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Qatar Foundation: Increasing Operational Visibility at Education City

Georgios Sichanis , SPM , ASTAD

Georgios Sichanis

Senior Project Manager

- Bachelor of Electrical & Automatic Control Systems Engineering
- Project Management Professional (PMP)®
- Certified Automation Professional (CAP)®
- ASTAD Project Management
- PMC for Qatar Foundation
- georgios.sichanis@astad.qa

Qatar Foundation

Unlocking Human Potential

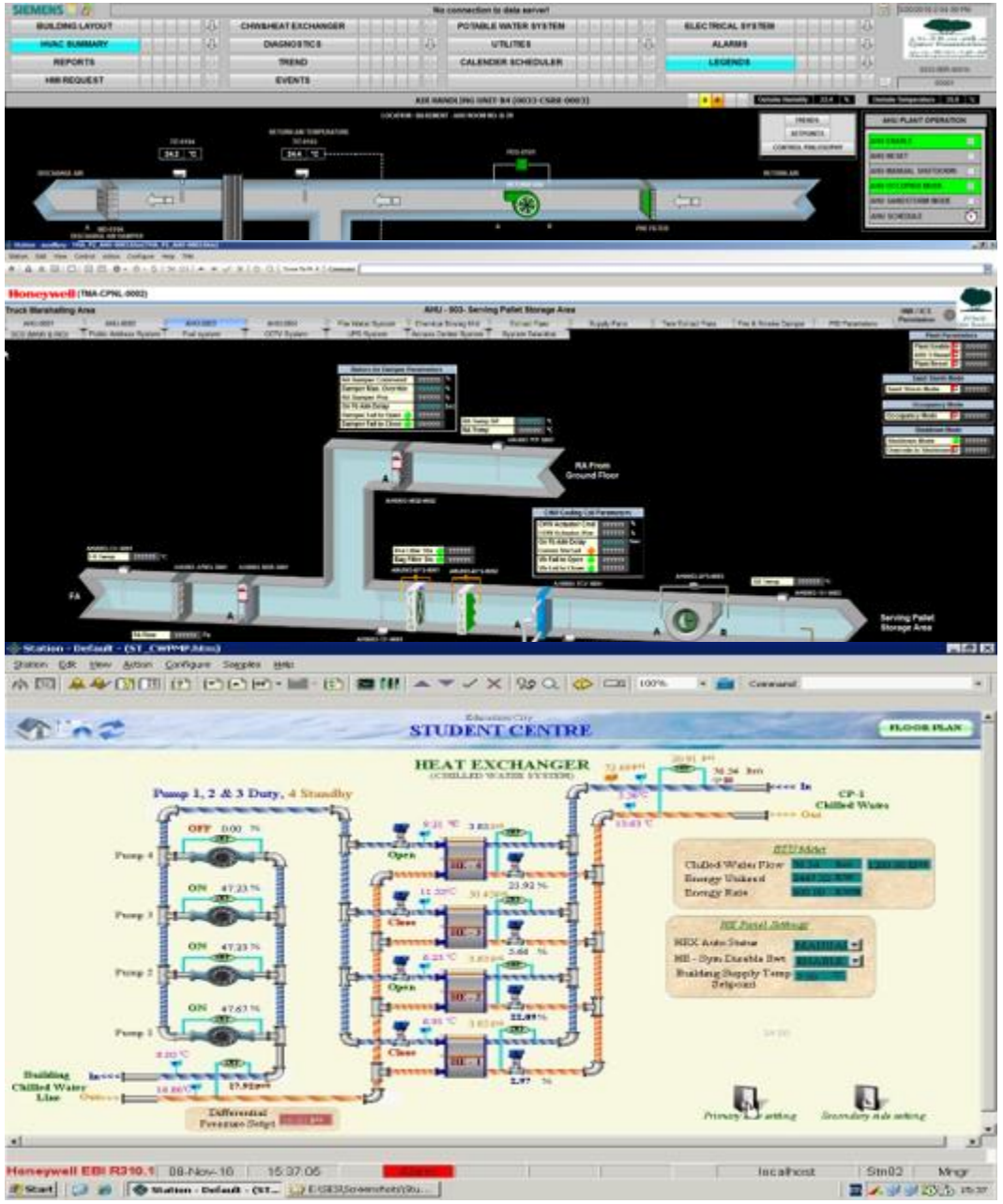
مؤسسة قطر
Qatar Foundation

- Qatar Foundation for Education, Science and Community Development (QF) was established in 1995 by:
  - His Highness, The Father Emir, Sheikh Hamad Bin Khalifa Al Thani
  - Her Highness, Sheikha Moza Bint Nasser Al Misnad (Chairperson)
- QF is a non-profit organization where centers and programs focused on education, research, innovation, and community development intertwine for the benefit of Qatar, and the world.

AVEVA

The Challenge

- Many facilities have their local BMS from different manufacturers.
- An OWS from every facility is added in the 2 Central Control Rooms (CCR) of Education City.
- South Campus facilities were connected to CCR 1
- North Campus facilities were connected to CCR 2
- Individual OWS to monitor & control every facility in the CCR has made the CCR very cluttered.
- Manual energy recording and reporting followed
- Not able to determine cooling energy wastages due to improper scheduling and not having energy management is place.
- A lot of manpower were needed to locally monitor & control every facility.



Various BMS at Education City Facilities

Facility Name	OEM	BMS
Central Plant 1	Schneider	Eco Struxure
Central Plant 1 Utility Tunnel		
North Utility Tunnel	Honeywell	EPKS
Central Plant 2	Honeywell	EBI
CP2 Utility Tunnel	Honeywell	EBI
TMA	Honeywell	EPKS
Central Plant 3	Honeywell	EPKS
Al Shaqab	Honeywell	EBI
CP4 utility tunnel	Honeywell	EBI
Central Plant 4	Honeywell	EBI
Central Plant 5	Siemens	WinCC
Central Plant 6	Honeywell	EPKS
South Utility Tunnel	Siemens	WinCC
Central Plant 7	Siemens	WinCC
Convention Centre (QNCC) & QNCC Extension	Honeywell	EBI
QNCC Carpark	Honeywell	EBI
QSTP - ITTC1	Honeywell	EBI
QSTP - ITTC2	Honeywell	EBI
College of Media and Communication (CMC)	Siemens	WinCC
School of Islamic Studies (QFIS)	Honeywell	EBI
Male Student Housing	Honeywell	EBI

