

LEADING THE WAY **CampusEnergy**2022

Feb. 15-18 | Westin Boston Seaport District Hotel | Boston, Mass.



University of Iowa CapEx Program Phase TG7 and TG 8

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Agenda

- Project Background
- Turbine Study
- Construction
- Project Details
- Best Practices and Key Take-aways
- Questions

Existing Turbine Capacity



Pre-Project Plant Capacity

Total Plant Output Capacity	Electric (kW)
TG 6	18
TG 1	3
TG5	3
Total	24

Post-Project Turbine Capacity



Post-Project Plant Capacity

Total Plant Output Capacity	Electric (kW)
TG 6	18
TG 7 & 8	15
Post Project Plant Capacity	33

Capacity Expansion Program Objectives



- New reliable boiler and turbine capacity
- Two new steam turbine generators to replace TG1 (installed in 1947) and TG5 (installed in 1952)
- New Maintenance Shop

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Contracting Methodology



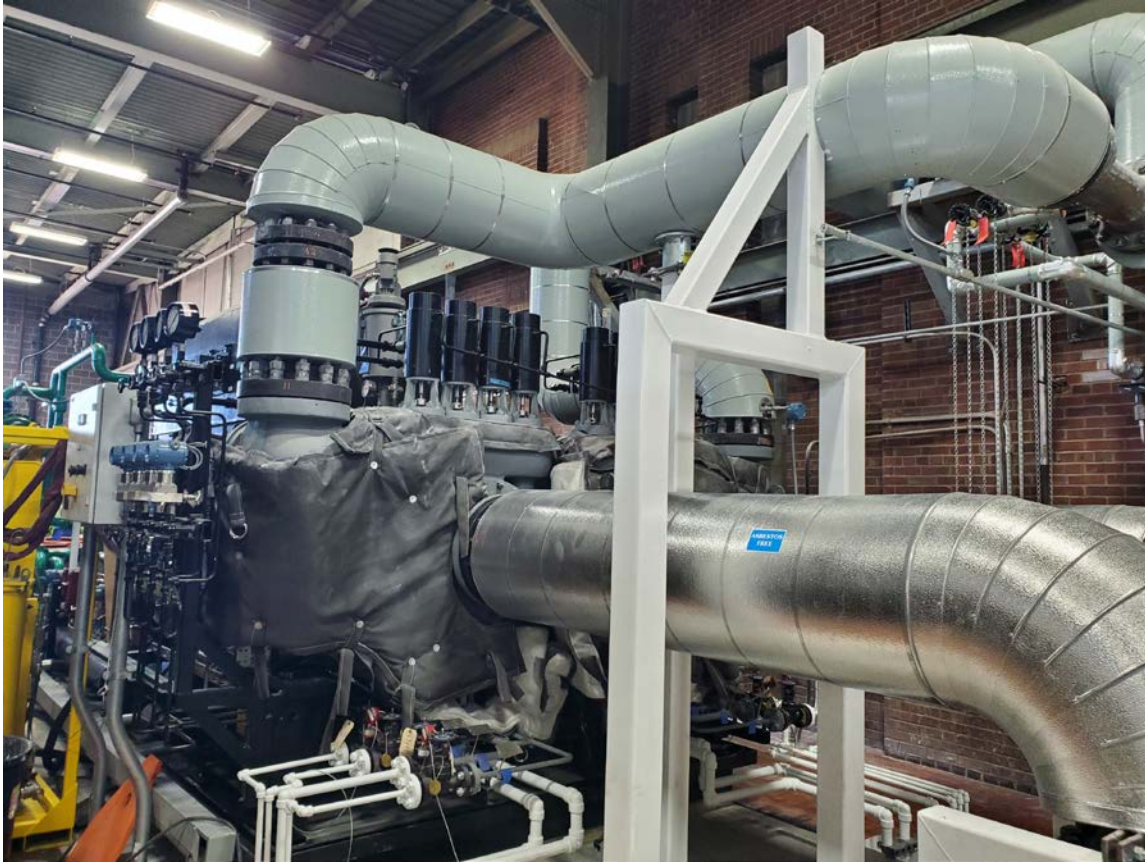
The CapEx program included several procurement contracts to expedite the schedule and provide shop drawings of actual equipment. Having shop drawings leads to a detailed design of the new equipment. The major equipment procurement packages include:

