



# GENERATOR HUB: THE CRITICAL BUILDING WE HOPE TO NEVER NEED

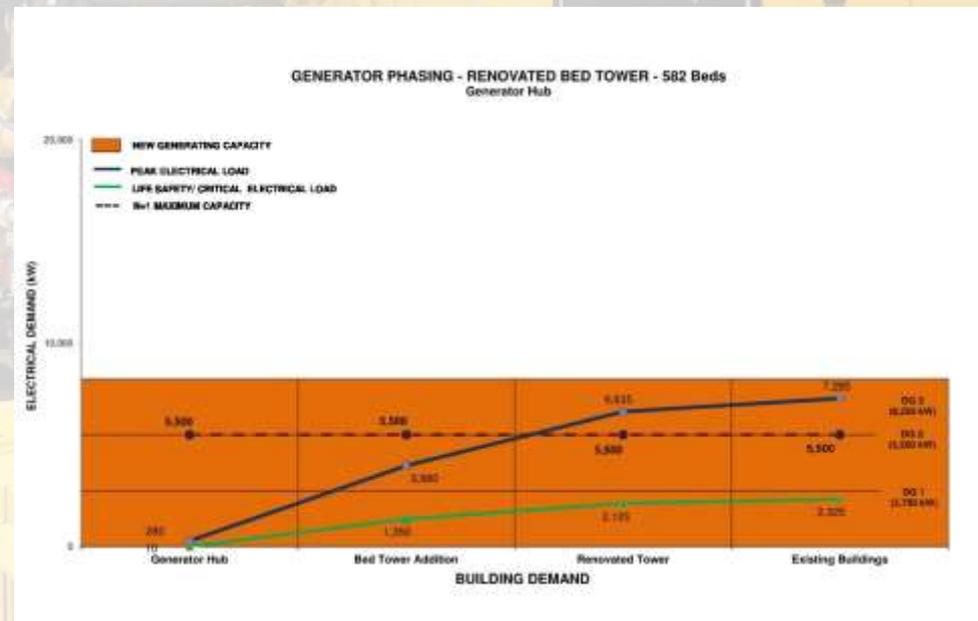
# AGENDA

- ❖ PROJECT BACKGROUND
- ❖ EVOLUTION OF EMERGENCY POWER
- ❖ CHALLENGES
- ❖ DESIGN PROCESS
- ❖ LESSONS LEARNED



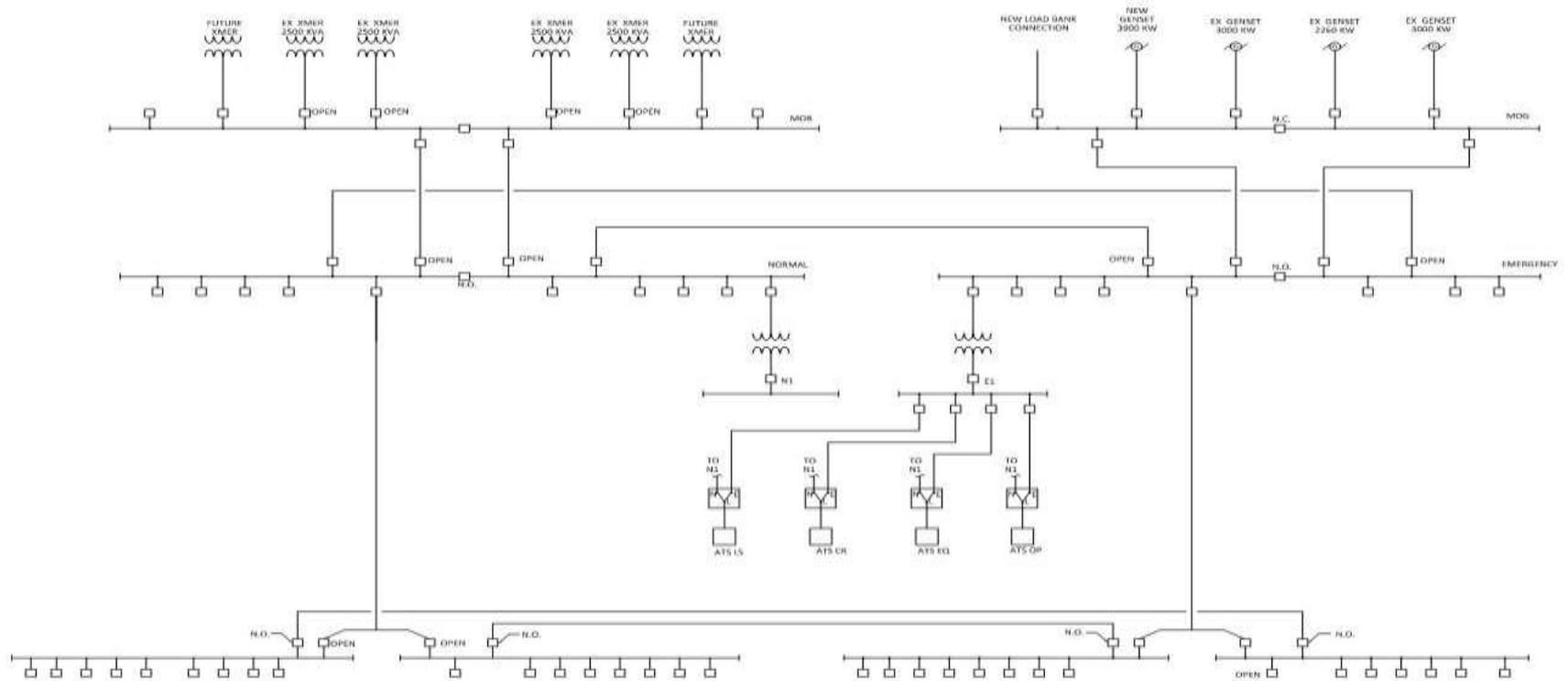
# BACKGROUND: MODERNIZING THE HEALTH CARE CAMPUS

- ❖ New construction: 350 bed new patient tower
- ❖ Existing generators without available capacity
  - » Individual units installed spread around campus
- ❖ Existing bed towers planned for complete renovation





# BACKGROUND: EMERGENCY POWER PHILOSOPHY



# GEN HUB CONCEPT

- ❖ Only Select Emergency and Optional Power
  - » No Peak Shave, Curtailment, Storm Avoidance
- ❖ Centrally Located
  - » Medium Voltage Generation and Distribution
- ❖ Robust, Resilient, Reliable



# GEN HUB RESULTS

- ❖ Medium Voltage, N+1, Expandable
  - » 8.25MW Installed, 12MW Future
- ❖ Centrally Located
  - » Best for Distribution, Worst for Construction & Disturbing the Health Care Environment
- ❖ Team Effort Required

