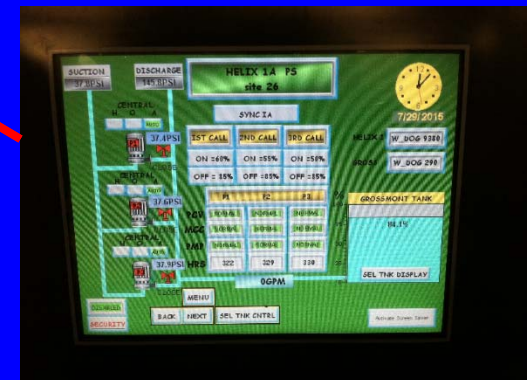


Application of PLC-HMI Pump Controls and Monitoring With or Without SCADA



by Bobby Fortuno, Helix Water District (HWD)
SCADA Prog. and Wireless Network Administrator

Helix Water District

- Celebrated 100 Years (2013)
- San Diego East County
- 270,000 population
- 106 MGD WTP / Ozone
- 50 Site distribution system
- System storage of 68.5 MG
- 722 miles of pipeline
- 50 square miles
- Supply three other districts
 - 3 Connections
 - Up to 36 MGD

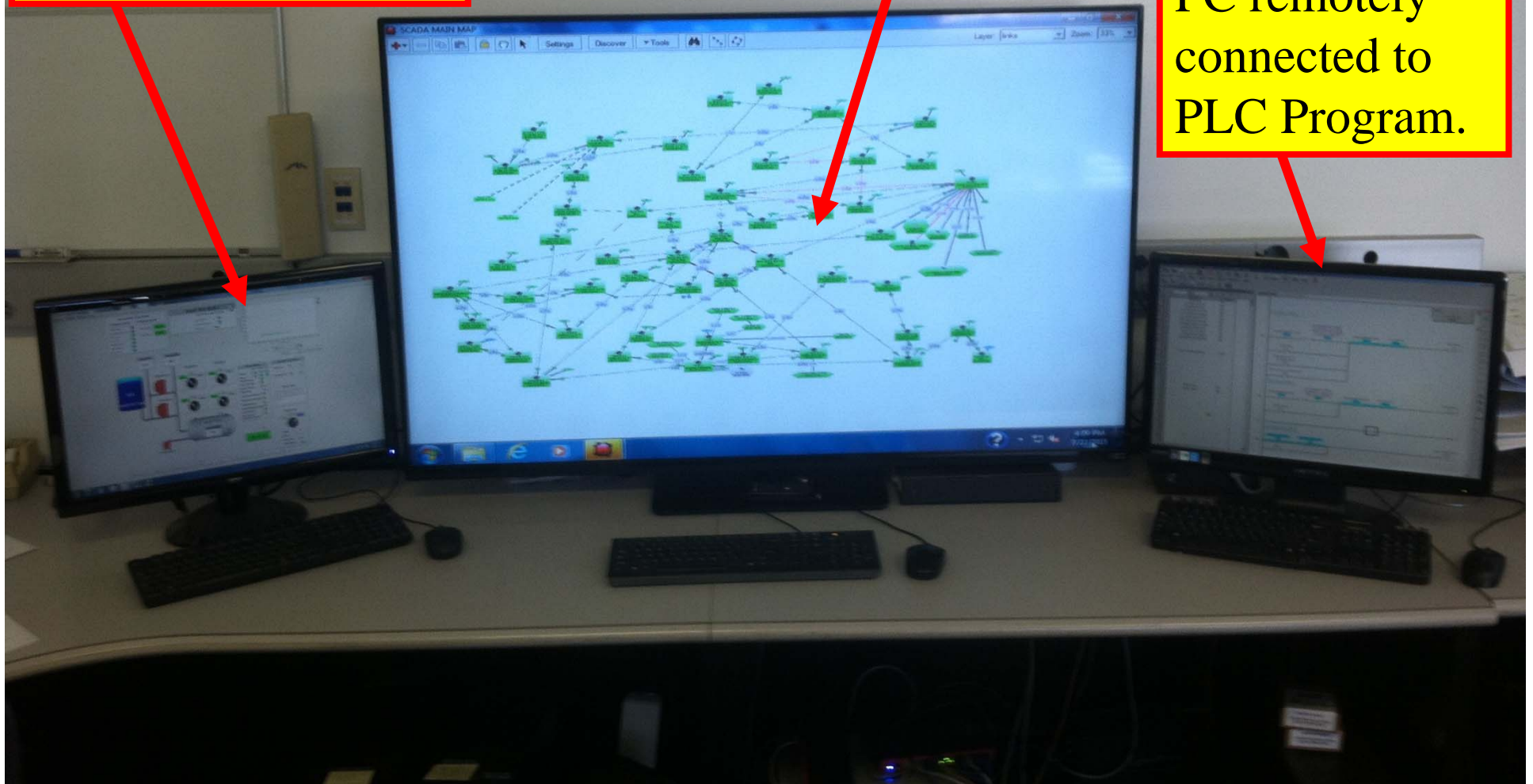


HWD SCADA System and Wireless Ethernet Radio Network

IGNITION SCADA

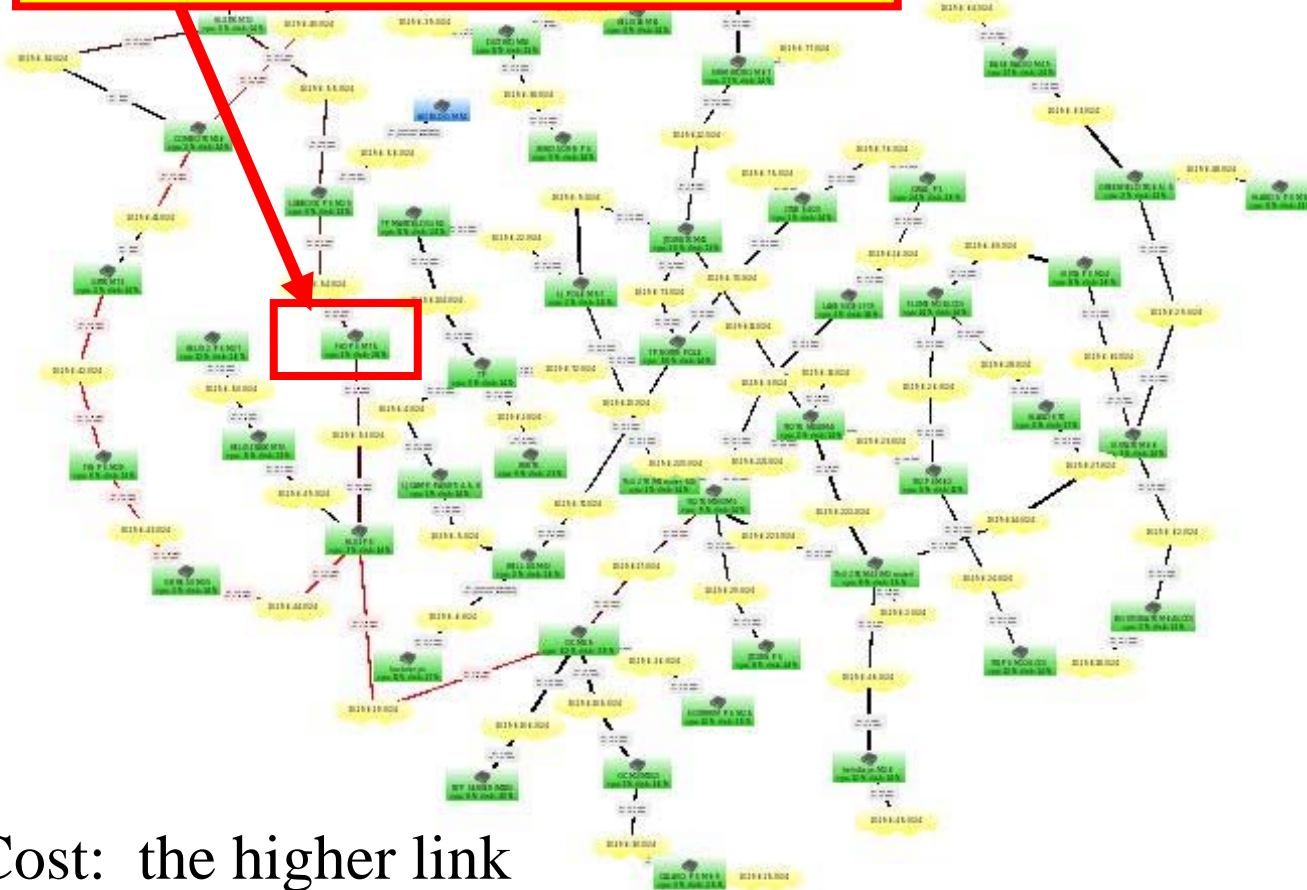
Wireless Ethernet Network

PC remotely
connected to
PLC Program.



SCADA Wireless Ethernet Radio Network (layer3-OSPF)

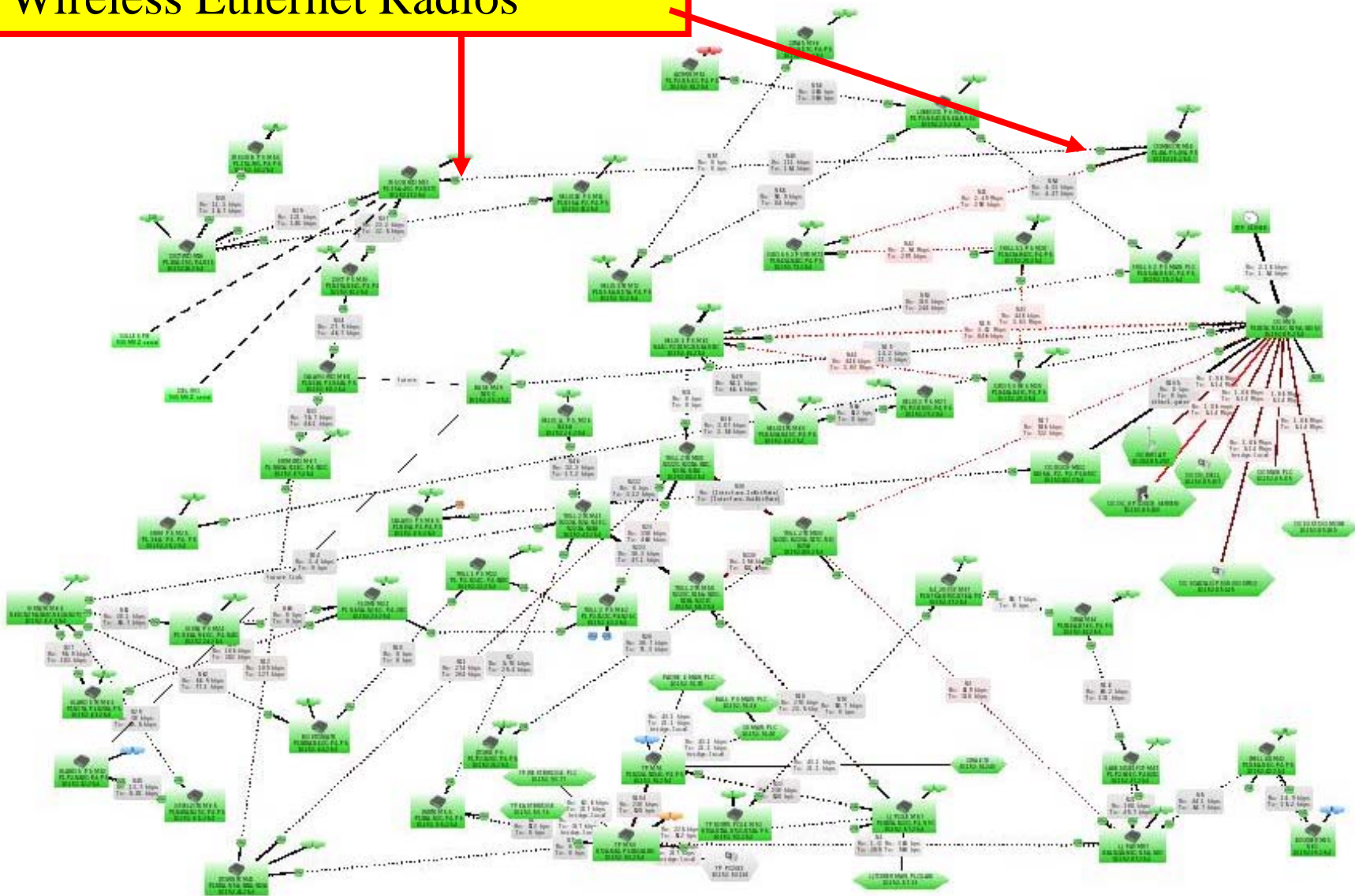
Router (represents a PS, Tank, FCF, or misc)



Cost: the higher link throughput the lesser the cost.