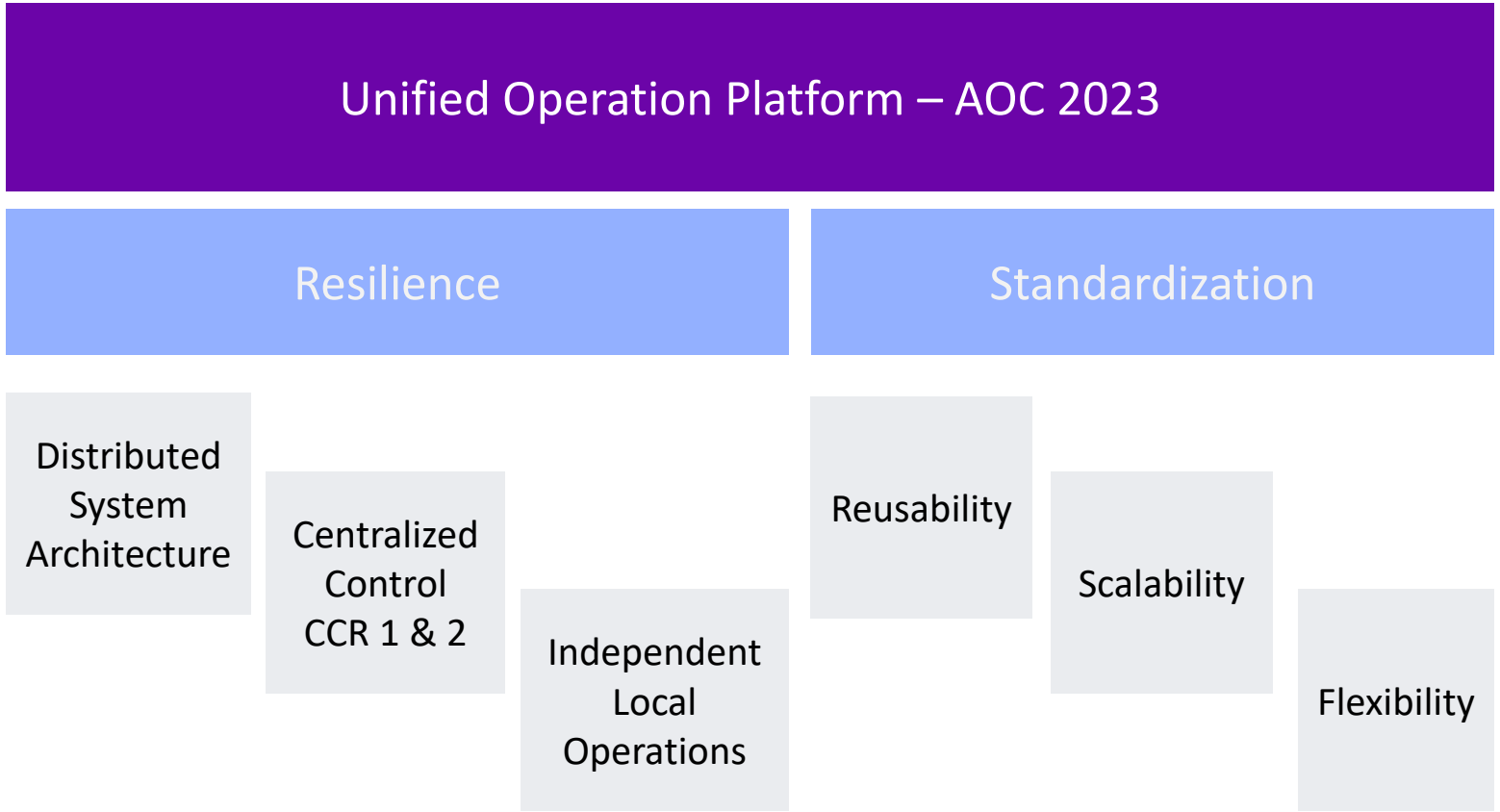
Facility Name	OEM	BMS
Female Student Housing	Honeywell	EBI
AWSAJ		
Strategic Studies Centre (HQ -SSC)	Siemens	WinCC
QF Headquarters	Siemens	WinCC
Central Library/ QNL	Honeywell	EPKS
Student Centre	Honeywell	EBI
Oxygen Park Area	Siemens	WinCC
NEUCP	Siemens	WinCC
TAMU	Honeywell	EBI
Tech 4	Honeywell	EBI
Research & Development Complex	Siemens	WinCC
VCU	Honeywell	EBI
Western Green Spine	Schneider	Citec SCADA
West Car Park	Siemens	WinCC
Carousel	Schneider	Wonderware
School of Foreign Service (GU)	Siemens	Desigo
Aljazeera Children	Schneider	Eco Struxure
College of Liberal Arts & Science (LAS)	Schneider	Eco Struxure
Ceremonial Court - Trend	Schneider	Eco Struxure
College of Medicine (WCMC)	Schneider	Eco Struxure
Carnegie Mellon University	Honeywell	EBI

Design Guidelines & Principles

The Master Solution incorporates existing guidelines and standards from industry best practices, AVEVA Software development practices, and Qatar Foundation Standards to deliver the SCADA system.

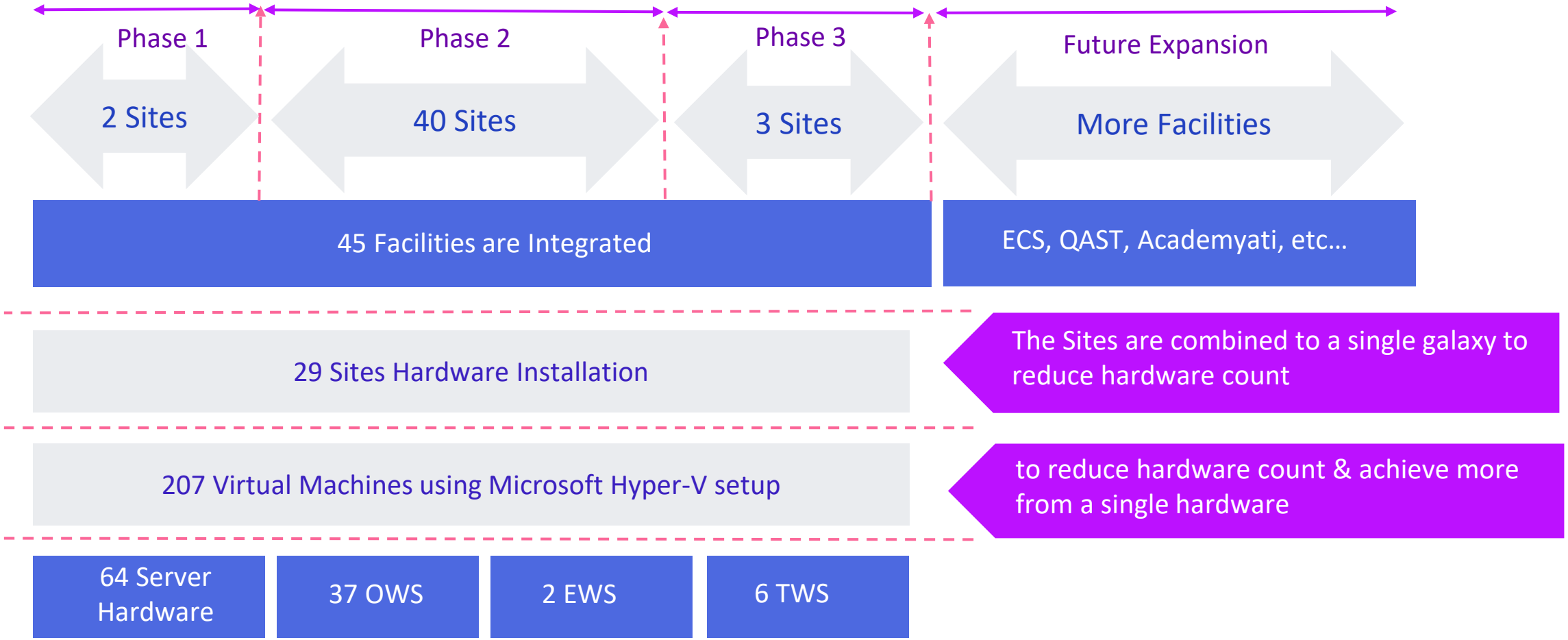
Design Guidelines & Principles

- Centralized Control & Independent local operations
- Simplify and streamline
- Accessible by operators from remote
- High Availability
- Redundant solution
- Standardizing operations
- Minimizing energy usage through scheduling
- Scalable for future expansion

