

**SCADA Data/Instrumentation Gap Analysis and Standard  
DW Storage Facilities**

Signal Type	Signal Name	Data Requirement 1=Basic Data 2=Advanced Data	Type of Field Instrument Required	Comments
<b>Control Panel Signals</b>				
DI	Control Panel AC Power Failure	1	Relay	
DI	Control Panel PLC Battery Voltage Low	1	Switch	
DI	Control Panel PLC Battery Charger Status	1	Switch	
DI	Control Panel Cabinet Door Open	1	Switch	
Internal	PLC State (PROGRAM-REMOTE-RUN)	1	PLC	
Internal	PLC Communication Fail	1	PLC	
Internal	PLC Fault Information	2	PLC	
AI	Control Panel Battery Voltage	2	PLC	May require voltage divider circuit or current to voltage circuit
AI	Control Cabinet temperature	2	RTD	For outdoor locations
<b>Intrusion (Security) Typical for All SCADA Sites</b>				
DI	Intrusion, Vault Entry (Not all sites)	1	Security	SCADA will interface to Security System Project Signals
DI	Intrusion, Building and Site Entry	1	Security	SCADA will interface to Security System Project Signals
DI	Intrusion, Storage Facility/ Tank Stairs or Hatch Entry	1	Security	SCADA will interface to Security System Project Signals
DI	Authorized Entry Switch (Intrusion Disarm)	1	Security	SCADA will interface to Security System Project Signals
<b>Storage Facility Signals</b>				
AI	Storage Facility Level	1	LT	
AI	Distribution System Pressure	1	PT	
AI	Storage Facility In/Out Flow	1	FM	
AI	Storage Facility Bypass Flow	1	FM	
Internal	Storage Facility Overflow/Drain Flow (Calculated by PLC)	1	PLC	
AI	Storage Facility Underfloor Drain Flow	1	FM	
AI	Chlorine Residual at Storage Facility Outlet	1	Cl Analyzer	
AI	Chlorine Residual inside Storage Facility (w/recirc. NaOCI)	1	Cl Analyzer	
AI	Chlorine Residual inside Storage Facility (w/o recirc. NaOCI)	2	Cl Analyzer	
AI	pH	2	pH Analyzer	
AI	Temperature	2	Temp Transmitter	
DI	Storage Facility Overflow Alarm Switch	1	Switch	
DI	Bypass Valve Open Limit Switch	1	Limit Switch	
DI	Bypass Valve Close Limit Switch	1	Limit Switch	
DO	Bypass Control Valve Open Command	1	Valve Controller	
DO	Bypass Control Valve Close Command	1	Valve Controller	
DO	Bypass PRV Enable Command	1	PRV Controller	
DO	Bypass PRV Disable Command	1	PRV Controller	
DI	Altitude Valve Closed Status Switch	1	Switch	
DI	Altitude Valve Vault Flood Alarm	1	Float Switch	
<b>Inlet/Outlet Valve Signals (Typical for each additional valve, but not at every site)</b>				
DI	Valve Open Limit Switch	1	Switch	
DI	Valve Close Limit Switch	1	Switch	
DO	Valve Open Command	1	Valve Controller	
DO	Valve Close Command	1	Valve Controller	
AO	Valve Position Setpoint	1	Valve Controller	
AI	Valve Position	1	Position Transmitter	
DI	Local-Off-Remote in Remote	1	Switch	
DI	Valve Vault Flood Alarm	1	Float Switch	
	PLC = Programmable Logic Controller			
	PT = Pressure Transmitter			
	LT = Level Transmitter			
	FM = Flow Meter			