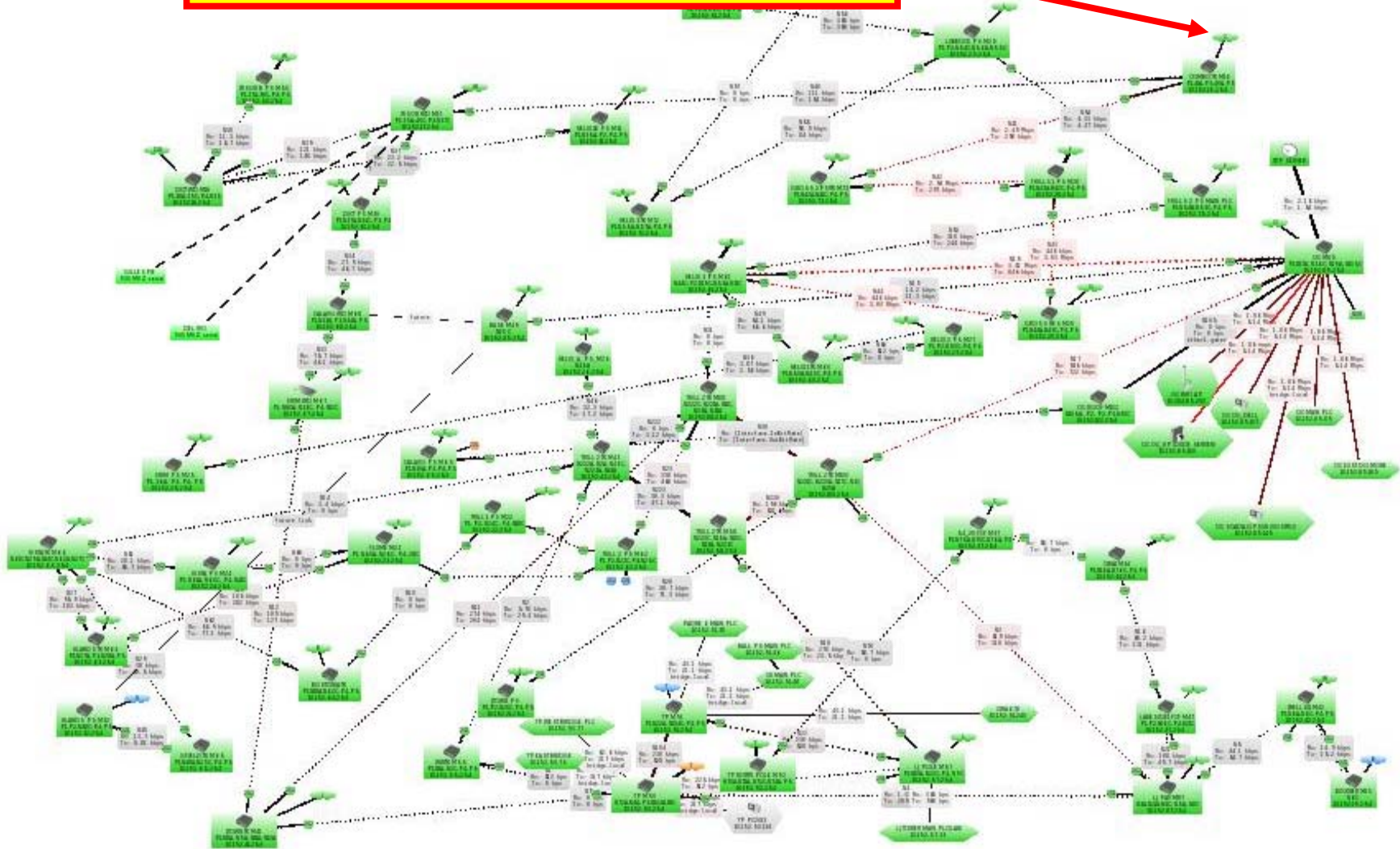
SCADA Network

Wireless Ethernet Radios

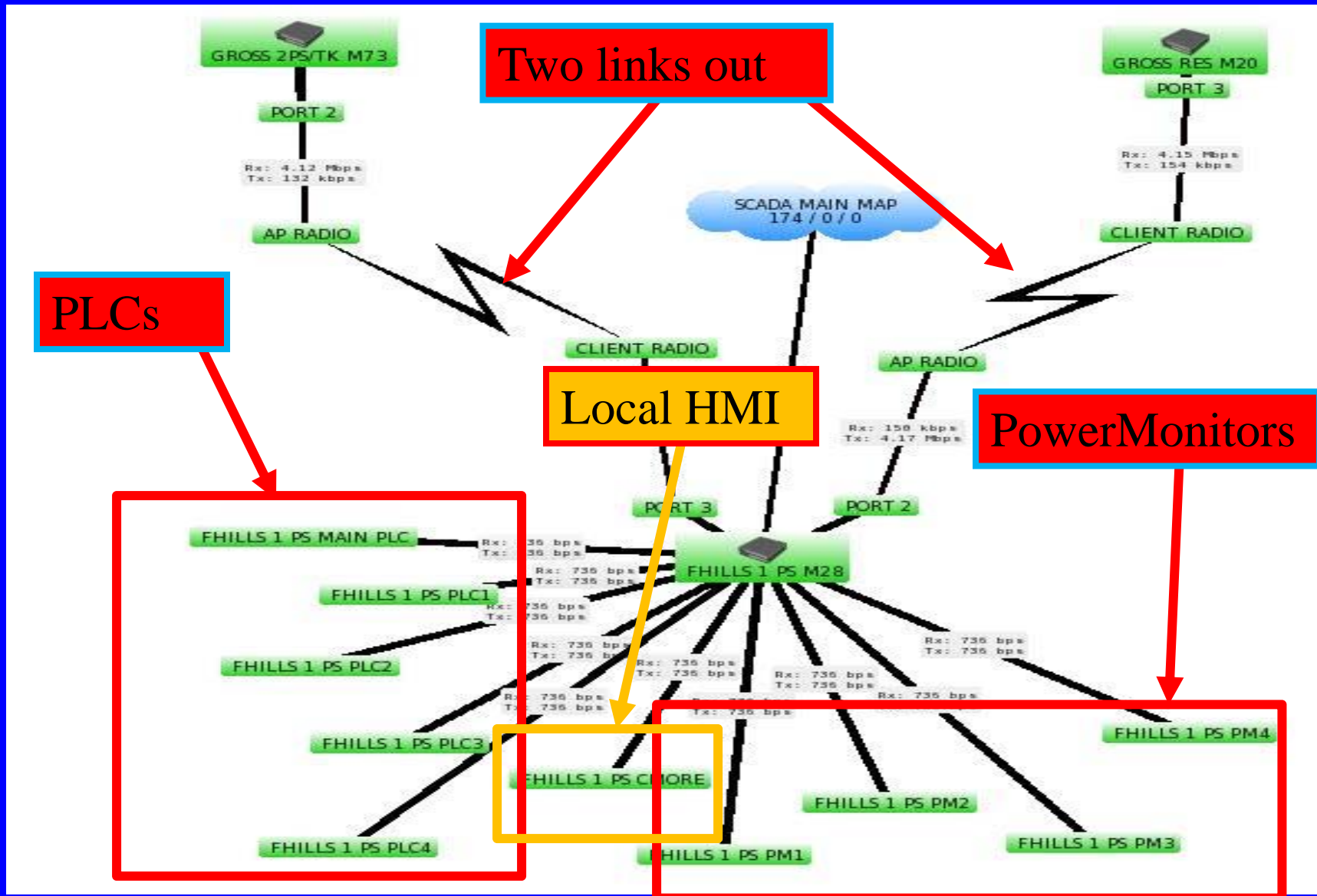


SCADA Network

Cloud icon → link to LAN



Local Area Network (LAN)



Typical Pump Control Circuits

PLC

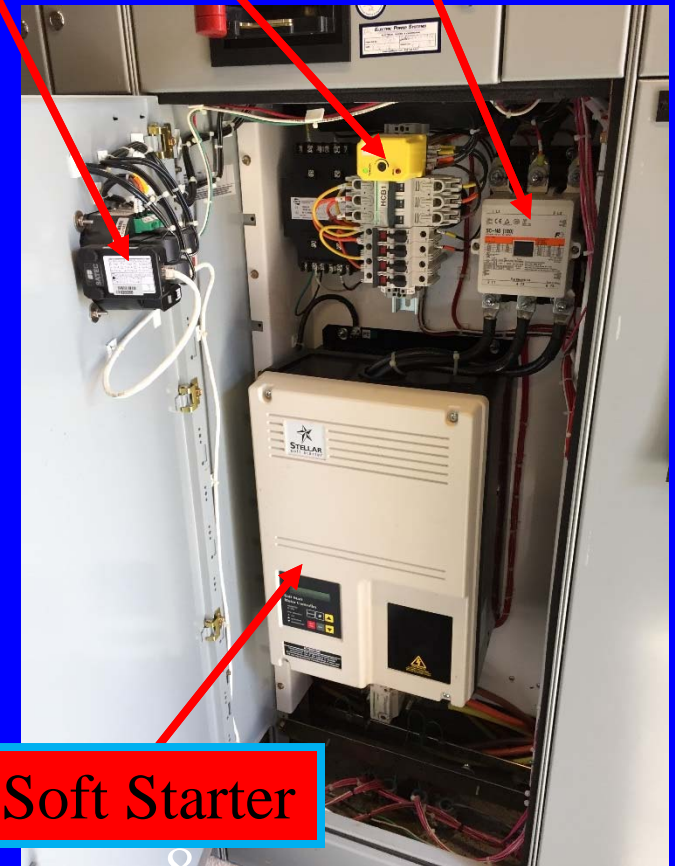
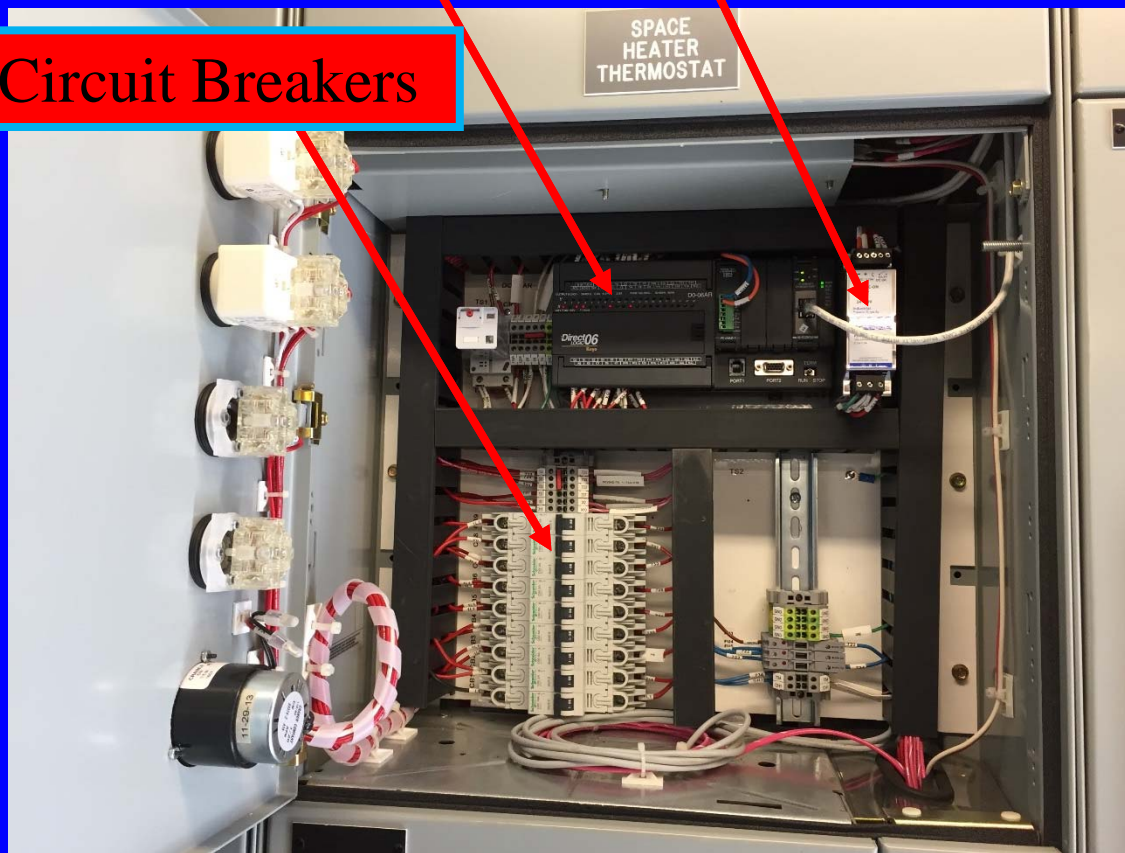
24VDC PS

Power monitor

PFR

In-line Starter

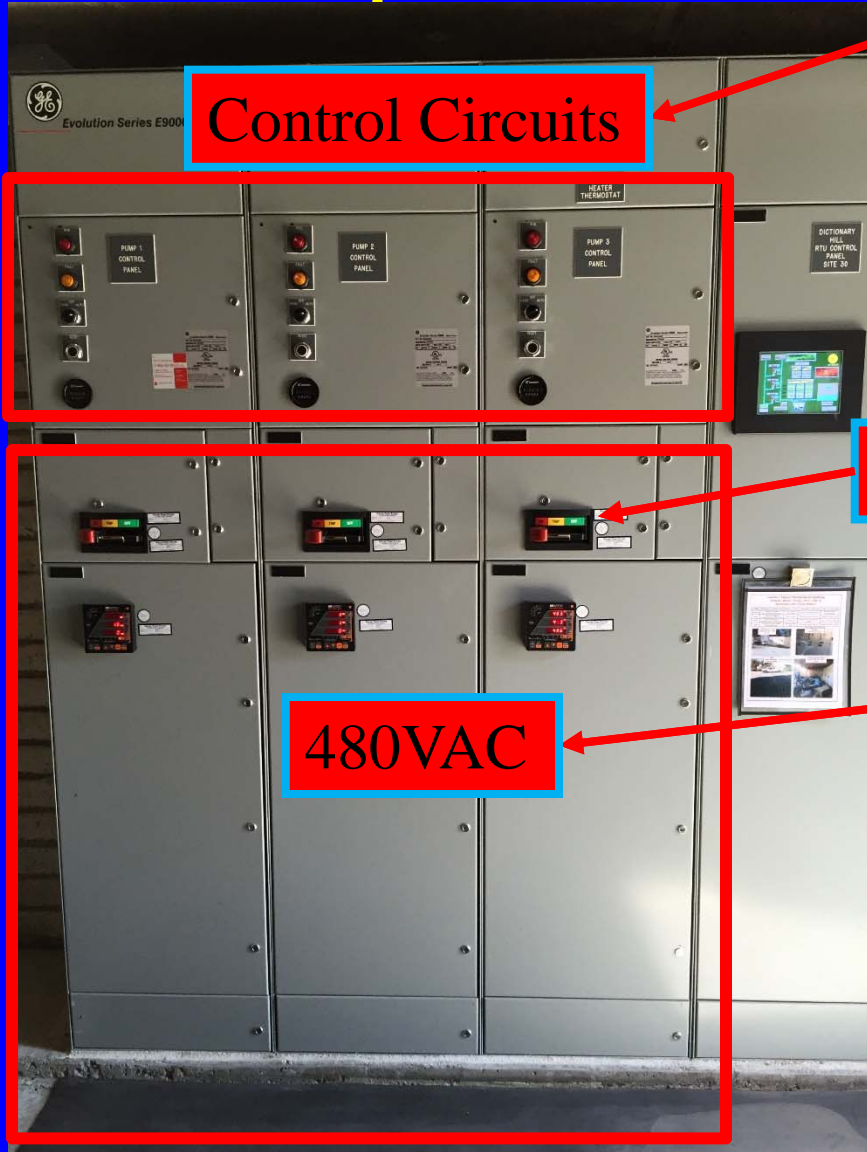
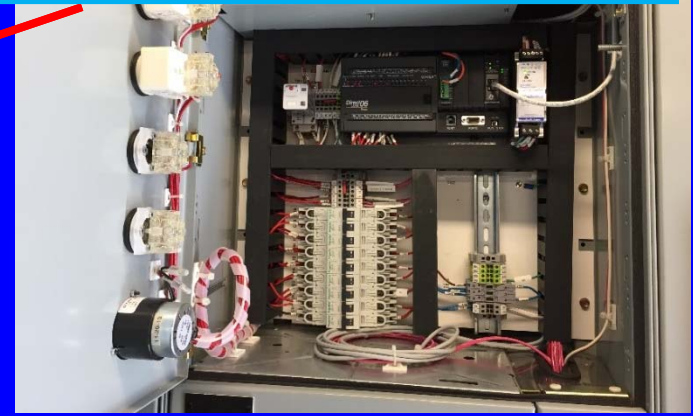
Circuit Breakers



Soft Starter

Reduces Arc Flash Requirements

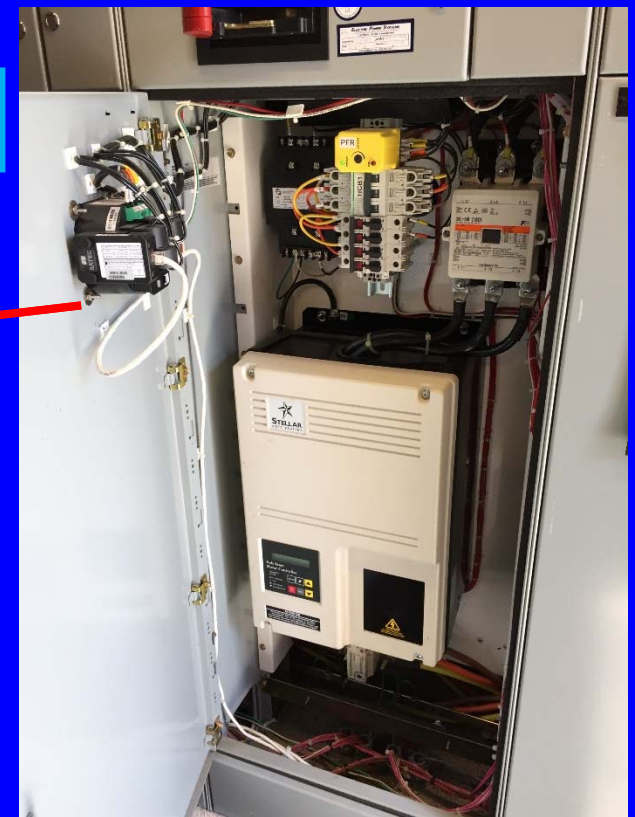
PLC (120Vac or 24 Vdc)



