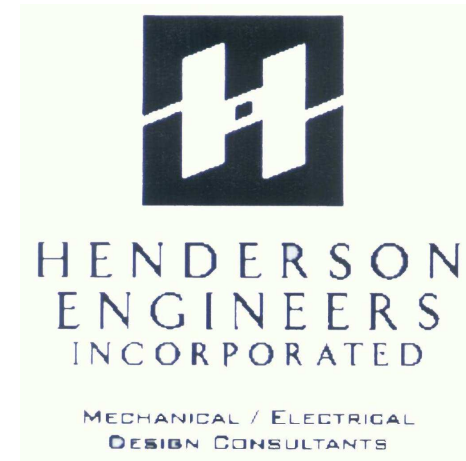


THE OLD AND THE NEW

The Story of an Integrated Chilled Water Plant

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The IRS Processing Facility



- Old Post Office – Offices – 500,000 sq. ft.
- New 70,000 sq. ft. warehouse
- New processing facility – 600,000 sq. ft.
- Approximately 1.2 million total square feet of space





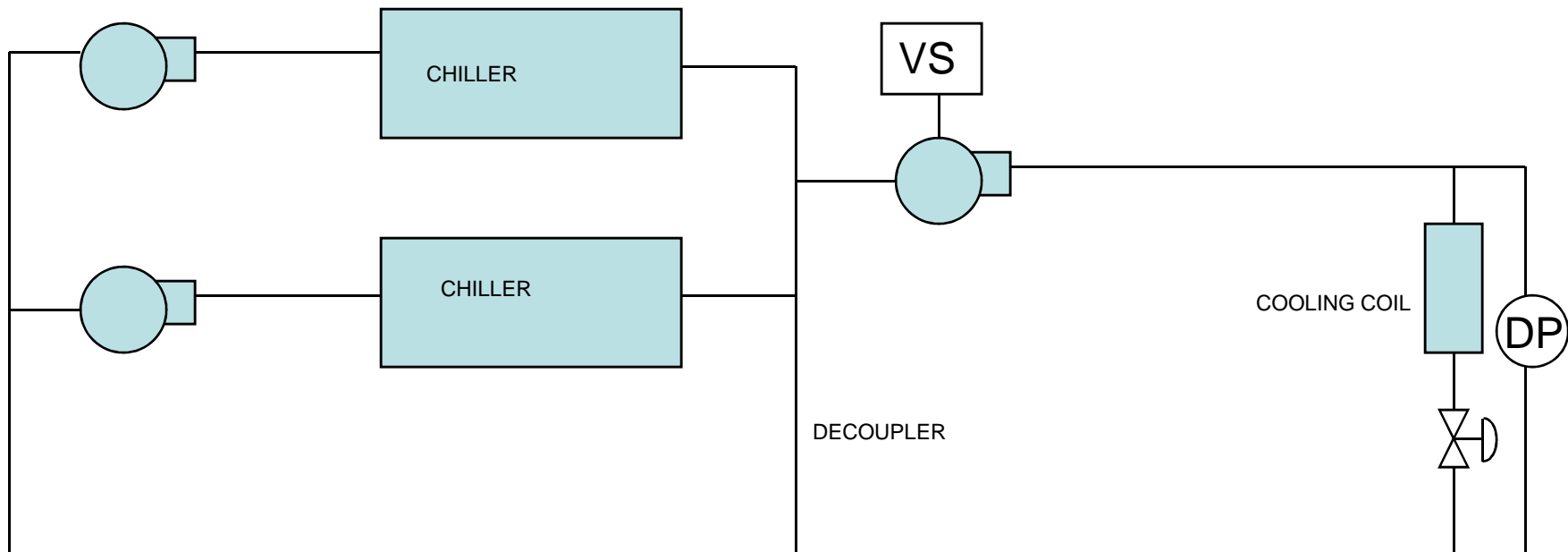


The Team

A Cast of Thousands

- General Services Administration
- The Developer (under contract with GSA)
- The Architect (a joint venture between 2 firms) – under contract with the developer
- The Construction Manager
- The Commissioning Agent
- The Test and Balance Contractor
- The Mechanical Design/Build Contractor – 4 MEP consulting firms
- The Electrical Design/Build Contractor – Another MEP consulting firm
- Lots of additional consultants