**SCADA Data/Instrumentation Gap Analysis and Standard  
Remote Controlled Valves**

Signal Type	Signal Name	Data Requirement 1=Basic Data 2=Advanced Data	Type of Field Instrument Required	Comments
<b>Control Panel Signals</b>				
DI	Control Panel AC Power Failure	1	Relay	
DI	Control Panel PLC Battery Voltage Low	1	Switch	
DI	Control Panel PLC Battery Charger Status	1	Switch	
DI	Control Panel Cabinet Door Open	1	Switch	
Internal	PLC State (PROGRAM-REMOTE-RUN)	1	PLC	
Internal	PLC Communication Fail	1	PLC	
Internal	PLC Fault Information	2	PLC	
AI	Control Panel Battery Voltage	2	PLC	May require voltage divider circuit or current to voltage circuit
<b>Intrusion (Security) Typical for All SCADA Sites</b>				
DI	Intrusion, Vault Entry (Not all sites)	1	Security	SCADA will interface to Security System Project Signals
DI	Authorized Entry Switch (Intrusion Disarm)	1	Security	SCADA will interface to Security System Project Signals
<b>Pressure and Flow Monitoring</b>				
AI	Upstream Pressure	1	PT	
AI	Downstream Pressure (1 for each valve)	1	PT	
Internal	Downstream Pressure High Alarm (Calculated by PLC)	1	PLC	
AI	Flow to Zone ( 1 for each valve)	1	FM	
<b>Remote Controlled Flow Valve</b>				
DI	Valve L-O-R Switch in Remote	1	Switch	
DI	Valve L-O-R Switch in Local	1	Switch	
DI	Valve Open Limit Switch	1	Switch	
DI	Valve Close Limit Switch	1	Switch	
DO	Valve Open Command	1	Valve Controller	
DO	Valve Close Command	1	Valve Controller	
AI	Valve Position	1	Position Indicator	
AO	Valve Position Command	1	Valve Controller	
Internal	Valve Failure to Open/Close Alarm	1	PLC	
DI	Vault Flood Alarm	1	Float Switch	
	PLC = Programmable Logic Controller			
	PT = Pressure Transducer			
	FM = Flow Meter			

**SCADA Data/Instrumentation Gap Analysis and Standard  
Pressure Regulating Valves**

Signal Type	Signal Name	Data Requirement 1=Basic Data 2=Advanced Data	Type of Field Instrument Required	Comments
<b>Control Panel Signals</b>				
DI	Control Panel AC Power Failure	1	Relay	
DI	Control Panel PLC Battery Voltage Low	1	Switch	
DI	Control Panel PLC Battery Charger Status	1	Switch	
DI	Control Panel Cabinet Door Open	1	Switch	
Internal	PLC State (PROGRAM-REMOTE-RUN)	1	PLC	
Internal	PLC Communication Fail	1	PLC	
Internal	PLC Fault Information	2	PLC	
AI	Control Panel Battery Voltage	2	PLC	May require voltage divider circuit or current to voltage circuit
<b>Intrusion (Security) Typical for All SCADA Sites</b>				
DI	Intrusion, Vault Entry (Not all sites)	1	Security	SCADA will interface to Security System Project Signals
DI	Authorized Entry Switch (Intrusion Disarm)	1	Security	SCADA will interface to Security System Project Signals
<b>Pressure Regulating Valves</b>				
AI	Upstream Pressure	1	PT	
AI	Downstream Pressure (1 for each valve)	1	PT	
AI	Flow to Zone ( 1 for each valve)	1	FM	Can be calculated by valve position with Cla-Val attachment
Internal	Downstream Pressure High Alarm	1	PLC	Calculated by PLC from pressure signal
Internal	Setpoint (Downloaded from SCADA)	2	PLC	
AO	Pressure Control SP (if analog output control)	2	PRV Controller	
DO	Pressure Control SP (Raise/lower if pulse control)	2	PRV Controller	
DO	PRV Enable Command	1	PRV Controller	
AI	Valve Position	1	Position Transmitter	
DI	Valve Closed Limit	1	Limit Switch	
DI	Valve Open Limit	1	Limit Switch	
DI	Vault Flood Alarm	1	Float Switch	Install a sump pump with the vault flood float switch at locations where water seepage could require frequent pumping to maintain a dry vault.
	PLC = Programmable Logic Controller			
	PT = Pressure Transducer			
	FM = Flow Meter			

**SCADA Data/Instrumentation Gap Analysis and Standard  
Pressure or Flow Monitor Sites**

Signal Type	Signal Name	Data Requirement 1=Basic Data 2=Advanced Data	Type of Field Instrument Required	Comments
<b>Control Panel Signals</b>				
DI	Control Panel AC Power Failure	1	Relay	
DI	Control Panel PLC Battery Voltage Low	1	Switch	
DI	Control Panel PLC Battery Charger Status	1	Switch	
DI	Control Panel Cabinet Door Open	1	Switch	
Internal	PLC State (PROGRAM-REMOTE-RUN)	1	PLC	
Internal	PLC Communication Fail	1	PLC	
Internal	PLC Fault Information	2	PLC	
AI	Control Panel Battery Voltage	2	PLC	May require voltage divider circuit or current to voltage circuit
<b>Intrusion (Security) Typical for All SCADA Sites</b>				
DI	Intrusion, Vault Entry (Not all sites)	2	Security	SCADA will interface to Security System Project Signals
DI	Authorized Entry Switch (Intrusion Disarm)	2	Security	SCADA will interface to Security System Project Signals
<b>Pressure or Flow Monitoring</b>				
AI	Line Pressure	1	PT	
AI	Flow to Zone	1	FM	
AI	Flow to Wholesale Customers	1	FM	Possible SCADA interface to AMR system could be implemented