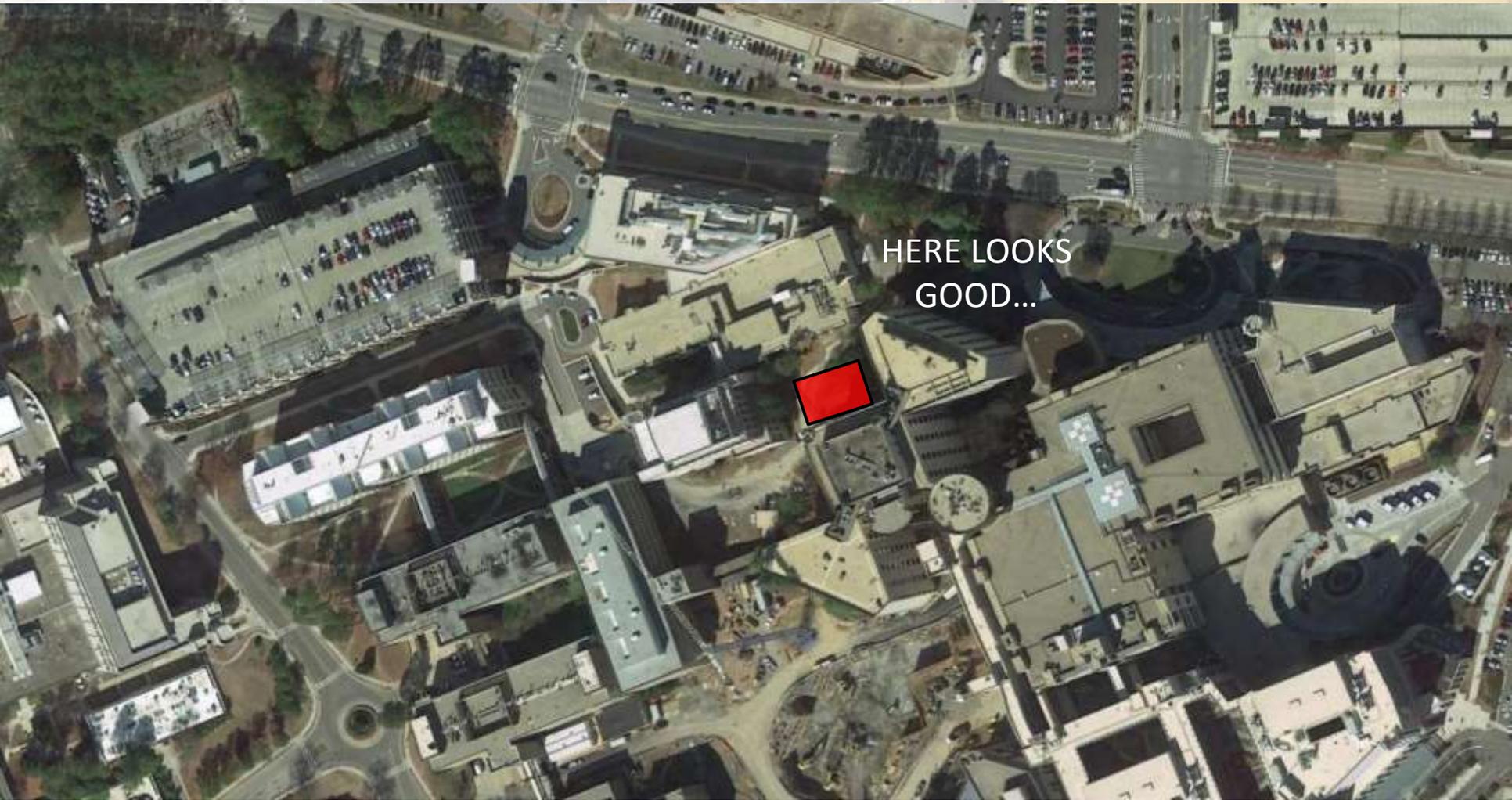


# PROJECT CHALLENGES

- ❖ Immovable deadline
- ❖ Escalating costs: pressure to pre-purchase
- ❖ Highly visible site



