
Chapter 15

Tools and Worksheets

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IRRIGATION SITE EVALUATION FORM GENERAL PLANNING DATA WORKSHEET

RESOURCE DATA

- Total Acres That Require Irrigation _____
- Type of Crops _____
- Row Spacing _____
- Plant Spacing _____
- Soils: Series _____ Texture _____
- Topography (Elevations In Field And At Water Supply) _____
- Aerial Photo With Existing and Proposed Irrigation Layout and Row Direction _____

WATER SUPPLY: Existing _____ Proposed _____

- Type _____ well _____ pond _____ other _____
- Location _____
- Capacity and Acres Irrigated _____ gmp _____ acres
- Water Quality _____ (ex. iron, algae, salt, other)
- Pump Type: Centrifugal _____ Submersible _____ Turbine _____
- Pump Model: _____
- Static Water Level _____
- Drawdown Level After Pump Is Running _____ (from well record)

IRRIGATION SYSTEM

- Currently Irrigating _____ Never Irrigated _____
- Is Irrigation Needed? _____
- Type Of Existing Irrigation System _____
- Type Of New Irrigation System _____
- Existing Mainline: Size _____ Material _____
- Proposed Mainline: Size _____ Material _____

COMPUTE CAPACITY REQUIREMENTS FOR IRRIGATED ACREAGE

$$Q = \frac{453 \cdot DA}{T} \quad \text{where } Q = \text{gpm } D = \text{depth (use .2" divided by system efficiency)}$$

$$A = \text{acres } T = \text{time (use 22 hours)}$$

$$Q = \text{_____ gpm}$$

DEP Water Allocation Certification Yes (>70gpm) No (<70gpm)

IRRIGATION WATER MANAGEMENT

Existing Water Management Practices: _____

Proposed: _____

- | | | |
|--|------------|-------------|
| Chemigation / Fertigation (Circle) | Yes | No |
| ➤ Chemigation Valve or Backflow Preventers | Type _____ | Size _____ |
| ➤ Flowmeter: | Type _____ | Size _____ |
| ➤ Soil Moisture Sensors | Type _____ | Depth _____ |
| ➤ Weather Station Network (Circle) | Yes | No |

OVERHEAD SPRINKLER INVENTORY WORKSHEET

TRACT # _____

TYPE OF CROPS _____

PUMP TYPE / MODEL # / CURVE _____

PUMP CAPACITY _____ GPM

SPRINKLER SYSTEM TYPE: Existing (acres) Proposed (acres)

- | | | |
|-----------------------|-------|-------|
| ➤ Hand Move Sprinkler | _____ | _____ |
| ➤ Solid Set Sprinkler | _____ | _____ |
| ➤ Traveling Gun | _____ | _____ |
| ➤ Stationary Gun | _____ | _____ |
| ➤ Center Pivot | _____ | _____ |
| ➤ Linear Move | _____ | _____ |
| ➤ Other | _____ | _____ |

SYSTEM DATA - SPRINKLERS

- | | | |
|--|-------|-------------|
| ➤ Sprinkler Nozzle Size / Manufacturer | _____ | |
| ➤ Flow Rate | _____ | gpm |
| ➤ Nozzle Pressure | _____ | psi |
| ➤ Sprinkler Spacing | _____ | ft |
| ➤ Lateral Spacing | _____ | ft |
| ➤ Riser Spacing | _____ | ft |
| ➤ Mainline Pipe Diameter and Length | _____ | in _____ ft |
| ➤ Submain Pipe Diameter and Length | _____ | in _____ ft |
| ➤ Lateral Pipe Diameter | _____ | in |
| ➤ Number of Sprinklers/Zone | _____ | |
| ➤ Pump Pressure | _____ | psi |

SYSTEM DATA - TRAVELER/GUN

- | | | |
|---|-------|-----------|
| ➤ Gun Model # | _____ | |
| ➤ Nozzle Size | _____ | in |
| ➤ Flow Rate | _____ | gpm |
| ➤ Water Winch Manufacturer and Model | _____ | |
| ➤ Hose Diameter (ID) | _____ | in |
| ➤ Hose Length | _____ | ft |
| ➤ Nozzle Pressure / Reel Pressure / Pump Pressure | _____ | _____ psi |

SYSTEM DATA - PIVOT / LINEAR MOVE

- | | | |
|---|-------|-------|
| ➤ Manufacturer/ Model # | _____ | |
| ➤ Sprinkler Type / Manufacturer and Model | _____ | _____ |
| ➤ Lateral Length | _____ | ft |
| ➤ Pressure Regulators / Model | _____ | psi |
| ➤ Pressure at Pivot | _____ | psi |
| ➤ Pump Pressure | _____ | psi |
| ➤ Sprinkler Package (from manufacturer) | _____ | |

DRIP IRRIGATION INVENTORY WORKSHEET

TRACT # _____

TYPE OF CROPS _____

PUMP TYPE/MODEL/CURVE _____

PUMP CAPACITY _____ GPM

ACRES OF *EXISTING* DRIP IRRIGATION _____TYPE OF *EXISTING* DRIP SYSTEM:

- Tape (Annual Crops/Short Term Irrigation) _____
- Hose (Perennial Tree Fruit, Small Fruit, Vines) _____
- Micro-sprinkler (Perennial Tree Fruit) _____

ACRES OF DRIP IRRIGATION *PROPOSED* _____TYPE OF DRIP SYSTEM *PROPOSED*:

- Tape (Annual Crops/Short Term Irrigation) _____
- Hose (Perennial Tree Fruit, Small Fruit, Vines) _____
- Micro-sprinkler (Perennial Tree Fruit) _____

SYSTEM DATA

- Emitter Manufacturer and Model _____
- Emitter Flow Rates _____
- Emitter Pressure _____
- Emitter Spacing _____
- Lateral Spacing _____
- Mainline Pipe Diameter _____
- Submain Pipe Diameter _____
- Lateral Diameter _____
- Lateral Length _____
- Number Of Zones _____
- Zone Size/Flow Rate _____
- Location And Type Of Control Valves _____
- Location Of Filter Station _____
- Filters – Type And Size _____
- Chemigation Valves or Backflow Preventers _____
- Flowmeter Type _____ Size _____
- Preset Pressure Regulators – Pressure/Flow Rate _____ / _____
- Pressure Reducing Valves - Location _____ Size _____
- Air and Vacuum Relief – Location _____ Size _____
- Manufacturer Data Sheets For System _____

IWM DATA WORKSHEET

TRACT # _____

RESOURCE DATA

- Total Acres That Require Irrigation _____
- Type of Crops _____
- Row Spacing _____
- Plant Spacing _____
- Soils: Series _____ Texture _____
- Topography (Elevations difference between field and water supply) _____
- Aerial Photo With Existing and Proposed Irrigation Layout and Row Direction _____

WATER SUPPLY: Existing _____ Proposed _____

- Type well pond other _____
- Capacity and Acres Irrigated _____ gpm _____ acres
- Water Quality _____ (ex. iron, algae, salt, other)
- Pump Type: Centrifugal _____ Submersible _____ Turbine _____
- Pump Model: _____
- Static Water Level _____
- Drawdown Level After Pump Is Running _____ (from well record)

COMPUTE CAPACITY REQUIREMENTS FOR IRRIGATED ACREAGE

$$Q = \frac{453 \cdot DA}{T} \quad \text{where } Q = \text{gpm} \quad D = \text{depth (use .2" divided by system efficiency)}$$

$$A = \text{acres} \quad T = \text{time (use 22 hours)}$$

$$Q = \text{_____ gpm}$$

DEP Water Allocation Certification Yes (>70gpm) No (<70gpm)

<u>SYSTEM TYPE:</u>	Existing (acres)	Proposed (acres)
➤ Drip (90% Eff.)	_____	_____
➤ Hand Move Sprinkler (70% Eff.)	_____	_____
➤ Solid Set Sprinkler (75% Eff.)	_____	_____
➤ Traveling Gun (65% Eff.)	_____	_____
➤ Stationary Gun (60% Eff.)	_____	_____
➤ Center Pivot (85% Eff.)	_____	_____
➤ Linear Move (85 % Eff.)	_____	_____
➤ Other	_____	_____

SYSTEM DATA - DRIP

- Emitter Manufacturer and Model _____
- Emitter Flow Rates and Pressure _____ psi
- Emitter Spacing _____
- Lateral Spacing _____ ft
- Lateral Diameter _____ in
- Filters – Type And Size _____
(Sand filters, disc and screen filters with automatic backwash for surface water supplies. Manual flush for ground water supplies)
- Preset Pressure Regulators – Pressure/Flow Rate _____ psi _____ gpm
- Pump Pressure _____ psi

SYSTEM DATA - SPRINKLERS

- Sprinkler Manufacturer and Nozzle Size _____
- Flow Rate _____ gpm
- Nozzle Pressure _____ psi
- Sprinkler Spacing _____ ft
- Lateral Spacing _____ ft
- Riser Spacing _____ ft
- Lateral Pipe Diameter _____ in
- Pump Pressure _____ psi

SYSTEM DATA – TRAVELER/GUN

- Water Winch Manufacturer and Model _____
- Nozzle Size _____ in
- Flow Rate _____ gpm
- Gun Model # _____
- Hose Diameter (ID) _____ in
- Hose Length _____ ft
- Riser Spacing _____ ft
- Nozzle Pressure / Reel Pressure / Pump Pressure _____ psi

SYSTEM DATA – PIVOT / LINEAR MOVE

- Manufacturer / Model # _____
- Sprinkler Type / Manufacturer / Model _____
- Lateral Length _____ ft
- Distance from Pivot point to outer drive wheel _____ ft
- Pressure Regulators / Model and Pressure _____ psi
- Pressure at Pivot _____ psi
- Pump Pressure _____ psi
- Sprinkler Package (from manufacturer) or
Sprinkler spacing at middle of lateral _____ ft
- End Gun Manufacturer / Model _____
- End Gun Nozzle Size / Pressure _____ in _____ psi

IRRIGATION SYSTEM LAYOUT - (Provide sketch with dimensions or drawing to scale)

- Type of irrigation system
- Field boundaries, pipeline, risers, valves, submain and laterals
- Mainline layout from water source to each field or zone
- Pipe sizes and lengths
- Zone Size/Flow Rate (Drip)
- Number of Sprinklers/Zone
- Spacing of Laterals and Emission Devices
- Number of laterals with corresponding pipe size for each field or zone
- Location of pump, pond and/or well, filters, injection pumps, air and vacuum relief valves.