**SCADA Data/Instrumentation Gap Analysis and Standard  
Water Pump Stations**

Signal Type	Signal Name	Data Requirement 1=Basic Data 2=Advanced Data	Type of Field Instrument Required	Comments
<b>Control Panel Signals</b>				
DI	Control Panel AC Power Failure	1	Relay	
DI	Control Panel PLC Battery Voltage Low	1	Switch	
DI	Control Panel PLC Battery Charger Status	1	Switch	
DI	Control Panel Cabinet Door Open	1	Switch	
Internal	PLC State (PROGRAM-REMOTE-RUN)	1	PLC	
Internal	PLC Communication Fail	1	PLC	
Internal	PLC Fault Information	2	PLC	
AI	Control Panel Battery Voltage	2	PLC	May require voltage divider circuit or current to voltage circuit
<b>Intrusion (Security) Typical for All SCADA Sites</b>				
DI	Intrusion, Vault Entry (Not all sites)	1	Security	SCADA will interface to Security System Project Signals
DI	Intrusion, Building and Site Entry	1	Security	SCADA will interface to Security System Project Signals
DI	Authorized Entry Switch (Intrusion Disarm)	1	Security	SCADA will interface to Security System Project Signals
<b>Pump Station Common Signals</b>				
AI	Station Suction Pressure	1	PT	
AI	Station Discharge Flow Rate (1 for each zone)	1	FM	
AI	Station Discharge Pressure (1 for each zone)	1	PT	
AI	Bypass (Zone Transfer) Valve Flowrate	1	PT	
DI	AC Power to Station	1	Relay	Phase Fail Relay to detect station AC power failure
DI or Ethernet	Pump Station Electrical KWH Usage Total	2	Power Meter Interface	Optional Electric meter KWH pulse output interface provided by Power Company if Power Monitor is not installed.
AI or Ethernet	Pump Station Electrical Information	2	Power Monitor	Power Monitor with KWH, total KWH, AC Voltage, AC Current, Power Factor, and other variables.
DI	Station Low Suction Pressure Switch	2	Switch	
Internal	Suction Pressure Low Alarm (Calculated by PLC)	1	PLC	
Internal	Discharge Pressure High Alarm (Calculated by PLC)	1	PLC	
DI	Flood Alarm	1	Float Switch	
DI	Fire Alarm	1	Heat Sensor	
<b>Pump Signals (Typical for each Pump)</b>				
DI	Pump 1 Running	1	Relay	
DO	Pump 1 Start Command	1	PLC	
DO	Pump 1 Stop Command	1	PLC	
Internal	Pump 1 Inhibit Command	1	PLC	
DI	Pump 1 L-O-R in REMOTE	1	Switch	
Internal	Pump 1 L-O-R in OFF	1	Switch	
DI	Pump 1 L-O-R in LOCAL	1	Switch	
Internal	Pump 1 Available (Calculated from LOR and motor alarms)	1	PLC	
DI	Pump 1 High Bearing Temperature	1	Temp Switch	Existing bearing temperature high switches will be interfaced to PLC. An additional relay may be required to add a dry contact for PLC input.
DI	Pump 1 Motor Overload Alarm	1	Relay	Existing MCC overload relays will be interfaced to PLC. An additional relay may be required to add a dry contact for PLC input.
DI	Pump 1 Discharge Valve Closed	1	Limit Switch	Existing discharge valve closed switch will be interfaced to PLC. An additional relay may be required to add a dry contact for PLC input.
DI	Pump 1 Discharge Valve Opened	1	Limit Switch	If there is an existing discharge valve opened limit switch, it will be interfaced to PLC. A new discharge valve opened limit switch will be installed if it is not existing. An additional relay may be required to add a dry contact for PLC input.
Internal	Previous Run Hours	1	PLC	
Internal	Current Day Run Hours	1	PLC	
Internal	Pump 1 Called (Calculated in PLC)	1	PLC	
AI or Ethernet	Pump 1 Electrical Power Information	2	Power Monitor	Power Monitor with KWH, total KWH, AC Voltage, AC Current, Power Factor, and other variables.
<b>Valve Signals (Typical For each Valve)</b>				
DI	Valve #1 Open	1	Limit Switch	
DI	Valve #1 Closed	1	Limit Switch	
DO	Valve #1 Open Command	1	PLC	
DO	Valve #1 Close Command	1	PLC	