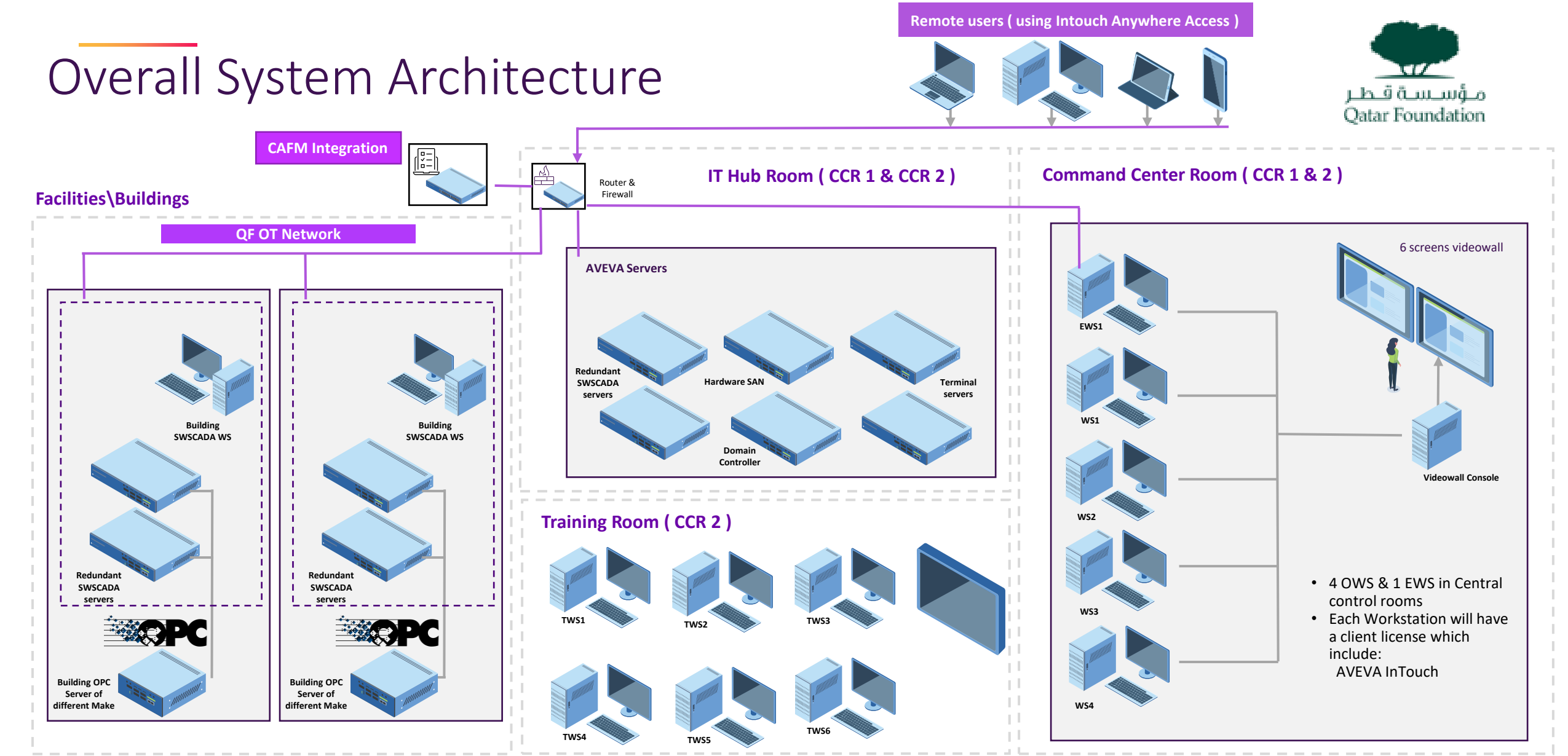


Project Overview

45 facilities are Integrated to SCADA with independent local control & Centralized control from CCR



Overall System Architecture



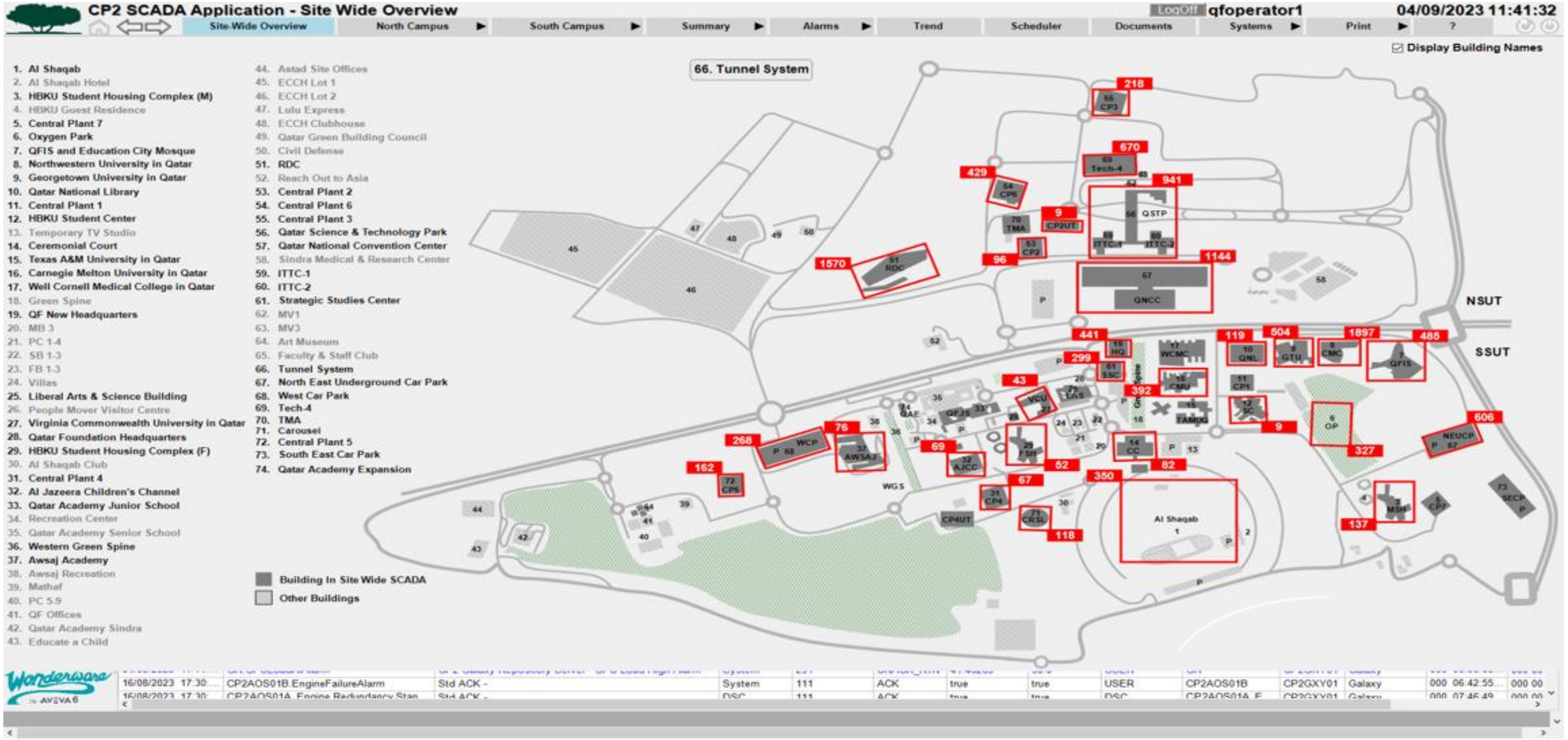
- 316,000 Data Points.
- Upgraded to 500,000 data points in total for future expansions.

Application Structure Overview

The following table lists the Hierarchy of the SCADA application.

