**Sentinel Control Bidding Specifications**

**Note: These specifications were current at the time of publication but are subject to change at any time without notice. Please confirm the accuracy of these specifications with the manufacturer and/or distributor prior to installation.**

 PART 1 - CENTRAL SOFTWARE

General Overview

A. The Water Management System shall be a Toro Sentinel Water Management System (WMS).

B. The System shall include the following general components:

1. Sentinel WMS Software
2. Sentinel Field Satellites with conventional wiring terminals, wireless output board terminals or two-wire (each satellite capable of up to 204-stations)
3. Sentinel Communications Hardware
4. Central Computer utilizing Windows 7® or Windows 8® Operating System

C. The system central computer may be furnished by the owner or purchased as part of the Water Management System package from Toro. The owner supplied computer must meet the minimum specifications as required by Central software.

**Central Software**

A. The central software shall have the following programming features:

1. Access to the programming features of field satellites through PC-based Central software.
2. Controls up to 999 field satellites.
3. Group field satellites into “Systems” for system-wide adjustment of:
	1. Rain Shut Downs
	2. Percent Scale (Percent Adjust)
	3. ET adjustment from shared weather source
4. Separate each field satellite into 16 unique programs. Each program shall have the following setup options:
	1. Specified start times (1-8)
	2. 6-week Active Water Days scheduling
	3. Hour/minute runtime format
	4. Percent Scale
	5. Cycle Delay
	6. Program Repeats
	7. Continuous Run (Continuous Program Repeat)
	8. Water Window
	9. Activate Auxiliary Pump.
	10. ET-based Run Time
	11. Soil Moisture based operation
	12. Percent Scale from 0–255% by field satellite, program or station, across the system
5. Separate each field satellite into 16 watering day schedules. Each schedule shall have the following:
	1. Rolling 6-week format
	2. Ability to overlay on current calendar
	3. Multiple standard Odd/Even or Interval options
6. Adjustment of station runtimes by:
	1. Manual runtime adjustment
	2. Manual percentage adjustments
	3. Automatic acquisition of evapotranspiration data
	4. Historical evapotranspiration
	5. Soil moisture sensor readings

B. The central software shall have the ability to import maps and have interactive symbols representing field locations of valves. Map shall include the following:

1. jpg or bmp formatted image
2. Valve icons indicating
	1. Manually activated valves
	2. Automatically activated valves
	3. Master valve or pump operation

C. The central software shall have the ability to monitor up to (2) flow inputs directly connected to each field satellite. Central software shall have the ability to:

1. Learn and record flow of individual stations
2. Record flow on a daily, weekly, yearly basis
3. Record station flow violations including:
	1. High flow
	2. Low flow
	3. Zero flow
	4. Mainline high flow
	5. Volumetric shutdowns

D. The central software shall be able to automatically schedule program start times based on flow of individual stations. Flow optimization shall include the following features:

1. Create water sources with maximum flow
2. Create flow zones associated to water sources with maximum flow
3. Individually assign stations to water sources or flow zones
4. Automatically run the Scheduler at a predetermined time
5. Automatically run the Scheduler after retrieval and recalculation of ET runtimes
6. Automatically send rescheduled start times to field satellites

E. The central software shall be able to monitor (1) alarm switch inputs, either normally open or normally closed. A pre-programmed action shall take place that includes:

1. Start programs based on switch change of state
2. Stop and block programs based on switch change of state

F. The central software shall have the ability to monitor (16) wireless soil moisture sensors per field satellite (one per program). Each sensor shall be able to learn low and high moisture levels and control program starts and cycles based on moisture thresholds. Sensor readings will be in volumetric values and can be scaled from 0% to 100%.

1. Threshold settings shall allow for start on low moisture, stop on high
2. Start on low threshold and run pre-set time
3. Start when below high moisture and run to high threshold
4. Start on low threshold and run based on evapotranspiration calculated time

G. The central software shall have the ability to connect to an unlimited quantity of weather stations:

1. The weather stations will measure and store temperature, relative humidity, dew point, wind speed and direction, and solar radiation for use in the calculation of evapotranspiration.
2. The central shall automatically communicate ET data to field satellites for recalculation of watering times.

H. The central software shall be capable of monitoring rainfall at a weather station or rain collector and implement a rain delay based on user-defined inputs including:

1. Rain threshold amount
2. Sampling period
3. Saved rain off to activate when threshold reached
4. System to affect
5. Reset condition

I. The central software shall be capable of monitoring temperature from a weather station and implement a delay based on user-defined inputs including:

1. Temperature threshold amount
2. Sampling period
3. Saved shut downs activate when threshold reached
4. System to affect
5. Reset condition

J. The central software shall provide a Satellite Activity/Alarm Report. This report will display and print satellite alarm and warning events that show various field anomalies. Such events include:

1. Failed communications
2. Station high flow
3. Station low flow
4. Station zero flow
5. Main line overflow
6. Unscheduled flow
7. Electrical current violations
8. Open circuits
9. Max station violation
10. Power failures
11. Decoder communication failures
12. Stations in programs
13. Stations in rain hold
14. Station runtime since day change

K. The central software will be capable of automatically creating and storing reports in an RTF format with specific date stamps in a user-defined location and include:

1. Station alarms
2. Station runtime since last day change
3. Stations in programs
4. Downloaded ET and rainfall
5. Daily water use
6. Weekly water use
7. Monthly water use
8. Yearly water use

L. The central software will be capable of exporting the following satellite data to an Excel spreadsheet:

1. Monthly water usage
2. Monthly accumulated ET
3. Monthly accumulated rainfall

M. The central software will be capable of automatically sending Satellite and System Activity/Alarm reports to specific email addresses.

N. The central software shall come standard with the following support:

1. Central computers provided by the manufacture shall come with two years of software support, computer warranty, remote access and an internet-based ET service.

**END OF SECTION**