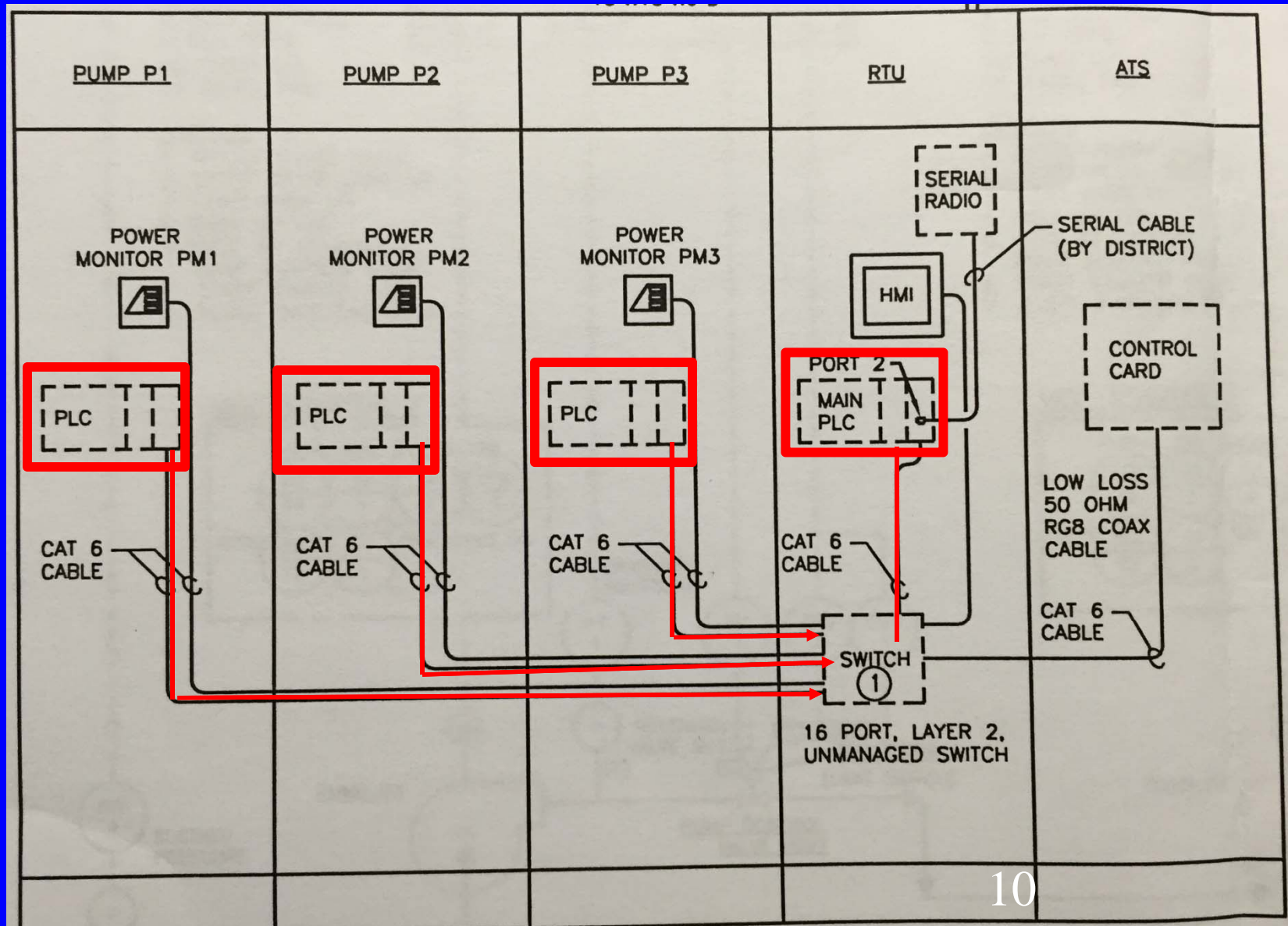
Control Circuits

480VAC CB

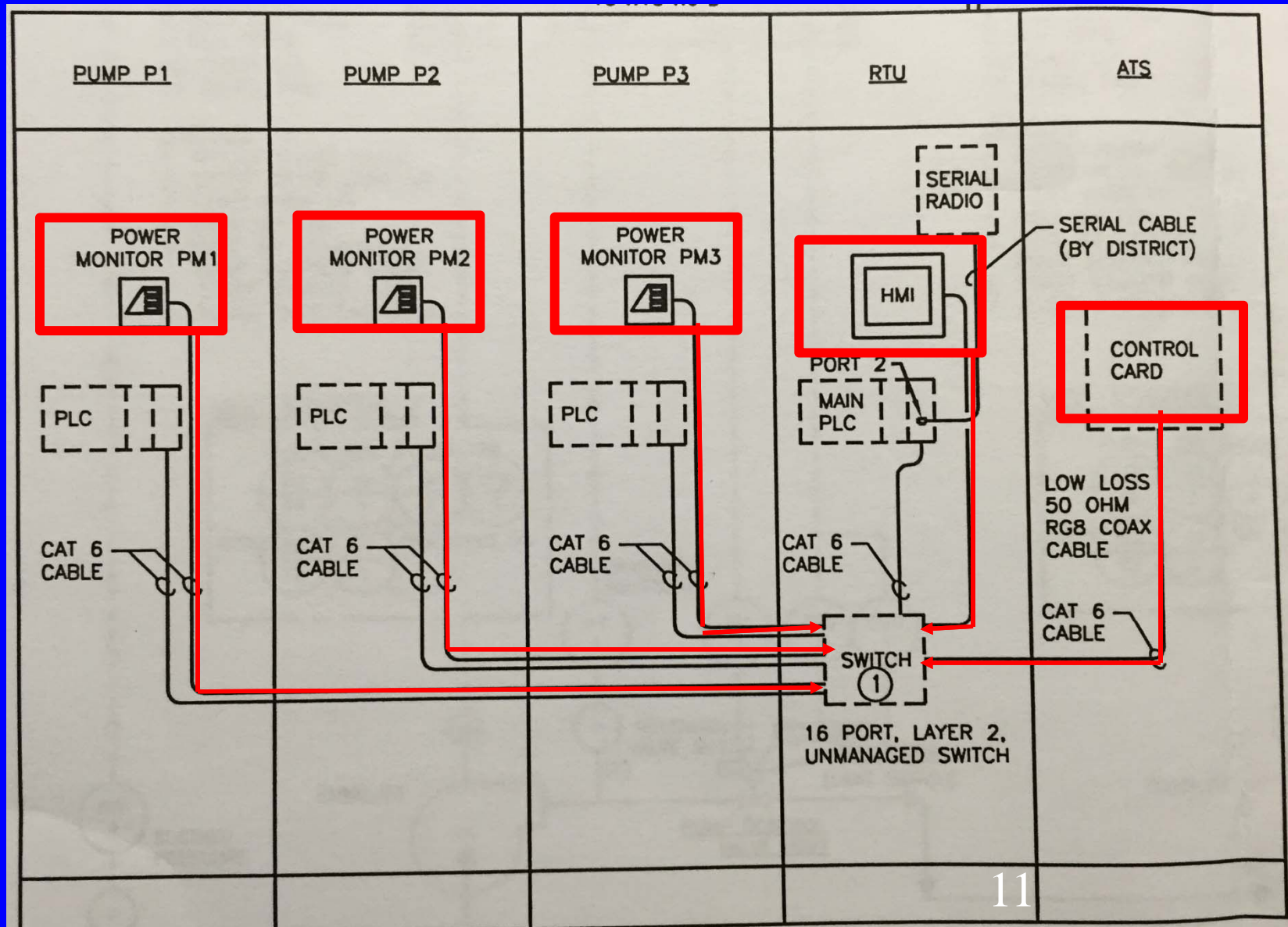
480VAC



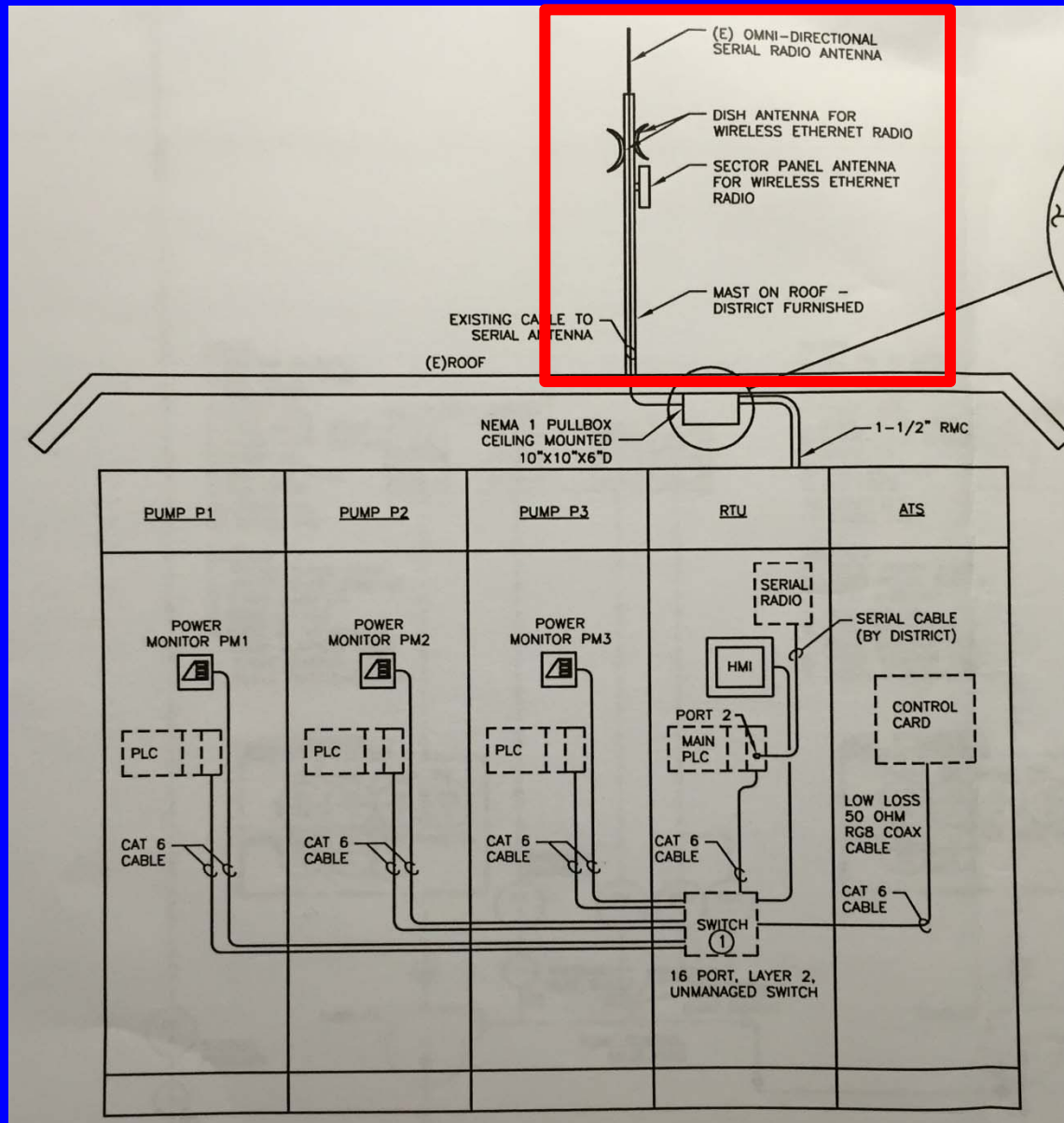
Ethernet Communication



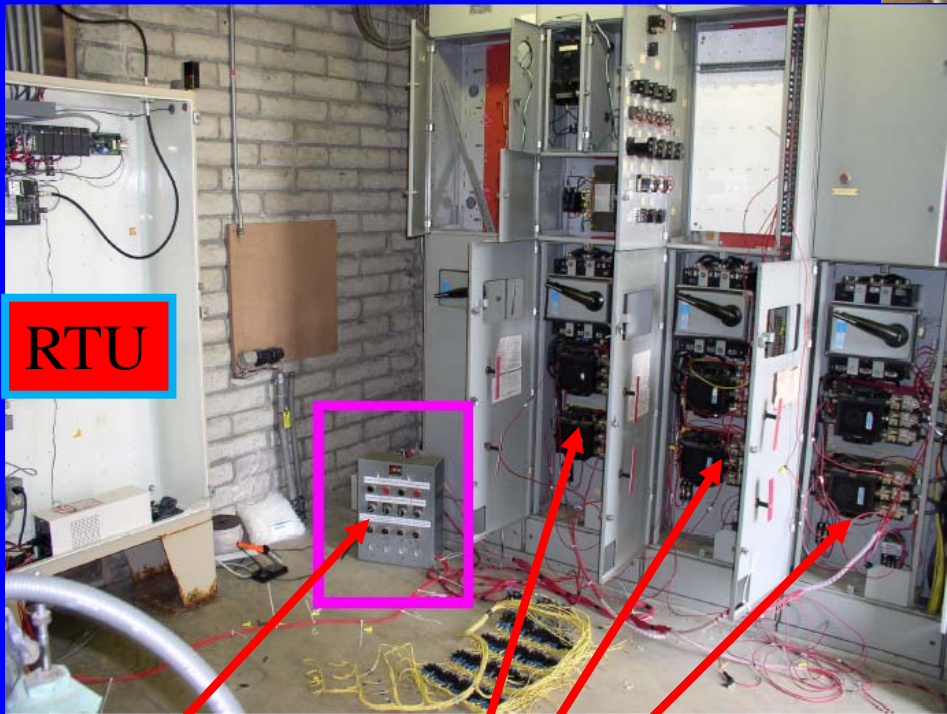
Ethernet Communication



Ethernet Communication



PLC installation eliminated hardwires and relays.



RTU

Temp MCC

MCC 1,2,3



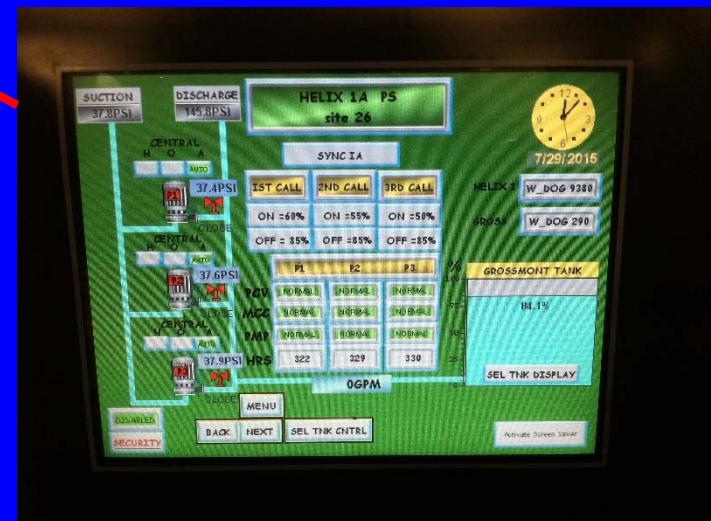
New and Upgraded MCCs.



Power Monitor



C-MORE HMI



C-MORE Touchscreen HMI

SUCTION
38.0PSI

DISCHARGE
146.4PSI

HELIX 1A PS
site 26

HELIX 1 W_DOG 2829

99

Power Monitor

PUMP 1

37.4PSI
0.6%EFF
CLOSE

VOLTAGE	CURRENT
477V	0A
476V	0A
474V	0A

TOTAL KW TOTAL PF FREQ
0 .00 60HZ

PUMP 2

160.4PSI
75.4%EFF
OPEN

VOLTAGE	CURRENT
477V	120A
477V	123A
475V	120A

TOTAL KW TOTAL PF FREQ
86 .86 60HZ

PUMP 3

38.3PSI
0.6%EFF
CLOSE

VOLTAGE	CURRENT
476V	0A
475V	0A
473V	0A

TOTAL KW TOTAL PF FREQ
0 .00 60HZ

ENABLED

SECURITY

MENU

BACK **NEXT**

HELIX 1 GROSS
49.0% 59.9%
1365GPM

Activate Screen Saver Before Leaving

Power Monitor Web browser (PAS)

File Edit View Monitor Logs MeterSetup Tools Reports Window Help

FH1 P1

Sites

- DICT PS
 - FH1 PS
 - FH1 P1**
 - FH1 P2
 - FH1 P3
 - FH1 P4
 - JTOWN PS
 - SRIM PS
 - WINDSOR B

RT Data Monitor Set #1 - DICT PS P3

DICT PS P3 RT Data Monitor Set #1 REAL-TIME MEASUREMENTS 08/03/15 12:41:16

No.	Date/Time	V12	V23	V31	I1	I2	I3	kW
1	08/03/15 08:24:27	466	466	470	117	109	112	
2	08/03/15 08:24:28	466	466	470	119	113	115	
3	08/03/15 08:24:29	466	466	470	120	115	115	
4	08/03/15 08:24:30	466	466	470	119	115	115	
5	08/03/15 08:24:31	467	466	471	113	106	111	
6	08/03/15 08:24:32	467	466	471	114	110	111	
7	08/03/15 08:24:33	466	467	470	113	106	110	
8	08/03/15 08:24:34	466	466	470	113	107	111	
9	08/03/15 08:24:35	466	466	470	115	108	111	
10	08/03/15 08:24:36	466	466	470	118	112	114	

C:\Users\bobby\Documents\Pas\REAL MEASUREMENT_DICT PS P3.mdb

RT Data Monitor Set #2 - DICT PS P3

DICT PS P3 RT Data Monitor Set #2 AVERAGE MEASUREMENTS 08/03/15 12:41:07

No.	Date/Time	V12	V23	V31	I1	I2	I3
1	08/03/15 08:21:14	467	466	471	116	111	113
2	08/03/15 08:21:15	466	466	471	116	111	113
3	08/03/15 08:21:16	467	467	471	116	111	113
4	08/03/15 08:21:17	467	467	471	116	110	113
5	08/03/15 08:21:18	467	467	471	116	110	113
6	08/03/15 08:21:19	467	467	471	116	110	113
7	08/03/15 08:21:20	467	467	471	116	111	113
8	08/03/15 08:21:21	467	466	471	116	110	113
9	08/03/15 08:21:22	466	466	470	116	111	113
10	08/03/15 08:21:23	466	466	470	116	111	113

C:\Users\bobby\Documents\Pas\REAL TIME TIME AND AVE MEASUREMENTS.mdb

Suction and Discharge

E Touchscreen HMI

Pump Efficiency

Power Monitor Data

The screenshot displays the HMI interface for Pump 2. At the top, suction and discharge pressures are shown as 38.0PSI and 146.4PSI. The pump's efficiency is 75.4%. The power monitor data includes three voltage readings (477V, 477V, 475V) and three current readings (0A, 120A, 123A). The total kW is 86, total PF is .86, and the frequency is 60HZ. The flow rate is 1365 GPM. The interface also includes a 'MENU' button, 'BACK' and 'NEXT' buttons, and a 'SECURITY' button.