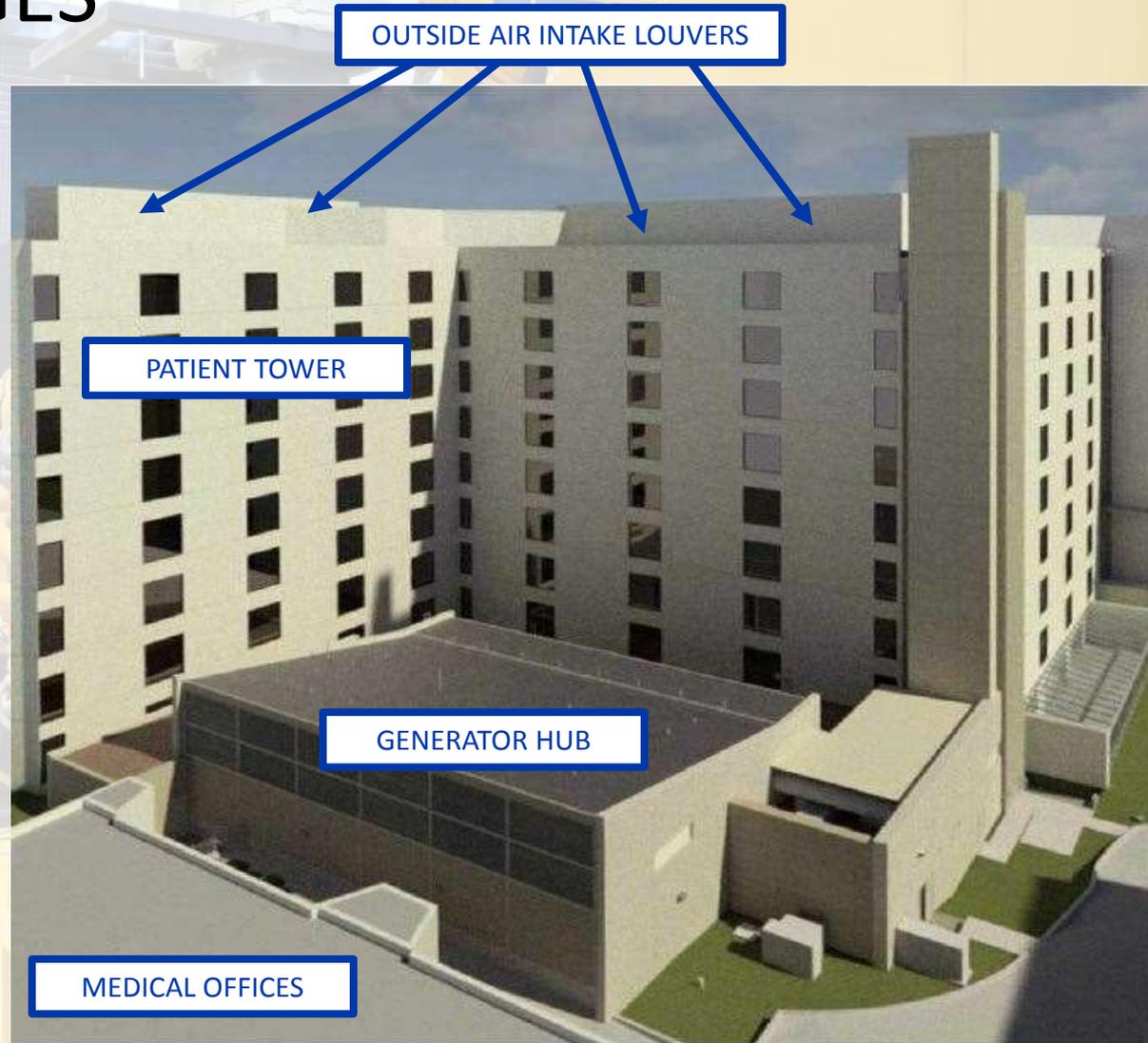
# GENERATOR PLANT CONCERNS



HERE LOOKS  
GOOD...

# SITE CHALLENGES

- ❖ Patient Experience
- ❖ Recirc Concerns
- ❖ Existing Utilities
- ❖ OA Louvers



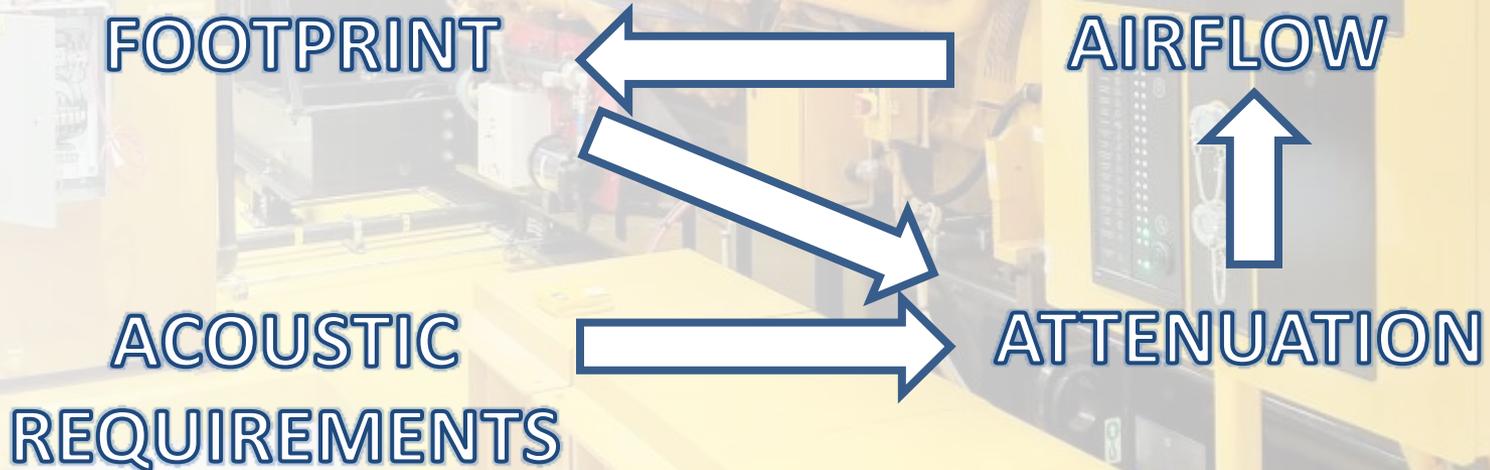
# ACOUSTIC CONSTRAINTS

- ❖ Building Occupants
- ❖ FGI Guidelines
- ❖ Distance
- ❖ Line of Sight
- ❖ Inline Attenuators
- ❖ Acoustic Louvers



