

UMass Medical School Power Plant

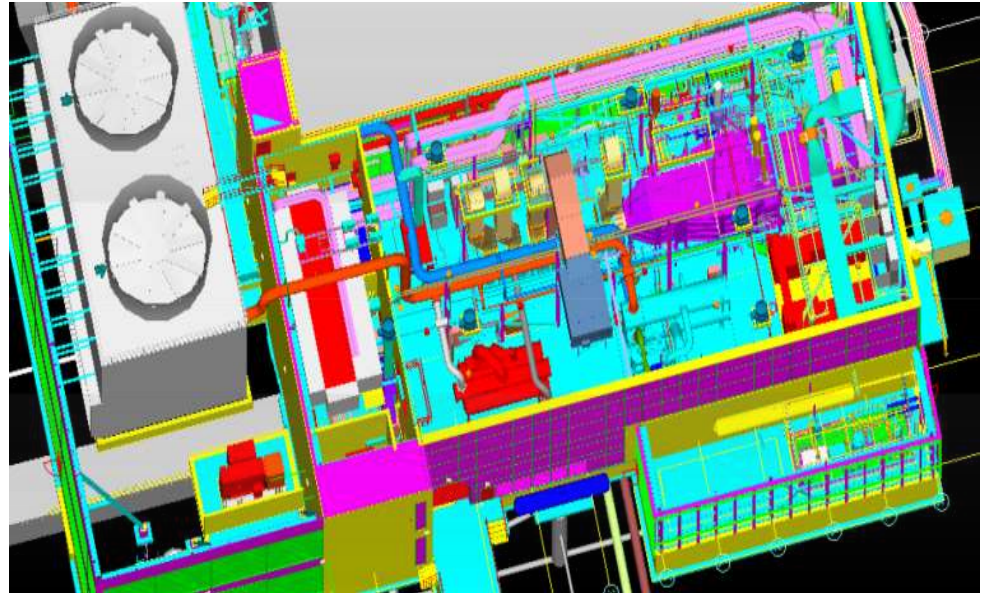
Running a Reliable Campus Combined Heat and Power Plant

June 27, 2015



Agenda


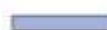
- UMass Medical School
- Our Plant
- Our 2012 Expansion
- Current Operational Issues