- Steam Turbine
- Steam Condenser
- Electrical Gear
- CEMS
- Control Hardware Integration

The following were major construction packages:

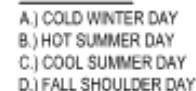
- Utility Outage
- Structural Foundation Contract
- Balance of Plant
- Boiler Procurement/Erection Contract
- Maintenance Shop
- Steam Turbine Construction

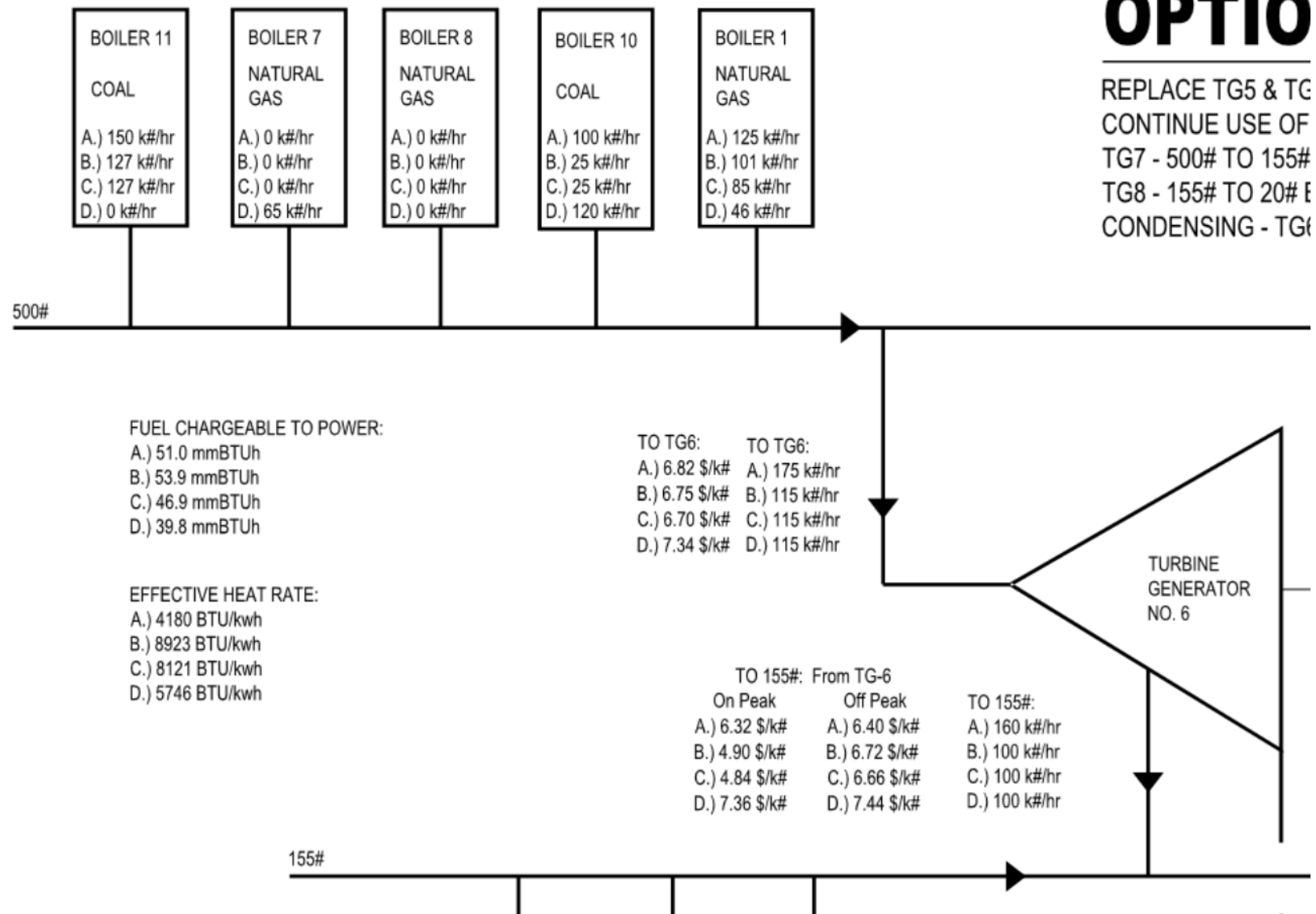
Turbine Study



Variables in the life cycle cost analysis and evaluation regarding the new Turbine Generators:

- Cost to produce power
- Condensing versus back pressure
- Ability to meet storm mode
- Life-cycle cost