DRIP IRRIGATION DESIGN WORKSHEET VEGETABLES/ROW CROPS

COOPERATOR: _____

DATE: _____

COUNTY: _____

TWP: _____

Checked: _____

Approved: _____

CROP DATA

- TYPE: _____
- ROOT ZONE DEPTH: _____ (NJ Irr. Guide, Table NJ 3.3)
- SPACING BETWEEN PLANTS: _____ (ft)
- ROW SPACING: _____ (ft)
- WIDTH OF CANOPY COVER: _____ (ft)
- % FOLIAGE COVERAGE: _____ (canopy cover ft / row spacing ft x 100)
- CROP Etc: _____ (in/day)
 = Eto inches/day x Kc. Where Kc = .8 of daily pan (Eto)
 (Eto = .2 in/day or use avg. daily Et from local weather stations posted on internet
 site: www.sjred.org)
- NET GALLONS/DAY REQUIRED per 100 feet = _____ (gallons/day)
 50 x Eto in/day x row spacing (ft)
- GROSS IRRIGATION REQUIREMENTS per 100 feet = _____ (gallons/day)
 net gallons/day required per 100 feet / irrigation efficiencies

SOILS DATA

- SERIES: _____
- APPLICATION RATE: _____ (NJ Irr. Guide, Table NJ 2.1)
- AVAILABLE WATER CAPACITY: _____ (inches) (NJ Irr. Guide, Table NJ 2.1)
- AMOUNT TO APPLY (25% DEPLETION): _____ (inches) (**available water capacity * 25%**)
- SOIL MOISTURE TENSION: _____ *cb* (NJ Irr. Guide, Table NJ 9.3)

DESIGN DATA

- TYPE OF DRIP LINE: _____(manufacturer spec sheets)
- MANUFACTURER MODEL: _____(manufacturer spec sheets)
- LATERAL DIAMETER/THICKNESS: _____(manufacturer spec sheets)
- EMITTER TYPE: _____(manufacturer spec sheets)
- FLOW RATE: _____(gal/hr) (convert to gpm) _____ gal/min = $(\text{gal/hr} \times \frac{1\text{hr}}{60\text{min}})$
- DESIGN PRESSURE: _____(psi) (manufacturer spec sheets)
- PC ___ OR Non PC ___ (check)
- RECOMMENDED PRESSURE RANGE: _____(manufacturer spec sheets)
- MAXIMUM LATERAL LENGTH: _____(measure maximum row length)
- EMITTER SPACING: _____(in)
- EMITTERS/PLANT: _____
 spacing between plants / emitter spacing
- WETTED DIAMETER/EMITTER: _____(Ft) (NJ Irr. Guide, Table 6.10)
- WETTED AREA/PLANT: _____(SqFt)
 = # of emitters/plant x emitter spacing x emitter wetted diameter
- % ROOT ZONE AREA WETTED: _____% (must meet 25% - 60%)
 = $\frac{\text{wetted diameter/emitter} \times 100}{\text{width of canopy cover}}$
- GAL/MINUTE/ACRE: _____ = $\frac{43560 \text{ sqft} \times \text{gpm/emitter}}{\text{emitter spacing(ft)} \times \text{row spacing(ft)}}$

APPLICATION RATES, RUN TIME, AND FREQUENCY CALCULATIONS

- APPLICATION RATE: _____(in/hr) = $\frac{96.3 \times \text{gpm/emitter}}{\text{emitter spacing(ft)} \times \text{row spacing(ft)}}$

NET APPLICATION RATE: _____(in/hr) = $\text{application rate} \times \text{efficiency}/100$

- ESTIMATED IRRIGATION TIME: _____ (hr/day)
gross irrigation requirements per 100 feet / tape flow rate (gallons per hr/100')
- IRRIGATION FREQUENCY (*days*):
(Based On Management Allowed Depletion)

= **Inches to be applied at Mgt. Allowed Depletion (25% Depletion)**
Eto"/day x Kc

= _____ *days*
- TOTAL HOURS OF IRRIGATION AT MGT. ALLOWED DEPLETION:

= **Irrigation Frequency (Days) x estimated irrigation time (Hrs/Day)**

= _____ *hrs*

CAPACITY REQUIREMENTS FOR IRRIGATION SYSTEM

$$QT = DA$$

$$\text{Gallons per minute, } Q = \frac{453 \times \text{Acres irrigated } (A) \times \text{inches of water required } (D)}{\text{Time in hours } (T)}$$

(Reference - NJIG pg. 6.35, Figure 6.2)

Q = gallons/minute - pumping capacity

D = net depth of irrigation (in inches) divided by system efficiency (as a decimal).

A = total area to be irrigated (acres)

T = total time required in hours to complete irrigation cycle (22 hr. irrigation day)

Show calculation:

$$= \text{_____ gallons/minute}$$

CHECK SYSTEM DESIGNDESIGN CAPACITY - _____ *gpm*SIZE OF MAINLINE - _____ Maximum Flow (*not to exceed 5fps*) - _____SIZE OF SUBMAIN - _____ Maximum Flow (*not to exceed 5fps*) - _____**FRICITION LOSSES**

TYPE OF LOSSES	PIPE SIZE	TOTAL FLOW GPM	LENGT H	FRICITION LOSSES PER 100'	CUM. LOSSES PSI
Mainline					
Submain					
Lateral					
Filter					
Static (Elevation)					
Fitting – 5%					
TOTAL LOSSES					

Avg. Emitter Pressure					
*Pump Operating Pressure					

*Pump Operating Pressure = Avg. Emitter Pressure + Total Pressure Losses

INSERT VALUES FROM FRICTION LOSS SOFTWARE PROGRAM IF AVAILABLE.

PUMP DATA

TYPE: _____

MANUFACTURER MODEL #: _____

RATED DISCHARGE GPM: _____

DESIGN DISCHARGE RATE: _____

TOTAL DYNAMIC HEAD:

Static Head (ft) (drawdown level) or Suction Lift + Pump Pressure (psi) x $\frac{2.31'}{\text{Psi}}$
 = _____ FT

PUMP EFFICIENCY: _____ (Pump Curve)

BRAKE HORSEPOWER: _____ TDH x Flow Rate/ 3960 x efficiency

POWER SOURCE: _____

DOES PUMP MEET IRRIGATION REQUIREMENT? ____ YES ____ NO

OPERATE PUMP AT _____ PSI TO DELIVER _____ *gpm*OPERATE PRESSURE REGULATING VALVE AT _____ *psi*

PRESSURE RANGE WITHIN ZONE: _____

FERTIGATION AND CHEMIGATION - YES OR NO

TYPE OF INJECTOR:

RATE OF INJECTION:

TYPE OF BACKFLOW PREVENTION DEVICE:

PRESSURE /FLOW VARIATION**NON-PRESSURE COMPENSATING EMITTERS**

Examples: Netafim Python, Triton, Streamline, and Typhoon; T Tape

Check manufacturer specification sheet for pressure range and EU curves.

Design Pressure - _____

Recommended Pressure Range - _____

Pressure Variation - _____

Discharge Variation - _____ (must meet +/- 15% variation)

NOTE: FOR NON-PC EMITTERS A 30% PRESSURE VARIATION WILL RESULT IN 20% FLOW VARIATION, (+/- 10%) ALONG LATERAL LINE.

WITHIN THE FIELD/ZONE, A 45% PRESSURE VARIATION WILL RESULT IN 30% FLOW VARIATION (+/- 15% VARIATION OR 85% EU).

PRESSURE COMPENSATING EMITTERS

Examples: Netafim Ram; Wade Rain; Drip In; Rainbird PC

Check Manufacturer specification sheet for Pressure range and EU curves

Design Pressure - _____

Recommended Pressure Range - _____

Pressure Variation - _____

Discharge Variation - _____ (must meet +/- 15% variation)

NOTE: FOR PC EMITTERS 80% or more PRESSURE VARIATION WILL RESULT IN 20% FLOW VARIATION, (+/- 10%). Refer to Manufacturer sheets.