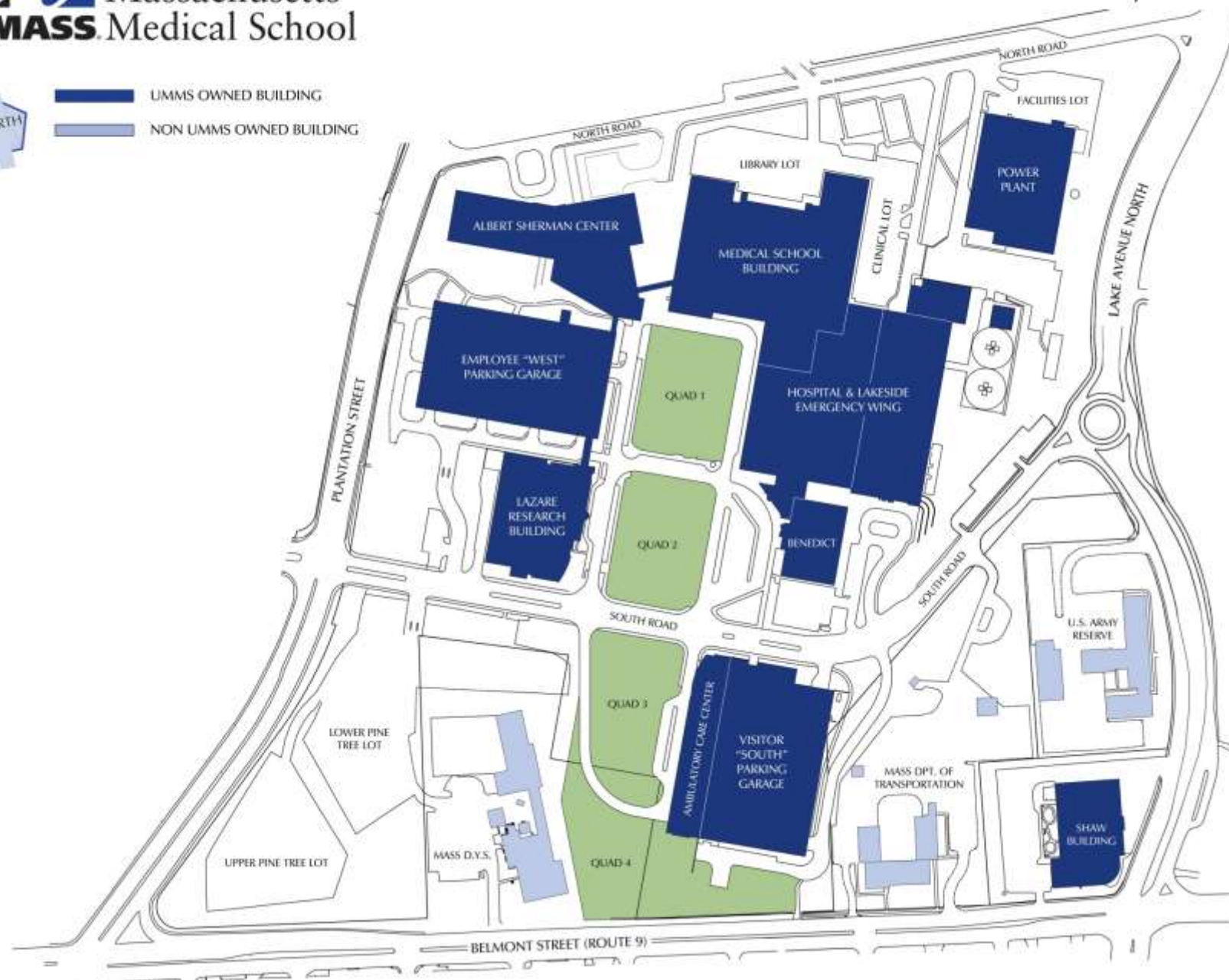


UMass Medical School

- Lake Ave, Worcester Campus
 - 60 acres
 - 3.5MSF of facilities
- Medical School
 - \$1B Enterprise - 3,000 Full and Part Time Faculty
 - 1,000 students (Medical Education, Graduate School of Biomedical Sciences and Grad School of Nursing)
 - Over \$220M in annual research funding
- UMass Memorial Healthcare System
 - Full service healthcare system in central Mass
 - Lake Ave Campus has 400 Registered Beds, Lifeflight, 20 surgery suites, Emergency Department, Radiology, Oncology, Cardio Vascular, Ortho, etc.



-  UMMS OWNED BUILDING
-  NON UMMS OWNED BUILDING



Plant History

- Original Plant Constructed in 1970
 - Served about 2msf of hospital and medical school
 - 3 each 100,000pph boilers, 2 each 2500KW extraction generators, and 3 each 2500 Ton Steam drive Chillers
 - Distribution included an underground steam, chilled water and electrical distribution system.
- First CHP Expansion in 2000
 - Increased NIH Funding and Healthcare Delivery needs – 1MSF of new space
 - New Equipment:
 - 5MW Topping Cycle Turbine (1100psi to 250psi)
 - Two 1100psi, 115,000pph boilers
 - 5,000 Ton Chiller, powered by 50psi steam
 - Cooling Towers and Auxillaries

The Albert Sherman Center

- Biomedical Research and Academic Support Building of 515,000 SF – Nine Stories
- Home to 150 Wet and Dry Principle Investigators in Bioinformatics, Quantitative Health Sciences, Pathology, Microbiology, Cardio Vascular, and Diabetes.
- Inter Professional Center for Experiential Learning and Simulation – simulation labs and standardized patient
- Construction Completed on 12/12/12