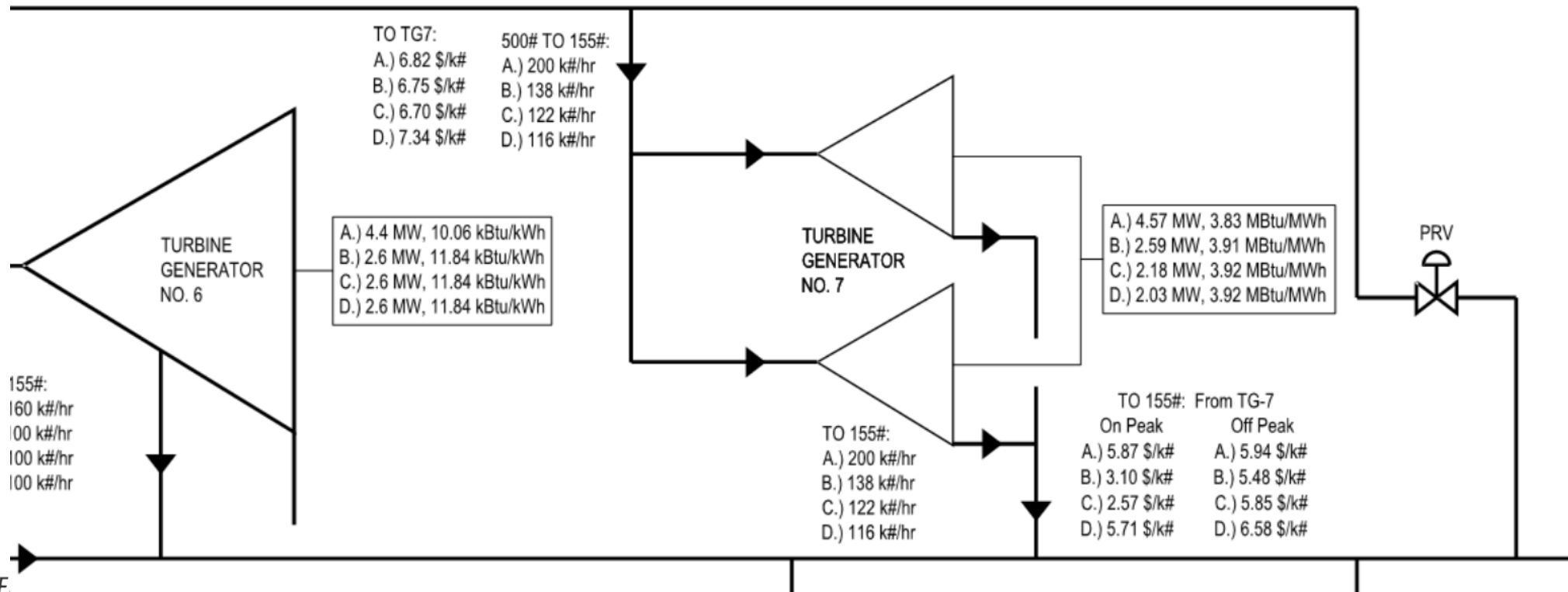


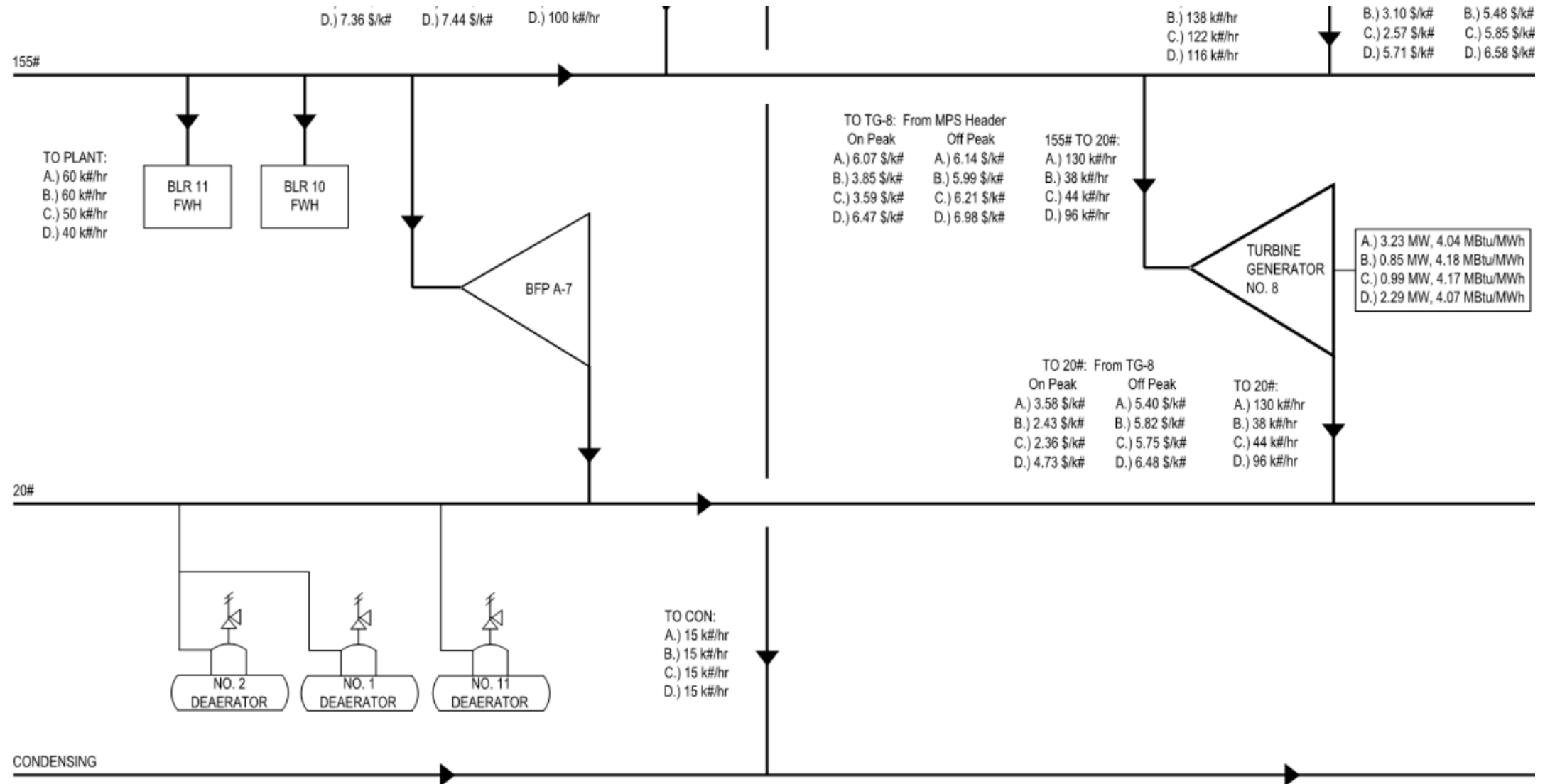
OPTION 1

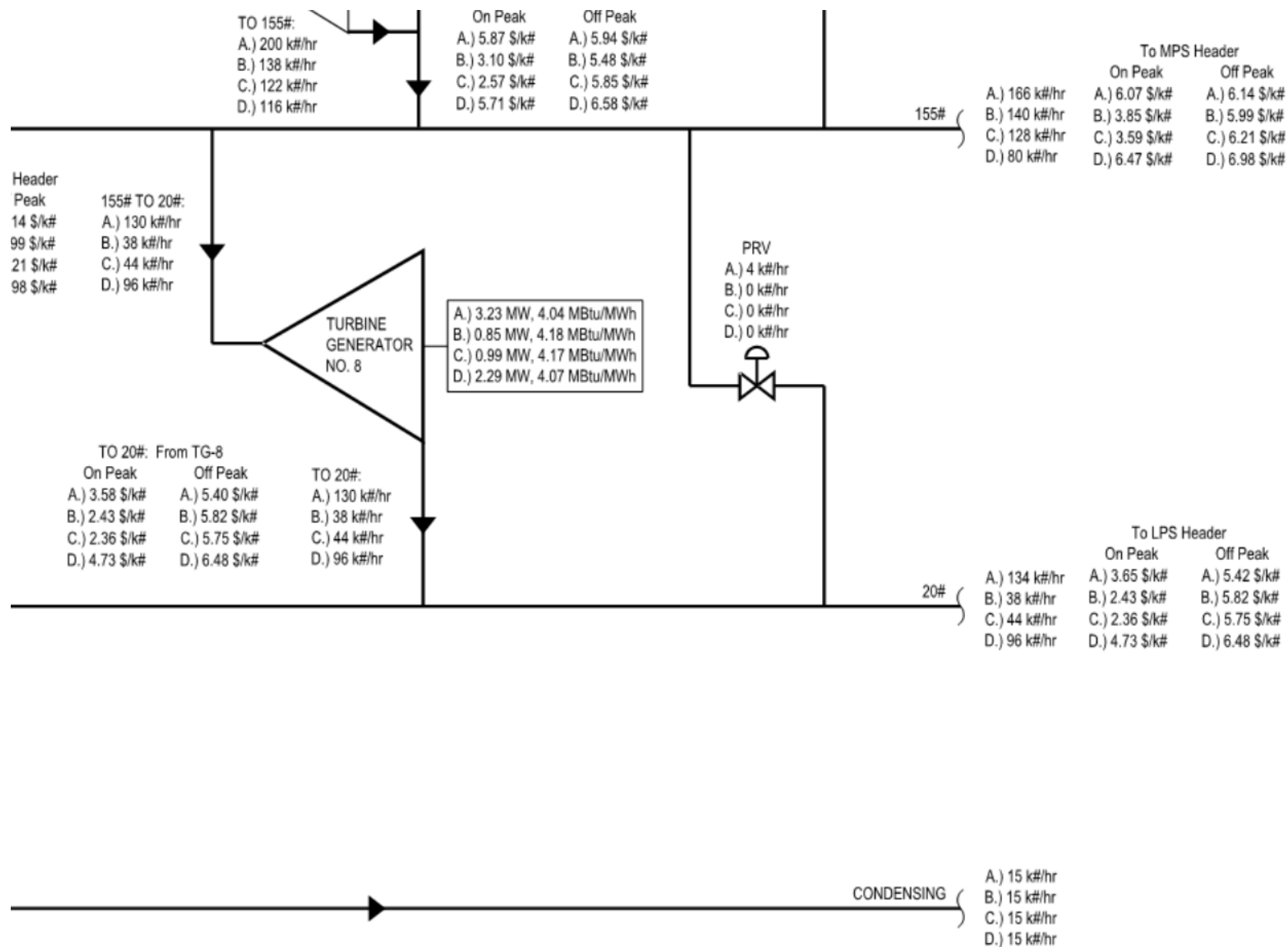
REPLACE TG5 & TG1 WITH NEW TURBINES (TG7 & TG8)
CONTINUE USE OF TG6 IN CONJUNCTION WITH NEW TURBINES
TG7 - 500# TO 155# BACKPRESSURE TURBINE (TWIN)
TG8 - 155# TO 20# BACKPRESSURE TURBINE (SINGLE)
CONDENSING - TG6 ONLY

LEGEND

A.) COLD WINTER DAY
B.) HOT SUMMER DAY
C.) COOL SUMMER DAY
D.) FALL SHOULDER DAY







Foundation



The existing turbine pedestal was demolished to the pile cap, approximately 5 feet under the basement floor.