Parameter	Value
Suction Pressure	38.0PSI
Discharge Pressure	146.4PSI
Pump Efficiency	75.4%
Voltage 1	477V
Voltage 2	477V
Voltage 3	475V
Current 1	0A
Current 2	120A
Current 3	123A
Total kW	86
Total PF	.86
Freq	60HZ
Flow in GPM	1365

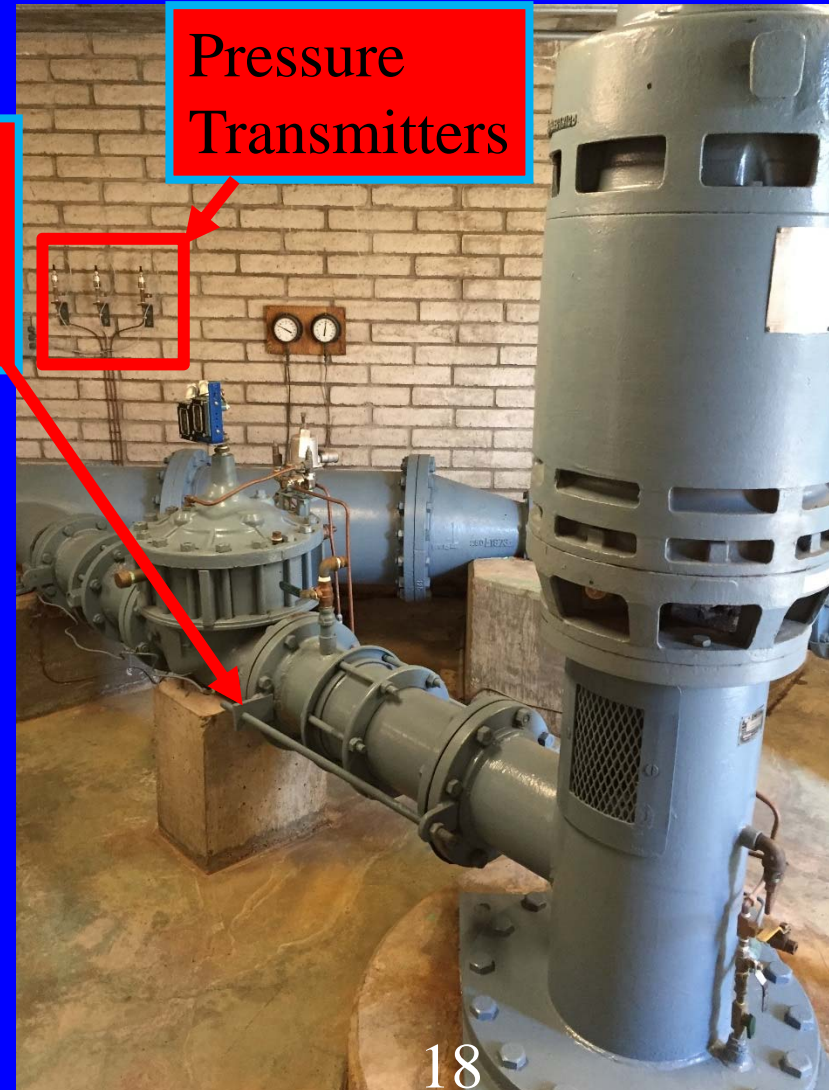
Flow in GPM

Activate Screen Saver Before Leaving

Pressure Transmitter for Run Status instead of Pressure Sw



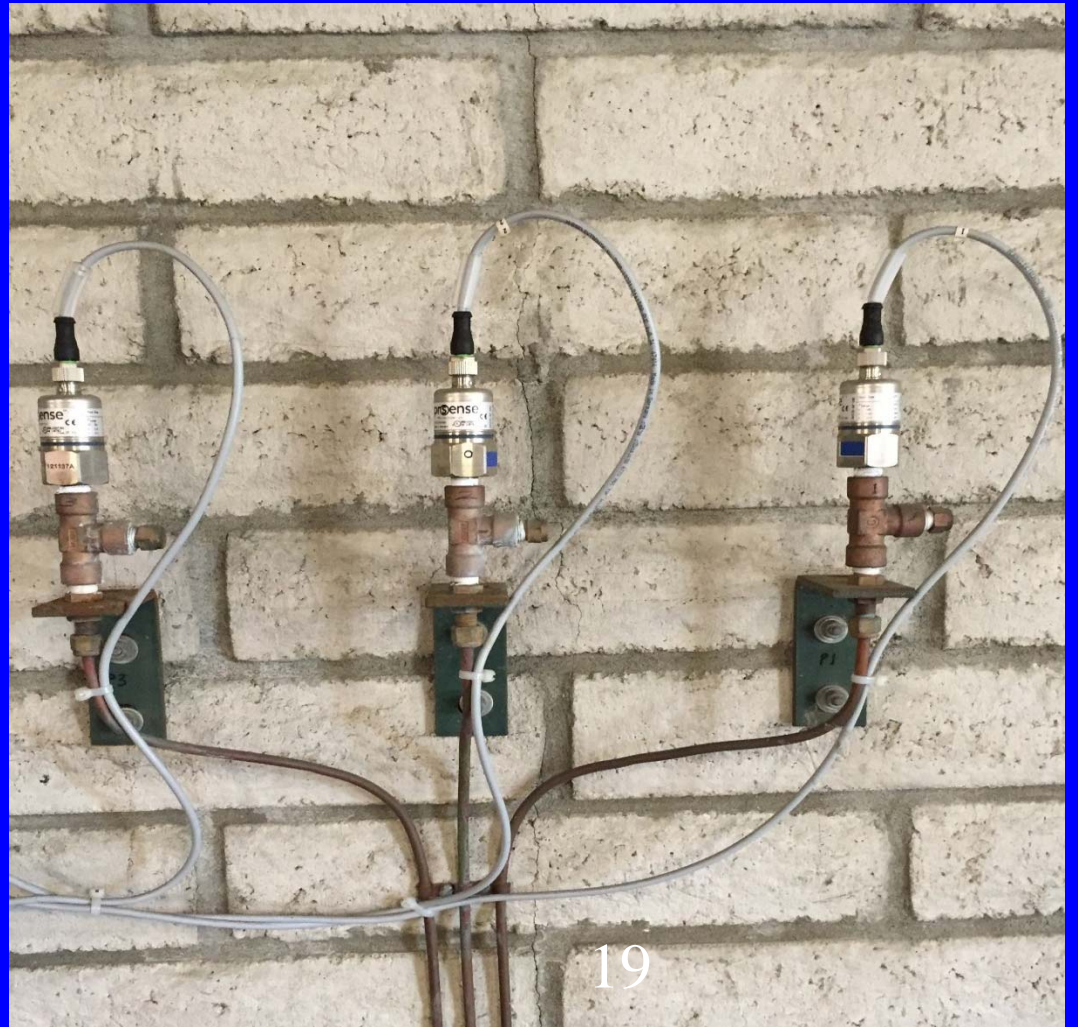
Pressure Transmitter tap



Pressure Transmitters

Blind Pressure Transmitter

no moving parts and contacts to corrode.