2013 Plant Expansion

- 7.5 MW Combustion Turbine
 - Natural Gas, No. 2 Fuel Oil Back-Up
- 60,000 lb/hr 1100psi Heat Recovery Steam Generator
 - Duct-Fired With Natural Gas
 - SCR Type Emissions Control System
- 4,000-ton Electric Drive Chiller
- Supporting Equipment & Systems

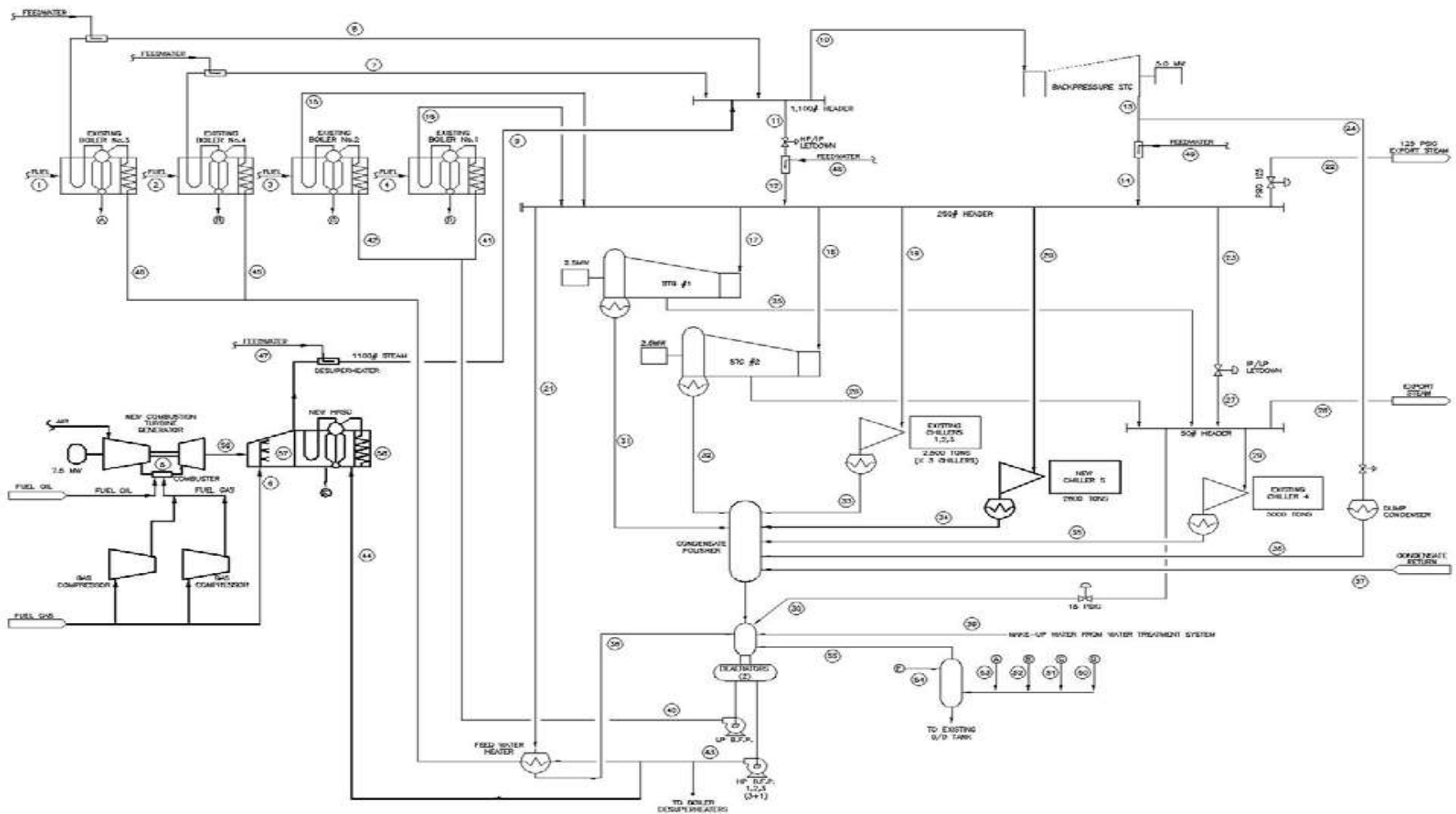
Operational Challenges

- Reliability and Reserves
- Utility Interconnection Agreement and Second Feeder Service Charge
- Upstream Reliability Review
- Environmental Reporting and Regulator Relationships
- Production and Billing Meter Management
- Computerized System Interoperability and Optimization