___ **SYSTEM MEETS NRCS STANDARDS AND SPECIFICATIONS.**

___ **SYSTEM MEETS, BUT CHANGES ARE RECOMMENDED TO IMPROVE EFFICIENCY.**

___ **SYSTEM DOES NOT MEET NRCS STANDARDS AND SPECS. REFER TO ATTACHED SHEET FOR RECOMMENDED DESIGN CHANGES.**

DRIP IRRIGATION DESIGN WORKSHEET ORCHARDS, BERRIES, VINEYARDS

COOPERATOR: _____

DATE: _____

COUNTY: _____

TWP: _____

Checked: _____

Approved: _____

CROP DATA

- TYPE: _____
- ROOT ZONE DEPTH: _____ (NJ Irr. Guide, Table NJ 3.3)
- ROW SPACING: _____ (ft)
- SPACING BETWEEN PLANTS: _____ (ft)
- SURFACE AREA: _____ (sqft) (row spacing * spacing between plants)
- CANOPY COVER: _____ (sqft) (Grapes; spacing between plants * 2', all other crops; spacing between plants² * $\pi \div 4$)
- % GROUND SHADE _____ (%) (canopy cover sqft / surface area sqft x 100)
- CROP DEVELOPMENT COEFFICIENT ($Kc1$): _____
(for peak demand use: 1.0 for orchards, 1.1 blueberries, .8 for grapes)
- CANOPY COEFFICIENT ($Kc2$): _____ (NJ Irr. Guide, Table NJ 6.26)
- PEAK PLANT WATER USE (net):
= _____ (E_{to} in/day) x _____ ($Kc1$) x _____ ($Kc2$) x _____ (surface area sqft) x .623
(E_{to} = .2 in/day or use avg. daily E_t from local weather stations posted on internet site www.sjrccd.org)
= _____ Gal/Day/Plant (net)
- GROSS IRRIGATION REQUIREMENTS _____ Gals/Day/Plant
= Gallons/Day/Plant (net)
Irrigation Efficiency (use .90)

SOILS DATA

- SERIES: _____
- APPLICATION RATE: _____ (in/hr) (NJ Irr. Guide, Table NJ 2.1)
- AVAILABLE WATER CAPACITY: _____ (inches) (NJ Irr. Guide, Table NJ 2.1)
- AMOUNT TO APPLY (25% DEPLETION): _____ (inches) (available water capacity * 25%)

DESIGN DATA

- TYPE OF DRIP LINE: _____ (manufacturer spec sheets)
- MANUFACTURER MODEL: _____ (manufacturer spec sheets)
- LATERAL DIAMETER/THICKNESS: _____ (manufacturer spec sheets)
- EMITTER TYPE: _____ (manufacturer spec sheets)
- FLOW RATE (per emitter): _____ (gal/hr) convert to gpm _____ (gal/min) = $(\text{gal/hr} \times \frac{1\text{hr}}{60\text{min}})$
- DESIGN PRESSURE: _____ (psi) (manufacturer spec sheets)
- PC ___ OR Non PC ___ (check)
- RECOMMENDED PRESSURE RANGE: _____ (manufacturer spec sheets)
- MAXIMUM LATERAL LENGTH: _____ (measure maximum row length)
- EMITTER SPACING: _____
- EMITTERS/PLANT: _____ (**plant spacing in row / emitter spacing**)
- GALLONS/HR/PLANT (gross): _____ (**gph/emitter x # of emitters/plant**)
- WETTED DIAMETER/EMITTER: _____ (ft) (NJ Irr. Guide, Table NJ 6.19)
- WETTED AREA/PLANT: _____ (sqft)
= **# of emitters/plant x emitter spacing x emitter wetted diameter**
- % ROOT ZONE AREA WETTED: _____ (%) (must be at least 25%)
= **# of emitters/plant x emitter spacing x wetted diameter of emitter x 100**
canopy area
- GAL/MINUTE/ACRE: _____ = **43560 sqft x gpm/emitter**
emitter spacing(ft) x row spacing(ft)

APPLICATION RATES, RUN TIME, AND FREQUENCY CALCULATIONS

- APPLICATION RATE: _____ (in/hr) = **96.3 x gpm/emitter**
emitter spacing(ft) x row spacing(ft)
- NET APPLICATION RATE: _____ (in/hr)
= **application rate x efficiency/100 ÷ canopy coefficient**

- DAILY RUN TIME:(Compute Both Ways)

$$= \frac{\text{Gross Gals/Plant/Day}}{\text{Gross Gals/Hr/Plant}} \quad \text{or} \quad \frac{\text{Eto}''/\text{day} \times \text{Kc1}}{\text{Net Application Rate (in/hr)}}$$

$$= \underline{\hspace{2cm}} \text{ (hrs/day)} \quad = \underline{\hspace{2cm}} \text{ (hrs/day)}$$

- IRRIGATION FREQUENCY (*days*):
(Based On Management Allowed Depletion)

$$= \frac{\text{Inches to be applied at Mgt. Allowed Depletion}}{\text{Eto}''/\text{day} \times \text{Kc1}}$$

$$= \underline{\hspace{2cm}} \text{ (days)}$$

- TOTAL HOURS OF IRRIGATION AT MGT. ALLOWED DEPLETION:

$$= \text{Irrigation Frequency (Days)} \times \text{Daily Run Time (Hrs/Day)}$$

$$= \underline{\hspace{2cm}} \text{ (hrs)}$$

CAPACITY REQUIREMENTS FOR IRRIGATION SYSTEM

$$QT = DA$$

$$\text{Gallons per minute, } Q = \frac{453 \times \text{Acres irrigated } (A) \times \text{inches of water required } (D)}{\text{Time in hours } (T)}$$

(Reference - NJIG pg. 6.35, Figure 6.2)

Q = gallons/minute - pumping capacity

D = net depth of irrigation (in inches) divided by system efficiency (as a decimal).

A = total area to be irrigated (acres)

T = total time required in hours to complete irrigation cycle (22 hr. irrigation day)

Show calculation:

$$= \underline{\hspace{2cm}} \text{ (gpm)}$$

CHECK SYSTEM DESIGN

DESIGN CAPACITY - _____ (gpm)

SIZE OF MAINLINE - _____ Maximum Flow (*not to exceed 5fps*) - _____SIZE OF SUBMAIN - _____ Maximum Flow (*not to exceed 5fps*) - _____**FRICION LOSSES**

TYPE OF LOSSES	PIPE SIZE	TOTAL FLOW GPM	LENGT H	FRICION LOSSES PER 100'	CUM. LOSSES PSI
Mainline					
Submain					
Lateral					
Filter					
Static (Elevation)					
Fitting – 5%					
TOTAL LOSSES					

Avg. Emitter Pressure					
*Pump Operating Pressure					

*Pump Operating Pressure = Avg. Emitter Pressure + Total Pressure Losses

INSERT VALUES FROM FRICTION LOSS SOFTWARE PROGRAM IF AVAILABLE.

PUMP DATA

TYPE: _____

MANUFACTURER MODEL #: _____

RATED DISCHARGE GPM: _____

DESIGN DISCHARGE RATE: _____

TOTAL DYNAMIC HEAD:

Static Head (ft) (drawdown level) or Suction Lift + Pump Pressure (psi) x $\frac{2.31'}{\text{Psi}}$
= _____ FT

PUMP EFFICIENCY: _____ (Pump Curve)

BRAKE HORSEPOWER: _____ TDH x Flow Rate/ 3960 x efficiency

POWER SOURCE: _____

DOES PUMP MEET IRRIGATION REQUIREMENT? ____ YES ____ NO

OPERATE PUMP AT _____ (psi) TO DELIVER _____ (gpm)

OPERATE PRESSURE REGULATING VALVE AT _____ (psi)

PRESSURE RANGE WITHIN ZONE: _____

FERTIGATION AND CHEMIGATION - YES OR NO

TYPE OF INJECTOR:

RATE OF INJECTION:

TYPE OF BACKFLOW PREVENTION DEVICE:

PRESSURE /FLOW VARIATION**NON-PRESSURE COMPENSATING EMITTERS**

Examples: Netafim Python, Triton, Streamline, and Typhoon; T Tape

Check manufacturer specification sheet for pressure range and EU curves.

Design Pressure - _____

Recommended Pressure Range - _____

Pressure Variation - _____

Discharge Variation - _____ (must meet +/- 15% variation)

NOTE: FOR NON-PC EMITTERS A 30% PRESSURE VARIATION WILL RESULT IN 20% FLOW VARIATION, (+/- 10%) ALONG LATERAL LINE.

WITHIN THE FIELD/ZONE, A 45% PRESSURE VARIATION WILL RESULT IN 30% FLOW VARIATION (+/- 15% VARIATION OR 85% EU).

PRESSURE COMPENSATING EMITTERS

Examples: Netafim Ram; Wade Rain; Drip In; Rainbird PC

Check Manufacturer specification sheet for Pressure range and EU curves

Design Pressure - _____

Recommended Pressure Range - _____

Pressure Variation - _____

Discharge Variation - _____ (must meet +/- 15% variation)

NOTE: FOR PC EMITTERS 80% or more PRESSURE VARIATION WILL RESULT IN 20% FLOW VARIATION, (+/- 10%). Refer to Manufacturer sheets.

