

CHAPTER 14

SUPERVISORY CONTROL AND DATA

ACQUISITION SYSTEM

(SCADA)

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14.0 SUPERVISORY CONTROL AND DATA ACQUISITION SYSTEM
(SCADA)

14.1 PURPOSE AND SCOPE

The Supervisory Control and Data Acquisition System shall be designed and installed for central control and monitoring of all wholesale water, wastewater and reuse facilities. This Chapter includes the specifications of all equipment and materials necessary to provide the required controls telemetry and instrumentation for all facilities. Equipment shall compose all control components including, but not limited to a "wall sized" electronic systems layout schematic and general status display panel, sensing elements, transmitters, receivers, controls alarms, indicators, totalizer, monitoring panel, radio or microwave equipment and all other items necessary to provide a complete and operations system. It is the intent of these Specifications to provide the Town with a system that will ultimately prove to be operationally reliable on a continuous basis and will require a minimum maintenance effort. Can be operated in a cost-effective manner over a long term, and is generally uniform from one facility to the next in appearance, operation and in materials and equipment used.

14.2 PURPOSE AND RATIONALE OF THE SCADA SYSTEM

A) The primary purpose of the Supervisory Central Control and Data Acquisition System is to provide the Town with a means to control, operate and monitor a utility system, with limited staffing levels and a high degree of efficiency. The topography of the area creates a complex water system requiring the ability to fine tune and control the system for the best possible water management. There is a current and future need to be able to balance the flows and to monitor facility operations. Add to the water and wastewater systems, a reuse system, and the planning and timed implementation for such a future central control system becomes apparent.

B) The secondary purpose of the Supervisory Control and Data Acquisition is the collection and archiving of operational data. The collection of data gives the Town the ability to use very accurate information

when planning for the additional demand created by growth.

14.3 SPECIFIED EQUIPMENT

The herewith specified equipment is current as of the writing of these specifications, and any modifications or revisions to this equipment shall be incorporated as directed by the Town.

14.4 GENERAL DESIGN CRITERIA

14.4.1 Design Responsibility. The Town of Bennett, through qualified personnel and Consultants shall be responsible for the actual design, supply, adjustment, calibration and start-up of all control and instrumentation systems specified herein, in order to create a working system that can perform all the functions as outlined in this Chapter.

14.4.2 Programming. All programming shall be generally specified by the Town Engineer and Director of Public Works. As new satellite facilities are added to the system, the central computer is to be programmed to control and display these facilities. New facilities will be automatically controlled from the central computer and report back various stations' status data as required in these Regulations.

14.4.3 Base Standards To Be Met.

- A) All ASTM Standards with latest revisions.
- B) Federal Occupational Safety and Health Act (OSHA)
- C) Uniform Building Code (UBO)
- D) Uniform Mechanical Code (UMC)
- E) Uniform Plumbing Code (UPC)
- F) National Electrical Code (NEC) (ANSI C1)
(National Fire Protection Association No.70)
- G) National Electrical Safety Code (ANSI C2)
(National Bureau of Standards - H3)
- H) American National Standards Institute, Inc. (ANSI)
- I) National Electrical Manufacturer's Association (NEMA)
- J) Institute of Electrical and Electronics Engineers (IEEE)
- K) Insulated Power Cable Engineers Asso. (IPCEA)

- L) Underwriter's Laboratories (UL)
- M) Lighting Protection Code (ANSI C5.1) (NFPA No.78) (LPI 1975)
- N) Instrument Society of American (ISA)
- O) Where applicable: UL Tested and Approved

14.5 MINIMUM FACILITY DESIGN REQUIREMENTS

14.5.1 Pump Stations.

A) General. All pump stations for raw, potable or reuse water shall have SCADA telemetry and associated instruments installed during initial construction of the facility or be retrofitted to that purpose. The SCADA telemetry shall be connected to the central computer via dedicated phone line unless otherwise directed by the Director of Public Works or Town Engineer. The telemetry and instrumentation installation shall include all associated equipment such as power, radio equipment, phone connections, telemetry control board and enclosures. Whenever possible, the telemetry elements shall be installed within a building or vault. An outside installation requires approval from the Town Engineer or Director of Public Works prior to completed design.

B) Facility Control Components. As a minimum and where applicable the control system shall be capable of providing the following functions:

- 1) Control of pumps based on tank levels and/or system pressure as directed by the Town.
- 2) Run signal for each pump.
- 3) Production rate in GPM for each pump.
- 4) Totalized flow in MG for each pump.
- 5) Level indicator for controlling tanks.
- 6) Pump discharge pressure.
- 7) Alarm for low input pressure.
- 8) Alarm for high input pressure.
- 9) Alarm for pump failure.
- 10) Alarm for low building temperature.
- 11) Alarm for building intrusion.
- 12) Elapsed pump run time in hours.

- 13) Bypass valve position status if so equipped with electrically controlled valve to allow for remote operation.