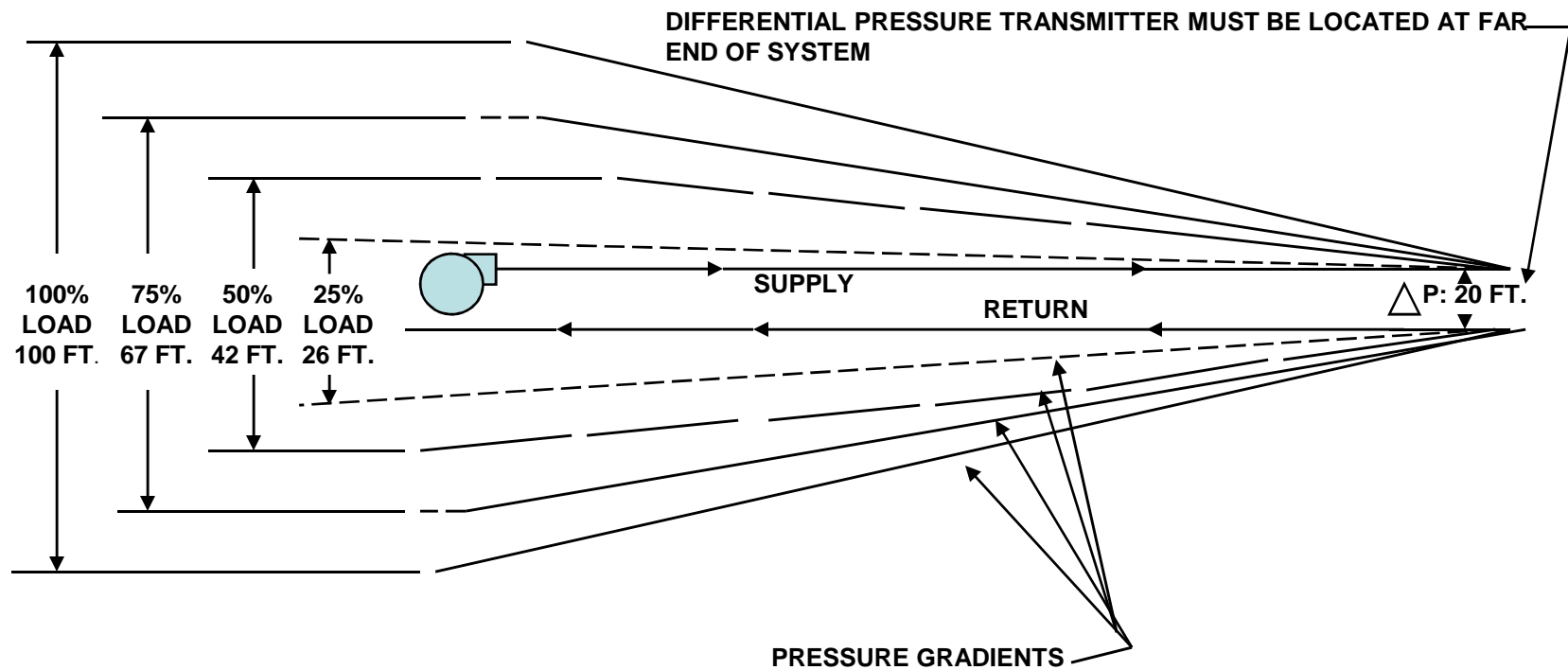


Size decouple pipe for very low pressure drop
(It does not need a check valve)