___ **SYSTEM MEETS NRCS STANDARDS AND SPECIFICATIONS.**

___ **SYSTEM MEETS, BUT CHANGES ARE RECOMMENDED TO IMPROVE EFFICIENCY.**

___ **SYSTEM DOES NOT MEET NRCS STANDARDS AND SPECS. REFER TO ATTACHED SHEET FOR RECOMMENDED DESIGN CHANGES.**

SPRINKLER IRRIGATION DESIGN WORKSHEET

COUNTY: _____

WATERSHED: _____

COOPERATOR: _____

Date: _____

Checked: _____

Approved: _____

CROP DATA

- TYPE: _____
- ROW SPACING: _____
- ROOT ZONE DEPTH: _____ (NJ Irr. Guide, Table 3.3)
- CONSUMPTIVE USE: _____ in/day
(Et = .2 in/day or use avg. daily Et from local weather stations posted on internet site: www.sjrkd.org)

SOILS DATA

- SERIES: _____
- APPLICATION RATE: _____ (NJ Irr. Guide, Table 2.1)
- AVAILABLE WATER CAPACITY: _____ inches (NJ Irr. Guide, Table 2.1)
- MAXIMUM ALLOWABLE DEFICIENCY: _____ %(MAD)
- NET IRRIGATION REQUIRED: _____
- IRRIGATION FREQUENCY: _____ = $\frac{\text{Net Irrigation}}{\text{daily ET}}$

DESIGN DATA

- TYPE OF SPRINKLER _____
- MANUFACTURER MODEL: _____
- DESIGN FLOW RATE (gpm): _____
- DESIGN PRESSURE: _____
- WETTED DIAMETER: _____
- SPRINKLER SPACING: _____
- GAL/MINUTE/ACRE: _____
- APPLICATION RATE: _____ in/hr = $\frac{96.3 \times \text{gpm}}{\text{spacing (Ft)}}$
- POTENTIAL SYSTEM EFFICIENCY % _____
- NET IRRIGATION REQUIRED _____
- GROSS IRRIGATION: _____ inches = $\frac{\text{Net Irr. Req. (50\% depletion)}}{\text{System Efficiency}}$
- HOURS OF IRRIGATION: _____ = $\frac{\text{Gross Irr. Required}}{\text{rate of application in/hr}}$
- IRRIGATION FREQUENCY: _____

SPRINKLER DESIGN SYSTEM CHECK

DESIGN CAPACITY - _____ GPM

SIZE OF MAINLINE - _____ MAXIMUM FLOW (*not to exceed 5fps*) - _____SIZE OF SUBMAIN - _____ MAXIMUM FLOW (*not to exceed 5fps*) - _____

MAXIMUM SPRINKLERS/ZONE - _____

CAPACITY REQUIREMENTS FOR IRRIGATION SYSTEM

QT = DA

$$\text{Gallons per minute, } Q = \frac{453 \times \text{Acres irrigated } (A) \times \text{ inches of water required } (D)}{\text{Number of days} \times \text{Hours per day } (T)}$$

Reference - NJIG pg. 6.35, Figure 6.2

Q = gallons/minute - pumping capacity

D = gross irrigation required

A = total area to be irrigated (acres)

T = total time required in hours to complete irrigation cycle(18 hr. irrigation day)

SHOW CALCULATION:

PUMP DATA:

TYPE : _____

MANUFACTURER MODEL #: _____

RATED DISCHARGE GPM: _____ GPM

DESIGN DISCHARGE RATE: _____ GPM

PUMPING LIFT /STATIC HEAD _____ FT

TOTAL DYNAMIC HEAD (TDH): _____ FT

PUMP EFFICIENCY: _____

BRAKE HORSEPOWER _____ $\frac{\text{GPM} \times \text{TDH}}{3960 \times \text{PUMP EFFICIENCY}}$

POWER SOURCE: _____

FRICION LOSSES

TYPE OF LOSSES	SIZE OF PIPE	TOTAL FLOW GPM	LENGTH	FRICION LOSSES PER 100'	CUM. LOSSES PSI	CUM. HEAD LOSSES
MAINLINE						
SUBMAIN						
LATERAL						
STATIC						
FITTING						
TOTAL PSI LOSSES						
PUMP SUCTION LIFT (FT)						
PUMP DISCHARGE HEAD/PRES.						
TOTAL DYNAMIC HEAD						

INSERT VALUES FROM FRICTION LOSS SOFTWARE PROGRAM IF AVAILABLE.

**Pump discharge pressure must be < 72% of pipe pressure rating.
Lateral line losses must be < 20% of design pressure at nozzle.**

___ SYSTEM MEETS NRCS STANDARDS AND SPECIFICATIONS.

___ SYSTEM MEETS, BUT CHANGES ARE RECOMMENDED TO IMPROVE EFFICIENCY.

___ SYSTEM DOES NOT MEET NRCS STANDARDS AND SPECS. REFER TO ATTACHED SHEET FOR RECOMMENDED DESIGN CHANGES.

TRAVELING GUN IRRIGATION DESIGN WORKSHEET

COOPERATOR: _____

Date: _____

COUNTY: _____

TWP: _____

Checked: _____

Approved: _____

CROP DATA

- ACRES IRRIGATED: _____
- TYPE: _____
- ROOT ZONE DEPTH: _____ (NJ Irr. Guide, Table 3.3)
- CONSUMPTIVE USE: _____ in/day
(Et = .2 in/day or use avg. daily Et from local weather stations posted on internet site: www.sjrcd.org)

SOILS DATA

- SERIES: _____
- APPLICATION RATE: _____ (NJ Irr.Guide, Table 2.1)
- AVAILABLE WATER CAPACITY: _____ inches (NJ Irr.Guide, Table 2.1)
- MAXIMUM ALLOWABLE DEFICIENCY: 50%(MAD)
- NET IRRIGATION REQUIRED: _____
- IRRIGATION FREQUENCY: _____ = $\frac{\text{Net Irrigation}}{\text{daily ET}}$

DESIGN DATA

- TYPE /SIZE OF NOZZLE : _____
- MANUFACTURER MODEL: _____
- TRAVELER MODEL: _____
- HOSE INNER DIAMETER AND LENGTH: _____
- DESIGN FLOW RATE : _____gpm
- DESIGN PRESSURE: _____psi
- WETTED DIAMETER: _____ft
- WETTED RADIUS (t) _____ft
- TOWPATH (RISER)SPACING: _____
(50% - 60% of wetted diameter for 5 –10mph wind speed)
- SPEED OF TRAVELER: _____FT/MIN
- APPLICATION RATE: _____in/hr = $\frac{96.3 \times \text{gpm} \times 360^\circ}{\pi(.9t)^2 \times 320^\circ}$
t = wetted radius
- GROSS IRRIGATION: _____inches = $\frac{1.605 \times Q}{\text{spacing} \times \text{speed of traveler}}$
- SYSTEM EFFICIENCY: _____%
- NET IRRIGATION APPLIED: _____inches = Gross irr. x system efficiency

SYSTEM DESIGN CHECK

DESIGN CAPACITY - _____GPM

SIZE OF MAINLINE - _____ MAXIMUM FLOW (*not to exceed 5fps*) - _____SIZE OF SUBMAIN - _____ MAXIMUM FLOW (*not to exceed 5fps*) - _____

MAXIMUM SPRINKLERS/ZONE - _____

CAPACITY REQUIREMENTS FOR IRRIGATION SYSTEM

QT = DA

$$\text{Gallons per minute, } Q = \frac{453 \times \text{Acres irrigated } (A) \times \text{inches of water required } (D)}{\text{Number of days} \times \text{Hours per day } (T)}$$

(Reference - NJIG pg. 6.35, Figure 6.2)

Q = gallons/minute - pumping capacity

D = net depth irrigation (in inches) divided by system efficiency (as a decimal)

A = total area to be irrigated (acres)

T = total time required in hours to complete irrigation cycle (22 hr. irrigation day)

SHOW CALCULATION:

FRICITION LOSSES

TYPE OF LOSSES	SIZE OF PIPE	TOTAL FLOW GPM	LENGTH	FRICITION LOSSES PER 100'	CUM. LOSSES PSI	CUM. HEAD LOSSES
MAINLINE						
SUBMAIN						
TRAVELER HOSE						
STATIC						
FITTING						
TOTAL PSI LOSSES						
NOZZLE PRESSURE						
PUMP DISCHARGE HEAD/PRES. (TOTAL PSI LOSSES + NOZZLE)						
PUMP SUCTION LIFT (FT)						
TOTAL DYNAMIC HEAD						

Pump discharge pressure must be < 72% of pipe pressure rating.**INSERT VALUES FROM FRICTION LOSS SOFTWARE PROGRAM IF AVAILABLE.**

PUMP DATA:

TYPE : _____

MANUFACTURER MODEL #: _____

RATED DISCHARGE GPM: _____ (PUMP) SYSTEM CAPACITY _____

TOTAL DYNAMIC HEAD: _____ (FT)

PUMP EFFICIENCY: _____%

BRAKE HORSEPOWER: _____ $\frac{\text{TDH} \times \text{FLOW RATE}}{3960 \times \text{EFFICIENCY}}$

POWER SOURCE: _____

HP HOURS/ GAL: _____ or KW HOURS/ GAL: _____

COST/HOUR RUN TIME: _____ (if data is available)

ATTACH COPY OF PUMP CURVE.