C-MORE HMI

SUCTION
38.0PSI

DISCHARGE
146.4PSI

HELIX 1A P...
site 26

GROSS W_DOG 299

PUMP 1

37.4PSI

0.6%EFF

CLOSE

VOLTAGE **CURRENT**

477V	0A
476V	0A
474V	0A

TOTAL KW **TOTAL PF** **FREQ**

0	.00	60HZ
---	-----	------

PUMP 2

160.4PSI

75.4%EFF

OPEN

VOLTAGE **CURRENT**

477V	120A
477V	123A
475V	120A

TOTAL KW **TOTAL PF** **FREQ**

86	.86	60HZ
----	-----	------

PUMP 3

38.3PSI

0.6%EFF

CLOSE

VOLTAGE **CURRENT**

476V	0A
475V	0A
473V	0A

TOTAL KW **TOTAL PF** **FREQ**

0	.00	60HZ
---	-----	------

ENABLED

SECURITY

MENU

BACK **NEXT**

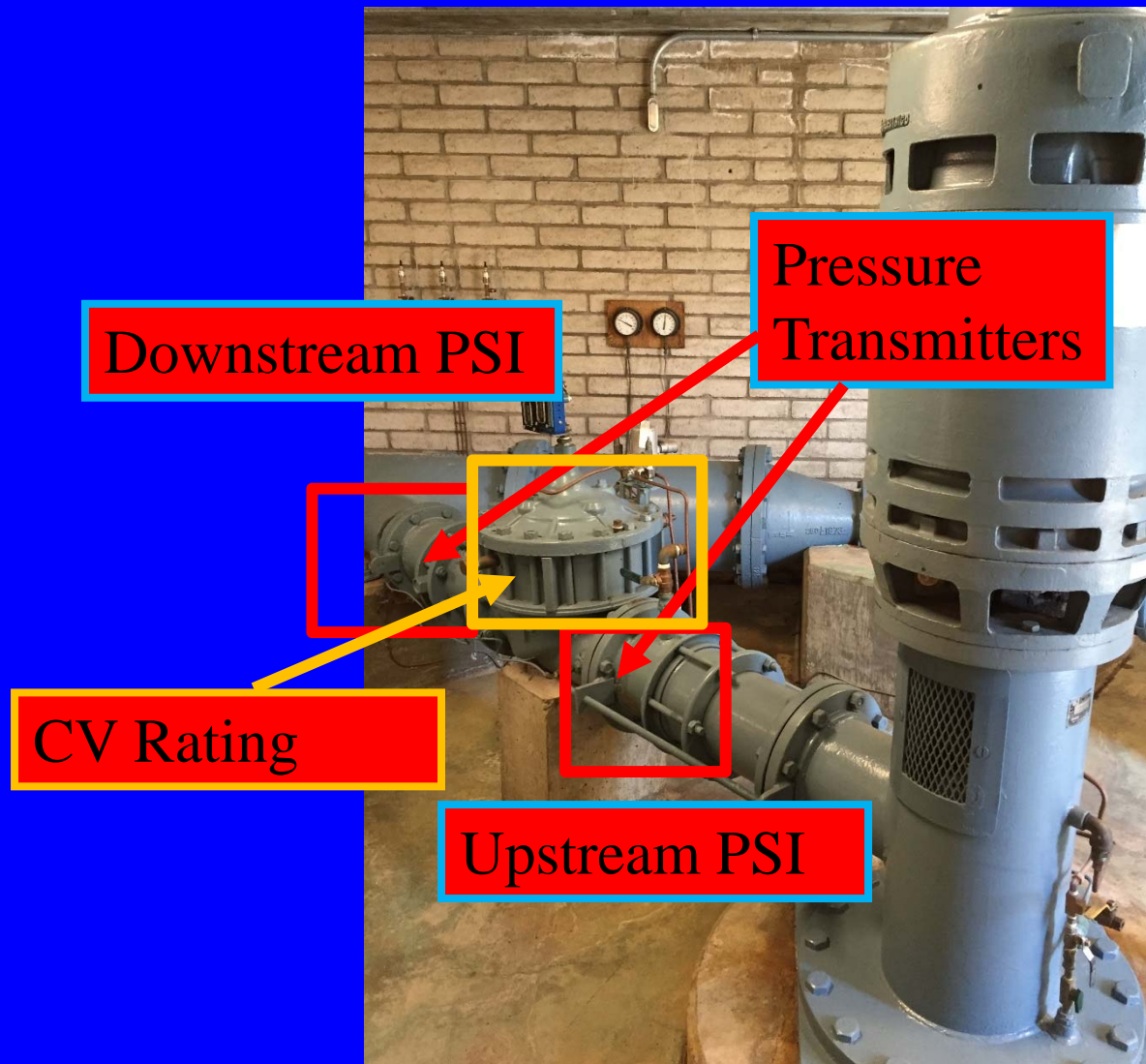
HELIX 1 GROSS

49.0%	59.9%
1365GPM	

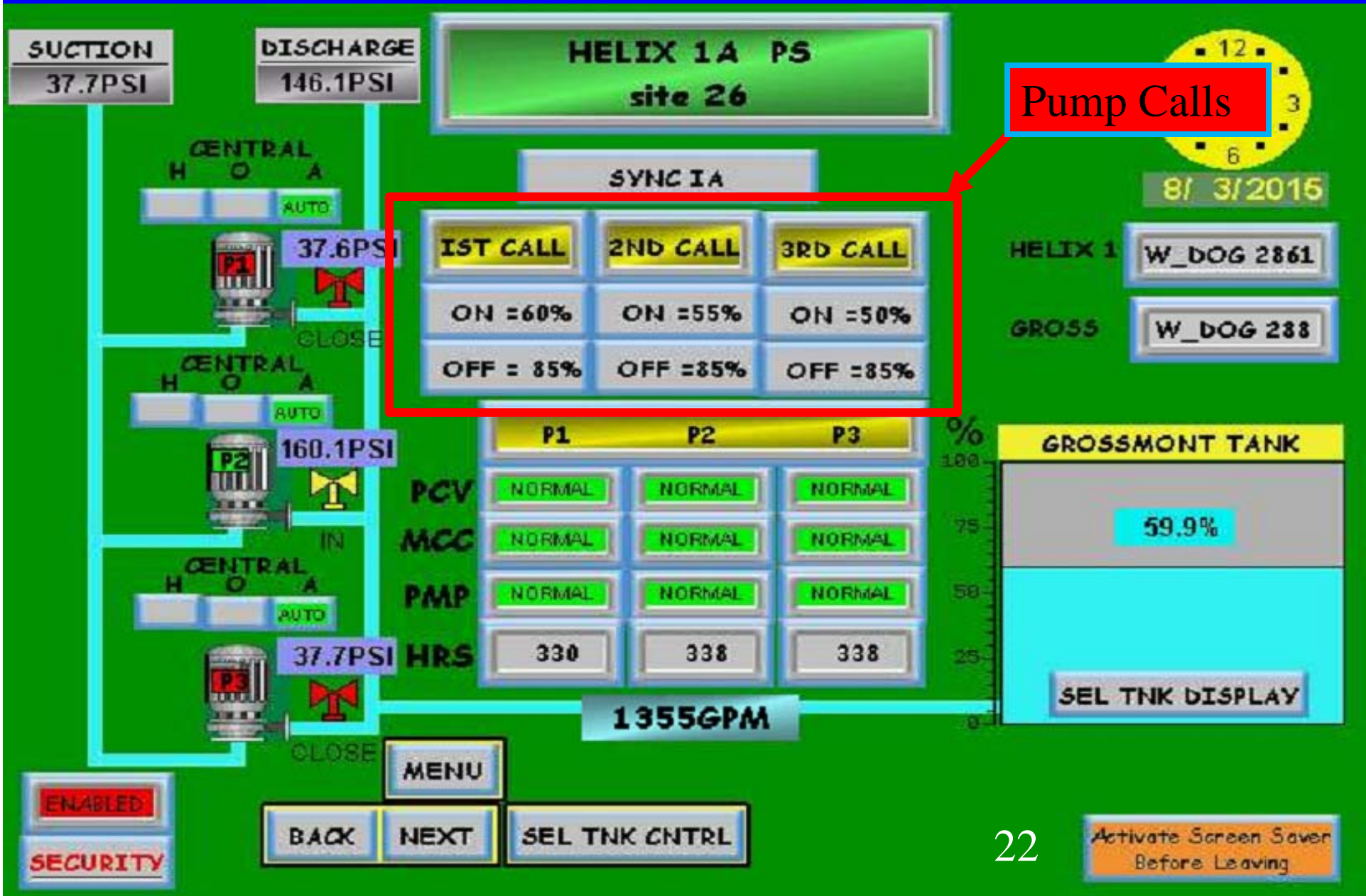
Activate Screen Saver Before Leaving

Pressure Transmitter Display

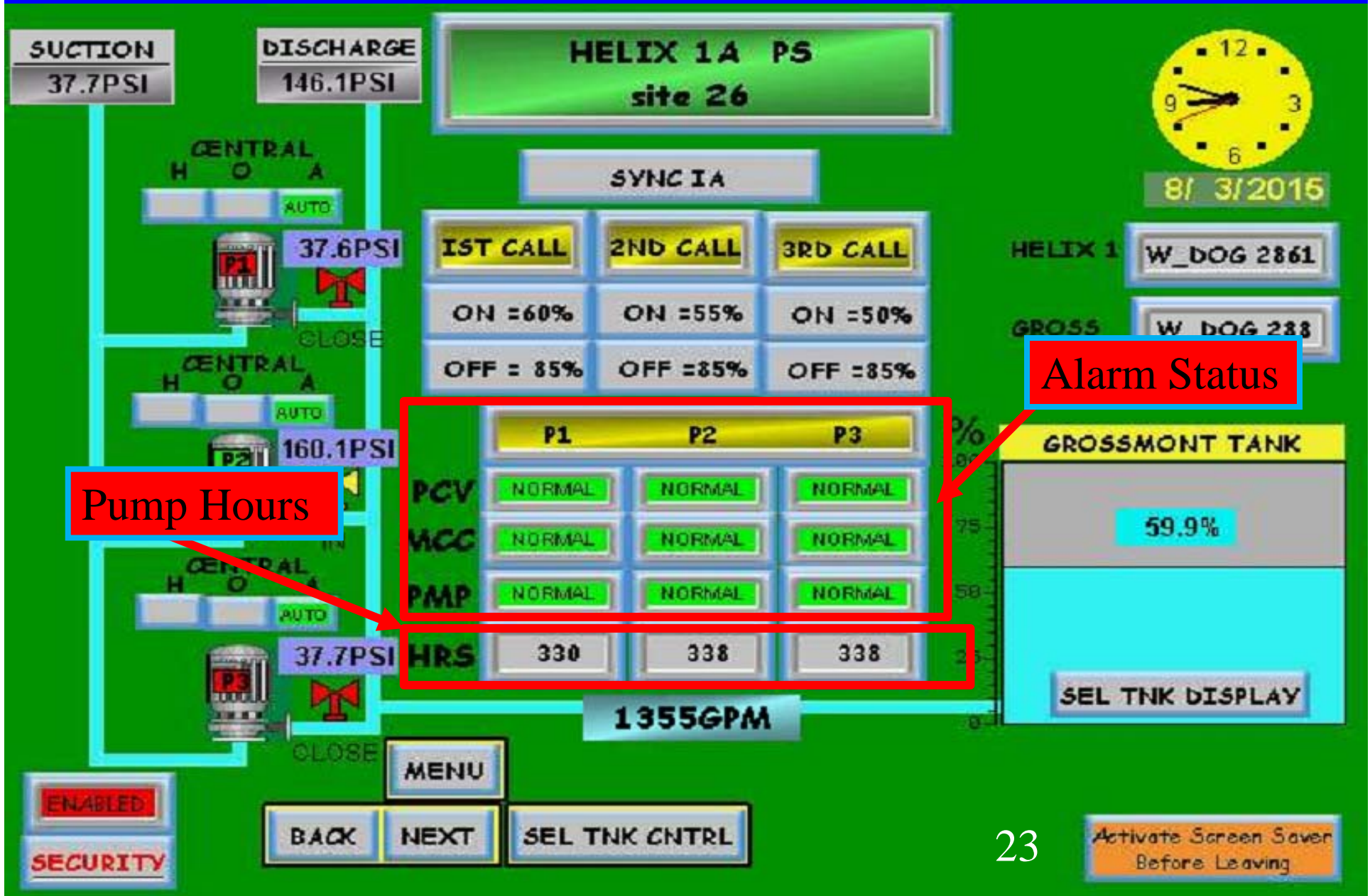
PLC logic Flow calculation using $Q = CV \text{ rating} \times \text{SQRT PSI diff}$



C-MORE Touchscreen HMI



C-MORE Touchscreen HMI



Synchronize Main SCADA System

SUCTION
37.7PSI

DISCHARGE
146.1PSI

HELIX 1A PS
site 26

SYNC IA

IST CALL **2ND CALL** **3RD CALL**

ON = 60% ON = 55% ON = 50%

OFF = 85% OFF = 85% OFF = 85%

	P1	P2	P3
PCV	NORMAL	NORMAL	NORMAL
MCC	NORMAL	NORMAL	NORMAL
PMP	NORMAL	NORMAL	NORMAL
HRS	330	338	338

1355GPM

GROSSMONT TANK
59.9%

SEL TNK DISPLAY

ENABLED
SECURITY

BACK **NEXT** **SEL TNK CNTRL**

MENU

Activate Screen Saver Before Leaving

8/ 3/2015

W_DOG 2861

W_DOG 288

Security Keypad

SUCTION
37.7PSI

DISCHARGE
146.1PSI

HELIX 1A PS
site 26

8/ 3/2015

SECURITY

7	8	9
4	5	6
1	2	3
0	Clear	

Minimum 0

Maximum 9999

Current 1

Cancel Enter

ENABLED

SECURITY

BACK **NEXT** **SEL TNK CNTRL**

1355GPM

GROSSMONT TANK

59.9%

SEL TNK DISPLAY

Activate Screen Saver Before Leaving

SCADA - Calavo PS
 Command SCREENS Windows Help

Calavo Pump Station

Site 9 Table V11000 Current Time: August 2, 16 10:34

MAX. HP: 375 @ 2600 GPM
 P1 125HP @ 1000 GPM
 P2 125HP @ 1000 GPM
 P3 125HP @ 1000 GPM
 P4 125HP @ 1000 GPM

Door Status ●
 Intrusion System ●
 Employee **None** ●

Suction PSI: 7 Discharge PSI: 178

5,888 Hours
 5,879 Hours
 5,867 Hours
 5,890 Hours

Remote Central

Pump Status

	MCC	PCV	Pump	PLC
Pump1	●	●	●	●
Pump2	●	●	●	●
Pump3	●	●	●	●
Pump4	●	●	●	●

Power Status ●
 PS to Tank Comm ●
 PS to TP Comm ●
 Tank to TP Comm ●

Update Counter: 5398
 Watch Dog: 550

EC Tank Hi Level Alarm ●
 EC Tank Hatch Intrusion ●
 Hi PSI Shutdown ●

Reset Hi Discharge [Reset]

Station Notes

Received

Flow in GPM: 2617 GPM

Level in Percent

Location	Level (%)
Calavo LvL @ Tank	53.8
Calavo LvL @ PS	53.7
S. Rim LvL @ Calavo	79.2
El Cajon LvL	58.7

Last: 24 Hours

Control and Notes

First Call: 35 75
 Second Call: 35 75
 Third Call: 35 75
 Pump SEQ

Energy Conservation System

System Enabled System Disabled

Off Peak Pumping: On Off

of Pumps During Off Peak = 3

Off Peak Start Time: 22
 Off Peak Stop Time: 6

CLICK for ECS Notes

Winter Peak Hours (1700 to 2000) ●
 Summer Peak Hours(1100 to 1800) ●
 Off Peak ● Peak ●
 AM Semi Peak ● PM Semi Peak ●

Tank Select: S_Rim Calavo

Tank Hatch ●
 Tank Hi Float ●

Calavo Tank: 54%

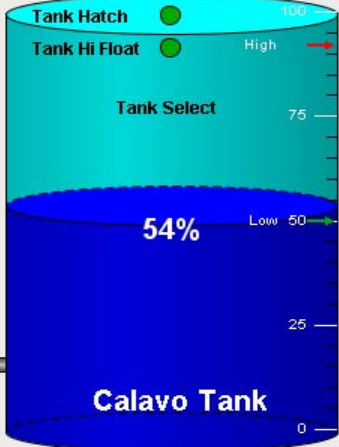
Energy work 4-12-16

Calavo Hydro South Rim Hydro Dist STR Sys Summary Menu Plant

10:34 AM 8/2/2016

Employee's Name

Door Status ●
 Intrusion System ●
 Employee **None** ●



SCADA - Calavo PS
Command SCREENS Windows Help

Calavo Pump Station

Site 9 Table V11000 Current Time: August 2, 16 10:34
MAX. HP: 375 @ 2600 GPM
P1 125HP @ 1000 GPM
P2 125HP @ 1000 GPM
P3 125HP @ 1000 GPM
P4 125HP @ 1000 GPM
Door Status ●
Intrusion System ●
Employee None

Suction PSI: 7 Discharge PSI: 178

Level in Percent: 100, 90, 80, 70, 60, 50, 40, 30

5,888 Hours
5,879 Hours
5,867 Hours
5,890 Hours

Remote Central

PLC logic rotate pumps automatically for equal runtime (Pump Hours).

Pump4 ● ● ● ●
Power Status ●
PS to Tank Comm ●
PS to TP Comm ●
Tank to TP Comm ●
Update Counter 5398
Watch Dog 550
EC Tank Hi Level Alarm ●
EC Tank Hatch Intrusion ●
Hi PSI Shutdown ●
Reset Hi Discharge Reset
Station Notes

Control and Notes
First Call 35 75
Second Call 35 75
Third Call 35 75
Pump SEQ

Energy Conservation System
System Enabled System Disabled
Off Peak Pumping On Off
of Pumps During Off Peak = 3
Off Peak Start Time 22
Off Peak Stop Time 6
CLICK for ECS Notes
Winter Peak Hours (1700 to 2000) ●
Summer Peak Hours(1100 to 1800) ●
Off Peak ● Peak ●
AM Semi Peak ● PM Semi Peak ●

Tank Select
S_Rim Calavo

Tank Hatch ● 100
Tank Hi Float ● High
Tank Select 75
54% Low 50
Calavo Tank 25 0

Flow in GPM
2617 GPM

Energy work 4-12-16

Calavo Hydro South Rim Hydro Dist STR Sys Summary Menu Plant

10:34 AM 8/2/2016

Calavo Pump Station

Site 9 Table V11000 Current Time: August 2, 16 10:34

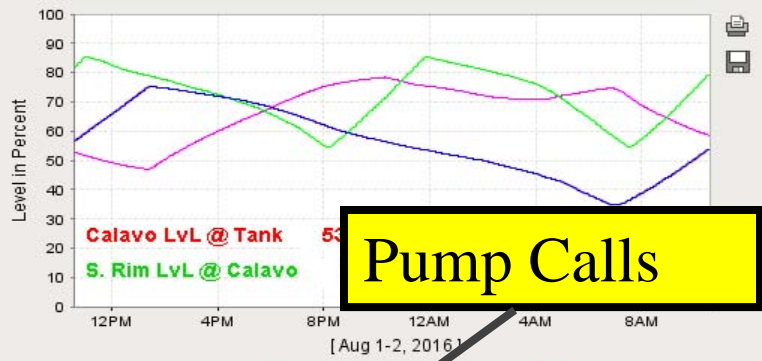
MAX. HP: 375 @ 2600 GPM

P1 125HP @ 1000 GPM Door Status ●

P2 125HP @ 1000 GPM Intrusion System ●

P3 125HP @ 1000 GPM Employee **None**

P4 125HP @ 1000 GPM



Pump Calls

Suction PSI: 7

Discharge PSI: 178

5,888 Hours

5,879 Hours

5,867 Hours

5,890 Hours

Remote Central

Auto Off Hand Auto Off Hand

Auto Off Hand Auto Off Hand

Auto Off Hand Auto Off Hand

Auto Off Hand Auto Off Hand

Auto Off Hand Auto Off Hand

Auto Off Hand Auto Off Hand

Pump Sequence

Control and Notes

First Call	35	75
Second Call	35	75
Third Call	35	75
Pump SEQ	2,3,4	

MCC PCV Pump PLC

Power Status ●

PS to Tank Comm ●

PS to TP Comm ●

Tank to TP Comm ●

Update Counter 5398

Watch Dog 550

EC Tank Hi Level Alarm ●

EC Tank Hatch Intrusion ●

Hi PSI Shutdown ●

Reset Hi Discharge Reset

Station Notes

Energy Conservation System

System Enabled ● System Disabled

Off Peak Pumping On Off

of Pumps During Off Peak = 3

Off Peak Start Time 22

Off Peak Stop Time 6

CLICK for ECS Notes

Winter Peak Hours (1700 to 2000) ●

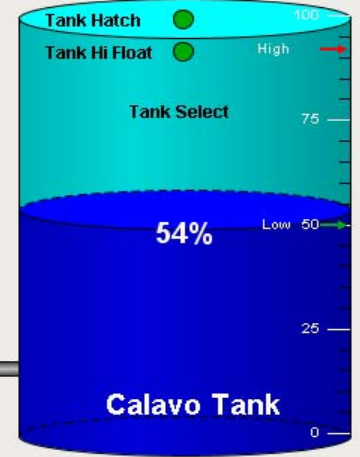
Summer Peak Hours(1100 to 1800) ●

Off Peak ● Peak ●

AM Semi Peak ● PM Semi Peak ●

Tank Select

S_Rim Calavo



Received

Flow in GPM

2617 GPM

Energy work 4-12-16

Calavo Pump Station

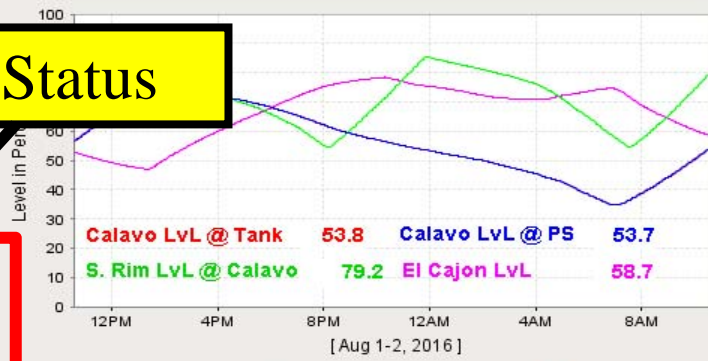
Site 9 Table V11000 Current Time: August 2, 16 10:34

MAX. HP: 375 @ 2600 GPM

P1 125HP @ 1000 GPM
 P2 125HP @ 1000 GPM
 P3 125HP @ 1000 GPM
 P4 125HP @ 1000 GPM

Door Status
 Intrusion System
 Employee None

Alarm Status



Suction PSI: 7
 Discharge PSI: 178

5,888 Hours

5,879 Hours

5,867 Hours

5,890 Hours

Remote Central

Auto Off Hand

Auto Off Hand

Auto Off Hand

Auto Off Hand

Pump Status				
	MCC	PCV	Pump	PLC
Pump1	●	●	●	●
Pump2	●	●	●	●
Pump3	●	●	●	●
Pump4	●	●	●	●