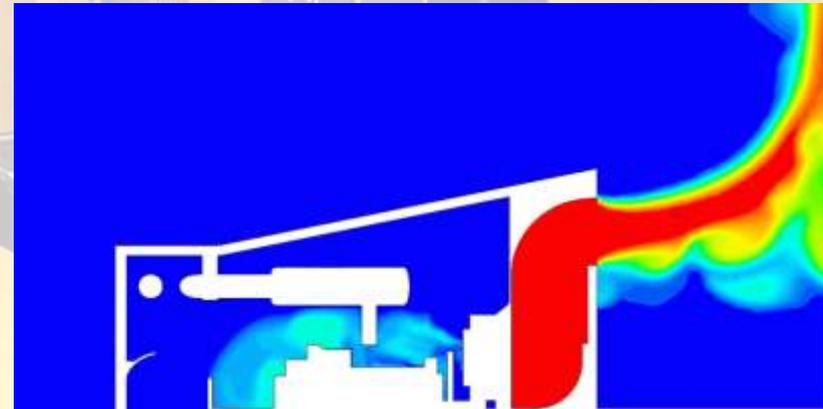
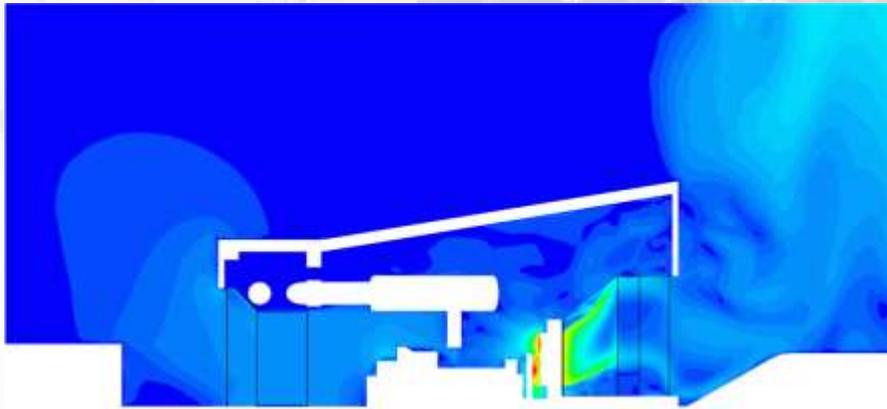
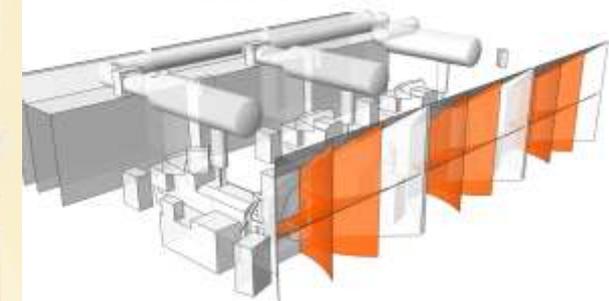
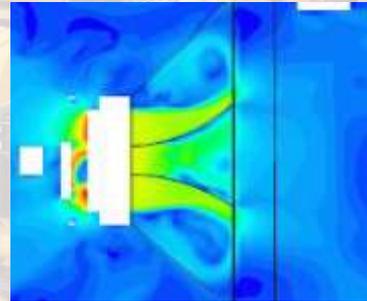
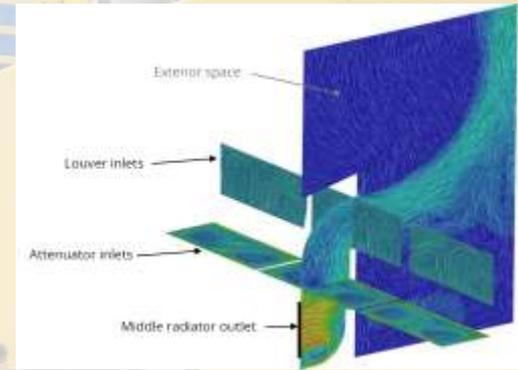