_____ **SYSTEM MEETS NRCS STANDARDS AND SPECIFICATIONS.**_____ **SYSTEM MEETS, BUT CHANGES ARE RECOMMENDED TO IMPROVE EFFICIENCY.**_____ **SYSTEM DOES NOT MEET NRCS STANDARDS AND SPECS. REFER TO ATTACHED SHEET FOR RECOMMENDED DESIGN CHANGES.**

CENTER PIVOT/LINEAR MOVE IRRIGATION DESIGN WORKSHEET

COOPERATOR: _____

Date: _____

COUNTY: _____

TWP: _____

Checked: _____

Approved: _____

CROP DATA

- TOTAL ACRES: _____ ac
- ACRES IRRIGATED BY PIVOT WETTED RADIUS (A): _____ ac
- TYPE: _____
- ROOT ZONE DEPTH: _____ (NJ Irr. Guide, Table NJ 3.3)
- CONSUMPTIVE USE (ETc): _____ in/day
(Et = .2 in/day or use avg. daily Et from local weather stations posted on internet site: www.sjrcd.org)

SOILS DATA

- SERIES: _____
- INTAKE FAMILY: _____ (NJ Irr. Guide, Table NJ 2.2)
- RESIDUE: _____ lbs/ac
- LAND SLOPE: _____ %
- AVAILABLE WATER CAPACITY: _____ inches (NJ Irr. Guide, Table NJ 2.1)
- MAXIMUM ALLOWABLE DEFICIENCY: 50% (MAD)

DESIGN DATA

- PIVOT MAKE AND MODEL: _____

- SPRINKLER TYPE AND MODEL: _____
- SPRINKLER SPACING ALONG LATERAL: _____
- SYSTEM LENGTH (**L**): _____ ft
- END GUN MODEL AND SIZE: _____ in
- END GUN FLOW RATE AND PRESSURE: _____ gpm _____ psi
- END GUN RADIUS (**ER**): _____ ft
- NUMBER OF TOWERS: _____
- PIVOT DESIGN FLOW RATE AND PRESSURE AT PIVOT (**Q**): _____ gpm _____ psi
- CENTER PIVOT WETTED RADIUS (**R**): _____ ft (**L + ER**)
- DISTANCE FROM CENTER PIVOT TO OUTER DRIVE WHEEL (**r**): _____ ft
- WETTED DIAMETER OF LARGEST LATERAL NOZZLE (**w**): _____ ft
- NOZZLE PRESSURE WITH REGULATOR: _____ psi
- SYSTEM EFFICIENCY: _____ % (**NJ Irr. Guide, Table NJ 4.4**)
- NET APPLICATION PER REVOLUTION: _____ in (**.5, .75, 1 or 1.25 in**)
- GROSS APPLICATION PER DAY (**D**): _____ in (**ETc ÷ SYSTEM EFFICIENCY**)
- DESIGN GPM/ACRE: _____ gpm/ac (**Q / A**)
- MINIMUM GROSS IRRIGATION REQUIREMENT: _____ gpm/ac (**453 * D**) / (**22**)
 $= (453 * \text{_____}) / 22 = \text{_____} \text{ gpm/ac}$ Note: Design gpm/ac must equal or exceed minimum irrigation requirements. If short, reduce acres or increase water supply.
- MAXIMUM ALLOWABLE APPLICATION RATE: _____ in/hr (**NJ Irr. Guide, Table NJ 2.3**)
- DESIGN APPLICATION RATE: _____ in/hr (**192.6 * r * Q**) / (**R² * w**)
 $= (192.6 * \text{_____} * \text{_____}) / (\text{_____}^2 * \text{_____}) = \text{_____} \text{ in/hr}$

Note: Design application rate must not exceed the maximum allowable application rate.
Decrease flowrate or increase wetted diameter if needed.

FRICITION LOSSES

TYPE OF LOSSES	SIZE OF PIPE	TOTAL FLOW GPM	LENGTH	FRICITION LOSSES PER 100'	CUM. LOSSES PSI	CUM. HEAD LOSSES
MAINLINE						
PIVOT LATERAL (P_L)						
FILTER						
STATIC HEIGHT OF PIVOT						
FITTING						
TOTAL PSI LOSSES (T_P)						
PUMP DISCHARGE HEAD (psi) ($T_P - P_L + \text{PRESSURE AT PIVOT}$)						
PUMP SUCTION LIFT/PUMPING DEPTH (ft)						
TOTAL DYNAMIC HEAD (ft) PUMP SUCTION LIFT + PUMP DISCHARGE HEAD						

Pump discharge pressure must be < 72% of pipe pressure rating.

INSERT VALUES FROM FRICTION LOSS SOFTWARE PROGRAM IF AVAILABLE.

PUMP DATA:

TYPE : _____
 MANUFACTURER MODEL #: _____
 RATED DISCHARGE GPM: _____ (PUMP) SYSTEM CAPACITY _____
 TOTAL DYNAMIC HEAD: _____ (FT)
 PUMP EFFICIENCY: _____ %
 BRAKE HORSEPOWER: _____ $\frac{\text{TDH} \times \text{FLOW RATE}}{3960 \times \text{EFFICIENCY}}$
 POWER SOURCE: _____
 HP HOURS/ GAL: _____ or KW HOURS/ GAL: _____
 COST/HOUR RUN TIME: _____ (if data is available)

ATTACH COPY OF PUMP CURVE.

___ SYSTEM MEETS NRCS STANDARDS AND SPECIFICATIONS.

___ SYSTEM MEETS, BUT CHANGES ARE RECOMMENDED TO IMPROVE EFFICIENCY.

___ SYSTEM DOES NOT MEET NRCS STANDARDS AND SPECS. REFER TO ATTACHED SHEET FOR RECOMMENDED DESIGN CHANGES.

DRIP IRRIGATION DESIGN VEGETABLES

COOPERATOR:
COUNTY:
CHECKED:

DATE:
TWP:
APPROVED:

CROP DATA

IRRIGATED ACRES:	ac
TYPE:	
ROOT ZONE DEPTH:	in
ROW SPACING:	ft
WIDTH OF CANOPY COVER:	ft
% FOLIAGE COVERAGE:	%
ETO:	in/day
GROSS IRRIGATION REQUIREMENTS (per 100'):	gal

SOIL DATA

SOIL TEXTURE:	
SERIES:	
APPLICATION RATE:	/hr
AVAILABLE WATER CAPACITY:	in
AMOUNT TO APPLY: <input style="width: 80px;" type="text"/>	in
IRRIGATION FREQUENCY (no rain):	days
TOTAL HOURS OF IRRIGATION:	hr
MOISTURE TENSION (cb):	

DESIGN DATA

IRRIGATION PIPE LINE TYPE AND RATING:	psi
TYPE OF DRIP LINE:	
MANUFACTURER MODEL:	
LATERAL DIAMETER/THICKNESS:	
EMITTER TYPE:	
FLOW RATE:	gpm/100'
DESIGN PRESSURE:	psi
RECOMMENDED PRESSURE RANGE:	psi
MAXIMUM LATERAL LENGTH:	ft
EMITTER SPACING:	in
WETTED DIAMETER/EMITTER:	ft
% ROOT ZONE AREA WETTED:	%
GAL/MINUTE/ACRE:	gpm/ac
APPLICATION RATE:	in/hr
NET APPLICATION RATE (ROOT ZONE):	in/hr
DAILY HOURS OF IRRIGATION:	hr/day

MINIMUM CAPACITY REQUIRED FOR IRRIGATED ACRES: **gpm**

PUMPING CAPACITY AVAILABLE: **gpm**

FRICTION LOSSES

TYPE OF MAINLINE:	TOTAL FLOW (gpm)	LENGTH (ft)	FRICTION LOSSES (psi per 100')	CUM. LOSSES (psi)
MAINLINE (in)				
SUBMAIN (in)				
LATERAL				
FILTER				
HYDROCYCLONE				
STATIC (outside zone)				
STATIC (inside zone)				

PUMP DATA

TYPE:

MANUFACTURER MODEL #:

RATED DISCHARGE (gpm):

DESIGN DISCHARGE RATE (gpm):

SUCTION LIFT/COLUMN HT (ft):

TOTAL DYNAMIC HEAD (ft):

% PUMP EFFICIENCY:

BRAKE HORSE POWER (hp):

POWER SOURCE:

GAL/HR: KW/HR/HR:

COST/HOUR RUN TIME (base on current energy rates):
 DIESEL ELECTRIC GASOLINE

OPERATE PUMP AT: psi gpm

PESSURE RANGE WITHIN ZONE: psi

FERTIGATION AND CHEMIGATION: YES NO

TYPE OF INJECTOR:

RATE OF INJECTION (gph):

TYPE OF BACKFLOW PREVENTION DEVICE:

THRUST BLOCK AREA						
PIPE SIZE	FITTING	PRESSURE	W (in)	L (in)	H (in)	
<input type="text"/>						