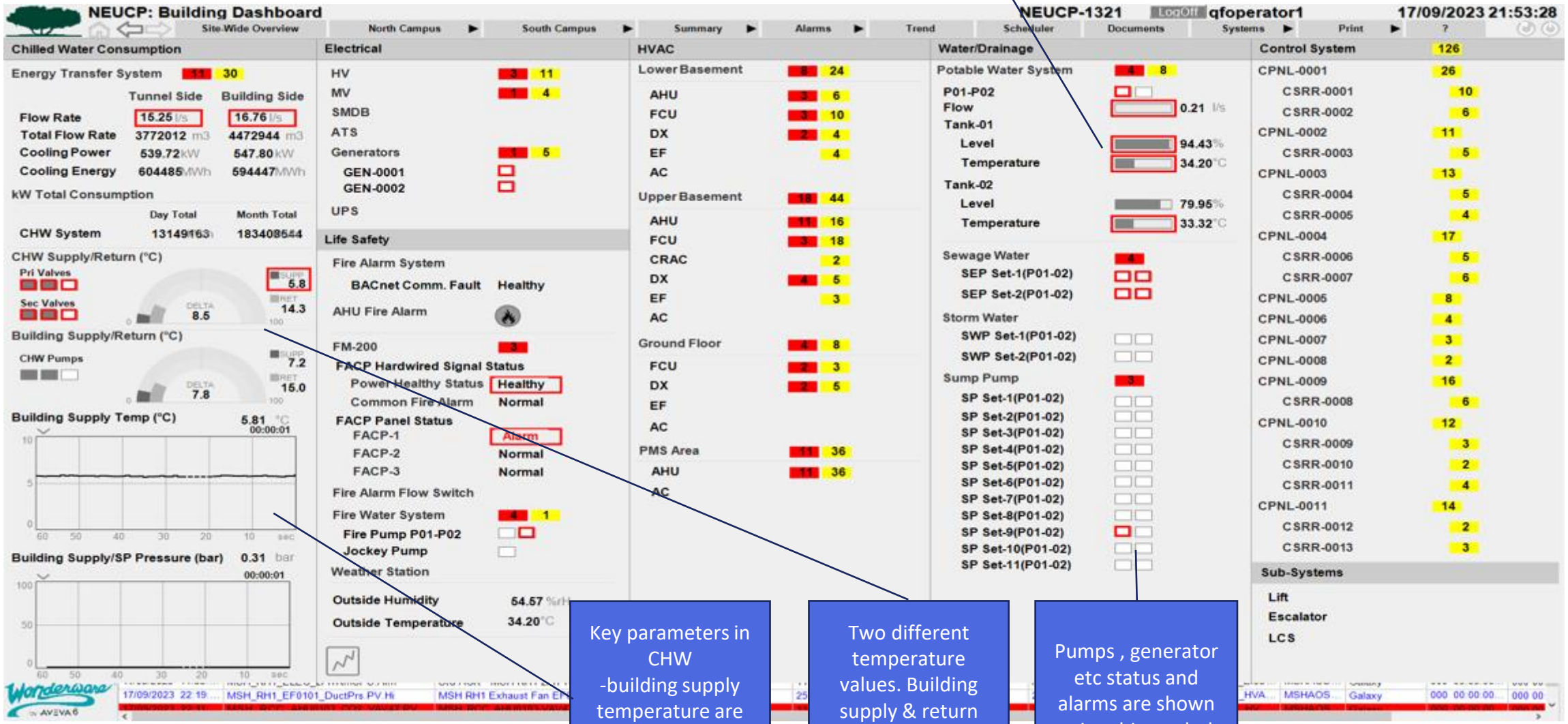
Style	Level	Description
Overview Map	0	Level 0 screen shows The Site Wide Overview gives a bird's eye view on Education City Masterplan where the facilities are mimicked as well as the total number of alarms associated with each facility.
Facility Dashboard	1	Level 1 Building Dashboard shows KPIs for the entire facility , sub sections includes CHW , HVAC , Electrical , Life safety etc…
Equipment Dashboard	2	Level 2 screens contain objects depicting KPIs for equipment in each facility / floor.
Process Graphics	3	Level 3 screens typically provide detail on a specific piece of equipment, process, or area.
Faceplate	4	Level 4 screens are pop-up style screens that are displayed when the user clicks on a component.

Level 0 – Site Wide Overview



Level 1 – Building Dashboard

Water tank level, pressure is displayed using this bar indicator

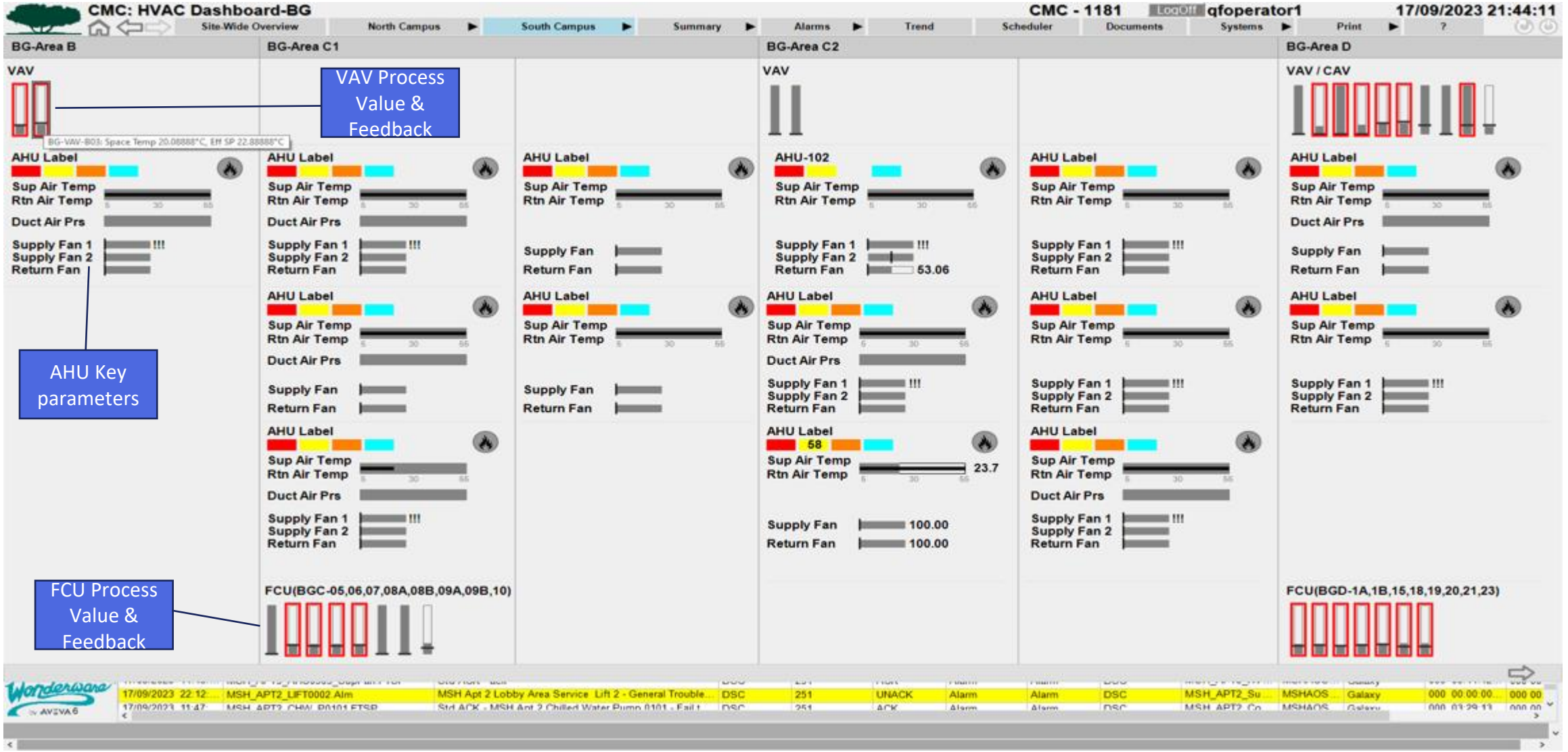


Key parameters in CHW -building supply temperature are displayed in the form of trend.

Two different temperature values. Building supply & return and its difference (delta) is displayed.