14.5.2 Well Facilities.

A) General. All well field facilities shall have SCADA telemetry and all associated instrumentation installed with the initial construction or be retrofitted to that purpose. The SCADA telemetry shall be connected to the central computer by means of dedicated phone lines, unless otherwise directed by the Director of Public Works or Town Engineer. The telemetry and instrumentation installation shall include all associated equipment, such as power, radio equipment, phone connections, telemetry control board and enclosures. Whenever possible, the telemetry elements shall be installed within a building or vault. An outside installation requires approval from the Town prior to completing design.

B) Facility Control Components. As a minimum the control system shall be capable of providing the following functions:

- 1) Individual well production rate in GPM.
- 2) Well water level in feet.
- 3) Elapsed well pump run time.
- 4) Pump Run Signal.
- 5) Alarm for well pump run time.
- 6) Alarm for low well water level.
- 7) Alarm for power failure.
- 8) Totalized flow in MG from well pump.

14.5.3 Tanks.

A) General. All storage tanks shall have SCADA telemetry and all associated instrumentation installed with the initial construction of the tank or be retrofitted to that purpose. The SCADA telemetry shall be connected to the central control station computer. The telemetry connection shall be made via dedicated phone lines, unless otherwise directed by the Town Engineer or Director

of Public Works. The telemetry and instrumentation installation shall include all associated equipment, such as power, radio equipment, phone connections, telemetry control board and enclosures. Whenever possible the telemetry elements shall be installed within a building or a vault. An outside installation requires approval from the Town prior to completing design.

B) Facility Control Components. As a minimum and where applicable the control system shall be capable of providing the following functions:

- 1) Tank Level Indicator.
- 2) Alarm for Tank Intrusion.
- 3) Alarm for High Tank Level.
- 4) Alarm for Low Tank Level.
- 5) Electrically controlled tank isolation valve.
- 6) Status of isolation valve.

14.5.4 Water and Wastewater Treatment Facilities.

A) General. All wastewater and future water treatment facilities shall have SCADA telemetry and all associated instrumentation installed with the initial construction of the facility or be retrofitted to that purpose. All SCADA units installed in water and wastewater treatment facilities shall be intelligent and capable of isolated automatic operation. Each treatment facility shall be equipped with a computer to monitor the SCADA system. All water treatment facilities shall be connected to the central control station computer via dedicated phone lines or microwave radio, unless otherwise directed by the Town Engineer or Director of Public Works. The telemetry and instrumentation installation shall include all associated equipment, such as power, radio connections, phone connections,

telemetry control and enclosures. All telemetry elements, except the microwave antenna shall be installed within a building or vault.

B) Facility Control Components. As a minimum and where applicable the control system shall be capable of providing the following functions:

- 1) Production rate in GPM for each pump.
- 2) Totalized flow in MG from each pump.
- 3) Alarm for pump failure.
- 4) Clearwell level indicator.
- 5) Alarm for high Clearwell level.
- 6) Alarm for low Clearwell level.
- 7) Alarm for low Building Temperature.
- 8) Alarm for Power Failure.
- 9) Alarm for Build Intrusion.
- 10) Pump elapsed running in hours.
- 11) Totalized flow from plant in MG.

14.5.5 Wastewater Lift Stations.

A) General. All wastewater lift stations shall have SCADA telemetry and all associated instrumentation installed with the initial construction of the facility or be retrofitted to that purpose. All SCADA units installed in wastewater lift stations shall be intelligent and be capable of isolated automatic operation. With the installation at the lift station site all necessary communication hardware and software shall be included to bring the control signals to the monitoring computer. Each lift station shall be controlled and monitored from the central control computer, unless otherwise directed by the Town. The telemetry and instrumentation installation shall include all associated equipment such as power, radio connections, phone connections,

telemetry control programming and enclosures. All telemetry elements except antennas shall be installed within a building.

B) Facility Control Components. As a minimum the control system shall be capable of providing the following functions:

- 1) Control of pumps.
- 2) Run signal for each pump.
- 3) Totalized Flow in MG for each pump.
- 4) Alarm for pump failure.
- 5) Alarm for low building temperature.
- 6) Alarm for power failure.
- 7) Alarm for building intrusion.
- 8) Alarm for high discharge pressure.
- 9) Elapsed pump run time in hours.
- 10) Alarm for high well level.

14.5.6 Water Distribution System.

A) General. Incorporation within the central control and monitoring system shall be water pressure recording and transmitting devices, with their appurtenances, located at critical points of each designated pressure zone within the Town's water distribution system.

14.5.7 Water Surface Flows.

A) General. Incorporated within the central control and monitoring system shall be flow magnitude and amount totalizing recording and transmitting devices, with their appurtenances, at primary inflow locations that are associated with the collection of major surface water collection areas.

14.5.8 Remote Alarm Capabilities.

A) General. There shall be several portable emergency transmitting devices of the "cellular" or "satellite" phone

type , capable of receiving a "beeper alarm" signal from the central control system computer, whenever major failures and/or emergencies arise within one or more of the overall systems.