The concrete was wetcut to reduce dust and craned out of the area.

Demolition



The existing turbines had drilled piers with a pile cap, approximately 5 feet under the basement floor. This project removed the existing turbine pedestal to the pile cap and built new turbine generator pedestals.

Note the original plant wall with the column, in the middle of everything.

Demolition





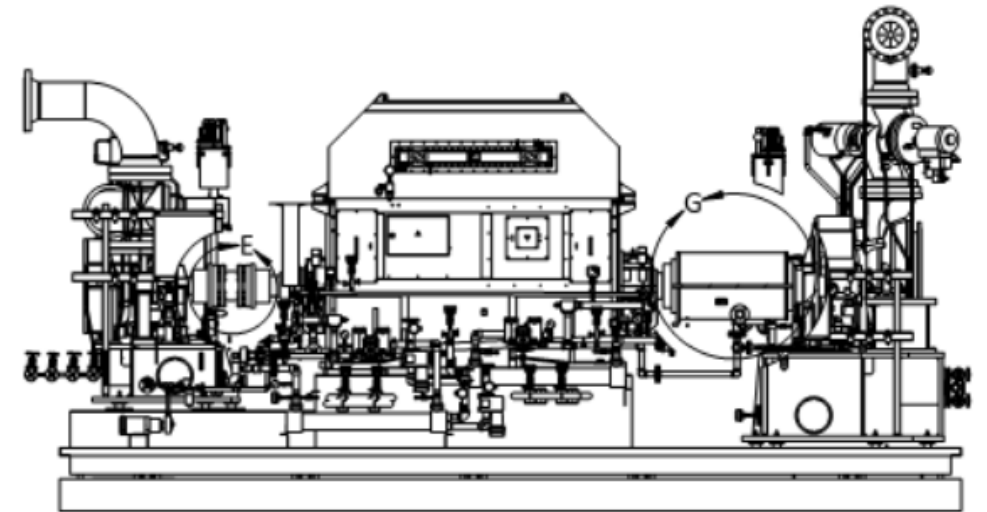




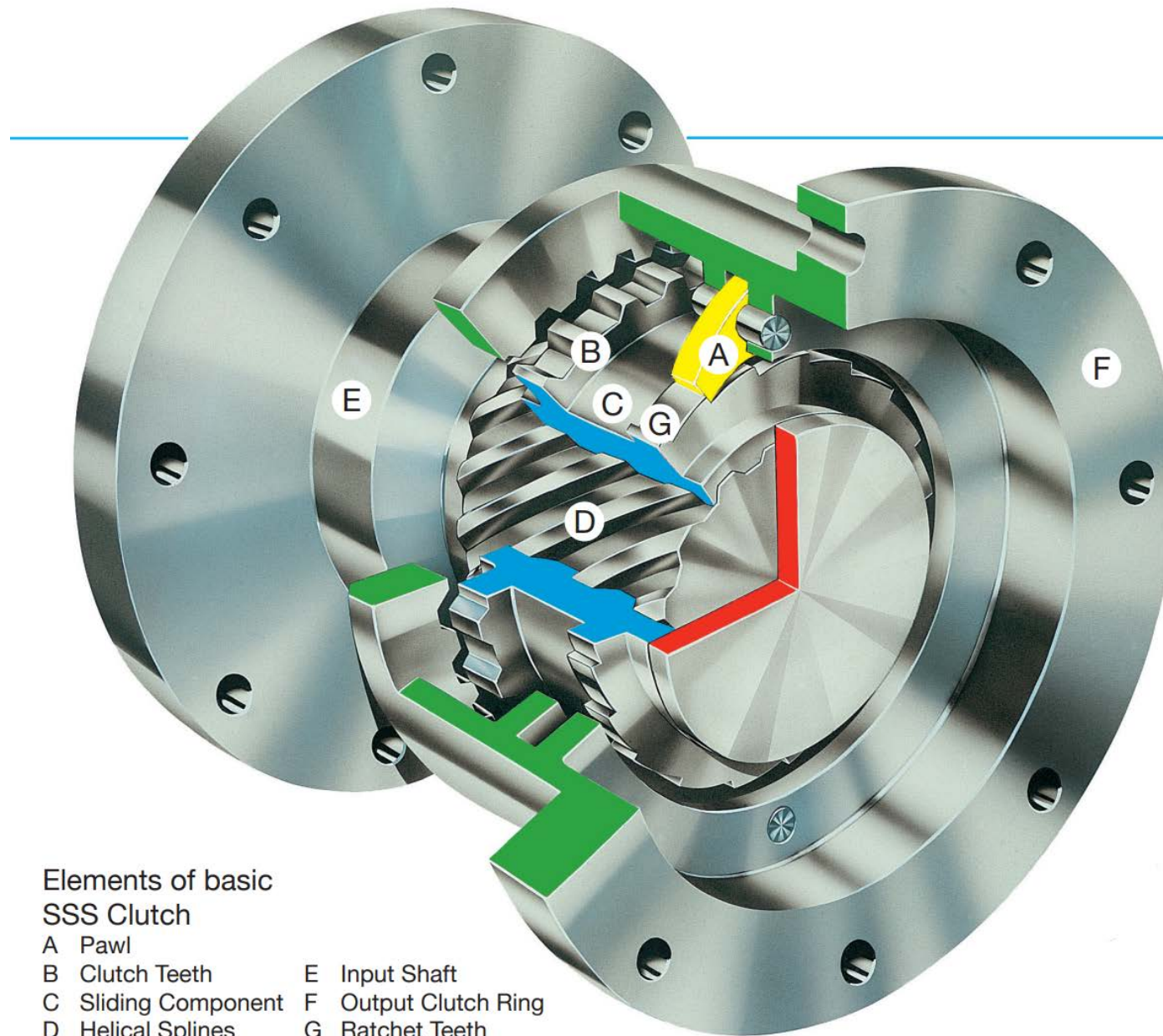
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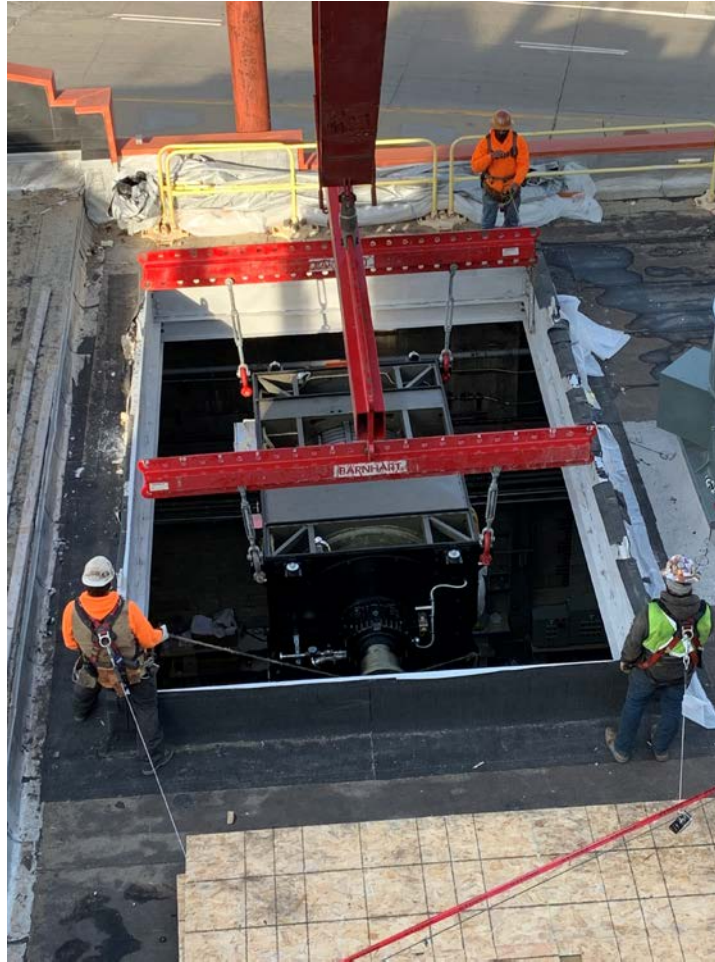
Elements of basic
SSS Clutch