- Staffing – Talent, Corporate Knowledge, in-house/contracting mix, and graying workforce

Plant Initiatives

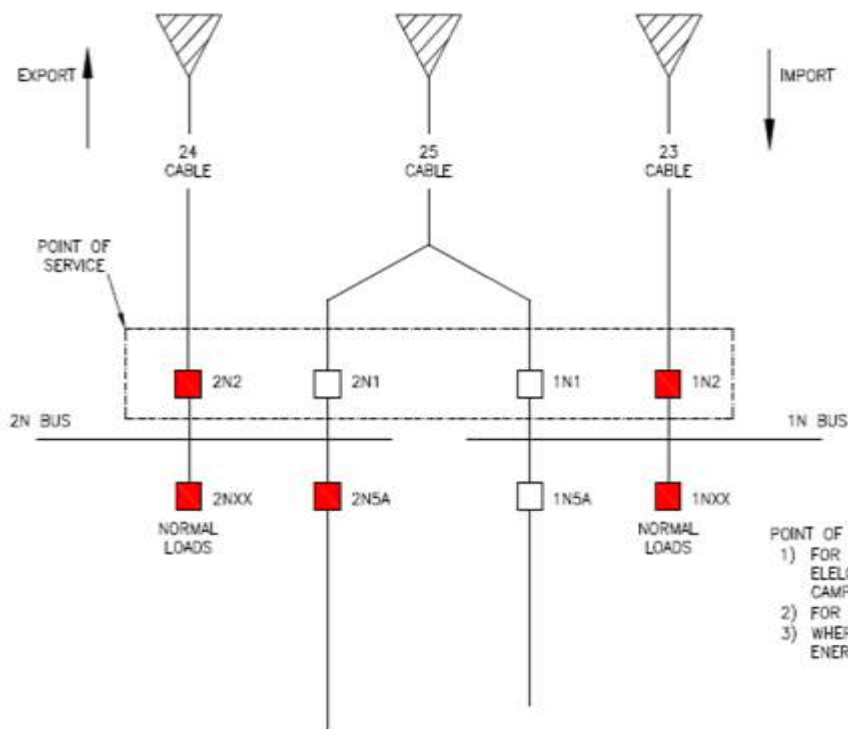
- The Plant as a Business Line – Income Statement, building meters, commodity and capacity rates, & capital treatment
- Focus on energy building performance and alignment of plant and property maintenance teams
- Make – Buy decisions and equipment line up with a diverse set of equipment and fuel switching options
- Capital Planning – get in front of the program teams – assure distribution and plant equipment receive equal equity
- Enhanced Island Mode Electrical Configuration

