NERSC-9 Facility Upgrade Overview & Status

NUG 2020

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Building Infrastructure Group
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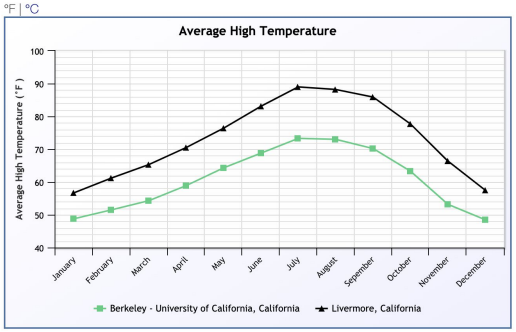
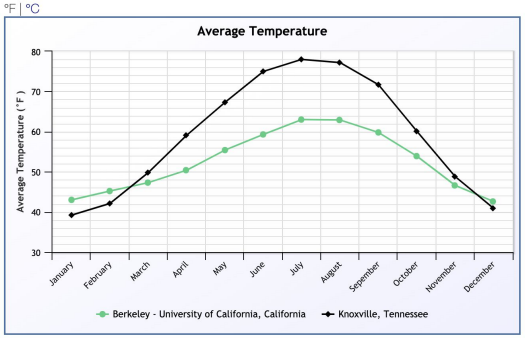
Shyh Wang Hall (Building 59)

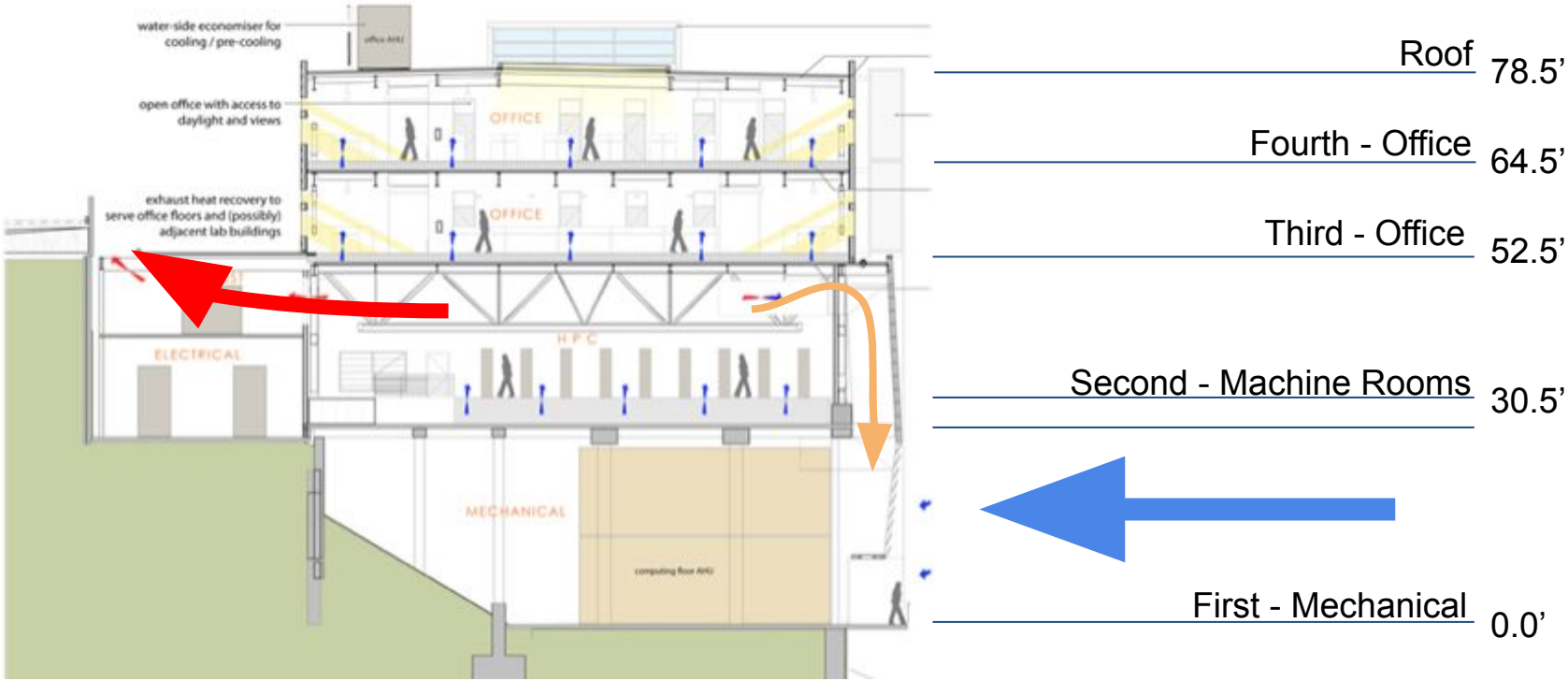
- Occupied in 2015
- Four story 150,000 gross SF
  - 20,000 SF data center
  - Expandable to 30,000 SF
  - 60,000 SF offices
  - Balance of space is electrical & mechanical
- Design included means for modular expansion of power and cooling
- Extremely energy efficient
  - Ambient (“free”) cooling only for both air and water systems
  - Power Usage Effectiveness (PUE) <1.1