**NOTE: NON PC EMITTERS NO MORE THEN 50% PRESSURE VARIATION
ALLOWED TO MAINTAIN +/- 10% FLOW VARIATION.**

- SYSTEM MEETS NRCS STANDARDS AND SPECIFICATIONS.
- SYSTEM MEETS WITH RECOMMENDED CHANGES TO IMPROVE EFFICIENCY.
- SYSTEM DOES NOT MEET NRCS STANDARDS AND SPECS. REFER TO ATTACHED SHEET FOR RECOMMENDED DESIGN CHANGES

DRIP IRRIGATION DESIGN Orchards, Berries, Vineyards

COOPERATOR:
COUNTY:
CHECKED:

DATE:
TWP:
APPROVED:

CROP DATA

IRRIGATED ACRES:
TYPE:
ROOT ZONE DEPTH:
ROW SPACING:
SPACING BETWEEN PLANTS:
SURFACE AREA (sqft):
CANOPY COVER (sqft):
CANOPY COEFFICIENT (Kc2):
% FOLIAGE COVERAGE:
ETO:
CROP COEFFICIENT (Kc1):
ETC:
PEAK PLANT WATER USE (per day):
GROSS IRRIGATION REQUIREMENTS (per day):

	ac
	in
	ft
	ft
	ft ²
	ft ²
	%
	gal
	gal

SOIL DATA

SOIL TEXTURE:
SERIES:
APPLICATION RATE:
AVAILABLE WATER CAPACITY:
AMOUNT TO APPLY:
IRRIGATION FREQUENCY (no rain):
TOTAL HOURS OF IRRIGATION:
MOISTURE TENSION (cb):

	"/hr
	in
	in
	days
	hr

DESIGN DATA

IRRIGATION PIPE LINE TYPE AND RATING:
TYPE OF DRIP LINE:
MANUFACTURER MODEL:
LATERAL DIAMETER/THICKNESS:
EMITTER TYPE:
FLOW RATE:
DESIGN PRESSURE:
RECOMMENDED PRESSURE RANGE:
MAXIMUM LATERAL LENGTH:
EMITTER SPACING:
EMITTER/PLANT:
WETTED DIAMETER/EMITTER:
WETTED AREA/PLANT:
% ROOT ZONE AREA WETTED:
GAL/MINUTE/ACRE
APPLICATION RATE:
DESIGN AREA TO BE IRRIGATED:
NET APPLICATION RATE (ROOT ZONE):
DAILY HOURS OF IRRIGATION:

	psi
	g/hr
	psi
	psi
	ft
	in
	ft
	ft ²
	%
	gpm/acre
	in/hr
	in/hr
	hr/day

MINIMUM CAPACITY REQUIRED FOR IRRIGATED ACRES: gpm

FRICITION LOSSES

TYPE OF MAINLINE:	TOTAL FLOW (gpm)	LENGTH (ft)	FRICITION LOSSES (psi per 100')	CUM. LOSSES (psi)
MAINLINE (in)				
SUBMAIN (in)				
LATERAL				
FILTER				
HYDROCYCLONE				
STATIC (outside zone)				
STATIC (inside zone)				
FITTING (%)				
TOTAL				
TOTAL PRESSURE LOSSES IN ZONE				
END LATERAL PRESSURE				
REGULATE ZONE AT				
MINIMUM OPERATED PRESSURE AT PUMP				

PUMP DATA

TYPE: _____

MANUFACTURER MODEL #: _____

RATED DISCHARGE (gpm): _____

DESIGN DISCHARGE RATE (gpm): _____

SUCTION LIFT/COLUMN HT (ft): _____

TOTAL DYNAMIC HEAD (ft): _____

% PUMP EFFICIENCY: _____

BRAKE HORSE POWER (hp): _____

POWER SOURCE: _____

GAL/HR: _____ KW/HR/HR: _____

COST/HOUR RUN TIME (base on current energy rates):
 DIESEL _____ ELECTRIC _____ GASOLINE _____

OPERATE PUMP AT: _____ psi _____ gpm

PESSURE RANGE WITHIN ZONE: _____ psi

FERTIGATION AND CHEMIGATION: YES NO

TYPE OF INJECTOR: _____

RATE OF INJECTION (gph): _____

TYPE OF BACKFLOW PREVENTION DEVICE: _____

PIPE SIZE	FITTING	PRESSURE	THRUST BLOCK AREA		
			W (in)	L (in)	H (in)

NOTE: FOR PC EMITTERS 80% OR MORE PRESSURE VARIATION WILL RESULT IN 20% FLOW VARIATION, (+/-10%). REFER TO MANUFACTURER SHEETS.

- SYSTEM MEETS NRCS STANDARDS AND SPECIFICATIONS.
- SYSTEM MEETS WITH RECOMMENDED CHANGES TO IMPROVE EFFICIENCY.
- SYSTEM DOES NOT MEET NRCS STANDARDS AND SPECS. REFER TO ATTACHED SHEET FOR RECOMMENDED DESIGN CHANGES

MICROSPRINKLER IRRIGATION DESIGN

COOPERATOR:
COUNTY:
CHECKED:

DATE:
TWP:
APPROVED:

CROP DATA

IRRIGATED ACRES:	ac
TYPE:	
ROOT ZONE DEPTH:	in
ROW SPACING:	ft
SPACING BETWEEN PLANTS:	ft
CANOPY DIAMETER:	ft
SURFACE AREA (sqft):	ft ²
CANOPY COVER (sqft):	ft ²
CANOPY COEFFICIENT (Kc2):	
% FOLIAGE COVERAGE:	%
ETO:	
CROP COEFFICIENT (Kc1):	
ETC:	
PEAK PLANT WATER USE (per day):	gal
GROSS IRRIGATION REQUIREMENTS (per day):	gal

SOIL DATA

SOIL TEXTURE:	
SERIES:	
APPLICATION RATE:	"/hr
AVAILABLE WATER CAPACITY:	in
AMOUNT TO APPLY: <input type="text"/>	in
IRRIGATION FREQUENCY (no rain):	days
TOTAL HOURS OF IRRIGATION:	hr
MOISTURE TENSION (cb):	

DESIGN DATA

IRRIGATION PIPE LINE TYPE AND RATING:		psi
LATERAL LINE: MANUFACTURER, ID, THICKNESS		
EMISSION DEVICE: TYPE AND MANUFACTURER		
FLOW RATE:	g/hr	
DESIGN PRESSURE:	psi	
RECOMMENDED PRESSURE RANGE:	psi	
MAXIMUM LATERAL LENGTH:	ft	
MICROSPRINKLER SPACING:	ft	
WETTED DIAMETER/MICROSPRINKLER:	ft	
WETTED AREA/TREE:	ft ²	
% ROOT ZONE AREA WETTED:	%	
GAL/MINUTE/ACRE	gpm/ac	
APPLICATION RATE:	in/hr	
DESIGN AREA TO BE IRRIGATED:		
NET APPLICATION RATE (ROOT ZONE):	in/hr	
DAILY HOURS OF IRRIGATION:	hr/day	

MINIMUM CAPACITY REQUIRED FOR IRRIGATED ACRES: gpm

FRICITION LOSSES

TYPE OF MAINLINE:	TOTAL FLOW (gpm)	LENGTH (ft)	FRICITION LOSSES (psi per 100')	CUM. LOSSES (psi)
MAINLINE (in)				
SUBMAIN (in)				
LATERAL				
FILTER				
HYDROCYCLONE				
STATIC (outside zone)				
STATIC (inside zone)				
FITTING (%)				
TOTAL				
TOTAL PRESSURE LOSSES IN ZONE				
END LATERAL PRESSURE				
REGULATE ZONE AT				
MINIMUM OPERATED PRESSURE AT PUMP				

PUMP DATA

TYPE: _____

MANUFACTURER MODEL #: _____

RATED DISCHARGE (gpm): _____

DESIGN DISCHARGE RATE (gpm): _____

SUCTION LIFT/COLUMN HT (ft): _____

TOTAL DYNAMIC HEAD (ft): _____

% PUMP EFFICIENCY: _____

BRAKE HORSE POWER (hp): _____

POWER SOURCE: _____

GAL/HR: _____ KW/HR/HR: _____

COST/HOUR RUN TIME (base on current energy rates):
 DIESEL _____ ELECTRIC _____ GASOLINE _____

OPERATE PUMP AT: _____ psi _____ gpm

PESSURE RANGE WITHIN ZONE: _____ psi

FERTIGATION AND CHEMIGATION: YES NO

TYPE OF INJECTOR: _____

RATE OF INJECTION (gph): _____

TYPE OF BACKFLOW PREVENTION DEVICE: _____

PIPE SIZE	FITTING	PRESSURE	THRUST BLOCK AREA		
			W (in)	L (in)	H (in)

NOTE: FOR PC EMITTERS 80% OR MORE PRESSURE VARIATION WILL RESULT IN 20% FLOW VARIATION, (+/-10%). REFER TO MANUFACTURER SHEETS.