Reference Slides



Prime Mover Integration Flow Diagram

PRESENT NORMAL OPERATING CONFIGURATION

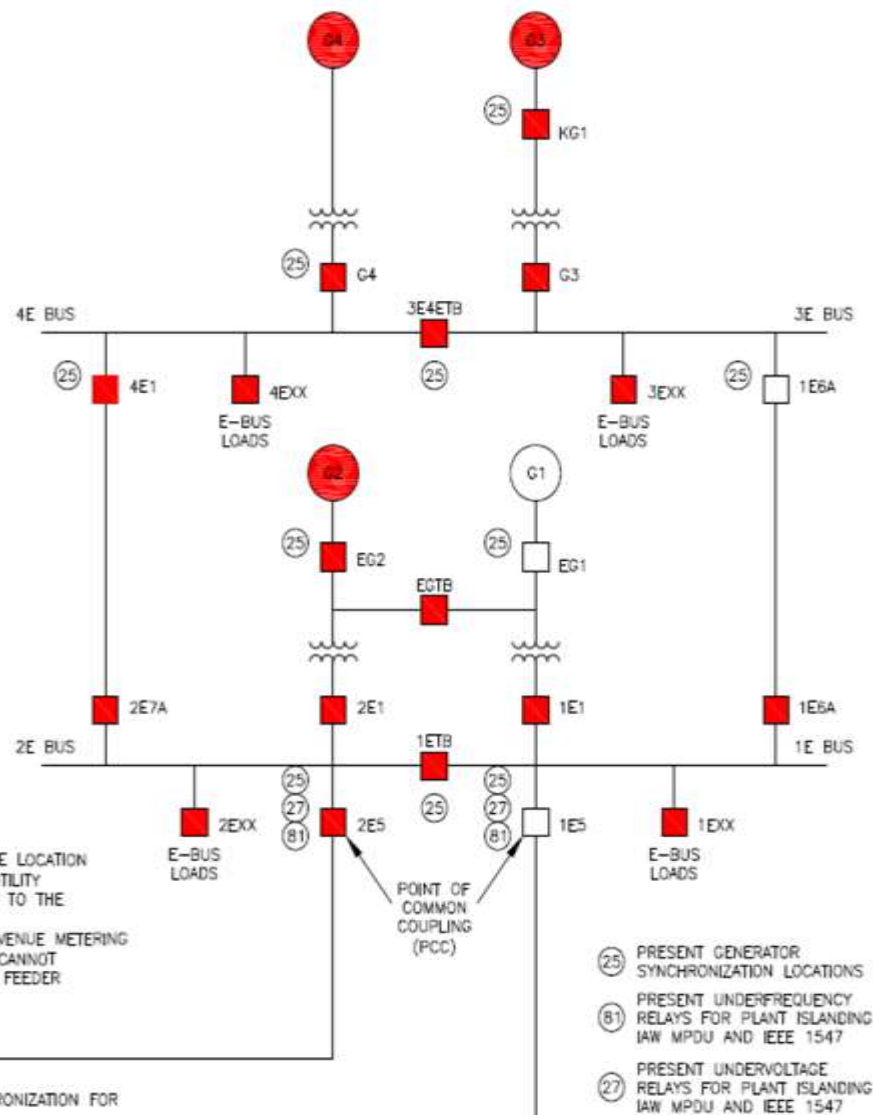


POINT OF SERVICE IS THE LOCATION

- 1) FOR DELIVERY OF UTILITY ELECTRICAL POWER TO THE CAMPUS
- 2) FOR ELECTRICAL REVENUE METERING
- 3) WHERE THE PLANT CANNOT ENERGIZE A UTILITY FEEDER

PCC IS THE LOCATION

- 1) FOR UTILITY SYNCHRONIZATION FOR PLANT GENERATION
- 2) FOR PLANT ISLANDING (UTILITY PROTECTION REQUIREMENTS MDP, IEEE1547, NPCC)
- 3) FOR DETERMINING GENERATION AND BOILER MODES OF OPERATION
- 4) FOR DETERMINING LOAD SHED REQUIREMENTS