Building 59's Not-so Secret Weapon...



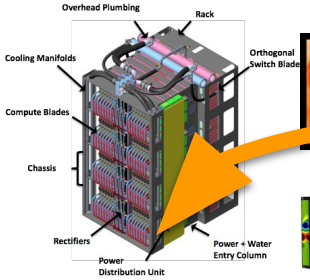


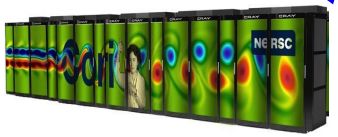
Building Section & Air Flow Diagram



Water Cooling System

HPC Racks

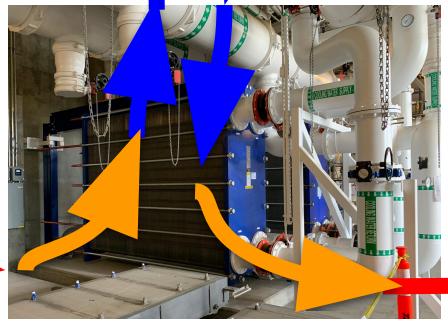




Tower pumps

Cooling water pumps

Heat Exchangers



evaporation

Cooling towers

Facility Upgrade: Overall Goal

What does the project scope look like through the eyes of an architect?

*More **POWER!!!*** (and cooling)