Power Status ●

PS to Tank Comm ●

PS to TP Comm ●

Tank to TP Comm ●

Update Counter 5398

Watch Dog 550

EC Tank Hi Level Alarm ●

EC Tank Hatch Intrusion ●

Hi PSI Shutdown ●

Reset Hi Discharge [Reset]

Control and Notes

First Call 35 75

Second Call 35 75

Third Call 35 75

Pump SEQ

Energy Conservation System

System Enabled System Disabled

Off Peak Pumping On Off

of Pumps During Off Peak = 3

Off Peak Start Time 22

Off Peak Stop Time 6

CLICK for ECS Notes

Winter Peak Hours (1700 to 2000) ●

Summer Peak Hours(1100 to 1800) ●

Off Peak ● Peak ●

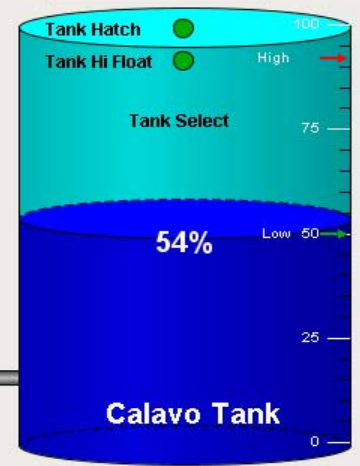
AM Semi Peak ● PM Semi Peak ●

Last: 24 Hours

Realtime Calavo Trend

Tank Select

S_Rim Calavo



Flow in GPM

2617 GPM

Received

Energy work 4-12-16

Calavo Pump Station

Site 9 Table V11000 Current Time: August 2, 16 10:34

MAX. HP: 375 @ 2600 GPM

P1 125HP @ 1000 GPM Door Status ●

P2 125HP @ 1000 GPM Intrusion System ●

P3 125HP @ 1000 GPM Employee **None**

P4 125HP @ 1000 GPM

Suction PSI
7

Discharge PSI
178



Remote **Central**

Auto Off Hand Auto Off Hand

Auto Off Hand Auto Off Hand

Auto Off Hand Auto Off Hand

Auto Off Hand Auto Off Hand

Pump Status

	MCC	PCV	Pump	PLC
Pump1	●	●	●	●
Pump2	●	●	●	●
Pump3	●	●	●	●
Pump4	●	●	●	●

Power Status ●

PS to Tank Comm ●

PS to TP Comm ●

Tank to TP Comm ●

Update Counter 5398

Watch Dog 550

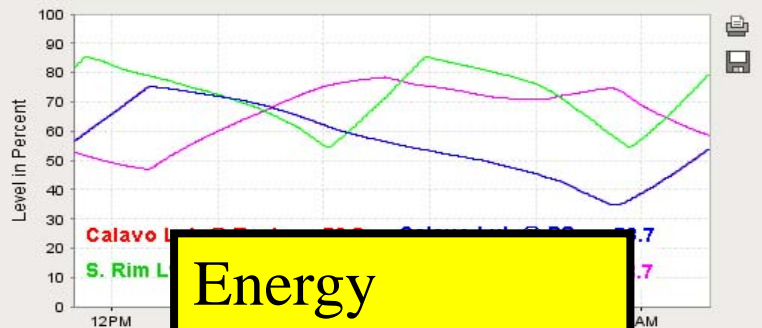
EC Tank Hi Level Alarm ●

EC Tank Hatch Intrusion ●

Hi PSI Shutdown ●

Reset Hi Discharge Reset

Station Notes



Energy Conservation/ TOU

Energy Conservation System

System Enabled System Disabled

Off Peak Pumping On Off

of Pumps During Off Peak = 3

Off Peak Start Time 22

Off Peak Stop Time 6

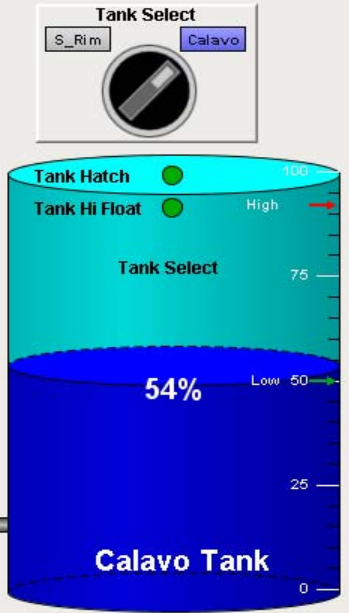
CLICK for ECS Notes

Winter Peak Hours (1700 to 2000)

Summer Peak Hours(1100 to 1800)

Off Peak Peak

AM Semi Peak PM Semi Peak



Flow in GPM
2617 GPM

Received

Energy work 4-12-16

Calavo Pump Station

Site 9 Table V11000 Current Time: August 2, 16 10:34

MAX. HP: 375 @ 2600 GPM

P1 125HP @ 1000 GPM Door Status ●

P2 125HP @ 1000 GPM Intrusion System ●

P3 125HP @ 1000 GPM Employee **None**

P4 125HP @ 1000 GPM

Suction PSI
7

Discharge PSI
178



Remote **Central**

Auto Off Hand Auto Off Hand

Auto Off Hand Auto Off Hand

Auto Off Hand Auto Off Hand

Auto Off Hand Auto Off Hand

Pump Status

	MCC	PCV	Pump	PLC
Pump1	●	●	●	●
Pump2	●	●	●	●
Pump3	●	●	●	●
Pump4	●	●	●	●

Power Status ●

PS to Tank Comm ●

PS to TP Comm ●

Tank to TP Comm ●

Update Counter 5398

Watch Dog 550

EC Tank Hi Level Alarm ●

EC Tank Hatch Intrusion ●

Hi PSI Shutdown ●

Reset Hi Discharge Reset

Station Notes



Control and Notes

First Call 35 75

Second Call 35 75

Third Call 35 75

Pump SEQ

Energy Conservation System

System Enabled System Disabled

Off Peak Pumping Off On

of Pumps During Off Peak = 3

Off Peak Start Time 22

Off Peak Stop Time 6

CLICK for ECS Notes

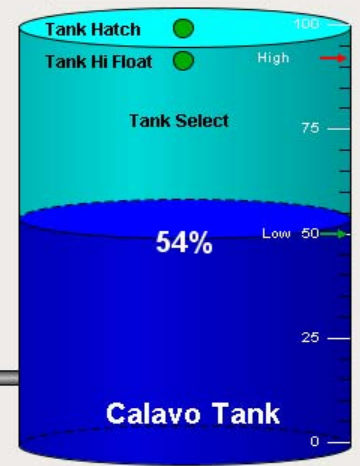
Winter Peak Hours (1700 to 2000)

Summer Peak Hours (1100 to 1800)

Off Peak Peak

AM Semi Peak PM Semi Peak

Off Peak Pumping



Flow in GPM
2617 GPM

Received

Energy work 4-12-16

Calavo Pump Station

Site 9 Table V11000 **Current Time: August 2, 16 10:34**

MAX. HP: 375 @ 2600 GPM

P1 125HP @ 1000 GPM
 P2 125HP @ 1000 GPM
 P3 125HP @ 1000 GPM
 P4 125HP @ 1000 GPM

Door Status ●
 Intrusion System ●
 Employee **None**



Suction PSI
7

Discharge PSI
178

5,888 Hours

5,879 Hours

5,867 Hours

5,890 Hours

Remote **Central**

Auto Off Hand

Auto Off Hand

Auto Off Hand

Auto Off Hand

Auto Off Hand

Auto Off Hand

Pump Status

	MCC	PCV	Pump	PLC
Pump1	●	●	●	●
Pump2	●	●	●	●
Pump3	●	●	●	●
Pump4	●	●	●	●

Power Status ●

PS to Tank Comm ●

PS to TP Comm ●

Tank to TP Comm ●

Update Counter 5398

Watch Dog 550

EC Tank Hi Level Alarm ●

EC Tank Hatch Intrusion ●

Hi PSI Shutdown ●

Reset Hi Discharge

Station Notes

Control and Notes

First Call	35	75
Second Call	35	75
Third Call	35	75

Pump SEQ

Energy Conservation System

System Enabled ● System Disabled ●

Off Peak Pumping

of Pumps During Off Peak = 3

Off Peak Start Time

Off Peak Stop Time

CLICK for ECS Notes

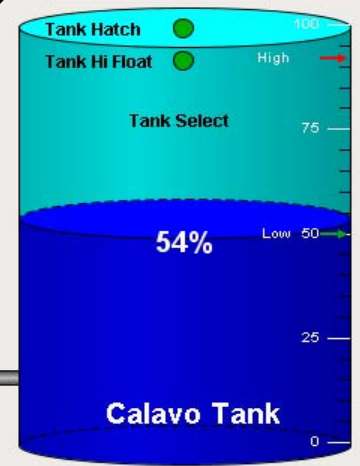
Winter Peak Hours (1700 to 2000)

Summer Peak Hours(1100 to 1800)

Off Peak Peak

AM Semi Peak PM Semi Peak

start/stop time



Flow in GPM

2617 GPM

Energy work 4-12-16

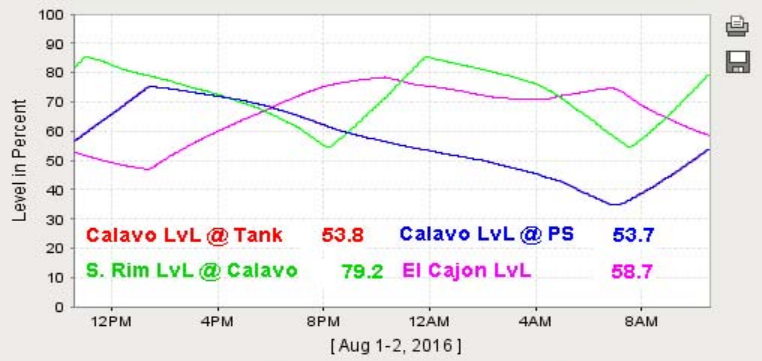
Calavo Pump Station

Site 9 Table V11000 **Current Time: August 2, 16 10:34**

MAX. HP: 375 @ 2600 GPM

P1 125HP @ 1000 GPM
 P2 125HP @ 1000 GPM
 P3 125HP @ 1000 GPM
 P4 125HP @ 1000 GPM

Door Status ●
 Intrusion System ●
 Employee **None**



Suction PSI
7

Discharge PSI
178



Remote **Central**

Auto Off Hand Auto Off Hand

Auto Off Hand Auto Off Hand

Auto Off Hand Auto Off Hand

Auto Off Hand Auto Off Hand

Pump Status

	MCC	PCV	Pump	PLC
Pump1	●	●	●	●
Pump2	●	●	●	●
Pump3	●	●	●	●
Pump4	●	●	●	●

Power Status ●
 PS to Tank Comm ●
 PS to TP Comm ●
 Tank to TP Comm ●

Update Counter 5398
 Watch Dog 550

EC Tank Hi Level Alarm ●
 EC Tank Hatch Intrusion ●
 Hi PSI Shutdown ●

Reset Hi Discharge Reset

Station Notes

Control and Notes

First Call 35 75
 Second Call 35 75
 Third Call 35 75
 Pump SEQ

Energy Conservation System

System Enabled System Disabled

Off Peak Pumping On Off

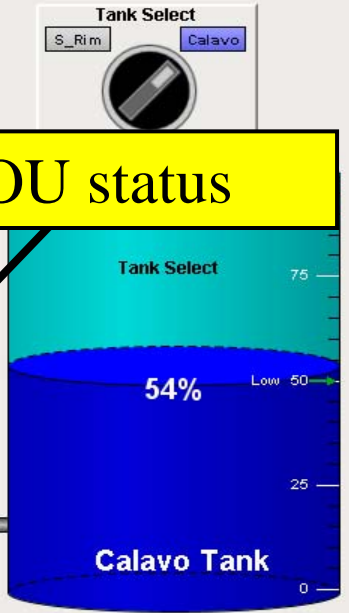
of Pumps During Off Peak = 3

Off Peak Start Time 22
 Off Peak Stop Time 6

CLICK for ECS Notes

Winter Peak Hours (1700 to 2000) ●
 Summer Peak Hours(1100 to 1800) ●
 Off Peak ● Peak ●
 AM Semi Peak ● PM Semi Peak ●

TOU status



Received

Flow in GPM
2617 GPM

Energy work 4-12-16

Calavo Pump Station

Site 9 Table V11000 Current Time: August 2, 16 10:34

MAX. HP: 375 @ 2600 GPM

P1 125HP @ 1000 GPM Door Status ●

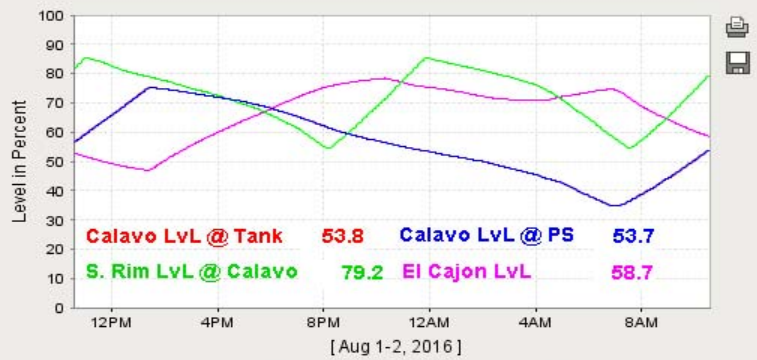
P2 125HP @ 1000 GPM Intrusion System ●

P3 125HP @ 1000 GPM Employee **None**

P4 125HP @ 1000 GPM

Suction PSI
7

Discharge PSI
178



5,888 Hours

5,879 Hours

5,867 Hours

5,890 Hours

Remote

Central

Control	Remote	Central
Auto	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Off	<input type="checkbox"/>	<input type="checkbox"/>
Hand	<input type="checkbox"/>	<input type="checkbox"/>

Pump Status

	MCC	PCV	Pump	PLC
Pump1	●	●	●	●
Pump2	●	●	●	●
Pump3	●	●	●	●
Pump4	●	●	●	●

Power Status ●

PS to Tank Comm ●

PS to TP Comm ●

Tank to TP Comm ●

Update Counter 5398

Watch Dog 550

EC Tank Hi Level Alarm ●

EC Tank Hatch Intrusion ●

Hi PSI Shutdown ●

Reset Hi Discharge

Station Notes

Station Notes

Received

Flow in GPM
2617 GPM

Tank select

Tank Select

S_Rim Calavo

Control and Notes

First Call

Second Call

Third Call

Pump SEQ

Energy Conservation System

System Enabled System Disabled

Off Peak Pumping

of Pumps During Off Peak = 3

Off Peak Start Time

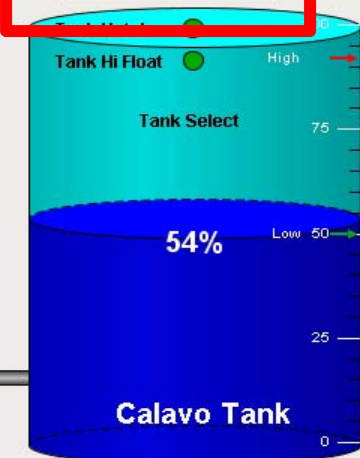
Off Peak Stop Time

Winter Peak Hours (1700 to 2000)

Summer Peak Hours(1100 to 1800)