Pumps , generator etc status and alarms are shown using this symbol

Level 2 – Equipment Dashboard



Level 3 – Process Graphics

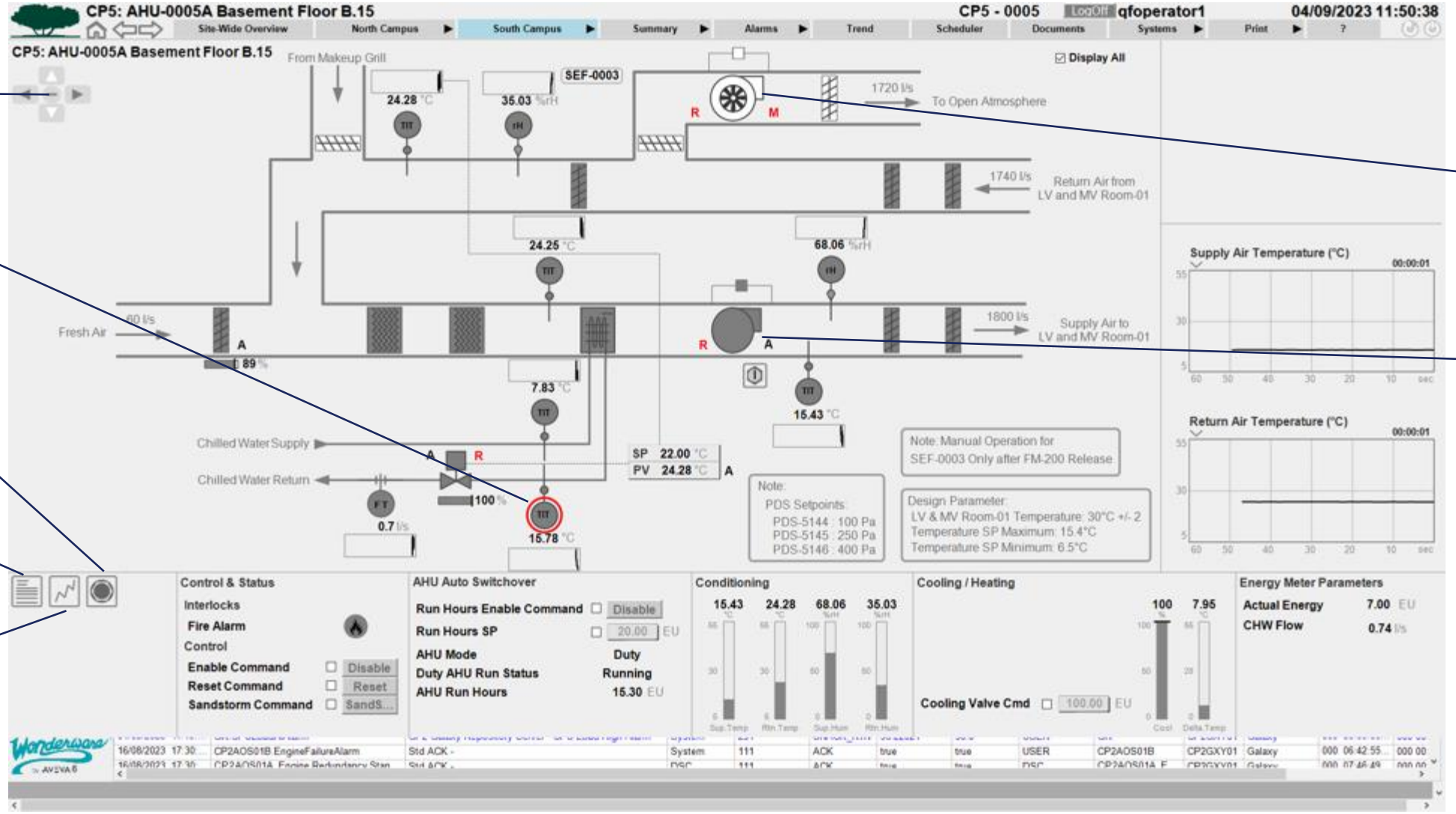
Star Navigation

If any alarm is active in the equipment, then a red border appears

Control Faceplate

Document Viewer

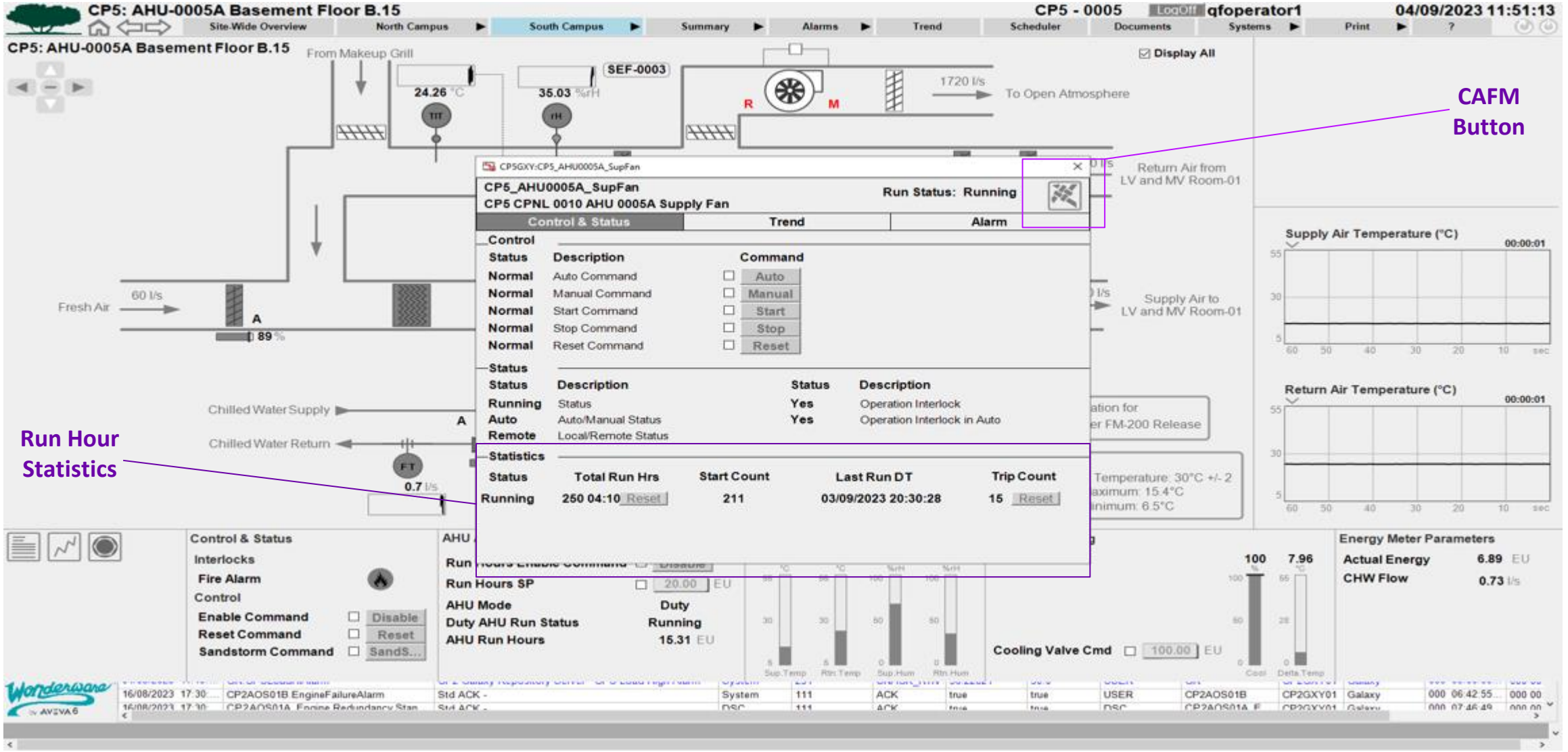
Page Trend



White color displays the equipment is not running

Grey color shows the equipment is running

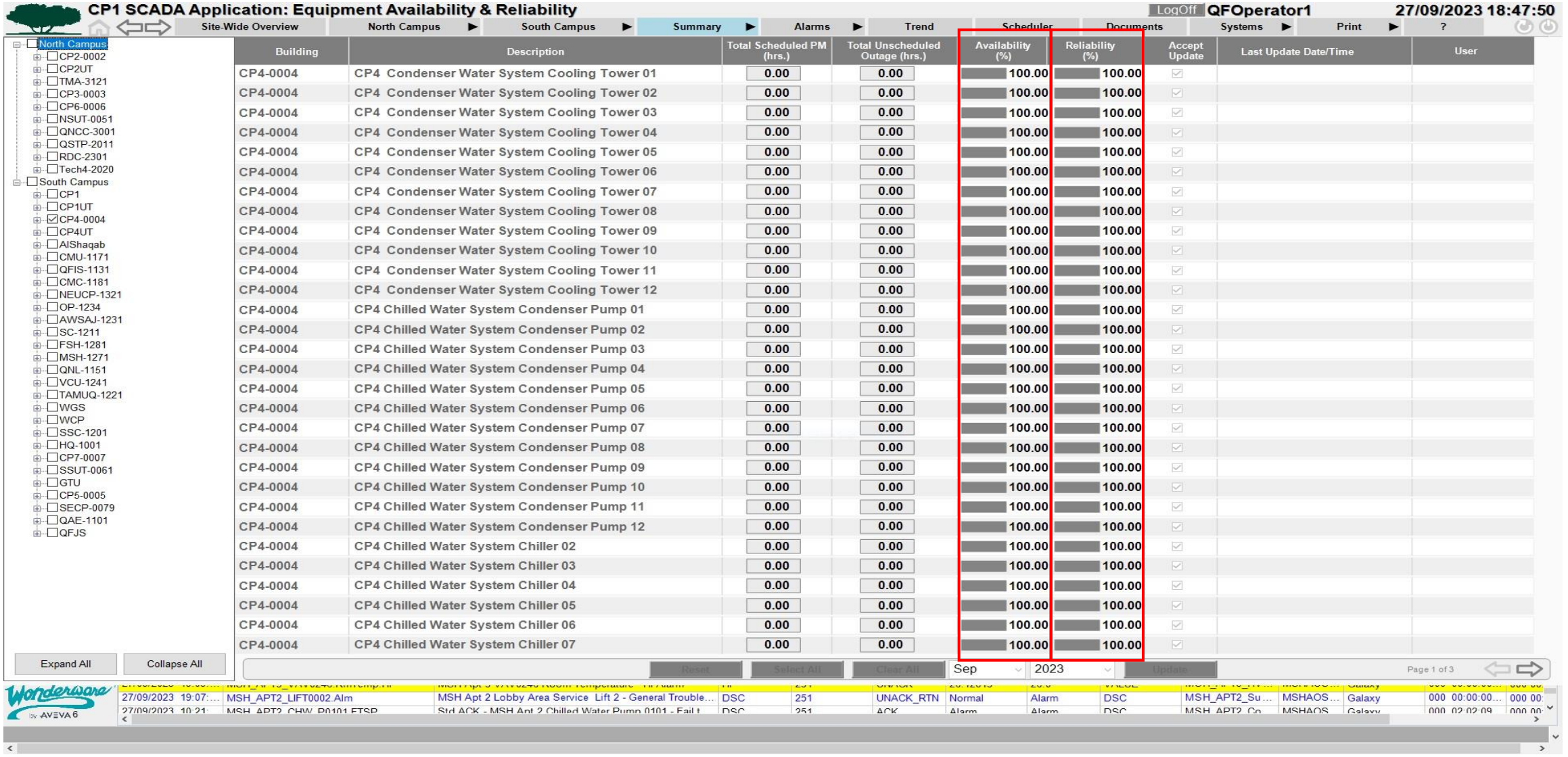
Level 4 – Faceplate



CAFM Button

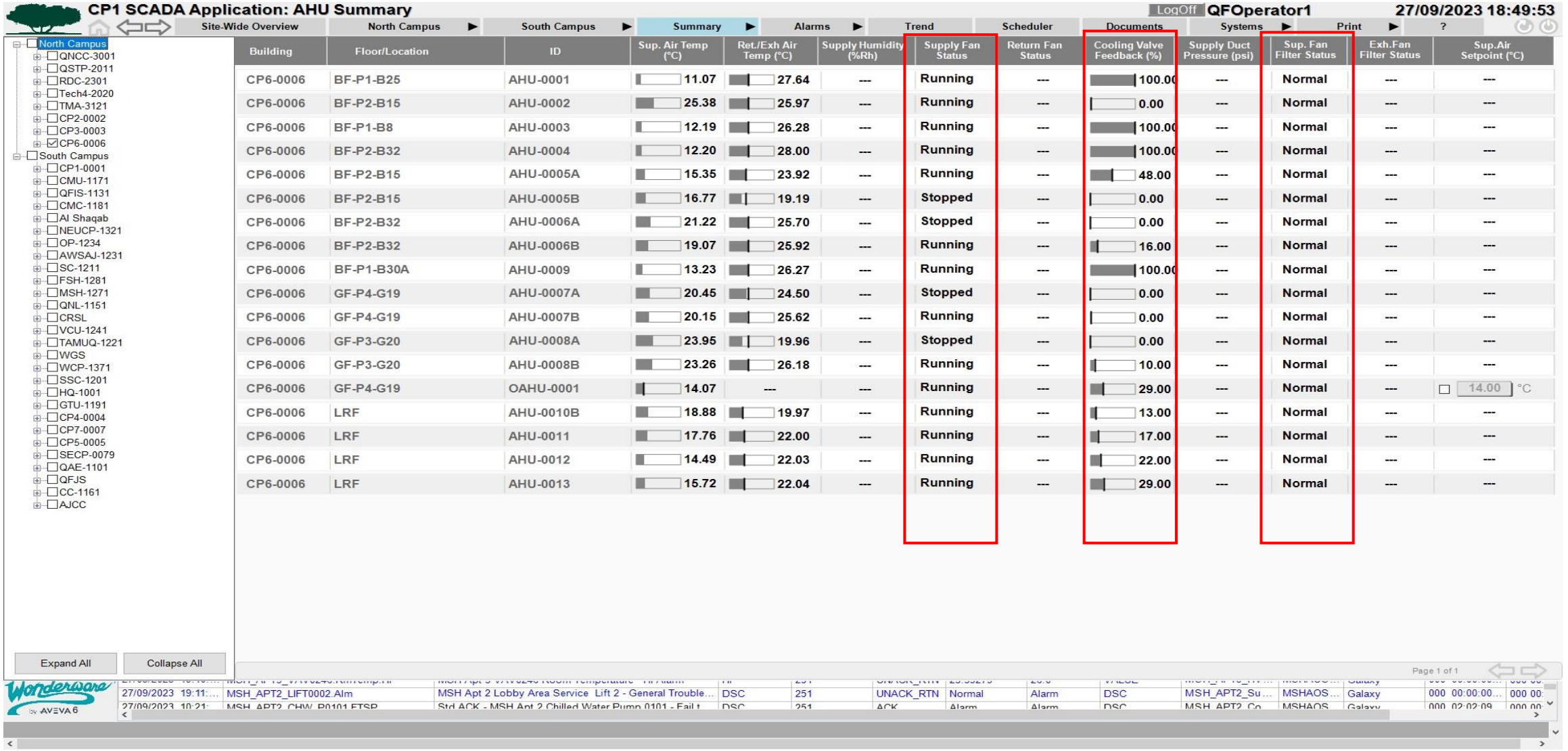
Run Hour Statistics

Better Visibility – Equipment Availability & Reliability



Building	Description	Total Scheduled PM (hrs.)	Total Unscheduled Outage (hrs.)	Availability (%)	Reliability (%)	Accept Update	Last Update Date/Time	User
CP4-0004	CP4 Condenser Water System Cooling Tower 01	0.00	0.00	100.00	100.00	☑		
CP4-0004	CP4 Condenser Water System Cooling Tower 02	0.00	0.00	100.00	100.00	☑		
CP4-0004	CP4 Condenser Water System Cooling Tower 03	0.00	0.00	100.00	100.00	☑		
CP4-0004	CP4 Condenser Water System Cooling Tower 04	0.00	0.00	100.00	100.00	☑		
CP4-0004	CP4 Condenser Water System Cooling Tower 05	0.00	0.00	100.00	100.00	☑		
CP4-0004	CP4 Condenser Water System Cooling Tower 06	0.00	0.00	100.00	100.00	☑		
CP4-0004	CP4 Condenser Water System Cooling Tower 07	0.00	0.00	100.00	100.00	☑		
CP4-0004	CP4 Condenser Water System Cooling Tower 08	0.00	0.00	100.00	100.00	☑		
CP4-0004	CP4 Condenser Water System Cooling Tower 09	0.00	0.00	100.00	100.00	☑		
CP4-0004	CP4 Condenser Water System Cooling Tower 10	0.00	0.00	100.00	100.00	☑		