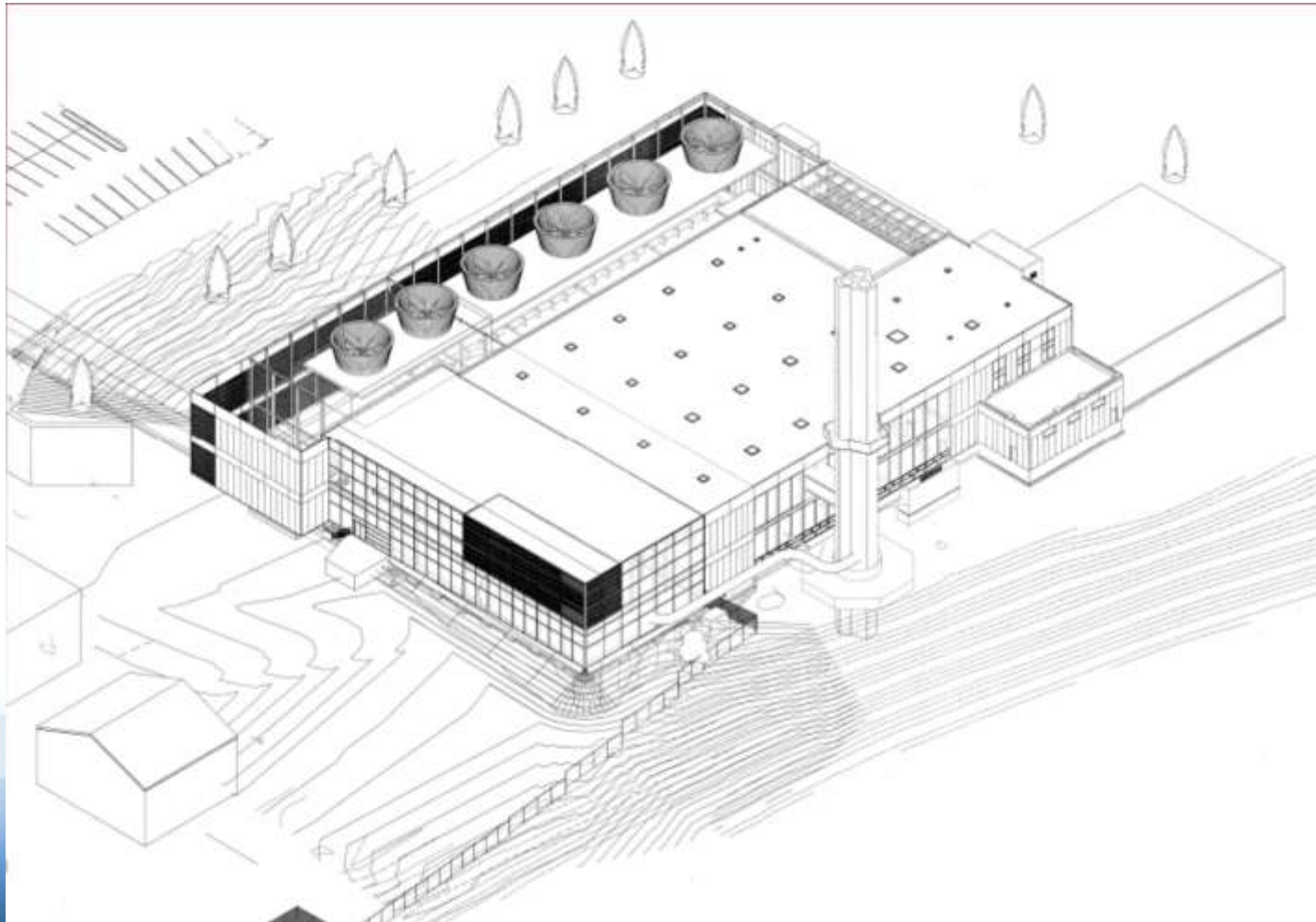


(25) PRESENT GENERATOR SYNCHRONIZATION LOCATIONS

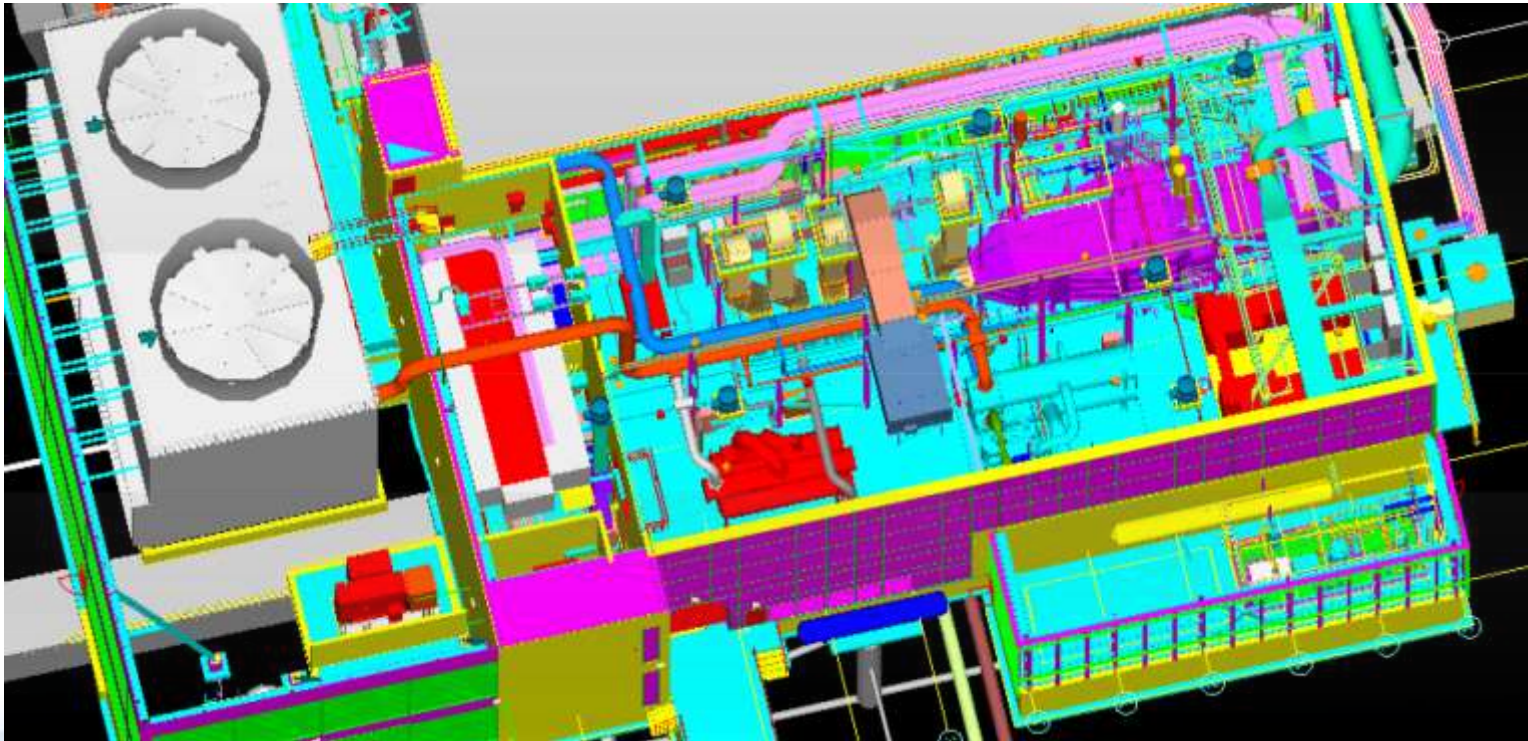
(81) PRESENT UNDERFREQUENCY RELAYS FOR PLANT ISLANDING IAW MDP AND IEEE 1547

(27) PRESENT UNDERVOLTAGE RELAYS FOR PLANT ISLANDING IAW MDP AND IEEE 1547



Architectural View – Building Expansion



Major Equipment General Arrangement





-  UMMS OWNED BUILDING
-  NON UMMS OWNED BUILDING