Off Peak Peak

AM Semi Peak PM Semi Peak



Energy work 4-12-16

Calavo Hydro South Rim Hydro Dist STR Sys Summary Menu Plant

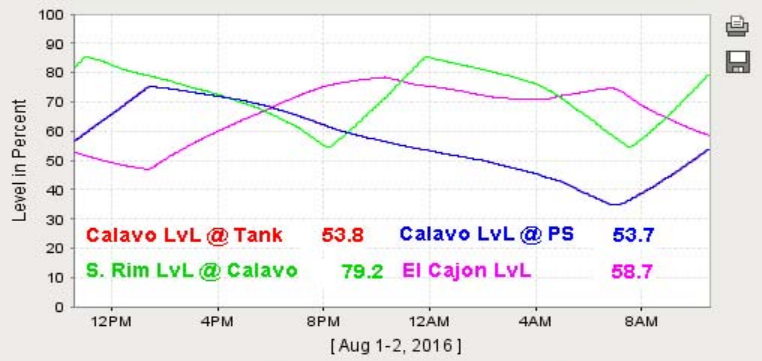
Calavo Pump Station

Site 9 Table V11000 **Current Time: August 2, 16 10:34**

MAX. HP: 375 @ 2600 GPM

P1 125HP @ 1000 GPM
 P2 125HP @ 1000 GPM
 P3 125HP @ 1000 GPM
 P4 125HP @ 1000 GPM

Door Status ●
 Intrusion System ●
 Employee **None**



Suction PSI
7

Discharge PSI
178



	Remote	Central
Pump 1	Auto <input checked="" type="checkbox"/> Off <input type="checkbox"/> Hand <input type="checkbox"/>	Auto <input checked="" type="checkbox"/> Off <input type="checkbox"/> Hand <input type="checkbox"/>
Pump 2	Auto <input checked="" type="checkbox"/> Off <input type="checkbox"/> Hand <input type="checkbox"/>	Auto <input checked="" type="checkbox"/> Off <input type="checkbox"/> Hand <input type="checkbox"/>
Pump 3	Auto <input checked="" type="checkbox"/> Off <input type="checkbox"/> Hand <input type="checkbox"/>	Auto <input checked="" type="checkbox"/> Off <input type="checkbox"/> Hand <input type="checkbox"/>
Pump 4	Auto <input checked="" type="checkbox"/> Off <input type="checkbox"/> Hand <input type="checkbox"/>	Auto <input checked="" type="checkbox"/> Off <input type="checkbox"/> Hand <input type="checkbox"/>

Pump Status

	MCC	PCV	Pump	PLC
Pump1	●	●	●	●
Pump2	●	●	●	●
Pump3	●	●	●	●
Pump4	●	●	●	●

Power Status ●
 PS to Tank Comm ●
 PS to TP Comm ●
 Tank to TP Comm ●

Update Counter 5398
 Watch Dog 550

EC Tank Hi Level Alarm ●
 EC Tank Hatch Intrusion ●
 Hi PSI Shutdown ●

Reset Hi Discharge

Station Notes

Control and Notes

First Call
 Second Call
 Third Call
 Pump SEQ

Energy Conservation System

System Enabled System Disabled

Off Peak Pumping

of Pumps During Off Peak = 3

Off Peak Start Time
 Off Peak Stop Time

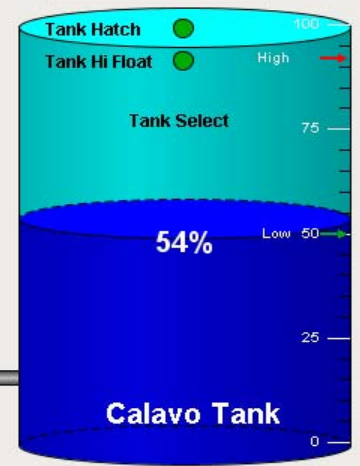
CLICK for ECS Notes

Winter Peak Hours (1700 to 2000)
 Summer Peak Hours (1100 to 1800)
 Off Peak Peak
 AM Semi Peak PM Semi Peak

Last: Hours

Tank Select

S_Rim Calavo

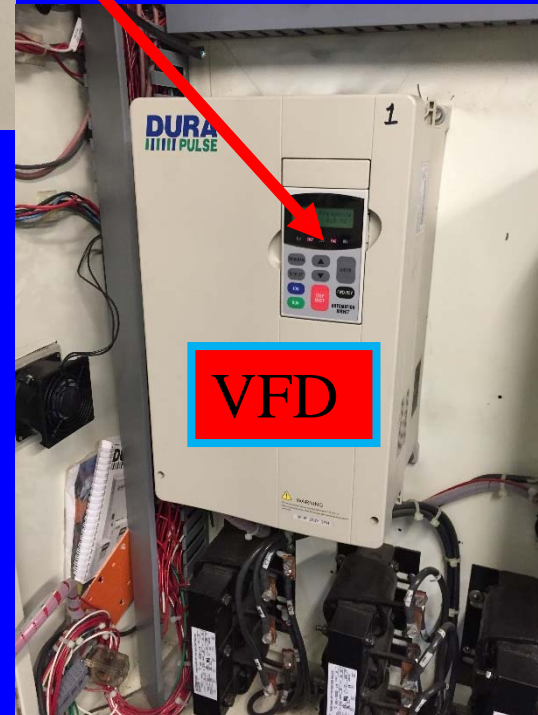
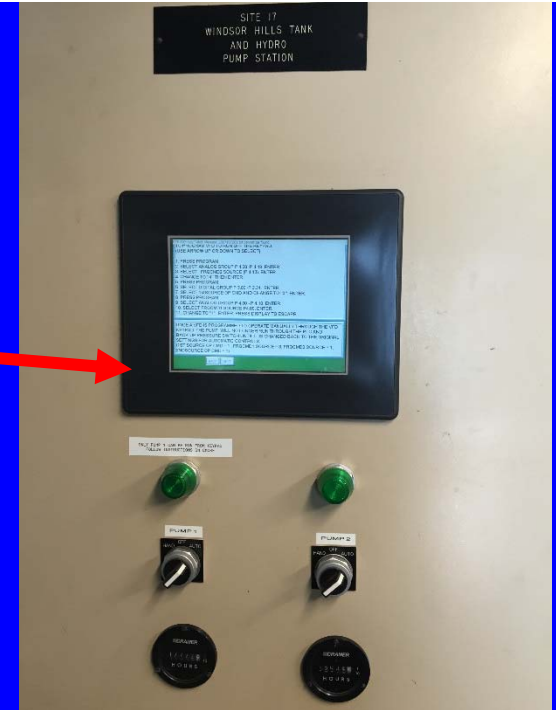
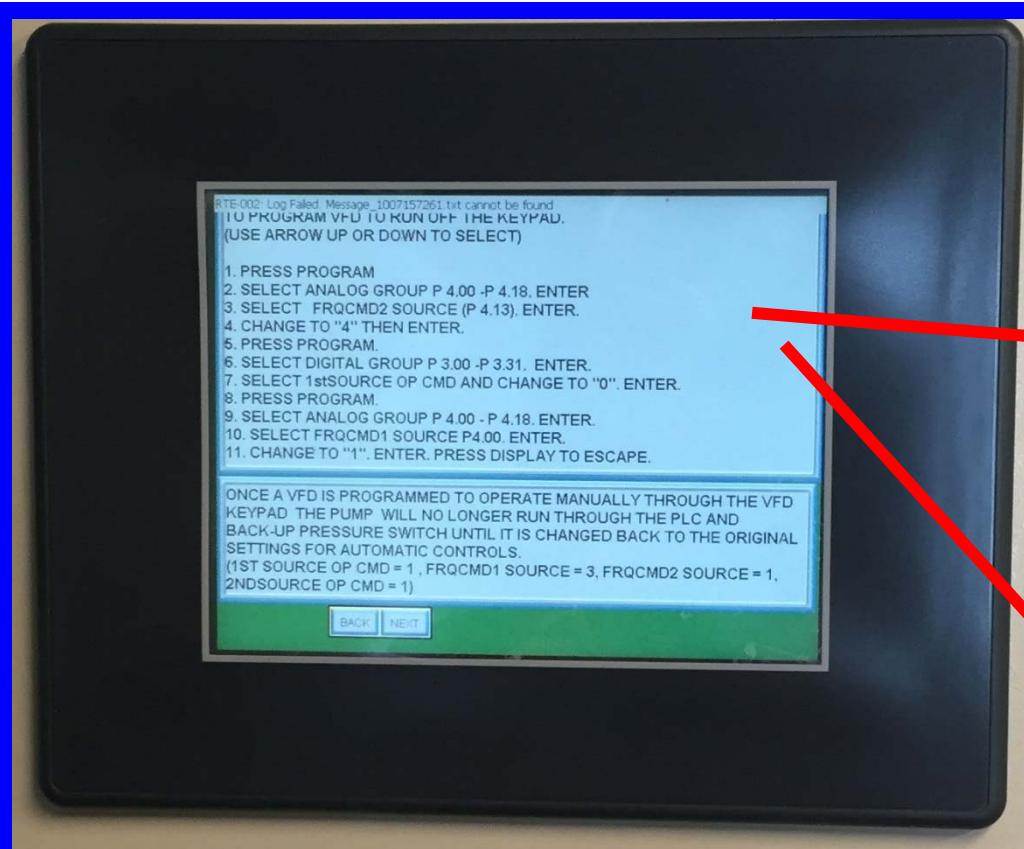


Flow in GPM
2617 GPM

Received

Energy work 4-12-16

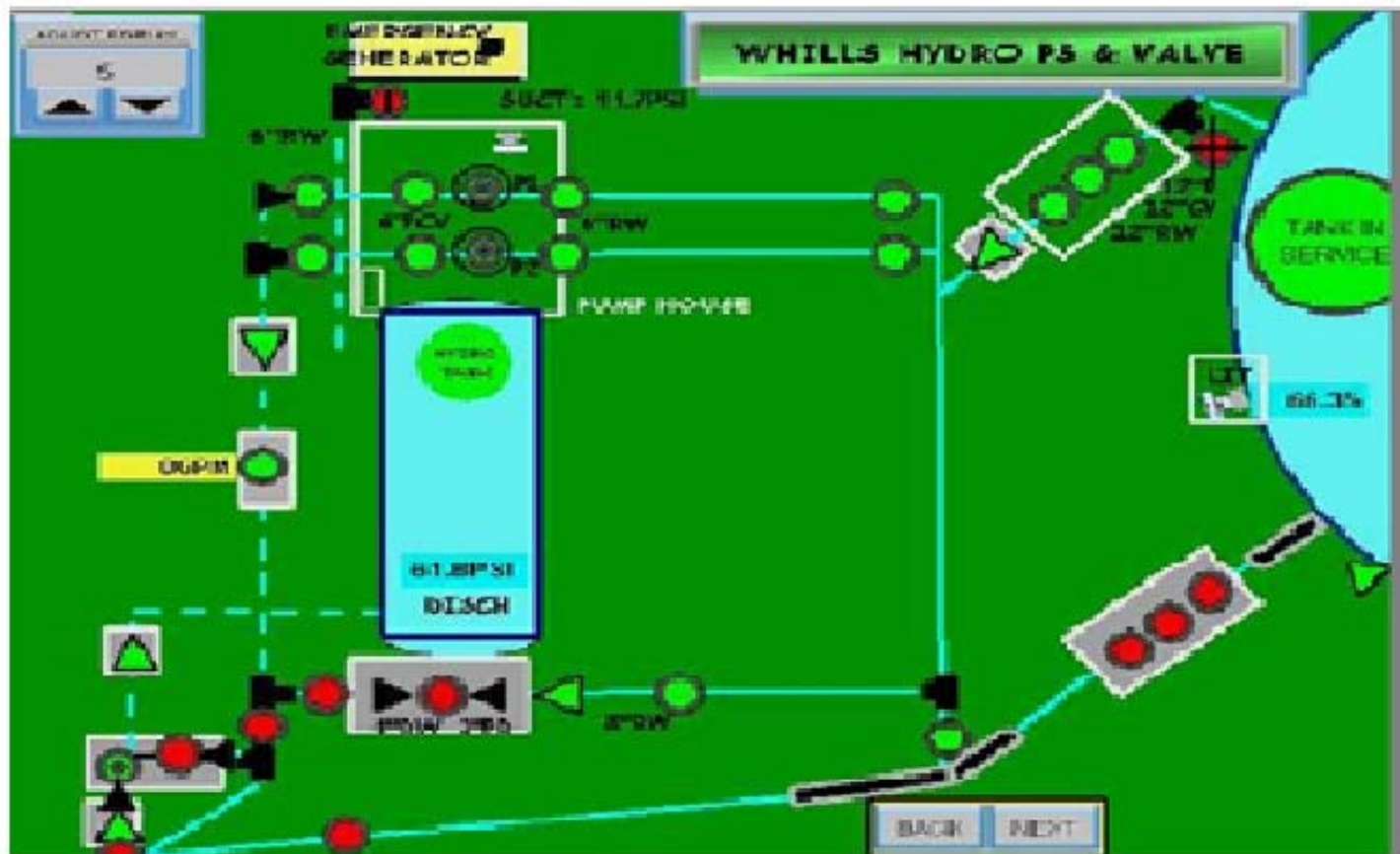
Calavo Hydro South Rim Hydro Dist STR Sys Summary Menu Plant



Store and Display Retentive Notes.

e.g. steps for VFD programming for auto or manual control

Retentive GIS Map



Alarm Log

Alarm History			Total of 8 Alarms
Entry No	Alarm No	Message	Confirm
1	14	PLC 2 WATCHDOG FAILED	
2	3	CONTROL POWER OFF	Required
3	13	PLC 1 WATCHDOG FAILED	
4	3	CONTROL POWER OFF	Required
5	8	INTRUSION ALARM!!!	
6	15	PLC 3 WATCHDOG FAILED	
7	14	PLC 2 WATCHDOG FAILED	
8	13	PLC 1 WATCHDOG FAILED	