# ACOUSTICS VS. AIRFLOW

- ❖ Free area = sound line of sight
- ❖ Attenuation = airflow resistance
- ❖ Extensive coordination between subs

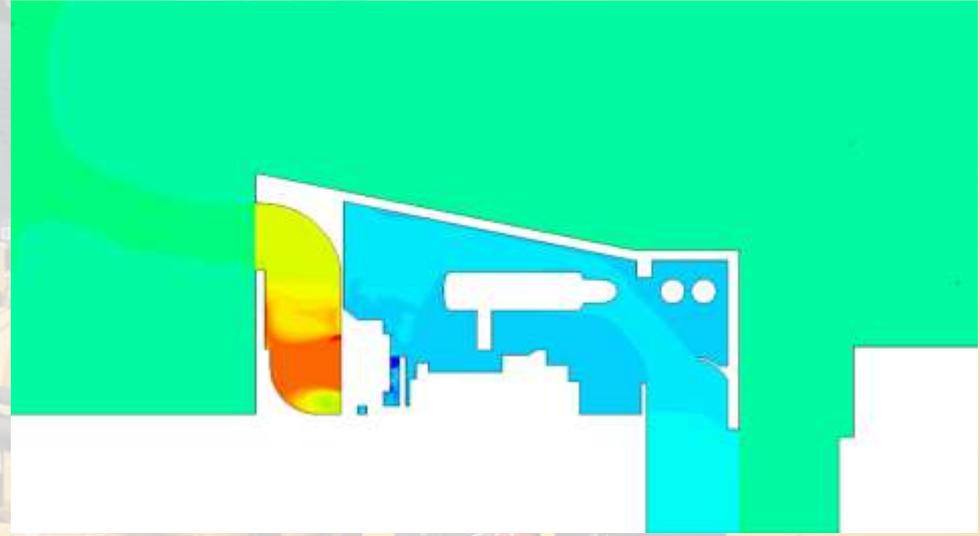
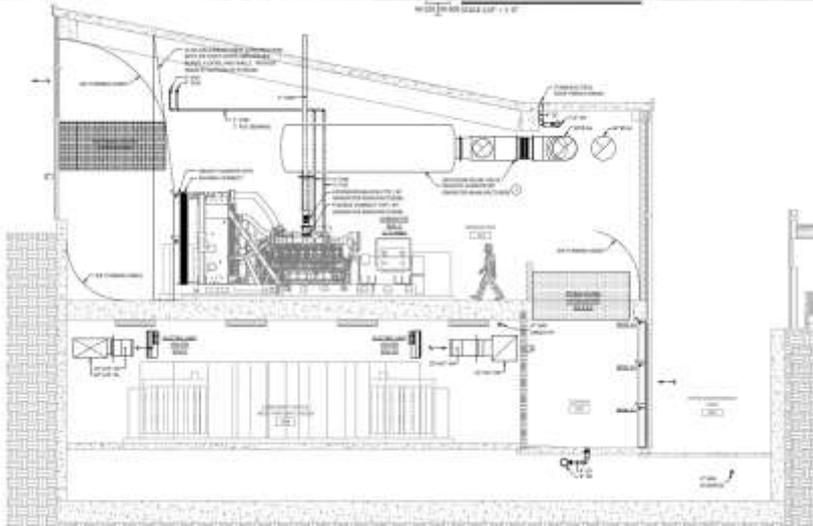