- | | |
|---------------------|----------------------|
| A Pawl | E Input Shaft |
| B Clutch Teeth | F Output Clutch Ring |
| C Sliding Component | G Ratchet Teeth |
| D Helical Splines | |

Pressure Balanced Expansion Joint



Generators



- TG 8 - 65,000 lbs
- TG 7 – 50,000 lbs
- New steam turbines and generators were rigged into the building through a new roof opening.

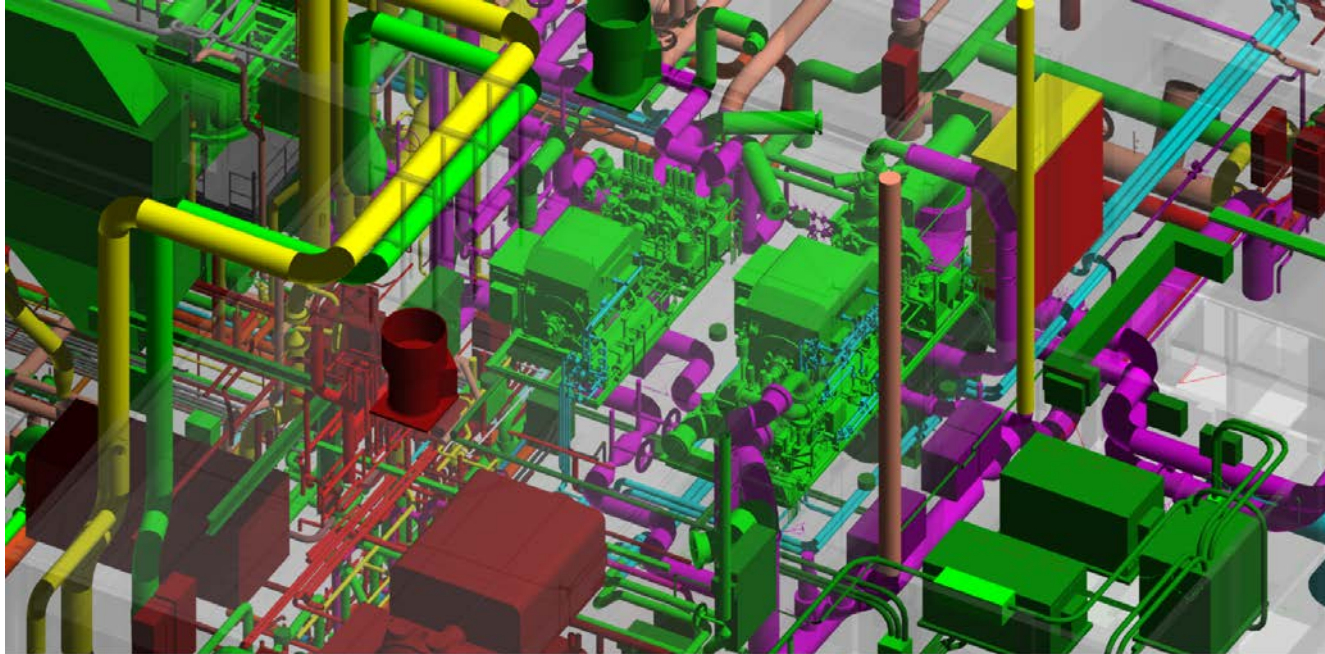


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Best Practices and Key Take-Aways



- Weekly meetings with action items
- 3D laser scan the Plant
- 3D model the Plant
- Plant involvement



Questions?

Thank you!

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