- SYSTEM MEETS NRCS STANDARDS AND SPECIFICATIONS.
- SYSTEM MEETS WITH RECOMMENDED CHANGES TO IMPROVE EFFICIENCY.
- SYSTEM DOES NOT MEET NRCS STANDARDS AND SPECS. REFER TO ATTACHED SHEET FOR RECOMMENDED DESIGN CHANGES

SPRINKLER IRRIGATION DESIGN

COOPERATOR:
COUNTY:
CHECKED:

DATE:
TWP:
APPROVED:

CROP DATA

IRRIGATED ACRES:
TYPE:
ROOT ZONE DEPTH:
ROW SPACING:
SPACING BETWEEN PLANTS:
ETO (avg. N.J. peak ET rate):
CROP COEFFICIENT (Kc1):
ETC:

ac
in
ft
ft
in/day

SOIL DATA

SOIL TEXTURE:
SOIL SERIES:
MAXIMUM APPLICATION RATE:
AVAILABLE WATER CAPACITY:
AMOUNT TO APPLY:
IRRIGATION FREQUENCY (no rain):
TOTAL HOURS OF IRRIGATION:
MOISTURE TENSION (cb):

hr
in
in
days
hr

DESIGN DATA

IRRIGATION PIPE LINE TYPE AND RATING:
TYPE OF SPRINKLER:
MANUFACTURER MODEL:
DESIGN FLOW RATE:
DESIGN PRESSURE:
WETTED DIAMETER:
SPRINKLER SPACING:
LATERAL SPACING:
GAL/MINUTE/ACRE
DESIGN APPLICATION RATE:
POTENTIAL SYSTEM EFFICIENCY:
NET IRRIGATION REQUIRED PER DAY:
GROSS IRRIGATION PER DAY:
DAILY TIME OF IRRIGATION:

	psi
gpm	
psi	
ft	
ft	
ft	
gpm/acre	
in/hr	
in/day	
in/day	
hr/day	

MINIMUM CAPACITY REQUIRED FOR IRRIGATED ACRES:

gpm

PUMPING CAPACITY AVAILABLE:

gpm

FRICITION LOSSES

TYPE OF MAINLINE:	TOTAL FLOW (gpm)	LENGTH (ft)	FRICITION LOSSES (psi per 100')	CUM. LOSSES (psi)
MAINLINE (in)				
SUBMAIN (in)				
LATERAL				
FILTER				
HYDROCYCLONE				
STATIC (outside zone)				
STATIC (inside zone)				
FITTING (%)				
TOTAL				

PUMP DATA

TYPE:

MANUFACTURER MODEL #:

RATED DISCHARGE (gpm):

DESIGN DISCHARGE RATE (gpm):

SUCTION LIFT/COLUMN HT (ft):

TOTAL DYNAMIC HEAD (ft):

% PUMP EFFICIENCY:

BRAKE HORSE POWER (hp):

POWER SOURCE:

gpm
gpm

GAL/HR:

KW/HR/HR:

COST/HOUR RUN TIME (base on current energy rates):

DIESEL

ELECTRIC

GASOLINE

OPERATE PUMP AT:

psi

gpm

THRUST BLOCK AREA

PIPE SIZE	FITTING	PRESSURE	W (in)	L (in)	H (in)		

- SYSTEM MEETS NRCS STANDARDS AND SPECIFICATIONS.
- SYSTEM MEETS WITH RECOMMENDED CHANGES TO IMPROVE EFFICIENCY.
- SYSTEM DOES NOT MEET NRCS STANDARDS AND SPECS. REFER TO ATTACHED SHEET FOR RECOMMENDED DESIGN CHANGES

HOOPHOUSE SPRINKLER IRRIGATION DESIGN

COOPERATOR:
COUNTY:
CHECKED:

DATE:
TWP:
APPROVED:

CROP DATA

IRRIGATED ACRES:
TYPE:
ROOT ZONE DEPTH:
ETO (avg. N.J. peak ET rate):
CROP COEFFICIENT (Kc1):
ETC:

ac
in
in/day

SOIL DATA

CONTAINER
SOIL TEXTURE:
AVAILABLE WATER CAPACITY:
MOISTURE TENSION (cb):

in
cb

FIELD
SOIL SERIES:
SOIL TEXTURE:
APPLICATION RATE:

in/hr

DESIGN DATA

IRRIGATION PIPE LINE TYPE AND RATING:
TYPE OF SPRINKLER:
MANUFACTURER MODEL:
DESIGN FLOW RATE:
DESIGN PRESSURE:
WETTED DIAMETER:
SPRINKLER SPACING:
GAL/MINUTE/ACRE
APPLICATION RATE:
POTENTIAL SYSTEM EFFICIENCY:
NET IRRIGATION REQUIRED PER DAY:
GROSS IRRIGATION PER DAY:
DAILY TIME OF IRRIGATION:
IRRIGATION FREQUENCY:
TOTAL HOURS OF IRRIGATION:
GROSS AMOUNT TO APPLY:

	psi
gpm	
psi	
ft	
ft	ft
gpm/acre	
in/hr	
in/day	
in/day	
min/day	
day	
hr	
in	

MINIMUM CAPACITY REQUIRED FOR IRRIGATED ACRES:

gpm

PUMPING CAPACITY AVAILABLE:

gpm

FRICITION LOSSES

TYPE OF MAINLINE:	TOTAL FLOW (gpm)	LENGTH (ft)	FRICITION LOSSES (psi per 100')	CUM. LOSSES (psi)
MAINLINE (in)				
SUBMAIN (in)				
LATERAL				
FILTER				
HYDROCYCLONE				
STATIC (outside zone)				
STATIC (inside zone)				
FITTING (%)				

PUMP DATA

TYPE:

MANUFACTURER MODEL #:

RATED DISCHARGE (gpm): **gpm**

DESIGN DISCHARGE RATE (gpm): **gpm**

SUCTION LIFT/COLUMN HT (ft): **ft**

TOTAL DYNAMIC HEAD (ft): **ft**

% PUMP EFFICIENCY:

BRAKE HORSE POWER (hp):

POWER SOURCE:

GAL/HR: KW/HR/HR:

COST/HOUR RUN TIME (base on current energy rates):
 DIESEL ELECTRIC GASOLINE

OPERATE PUMP AT: **psi** **gpm**

FERTIGATION AND CHEMIGATION: YES NO

TYPE OF INJECTOR:

RATE OF INJECTION (gph):

TYPE OF BACKFLOW PREVENTION DEVICE:

TAIL WATER RECOVERY SYSTEM: RECYCLING: YES NO

PUMP BACK WATER TREATMENT: CLORINATION:
 IONIZATION:

PIPE SIZE	FITTING	PRESSURE	THRUST BLOCK AREA		
			W (in)	L (in)	H (in)
<input type="text"/>					

- SYSTEM MEETS NRCS STANDARDS AND SPECIFICATIONS.
- SYSTEM MEETS WITH RECOMMENDED CHANGES TO IMPROVE EFFICIENCY.
- SYSTEM DOES NOT MEET NRCS STANDARDS AND SPECS. REFER TO ATTACHED SHEET FOR RECOMMENDED DESIGN CHANGES

CENTER PIVOT IRRIGATION DESIGN

COOPERATOR:
COUNTY:
CHECKED:

DATE:
TWP:
APPROVED:

CROP DATA

TOTAL ACRES:
AREA IRRIGATED BY CENTER PIVOT WETTED RADIUS:
CROP TYPE:
ROOT ZONE DEPTH:
ETO:
CROP COEFFICIENT (Kc1):
ETC:

ac
ac
in
in/day

SOIL DATA

SOIL TEXTURE:
SERIES:
INTAKE FAMILY:
RESIDUE:
LAND SLOPE:
AVAILABLE WATER CAPACITY:
MOISTURE TENSION (50% DEPLETION):

lb/ac
%
in
cb

DESIGN DATA

IRRIGATION PIPE LINE TYPE AND RATING:
PIVOT MAKE AND MODEL:
SPRINKLER TYPE AND MODEL:
SPRINKLER SPACING ALONG LATERAL:
SYSTEM LENGTH:
END GUN MODEL:
END GUN NOZZLE SIZE:
END GUN FLOW RATE:
END GUN PRESSURE:
END GUN RADIUS:
NUMBER OF TOWERS:
DESIGN FLOW RATE:
DESIGN PRESSURE AT PIVOT:
CENTER PIVOT WETTED RADIUS:
DISTANCE FROM CENTER PIVOT TO OUTER DRIVE WHEEL:
WETTED DIAMETER OF LARGEST LATERAL NOZZLE:
NOZZLE PRESSURE WITH REGULATOR:
SYSTEM EFFICIENCY:
MAXIMUM IRRIGATION APPLICATION PER REVOLUTION:
GROSS APPLICATION PER DAY:
TIME TO IRRIGATE CENTER PIVOT AREA (one revolution):
GPM/ACRE:
MINIMUM GROSS IRRIGATION REQUIREMENT (gpm/ac):
MAXIMUM ALLOWABLE APPLICATION RATE:
DESIGN APPLICATION RATE:
CHECK SPRINKLER DESIGN FLOW RATE:
CHECK END GUN FLOW RATE:

	psi
ft	
ft	
in	
gpm	
psi	
ft	
gpm	
psi	
ft	
ft	
psi low and medium flow	
%	
in	
in	
days	hrs
gpm/ac	
gpm/ac	
in/hr	
in/hr	
gpm	
gpm	