CP4-0004	CP4 Condenser Water System Cooling Tower 11	0.00	0.00	100.00	100.00	☑		
CP4-0004	CP4 Condenser Water System Cooling Tower 12	0.00	0.00	100.00	100.00	☑		
CP4-0004	CP4 Chilled Water System Condenser Pump 01	0.00	0.00	100.00	100.00	☑		
CP4-0004	CP4 Chilled Water System Condenser Pump 02	0.00	0.00	100.00	100.00	☑		
CP4-0004	CP4 Chilled Water System Condenser Pump 03	0.00	0.00	100.00	100.00	☑		
CP4-0004	CP4 Chilled Water System Condenser Pump 04	0.00	0.00	100.00	100.00	☑		
CP4-0004	CP4 Chilled Water System Condenser Pump 05	0.00	0.00	100.00	100.00	☑		
CP4-0004	CP4 Chilled Water System Condenser Pump 06	0.00	0.00	100.00	100.00	☑		
CP4-0004	CP4 Chilled Water System Condenser Pump 07	0.00	0.00	100.00	100.00	☑		
CP4-0004	CP4 Chilled Water System Condenser Pump 08	0.00	0.00	100.00	100.00	☑		
CP4-0004	CP4 Chilled Water System Condenser Pump 09	0.00	0.00	100.00	100.00	☑		
CP4-0004	CP4 Chilled Water System Condenser Pump 10	0.00	0.00	100.00	100.00	☑		
CP4-0004	CP4 Chilled Water System Condenser Pump 11	0.00	0.00	100.00	100.00	☑		
CP4-0004	CP4 Chilled Water System Condenser Pump 12	0.00	0.00	100.00	100.00	☑		
CP4-0004	CP4 Chilled Water System Chiller 02	0.00	0.00	100.00	100.00	☑		
CP4-0004	CP4 Chilled Water System Chiller 03	0.00	0.00	100.00	100.00	☑		
CP4-0004	CP4 Chilled Water System Chiller 04	0.00	0.00	100.00	100.00	☑		
CP4-0004	CP4 Chilled Water System Chiller 05	0.00	0.00	100.00	100.00	☑		
CP4-0004	CP4 Chilled Water System Chiller 06	0.00	0.00	100.00	100.00	☑		
CP4-0004	CP4 Chilled Water System Chiller 07	0.00	0.00	100.00	100.00	☑		