5 MW → 7.5 MW → 12.5 MW

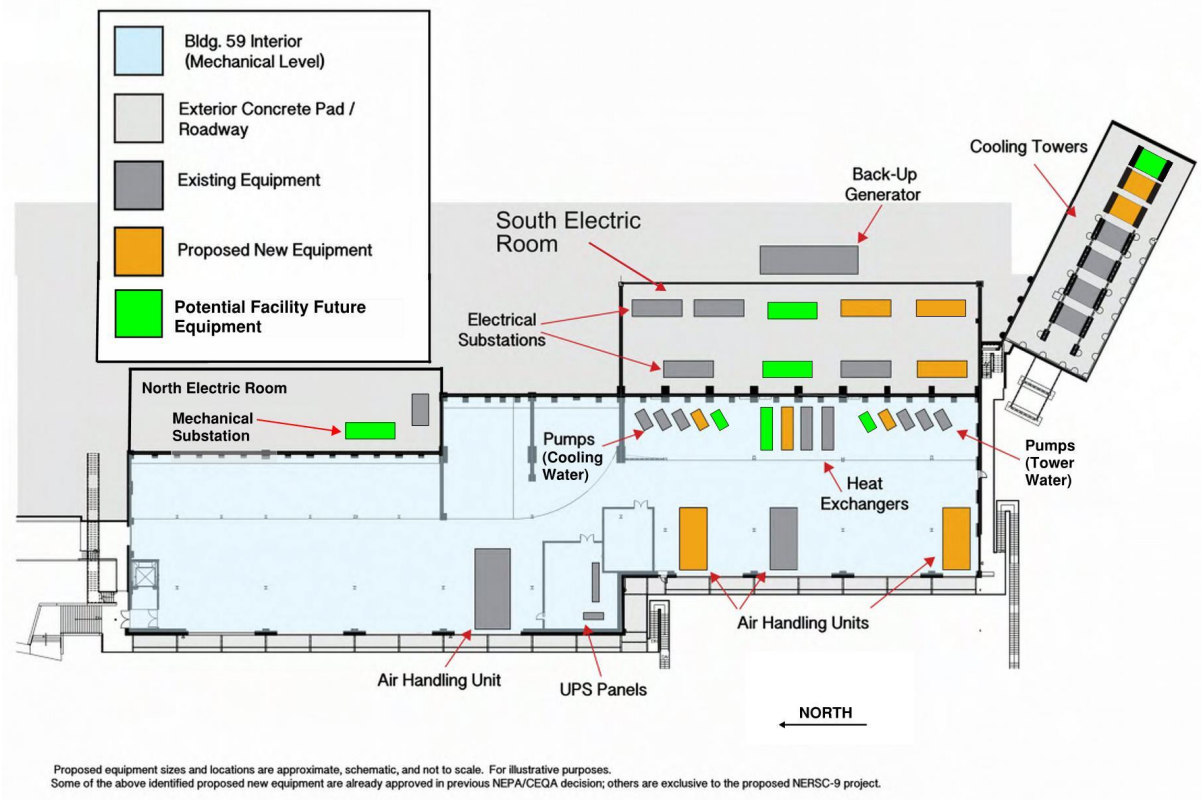
"Threshold" (Minimum)	"Target"	"Objective" (Maximum achievable)

And finish on time!

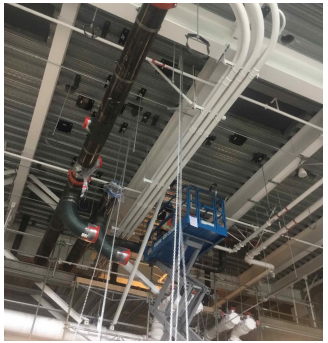
Generalized Project Scope

- 12.5 MW Power/Cooling Expansion:
  - 100% increase in B59 power (from 5 substations to 10)
  - 167% increase in compute power (from 3 substations up to 8)
- New Scope:
  - 5 electrical substations (10 total)
  - 3 cooling towers (7 total)
  - 3 heat exchangers (4 total)
  - 6 pumps (10 total)
  - 3 air handling units (7 total)
  - 29 electrical distribution panels
  - Enhanced backup power
  - Maintains energy efficiency