# AIRFLOW CFD ANALYSIS

- ❖ Radiator Backpressure
- ❖ Site Air Recirculation
- ❖ Inside Air Stagnation
- ❖ CO<sub>2</sub> Dispersion
- ❖ Guide Vane Design



# DESIGN ITERATION



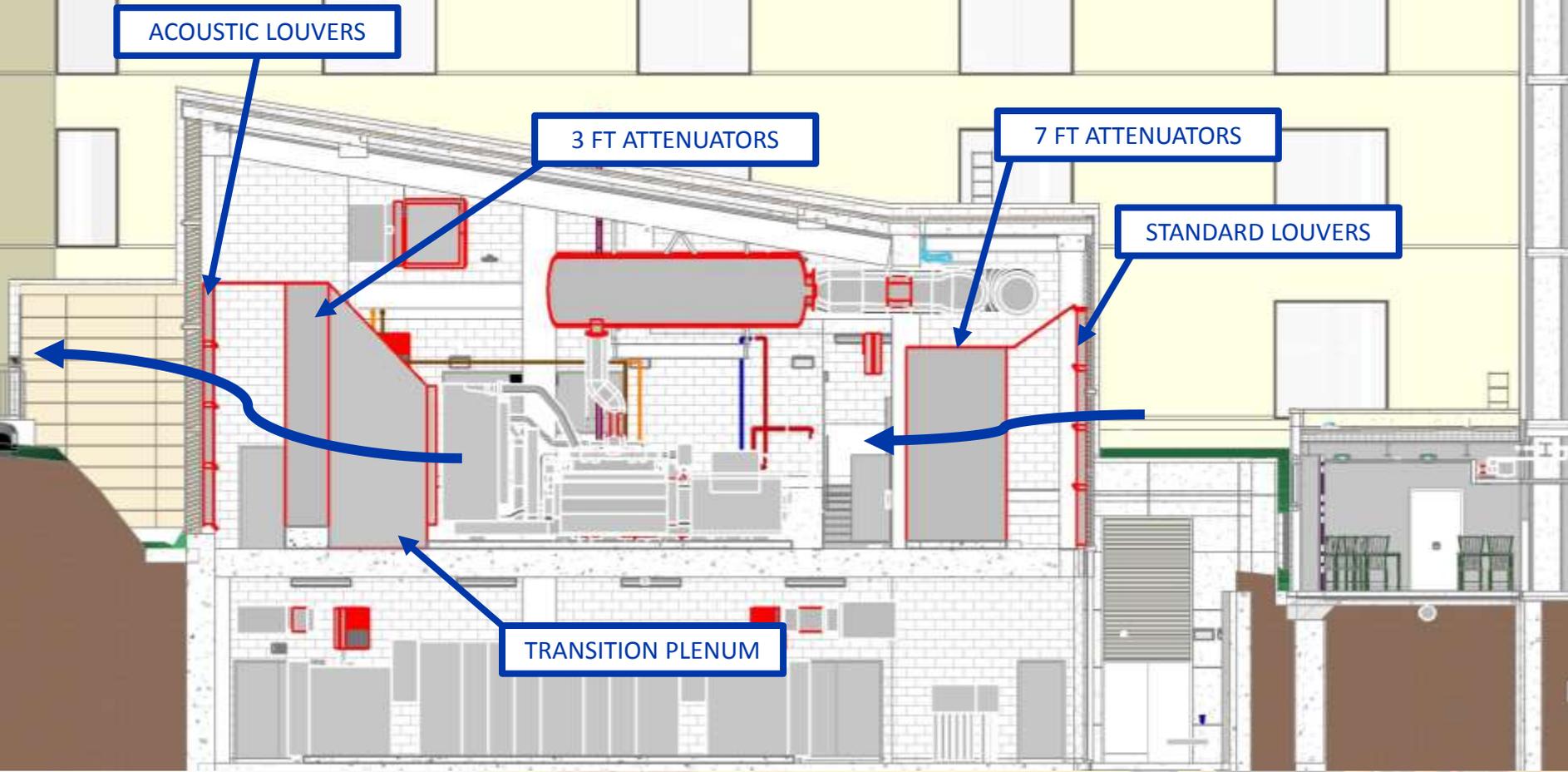
FOOTPRINT

AIRFLOW

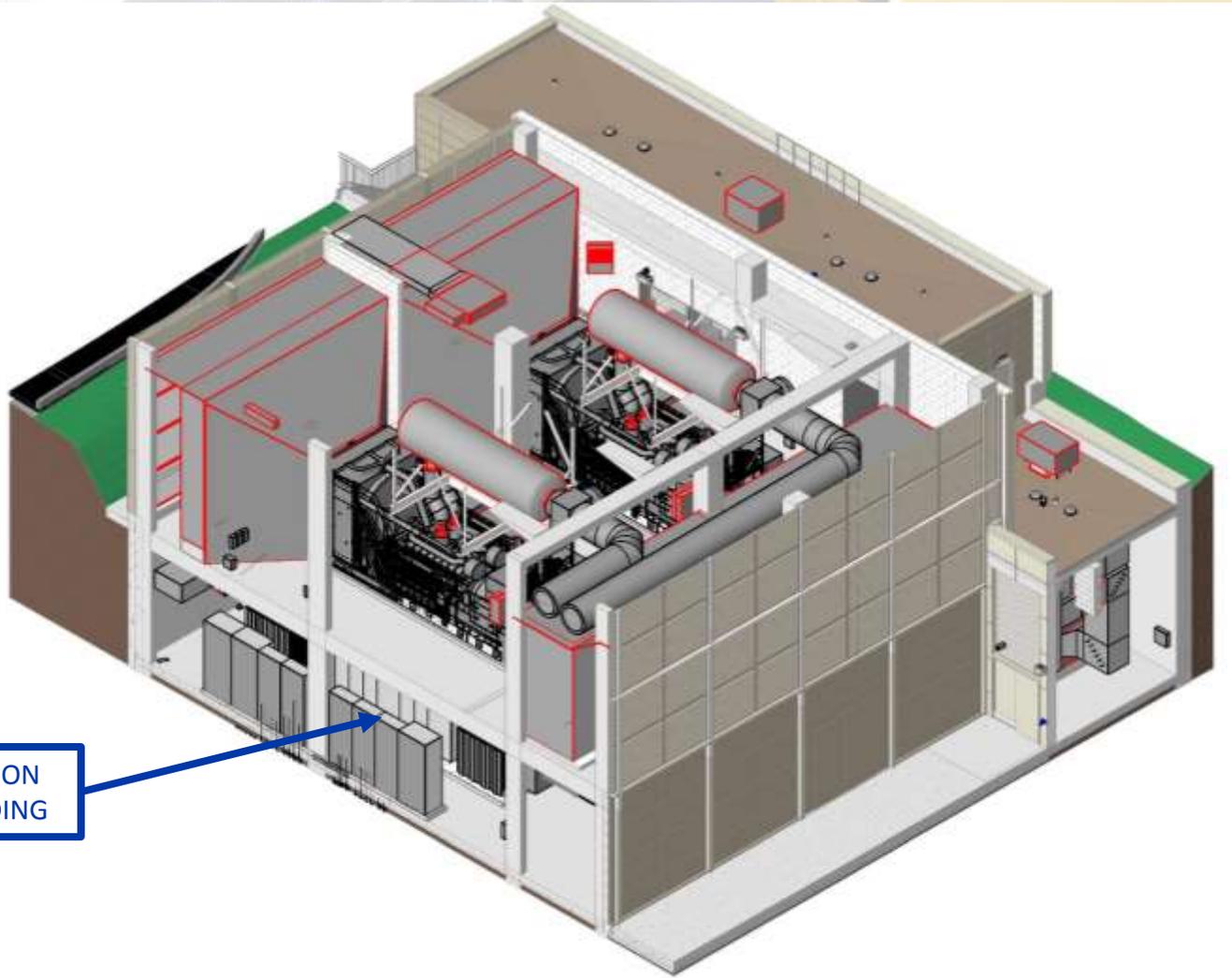