Better Visibility – Equipment Summary



Water Meter Management

SWSCADA Flow Meter Report(Daily) - ALSQB

Report Period : 25/08/2023 12:59 PM To 26/08/2023 01:00 PM

DAILY FLOW (l/s)

Item Name	Min	Max	Average
SSUT_ALSQB_FM1_FR.PV	0.93	17.86	8.51
SSUT_ALSQB_FM2_FR.PV	-0.95	91.23	26.57

DAILY TOTAL (m3)

Item Name	Total
SSUT_ALSQB_FM1_FR.Tot	733.47
SSUT_ALSQB_FM2_FR.Tot	2287.72

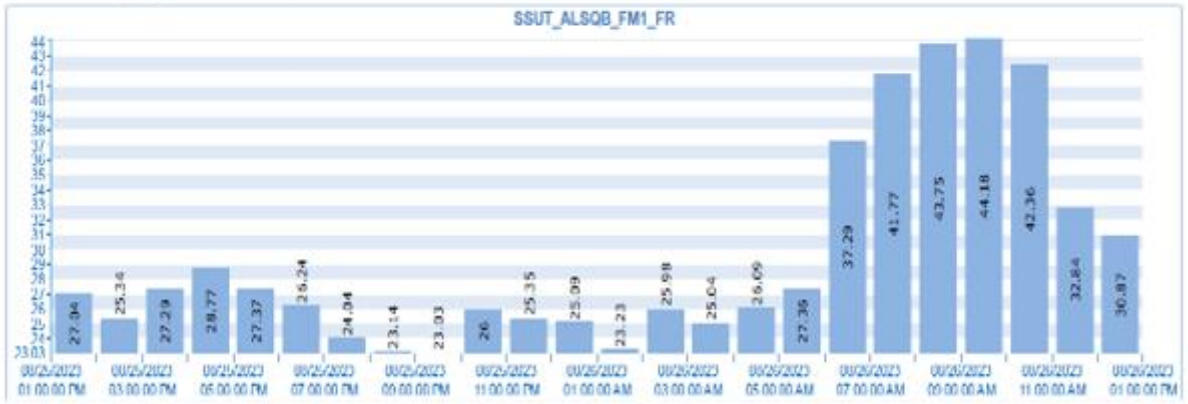
HOURLY TOTAL (m3)

Time	SSUT_ALSQB_FM1	SSUT_ALSQB_FM2	SysMin	SysHour
25/08/2023 14:00:00	27.04	5.10	0.00	0.00
25/08/2023 15:00:00	26.43	32.02	0.00	1.00
25/08/2023 16:00:00	28.34	53.34	0.00	1.00
25/08/2023 17:00:00	29.79	143.23	0.00	1.00
25/08/2023 18:00:00	28.36	118.51	0.00	1.00
25/08/2023 19:00:00	27.32	101.45	0.00	1.00
25/08/2023 20:00:00	25.04	76.25	0.00	1.00
25/08/2023 21:00:00	24.21	122.38	0.00	1.00
25/08/2023 22:00:00	24.09	20.57	0.00	1.00
25/08/2023 23:00:00	27.06	71.06	0.00	1.00
26/08/2023 00:00:00	26.37	114.31	0.00	1.00
26/08/2023 01:00:00	26.12	68.85	0.00	0.00
26/08/2023 02:00:00	24.31	162.63	0.00	1.00
26/08/2023 03:00:00	27.04	171.20	0.00	1.00
26/08/2023 04:00:00	26.07	204.32	0.00	1.00
26/08/2023 05:00:00	27.10	257.80	0.00	1.00
26/08/2023 06:00:00	28.41	146.33	0.00	1.00
26/08/2023 07:00:00	38.29	76.33	0.00	1.00
26/08/2023 08:00:00	42.80	100.47	0.00	0.00
26/08/2023 09:00:00	44.81	161.97	0.00	0.00
26/08/2023 10:00:00	45.25	44.89	0.00	0.00
26/08/2023 11:00:00	43.38	11.29	0.00	0.00
26/08/2023 12:00:00	33.93	13.23	0.00	0.00
26/08/2023 13:00:00	31.93	10.19	0.00	0.00

SWSCADA Flow Meter Report(Daily) - ALSQB

Report Period : 25/08/2023 12:59 PM To 26/08/2023 01:00 PM

HOURLY TOTAL (m3)