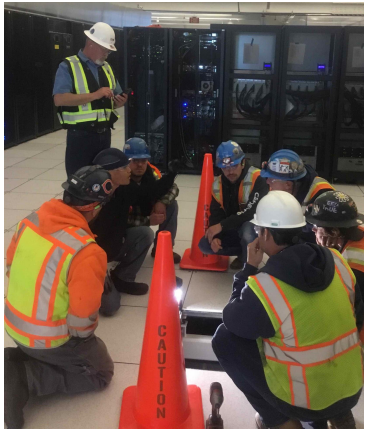
Scope - Plan Schematic

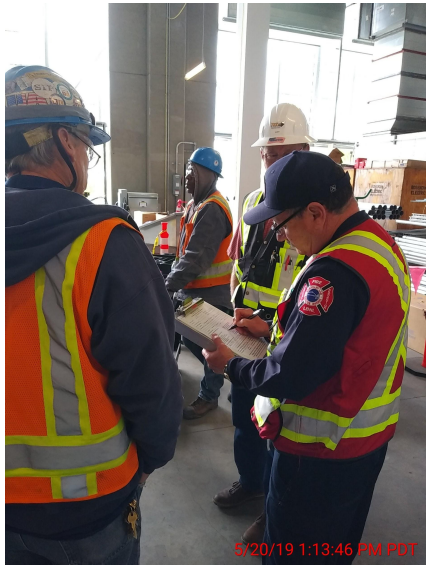


Mechanical Scope

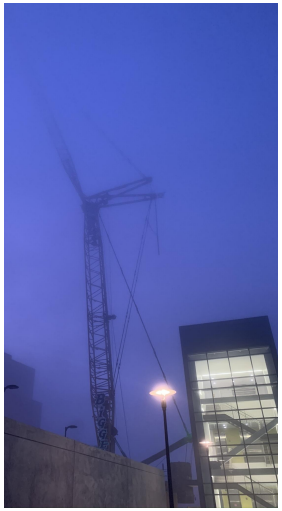


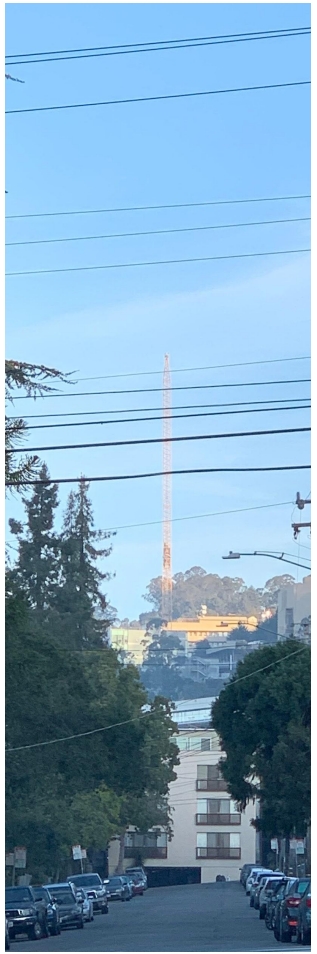
Project Constraints, Safety, and Challenges

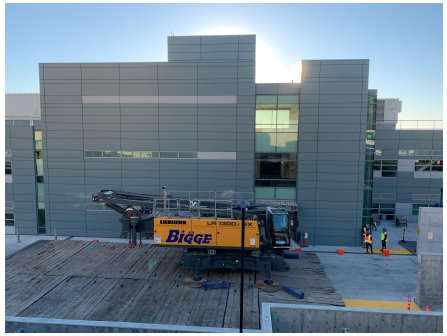




Cranezilla!!!







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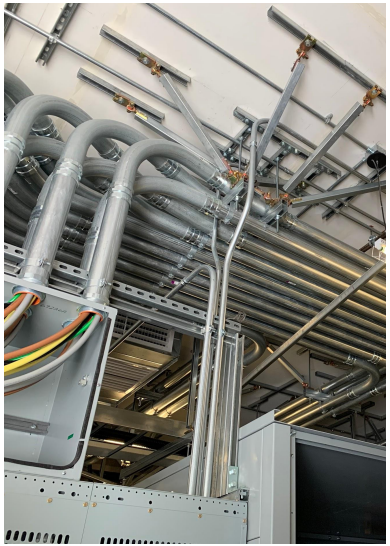
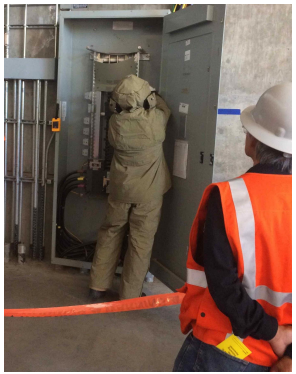
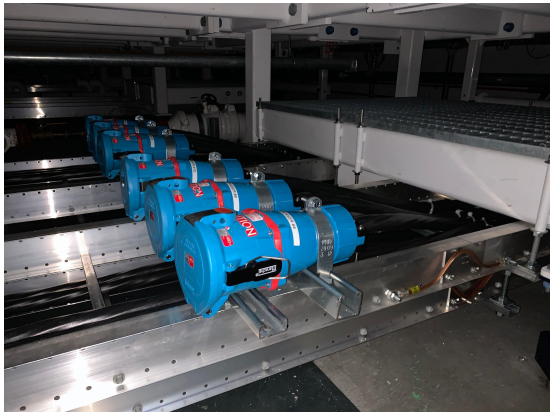
Electrical Scope







Coming Together