ACOUSTIC  
REQUIREMENTS

ATTENUATION

# FINAL DESIGN

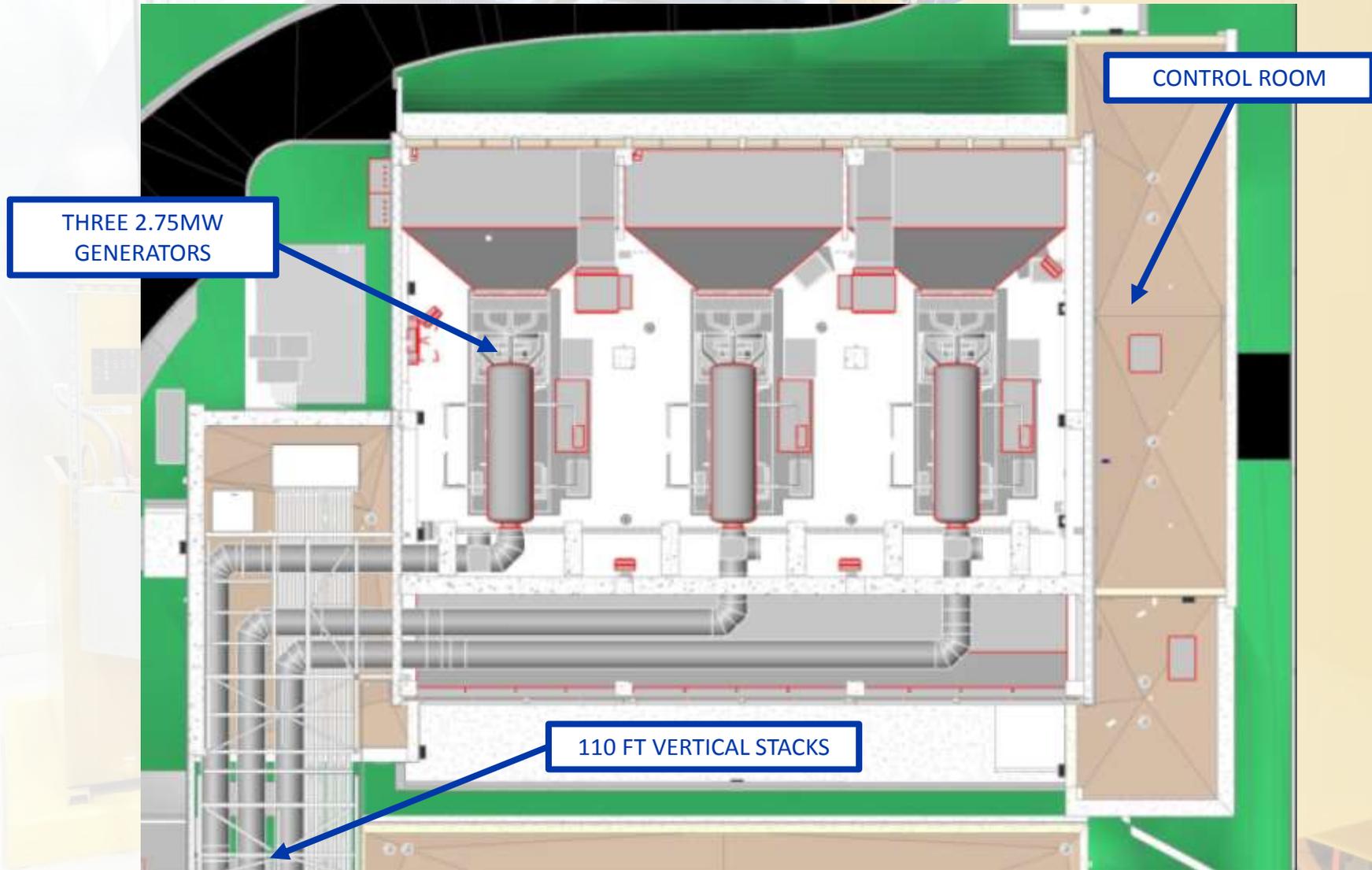


# FINAL DESIGN



BASEMENT SUBSTATION  
FOR ADJACENT BUILDING

# FINAL DESIGN



# LESSONS LEARNED

- ❖ FGI subject to interpretation on gen noise
- ❖ Airflow subconsultants are experts in CFD, not generators
- ❖ CFD reveals what hand calcs cannot
- ❖ Work with Authorities – Code Interpretations.



# KEY TAKEAWAYS

- ❖ Keep Owner Involved
- ❖ Make Time for Iterative Design
- ❖ Compromise where you can; Emergency Power is the Goal.

