____
b) Zone(s) _____
c) Zone(s) _____

Irrigation set time(s)

a) Zone(s) 1,2,3… _____ hrs
b) Zone(s) 1,2,3… _____ hrs
c) Zone(s) 1,2,3… _____ hrs
d) Zone(s) 1,2,3… _____ hrs

Gross application depth _____inches

Brand name of lateral line material _____
Lateral line max water pressure rating _____ psi
Lateral line design placement depth _____ inches
Design flushing velocity (required $\geq$1.5 ft/sec) _____ ft/s
Design flushing end pressure (suggested at $\geq$3 psi) _____ psi

Primary Filter system data

a) Make _____
b) Model _____
c) Rated range capacity _____ gpm
d) Design pressure loss across filter (clean) _____ psi
e) Design pressure loss across filter (dirty) _____ psi

Secondary Filter system data (if necessary)

a) Make _____
b) Model _____
c) Rated range capacity _____ gpm
d) Design pressure loss across filter (clean) _____ psi
e) Design pressure loss across filter (dirty) _____ psi

Micro Irrigation System Zone Data
Replicate this sheet as necessary and submit a complete data set for each zone

Zone number / name _____
Zone Area _____ acres
Lateral line manufacturers model no. _____
Lateral line inside diameter _____ inches
Lateral line spacing(s) _____ inches
No. of lateral in the zone _____
Zone irrigating flow rate _____gpm @ _____ psi (at the entrance to the manifold)
Zone flushing flow rate _____gpm @ _____ psi (at the entrance to the manifold)

Lateral line emitter type (compensating or non-compensating) _____
Emitter spacing on the lateral _____ inches
Nominal emitter discharge _____ gph[2] at _____ psi
Emitter factors: C_v value[3]_____; x value[4]_____ ; K_d value[5]_____
Manufacturers emitter barb loss (equivalent length)[6] _____ feet

Number of lateral line(s) hydraulically analyzed within the zone _____
List the laterals analyzed (labeled on plan map) _____
(Complete sheet 3 to document the information used for each lateral line analyzed)

Maximum emitter discharge _____ gph at _____ psi
Minimum emitter discharge _____gph at _____ psi
Average design emitter discharge _____gph at _____ psi

$$\text{Flow Rate Variation} = \frac{\text{Maximum Discharge - Minimum Discharge}}{\text{Average Design Emitter Discharge}} \times 100 = _____\%^{7}$$

EU (emission uniformity)[8]_____ %

Zone Flushing Design
Is the zone to be flushed in sub-parts (Yes or No) _____
(if you answered "No", you may stop here)
Number of sub-parts to be flushed in the zone _____

1. Sub-part #1
   a) Flush time _____ min
   b) No. of laterals being flushed ____ flow rate of flushing laterals _____ gpm
   c) Flow rate of the laterals not being flushed _____ gpm
2. Subpart #2
   a) Flush time _____ min
   b) No. of laterals being flushed ____ flow rate of flushing laterals _____ gpm
   c) Flow rate of the laterals not being flushed _____ gpm
3. Sub-part #3 (if necessary)
   a) Flush time _____ min
   b) No. of laterals being flushed ____ flow rate of flushing laterals _____ gpm
   c) Flow rate of the laterals not being flushed _____ gpm

Zone # Lateral #

Station	Elevation	Lateral Inlet Pressure
0+00		

Zone # Lateral #

Station	Elevation	Lateral Inlet Pressure
0+00		

Zone# Lateral #

Station	Elevation	Lateral Inlet Pressure
0+00		

Zone # Lateral #

Station	Elevation	Lateral Inlet Pressure
0+00		

Zone # Lateral #

Station	Elevation	Lateral Inlet Pressure
0+00		

Zone # Lateral #

Station	Elevation	Lateral Inlet Pressure
0+00		

Zone # Lateral #

Station	Elevation	Lateral Inlet Pressure
0+00		

Zone # Lateral #

Station	Elevation	Lateral Inlet Pressure
0+00		

* Replicate page as necessary

Definitions:

Flush Lines: the pipeline(s) at the bottom end of the field used to discharge water from the lateral lines during flushing situations

Lateral lines: the water delivery pipeline(s) that supply water to the emitters from the manifold pipeline

Mainline: also known as sub-mainline, the water delivery pipeline(s) for the irrigation system that does not have lateral drip lines attached to it

Manifold Pipe: also known header pipe, the water delivery pipeline that supplies water from the mainline to the lateral lines

Zone valves: a valve used to control the pressure at a particular manifold

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Endnotes:

[1] The Plan Map shall include, but is not limited to, micro irrigation zones labeled, delineated and dimensioned, well location labeled, pipeline layout with size, length and pressure rating labels, all valves labeled and sized.

[2] The flow or discharge from most micro irrigation emitters with fixed or flexible cross sections can be expressed by the equation $q = K_d * H^x$ where H is the water pressure head on the emitter and the respective "x" value and "K_d" value are describe below in Endnotes 3 and 4.

[3] Manufacturer's Coefficient of Variation (C_v): The measure of the variability of discharge of a random sample of a given make, model, and size of emitter, as produced by the manufacturer and before any field operation or aging has taken place. For line source emitters, like those used in sdi systems, Practice Standard 441 says that C_v must be less than 0.20.

[4] "x" value: The value of "x" characterizes the flow regime and discharge verses pressure relationship of the emitter. The lower the value "x", the less discharge will be affected by variations in pressure.

[5] "K_d" value: a discharge coefficient, which is a constant proportionality that characterizes each emitter.

[6] Emitter barb loss: the emitter connection friction loss as an equivalent length of lateral is a useful value to estimate the friction loss of laterals.

[7] Flow rate variation must be $\leq$ 20% as per criteria found in Practice Standard 441

[8] Design emission uniformity (EU): a measurement of the uniformity of emitter discharge rates throughout the system.

$$EU = 100\,[1 - (1.27 * C_v)] * (q_m / q_a);$$

where:

q_m = the minimum emitter discharge rate for the minimum pressure in the subunit
q_a = the average or design emitter discharge rate for the subunit