DIGITAL CLOCK: 06:38:33 09-11-2011

MENU: BACK NEXT

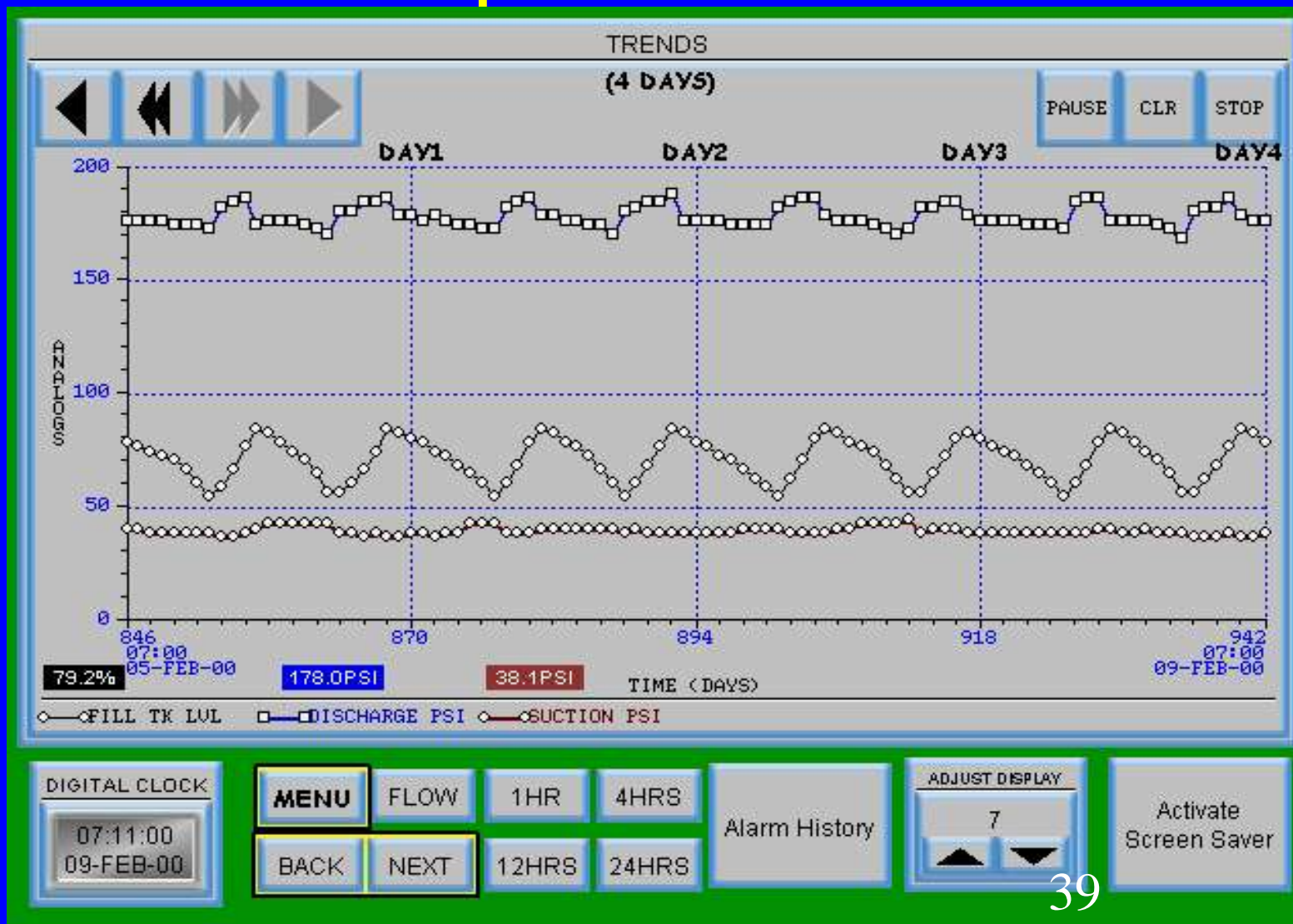
DATE RESET

Alarm History

ADJUST DISPLAY: 7

Activate Screen Saver

Pump Station Trend



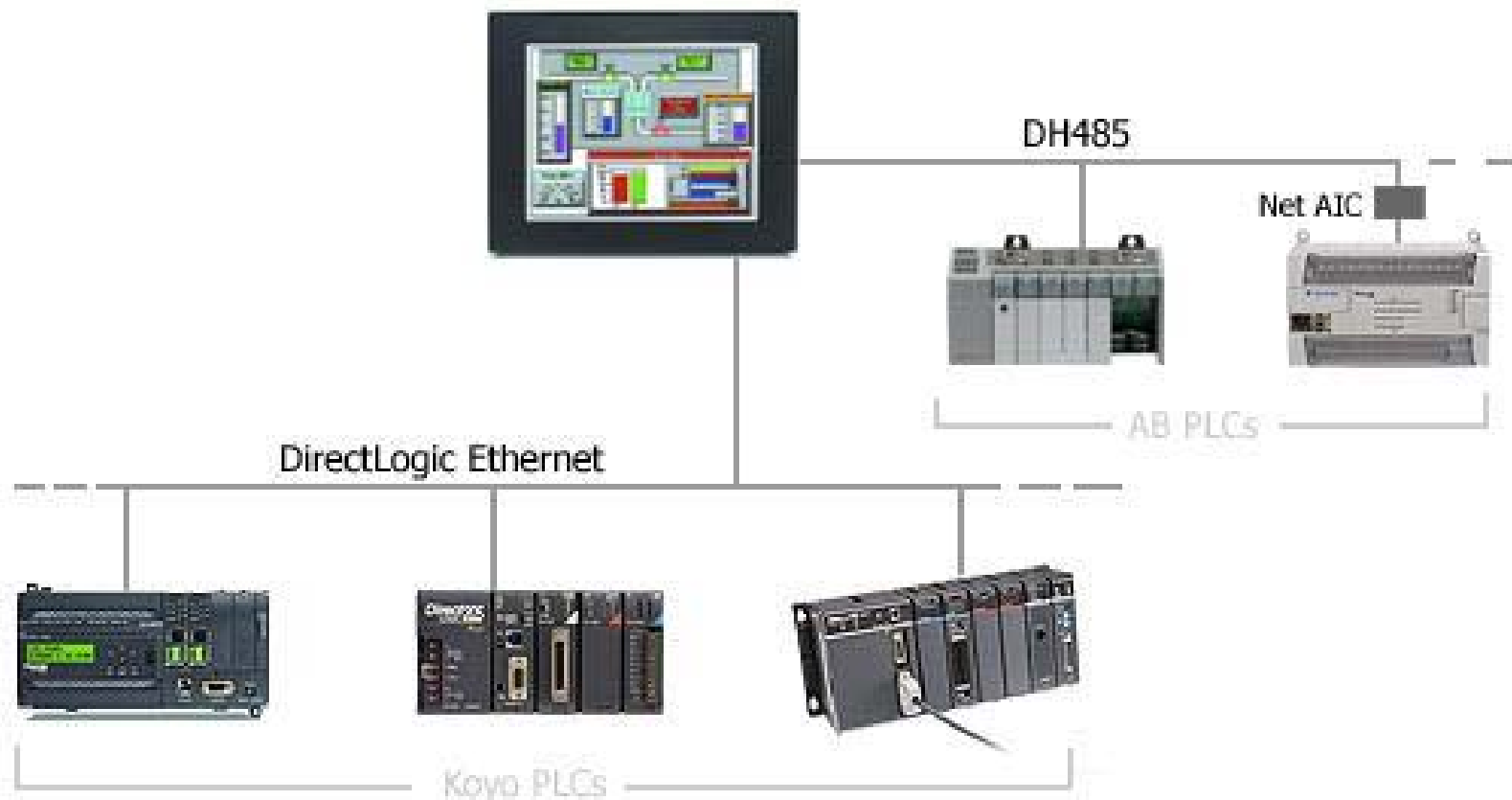
Use Smart Devices to access HMI

Remote HMI App



HMI acts as a gateway between different PLCs

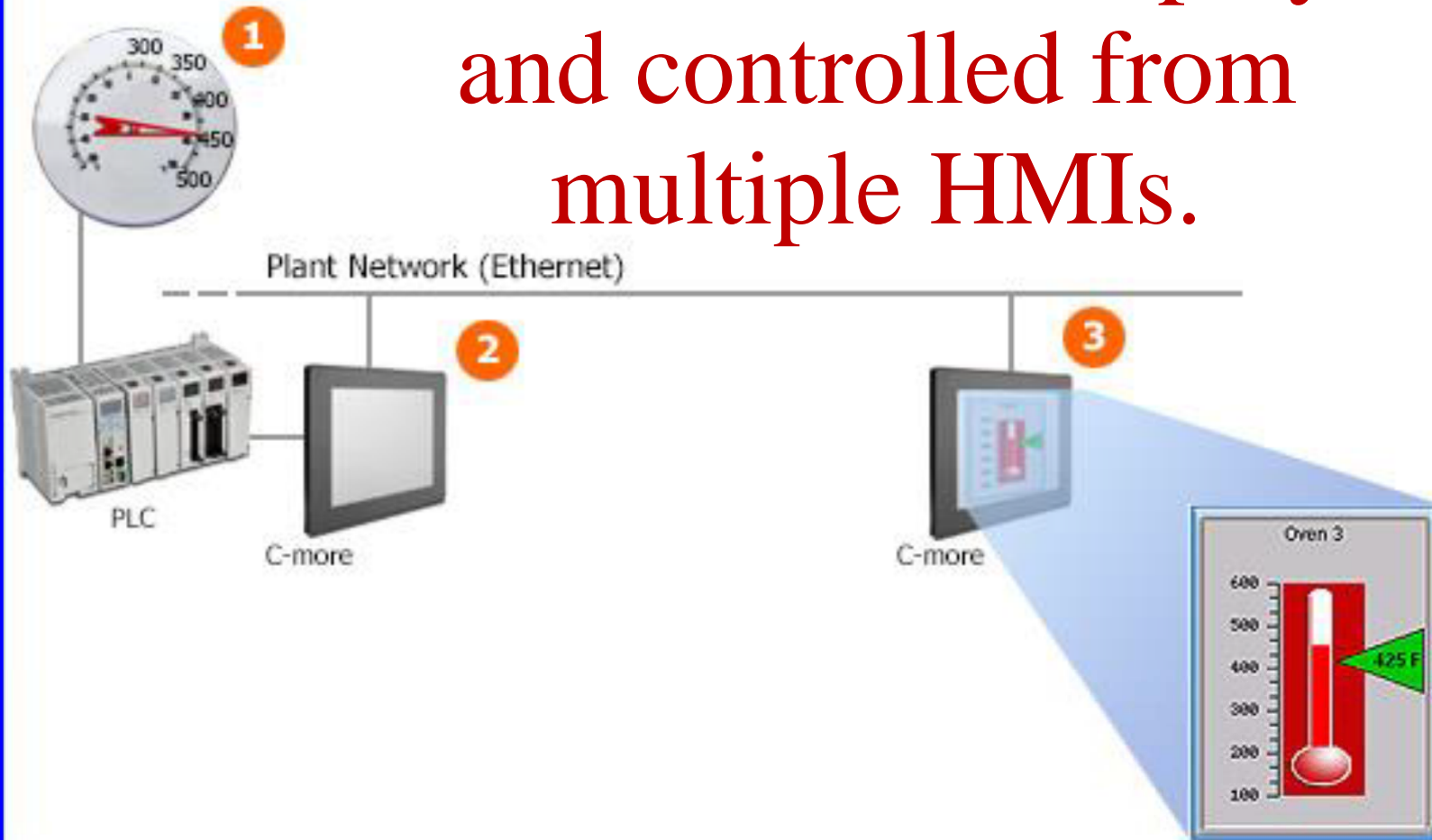
PLC Connection Diagram



C-more can even act as an interpreter or "protocol bridge" between two different PLC brands!

Panel Pass-through

PLC data can be displayed and controlled from multiple HMIs.



1 Temperature is monitored by PLC connected to first C-more touch panel

2 First C-more panel passes-through the data to a second C-more touch panel

3 Second C-more panel accesses (and displays) the PLC data via the Ethernet connection

While dosing the Tank, can connect to remote PS through HMI to control pump.

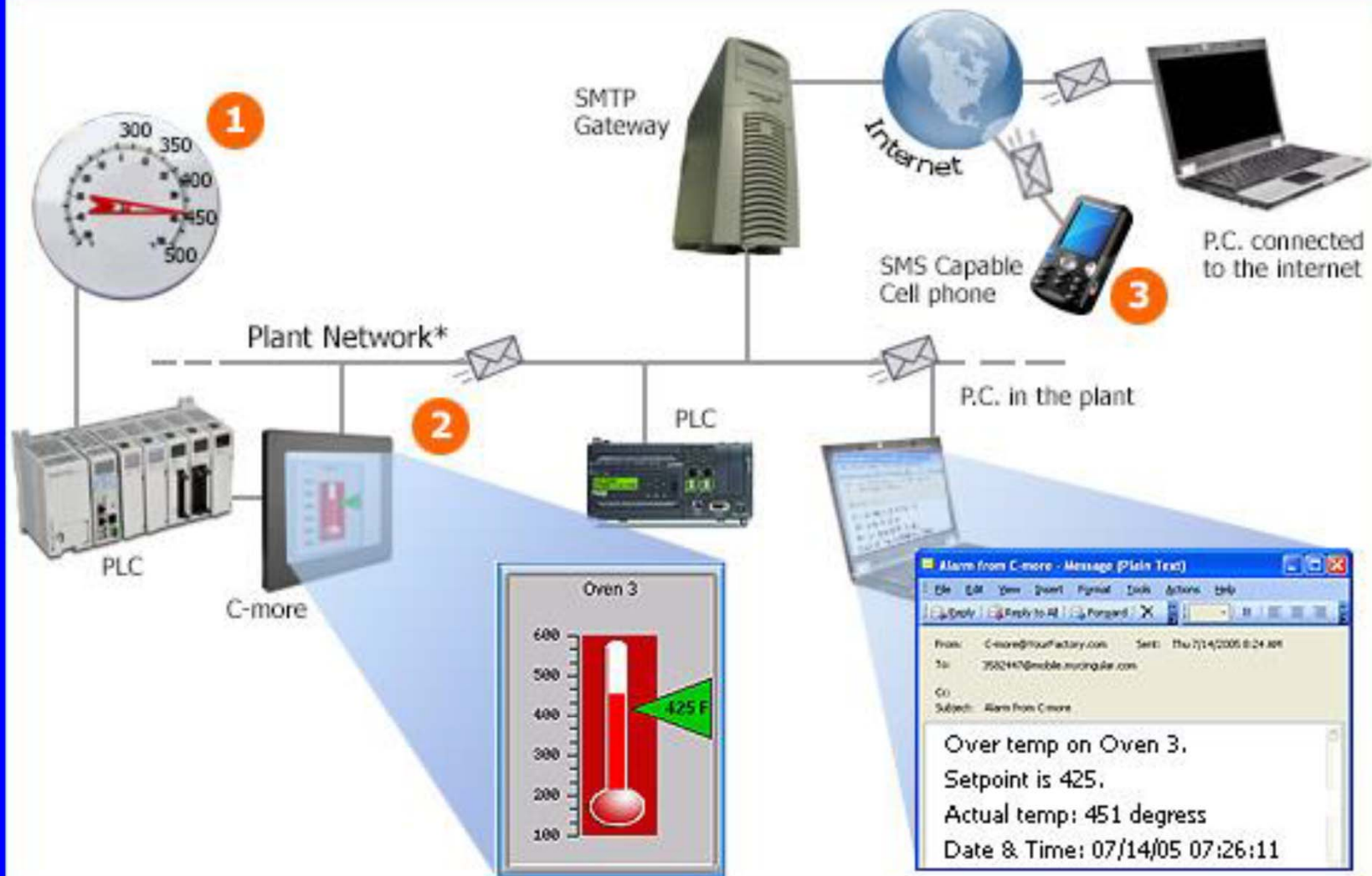


Remote PS



Tank Site

C-more can send e-mail



1 Temperature exceeds allowable range

2 C-more logs an alarm and sends an e-mail to a list of addresses

3 E-mail notification to various devices, both in the plant and on the internet

Stores PLC data on USB flash Drive or SD card.

C-more has a built-in FTP server



1 C-more can collect and log data from the PLC to an SD card or a USB Flash drive. Large Flash devices allow storage of large amounts of data

2 C-more can also capture screens periodically, or when an event occurs, and store these on Flash drives

3 Use FTP to request the data at any time from any connected PC (password protection possible)

PLC-HMI summary

- Local PLC-HMI application
 - Allows integration of PLC data and control.
 - Remote Connect for full control.
 - Remote Screen development and configuration
 - Serves as a back-up SCADA.
 - Alarm display and notification.
 - Displays up to 255 screens.
 - Trend and stores data.
 - Wireless connection using PC and smart devices

End

bobby.fortuno@helixwater.org

(619) 944-1036

Remotely Connect to PLC

DirectSOFT 5 Programming - helix1a main plc 7_29_15 - [Ladder View]

File Edit Search View Tools PLC Debug Window Help

Read Write New Open Backup EDIT MODE Accept Cut Copy Paste Find Next Browse DPTs Zoom ...Out www DSP Help

Read Write Status Data Value Mode Info Sysvar

Ladder View

EDIT MODE

Accept

F2 F3 ^F2 ^F3 ShHF2 ShHF3 = ! > < Contact Coil Box

Output

For Help, press F1

OK Online:HELIX 1 A Run 02214/07680 06 0269:002:002

COMBO TANK FL... cmore remote ... Helix1APS [10.19... VIDEO - Window... DirectSOFT 5 Pro... 49 9:14 AM 8/3/2015

PUMP CALL LOGIC. The following rungs sets-up the pump calls in central manual or central auto. PUMPS are automatically rotated. Control relays C1 for pump1, C2 for pump2, C3 for pump3 @MAIN PLC corresponds to C61, C62, C63 AND C64 respectively @ O6 PLC1, PLC2, PLC3 and PLC4.

FIRST CALL LOGIC. WHEN LEVEL IS BELOW THE FIRST CALL SETTING TMR 0 IS ACTIVATED AND TIMES OUT, C124 IS TRIGGERED AND INCREMENT CTA3 TO SET UP NEXT PUMP TO CALL.

ON FOR HELIX1, OFF FOR GROSMTONTANK LEVEL
c2630/v13150.10
TANK SELECT BIT
B5050.10

LOSS OF TANK LEVEL SIGNAL
INTERLOCK
C47

TMR
1ST CALL TD
T0
K800 0

4

2572

1ST CALL ON AT
2457

1940

HELIX 1TANK LVL

1ST CALL ON AT
2457

ON FOR HELIX1, OFF FOR GROSMTONTANK LEVEL
c2630/v13150.10
TANK SELECT BIT
B5050.10

5

1ST CALL TD
T0

STOP ALL PUMPS
C150

1ST CALL
C120

INCREMENT CTA3 @1ST CALL
INCREMENT CTA3
C454

PV System

Battery		Array	
Battery Voltage	28.30 V	Array Voltage	30.79 V
Target Voltage	28.30 V	Array Current	6.3 A
Charge Current	6.9 A	Sweep Vmp	28.73 V
Charge State	Absorption	Sweep Voc	33.96 V
Output Power	194 W	Sweep Pmax	274 W

Temperatures		Resettable Counters	
Battery	25 °C	Amp Hours	18808.7 Ah
Heat Sink	29 °C	Kilowatt Hours	516 kWh