**SCADA Data/Instrumentation Gap Analysis and Standard  
Water Pump Stations**

Signal Type	Signal Name	Data Requirement 1=Basic Data 2=Advanced Data	Type of Field Instrument Required	Comments
AI	Valve #1 Position (Percent Open)	1	Position Transmitter	Valve position will be used to determine if valve is moving
	PLC = Programmable Logic Controller			
	PT = Pressure Transducer			
	FM = Flow Meter			

**SCADA Data/Instrumentation Gap Analysis and Standard  
Wastewater Pump Stations**

Signal Type	Signal Name	Data Requirement 1=Basic Data 2=Advanced Data	Type of Field Instrument Required	Comments
<b>Control Panel Signals</b>				
DI	Control Panel AC Power Failure	1	Relay	
DI	Control Panel PLC Battery Voltage Low	1	Switch	
DI	Control Panel PLC Battery Charger Status	1	Switch	
DI	Control Panel Cabinet Door Open	1	Switch	
Internal	PLC State (PROGRAM-REMOTE-RUN)	1	PLC	
Internal	PLC Communication Fail	1	PLC	
Internal	PLC Fault Information	2	PLC	
AI	Control Panel Battery Voltage	2	PLC	May require voltage divider circuit or current to voltage circuit
<b>Intrusion (Security) Typical for All SCADA Sites</b>				
DI	Intrusion, Vault Entry (Not all sites)	1	Switch	
<b>Pump Station Common Signals</b>				
AI	Station Wet Well Level	1	LT	
AI	Station Effluent Flow Rate (1 for each zone)	1	FM	Derived from wet well level changes or effluent flow meter.
DI	AC Power to Station	1	Relay	Phase Fail Relay to detect station AC power failure.
DI or Ethernet	Pump Station Electrical KWH Usage Total	2	Power Meter Interface	Optional Electric meter KWH pulse output interface provided by Power Company if Power Monitor is not installed.
AI or Ethernet	Pump Station Electrical KW Usage Rate	2	Power Monitor	Power Monitor with KWH, total KWH, AC Voltage, AC Current, Power Factor, and other variables.
DI	Dry Well Flood Alarm	1	Float Switch	
DI	Fire Alarm	1	Heat Sensor	
DI	High Float Alarm	1	Switch	
<b>Pump Signals (Typical for each Pump)</b>				
DI	Pump Running	1	Relay	
DO	Pump Start Command	1	PLC	
DO	Pump Stop Command	1	PLC	
Internal	Pump Inhibit Command	1	PLC	
DI	Pump H-O-A in HAND	1	Switch	
Internal	Pump H-O-A in OFF	1	Switch	
DI	Pump H-O-A in AUTO	1	Switch	
Internal	Pump Available (Calculated from H-O-A switch and motor alarms)	1	PLC	
DI	Pump Over Temperature	1	Temp Switch	Used on submersible pumps only.
DI	Pump Seal Fail	1	Seal Switch	Used on submersible pumps only.
DI	Pump Motor Overload Alarm	1	Relay	Existing MCC overload relays will be interfaced to PLC. An additional relay may be required to add a dry contact for PLC input.
Internal	Previous Run Hours	1	PLC	
Internal	Current Day Run Hours	1	PLC	
Internal	Pump Called (Calculated in PLC)	1	PLC	
<b>Valve Signals (Typical For each Check Valve)</b>				
DI	Check Valve Closed	1	Limit Switch	
DI	Check Valve Open	1	Limit Switch	
	PLC = Programmable Logic Controller			
	PT = Pressure Transducer			
	FM = Flow Meter			

**SCADA Data/Instrumentation Gap Analysis and Standard  
Combined Sewer Overflow**

Signal Type	Signal Name	Data Requirement 1=Basic Data 2=Advanced Data	Type of Field Instrument Required	Comments
<b>Control Panel Signals</b>				
DI	Control Panel AC Power Failure	1	Relay	
DI	Control Panel PLC Battery Voltage Low	1	Switch	
DI	Control Panel PLC Battery Charger Status	1	Switch	
DI	Control Panel Cabinet Door Open	1	Switch	
Internal	PLC State (PROGRAM-REMOTE-RUN)	1	PLC	
Internal	PLC Communication Fail	1	PLC	
Internal	PLC Fault Information	2	PLC	
AI	Control Panel Battery Voltage	2	PLC	May require voltage divider circuit or current to voltage circuit
<b>Intrusion (Security) Typical for All SCADA Sites</b>				
DI	Intrusion, Vault Entry (Not all sites)	1	Switch	
<b>CSO Common Signals</b>				
AI	CSO Level	1	LT	
AI	CSO Effluent Flow Rate	1	FM	
DI	Overflow Alarm	1	FS	
	PLC = Programmable Logic Controller			
	PT = Pressure Transducer			
	FM = Flow Meter			