MINIMUM CAPACITY REQUIRED FOR TOTAL ACRES: MINIMUM CAPACITY REQUIRED FOR CENTER PIVOT ACRES:
 TOTAL PUMPING CAPACITY AVAILABLE: CENTER PIVOT DESIGN CAPACITY:

FRICTION LOSSES

TYPE OF MAINLINE:	TOTAL FLOW (gpm)	LENGTH (ft)	FRICTION LOSSES (psi per 100')	CUM. LOSSES (psi)
MAINLINE (in)				
PIVOT LATERAL				
FILTER				

PUMP DATA

TYPE:

MANUFACTURER MODEL #:

RATED DISCHARGE (gpm):

DESIGN DISCHARGE RATE (gpm):

SUCTION LIFT/PUMPING DEPTH (ft):

TOTAL DYNAMIC HEAD REQUIRED (ft):

TOTAL DYNAMIC HEAD AVAILABLE (ft):

% PUMP EFFICIENCY:

BRAKE HORSE POWER (hp):

POWER SOURCE:

GAL/HR: KW/HR/HR:

COST/HOUR RUN TIME (base on current energy rates):
 DIESEL ELECTRIC GASOLINE

PUMP OPERATING PRESSURE: psi

PRESSURE REDUCING VALVE NEEDED: YES NO

PRV (psi): psi

BOOSTER PUMP:

LINE PRESSURE AT END OF LATERAL: psi

GUN HOSE LOSSES: psi

BOOSTER PUMP (psi): psi

BRAKE HORSE POWER (hp): hp

PIPE SIZE	FITTING	PRESSURE	THRUST BLOCK AREA		
			W (in)	L (in)	H (in)
<input type="text"/>					

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LINEAR MOVE IRRIGATION DESIGN

COOPERATOR:
COUNTY:
CHECKED:

DATE:
TWP:
APPROVED:

CROP DATA

TOTAL ACRES:
DISTANCE TRAVELED BY LINEAR MOVE:
AREA IRRIGATED BY LINEAR MOVE SYSTEM:
CROP TYPE:
ROOT ZONE DEPTH:
ETO:
CROP COEFFICIENT (Kc1):
ETC:

ac
ft
ac
in
in/day

SOIL DATA

SOIL TEXTURE:
SERIES:
INTAKE FAMILY:
RESIDUE:
LAND SLOPE:
AVAILABLE WATER CAPACITY:
MOISTURE TENSION (50% DEPLETION):

lb/ac
%
in
cb

DESIGN DATA

IRRIGATION PIPE LINE TYPE AND RATING:
LINEAR MOVE MAKE AND MODEL:
SPRINKLER TYPE AND MODEL:
SPRINKLER SPACING ALONG LATERAL:
SYSTEM LENGTH:
END GUN MODEL:
END GUN NOZZLE SIZE:
END GUN FLOW RATE:
END GUN PRESSURE:
END GUN RADIUS:
NUMBER OF TOWERS:
DESIGN FLOW RATE:
DESIGN PRESSURE AT PIVOT:
LINEAR MOVE WETTED LENGTH:
DISTANCE FROM CENTER PIVOT TO OUTER DRIVE WHEEL:
WETTED DIAMETER OF SPRINKLER NOZZLE:
NOZZLE PRESSURE WITH REGULATOR:
SYSTEM EFFICIENCY:
MAXIMUM IRRIGATION APPLICATION PER REVOLUTION:
GROSS APPLICATION PER DAY:
TIME TO IRRIGATE LINERA MOVE AREA (one pass):
GPM/ACRE:
MINIMUM GROSS IRRIGATION REQUIREMENT (gpm/ac):
MAXIMUM ALLOWABLE APPLICATION RATE:
DESIGN APPLICATION RATE:
CHECK SPRINKLER DESIGN FLOW RATE:

	psi
ft	
ft	
in	
gpm	
psi	
ft	
gpm	
psi	
ft	
ft	
ft	
psi low and medium flow	
%	
in	
in	
days	hrs
gpm/ac	
gpm/ac	
in/hr	
in/hr	
gpm	

MINIMUM CAPACITY REQUIRED FOR IRRIGATED ACRES:

gpm

PUMPING CAPACITY AVAILABLE:

gpm

FRICTION LOSSES

TYPE OF MAINLINE:	TOTAL FLOW (gpm)	LENGTH (ft)	FRICTION LOSSES (psi per 100')	CUM. LOSSES (psi)
MAINLINE (in)				

PUMP DATA

TYPE:

MANUFACTURER MODEL #:

RATED DISCHARGE (gpm):

DESIGN DISCHARGE RATE (gpm):

SUCTION LIFT/PUMPING DEPTH (ft):

TOTAL DYNAMIC HEAD REQUIRED (ft):

TOTAL DYNAMIC HEAD AVAILABLE (ft):

% PUMP EFFICIENCY:

BRAKE HORSE POWER (hp):

POWER SOURCE:

GAL/HR: KW/HR/HR:

COST/HOUR RUN TIME (base on current energy rates):
 DIESEL ELECTRIC GASOLINE

PUMP OPERATING PRESSURE: psi

PRESSURE REDUCING VALVE NEEDED: YES NO

PRV (psi): psi

BOOSTER PUMP:

LINE PRESSURE AT END OF LATERAL: psi

GUN HOSE LOSSES: psi

BOOSTER PUMP (psi): psi

BRAKE HORSE POWER (hp): hp

PIPE SIZE	FITTING	PRESSURE	THRUST BLOCK AREA				
			W (in)	L (in)	H (in)		
<input type="text"/>							

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- SYSTEM MEETS WITH RECOMMENDED CHANGES TO IMPROVE EFFICIENCY.
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TRAVELING GUN IRRIGATION DESIGN

COOPERATOR:
COUNTY:
CHECKED:

DATE:
TWP:
APPROVED:

CROP DATA

IRRIGATED ACRES:

ac

 TYPE:

--

 ROOT ZONE DEPTH:

in

 ETO (avg. N.J. peak ET rate):

--

 CROP COEFFICIENT (Kc1):

--

 ETC:

--

SOIL DATA

SOIL TEXTURE:

--

 SOIL SERIES:

--

 MAXIMUM APPLICATION RATE:

in/hr

 AVAILABLE WATER CAPACITY:

in

 AMOUNT TO APPLY:

in

 MOISTURE TENSION (cb):

--

DESIGN DATA

IRRIGATION PIPE LINE TYPE AND RATING:

	psi
--	-----

 TYPE/SIZE OF NOZZLE:

--

 MANUFACTURER MODEL:

--

 TRAVELER MODEL:

--

 HOSE DIAMETER AND LENGTH:

in	ft
----	----

 DESIGN FLOW RATE:

gpm

 DESIGN PRESSURE:

psi

 WETTED DIAMETER:

ft

 TOWPATH (RISER) SPACING:

ft

 SPEED OF TRAVELER:

ft/min

 DESIGN APPLICATION RATE:

in/hr

 POTENTIAL SYSTEM EFFICIENCY:

--

 GROSS IRRIGATION:

in

 NET IRRIGATION APPLIED:

in

 IRRIGATION FREQUENCY (no rain):

days

MINIMUM CAPACITY REQUIRED FOR IRRIGATED ACRES:

gpm

 PUMPING CAPACITY AVAILABLE:

gpm

FRICITION LOSSES

TYPE OF MAINLINE:	TOTAL FLOW (gpm)	LENGTH (ft)	FRICITION LOSSES (psi per 100')	CUM. LOSSES (psi)
MAINLINE (in)				
SUBMAIN (in)				
TRAVELER HOSE ID				
TURBINE				
FILTER				
SAND SEPARATOR				
STATIC				
FITTING (%)				

PUMP DATA

TYPE:

MANUFACTURER MODEL #:

RATED DISCHARGE (gpm):

DESIGN DISCHARGE RATE (gpm):

SUCTION LIFT/COLUMN HT (ft):

TOTAL DYNAMIC HEAD (ft):

% PUMP EFFICIENCY:

BRAKE HORSE POWER (hp):

POWER SOURCE:

gpm
gpm

GAL/HR:

	KW/HR/HR:	
--	-----------	--

COST/HOUR RUN TIME (base on current energy rates):

DIESEL		ELECTRIC		GASOLINE	
--------	--	----------	--	----------	--

OPERATE PUMP AT:

	psi		gpm
--	-----	--	-----

PIPE SIZE	FITTING	PRESSURE	THRUST BLOCK AREA				
			W (in)	L (in)	H (in)		

- SYSTEM MEETS NRCS STANDARDS AND SPECIFICATIONS.
- SYSTEM MEETS WITH RECOMMENDED CHANGES TO IMPROVE EFFICIENCY.
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IWM DATA SHEET

Month _____

Field _____

Soil Texture _____

Available water _____ inches

Allowable Depletion _____ inches

Irrigate At _____

Irrigation Rate of Application _____

Date	Site #1 Sensor Readings (CB)	Site #2 Sensor Readings (CB)	Rainfall (inches)	Run Time (hours)	Irrigation (inches)	ET (inches)	Moisture Balance	Fertigation (hours)
1								
2								
3								
4								
5								
6								
7								
8								
9								
10								
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								
21								
22								
23								
24								
25								
26								
27								
28								
29								
30								
31								

Total For Month: ET _____ Rainfall _____ Irrigation _____
 Weather Station- _____