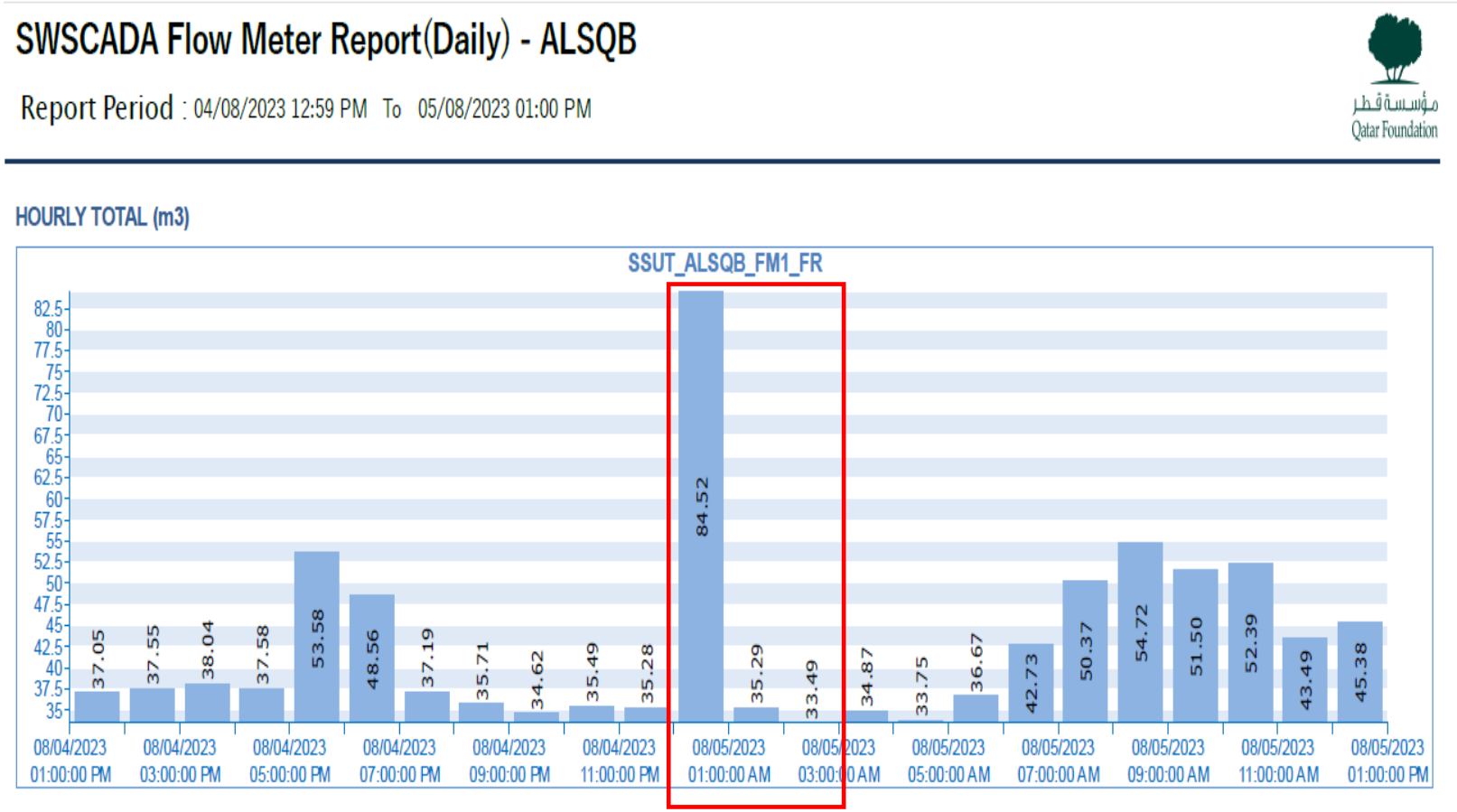


HOURLY TOTAL (m3)

Water Meter Management

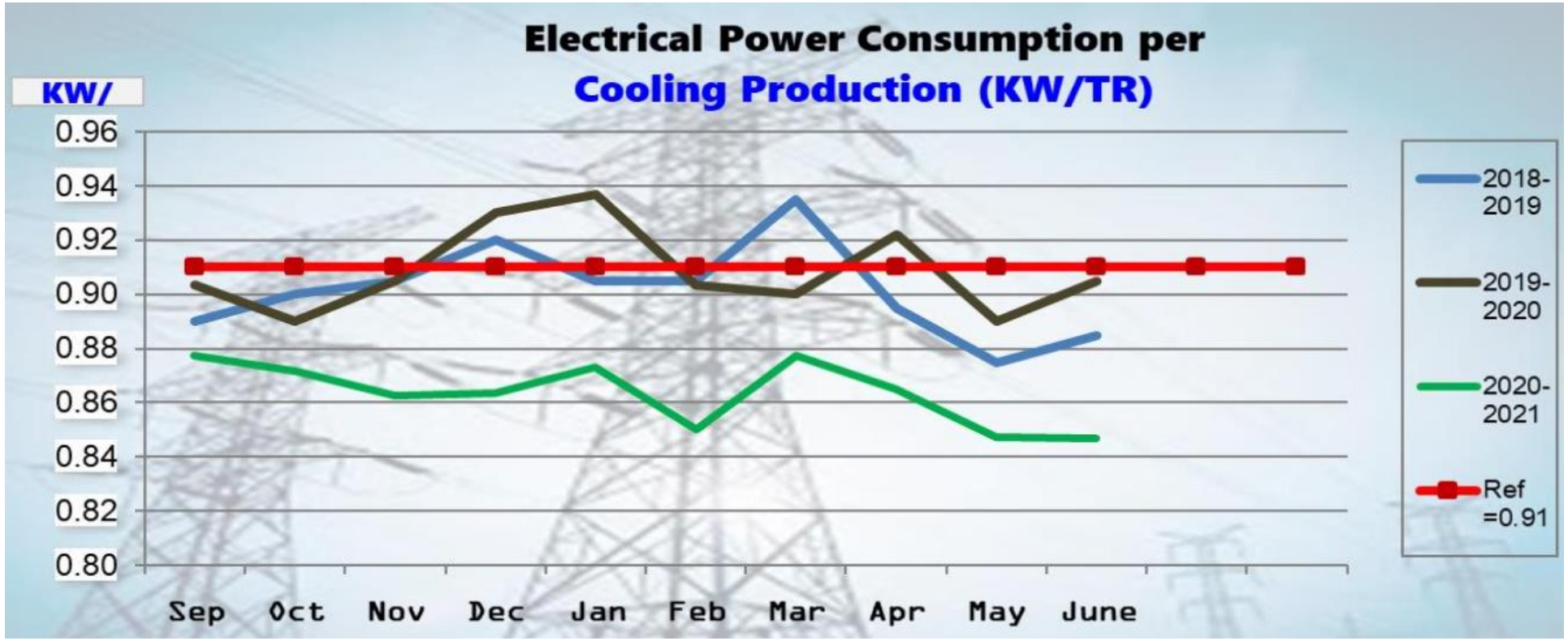
QF were able to identify a leakage in one of the sub header lines on the 5th of August 2023 utilizing the High Alarm set for Al Shaqab Flow meter

- Facilities water usage at night is less compared morning due to unoccupancy.
- Average water usage at Al Shaqab facility is around 35 m^3/Hr at night.
- On the 5th August 2023 at night water usage peaked to 84 m^3/hr due to a leakage in the sub header.
- High flow alerted the remote operator on his cell phone, and local operators were able to bypass the line and avoid huge wastage and cooling water.



Optimum Energy Utilization

Electrical Consumption is considerably reduced and Chiller Plant efficiency has improved from previous years average from 0.91 kW/TR down to 0.86 KW/TR leading to 5.5 % cost reduction to QF



- Performance of the District Cooling Plants and Energy Transfer Stations are continuously monitored 24/7.
- Real time diagnostics of all operating systems and equipment for higher reliability and lower operating costs.

Reduction of Education City carbon footprint through optimum energy consumption

Smart Cities & Infrastructure | Education City

Challenge

- 12 sq km campus with 45+ buildings including educational, hospital, recreational, industrial, and sports facilities.
- Diverse makes and models of existing controls across facilities with inconsistency visualization, trending, and reporting interfaces.
- Difficulty to control and monitor all operations from centralized control rooms.

Solution

- Deployed AVEVA Operations Control to streamline process visibility and centralized control. Utilizing a high availability architecture design enabling operation from two command centers interconnected throughout all facilities.

Results

- Centralized control and independent monitoring & Control for over 45+ facilities
- Better visibility to information has led to 5.5 % reduction in energy consumption, optimum energy utilization, and enabled more reliable operations performance
- Corner stone for smart city transformation at Education City through a unified operation platform
- Streamlined operator training due to standardized design and function

"AVEVA Operations Platform aligns Education City with our leadership's vision to transform it into a Digital Smart City, controlled from a centralized command center to attain optimum operability and to provide necessary information for decision making for our prestigious facilities to reduce their carbon footprint and O&M costs."

Georgios Sichanis, SPM, ASTAD

AVEVA

Team Members Acknowledgment

Distinctive Appreciation goes to the professional AVEVA team members who have successfully delivered the EPC of SCADA System for Qatar Foundation at Education City.

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- Mohamed Ismail
- Jeremiah Manalastas
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- Lakshminarayana Rao
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- Akshita K
- Siva Parvati V
- Bogati Naga Pushpa
- Purwa Nishikant
- Michelle Klein
- Aravind Deep
- Dana Childs
- Krishna Kant
- Dhruv Naik
- Karan Modgil
- Pulla Rao
- Venkat
- Sandeep Deekonda
- Lalit Yadav
- Sanjiva Reddy
- Sai Teja

Questions?

Please wait for the microphone.

State your name and company.

Please remember to…

Navigate to this session in the mobile app to complete the survey.

Thank you!

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@avevagroup

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Over 20,000 enterprises in over 100 countries rely on AVEVA to help them deliver life's essentials: safe and reliable energy, food, medicines, infrastructure and more. By connecting people with trusted information and AI-enriched insights, AVEVA enables teams to engineer efficiently and optimize operations, driving growth and sustainability.

Named as one of the world's most innovative companies, AVEVA supports customers with open solutions and the expertise of more than 6,400 employees, 5,000 partners and 5,700 certified developers. The company is headquartered in Cambridge, UK.

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