PRIMARY SECONDARY SYSTEM

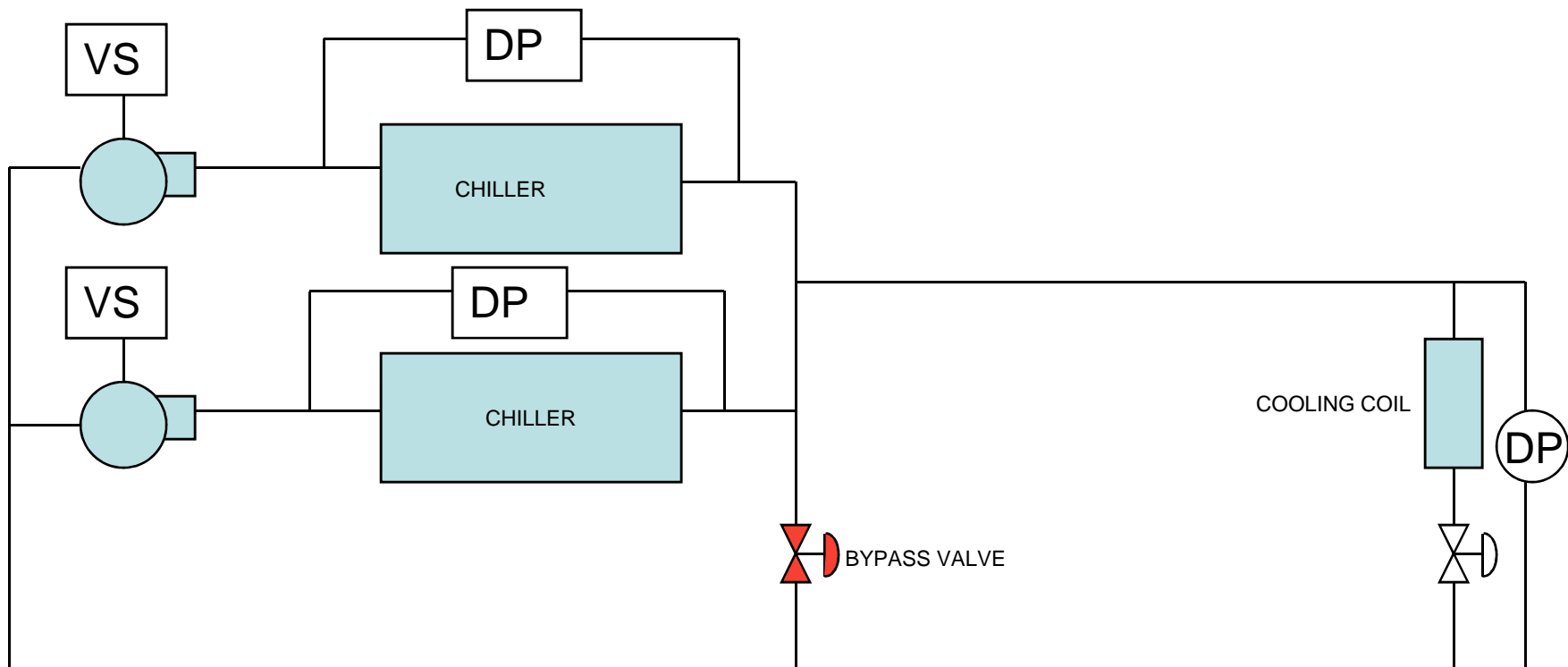
Controls for Primary/Secondary

- Primary pumps are constant speed – matched to chillers
- Secondary pump speed controlled to maintain remote delta P
- Chillers controlled to maintain leaving water temperature
- Chillers staged on/off to maintain LWT
- Excess chilled water will bypass using the decouple pipe
- Low delta T can be a problem, resulting in more water required than what the operating chillers can flow
- Consider resetting remote delta P based on coil valve position



PRESSURE VARIATIONS IN A CHILLED OR HOT WATER SYSTEM

(COILS AND CONTROL VALVES NOT SHOWN)



VARIABLE PRIMARY SYSTEM

Controls for Variable Primary

- Pump speed controlled to maintain remote delta P
- Bypass valve controlled to insure minimum chiller evaporator flow
- Use evaporator delta T to determine chiller flow – works better than a flow meter
- Chillers controlled to maintain leaving water temperature
- Chillers staged on/off on load (flow + delta T)
- Consider resetting remote delta P based on coil valve position

Important Design Points

- Size of bypass line and valve
 - Must flow difference between min. load and min. chiller flow
- Valves
 - slow chiller isolation valves don't cause upset
 - Bypass valve must be actuated open and closed
- Chiller selection
 - Select evaporator near peak flow and list the minimum in the equipment schedule
- Hard wire remote delta P to same controller as pump VFD
- Need tight controls specification

Advantages/Disadvantages

- Lower first cost
- Fewer pumps
- Smaller footprint
- Lower energy cost
- Helps combat low Delta T syndrome
- Operator unfamiliarity

**MUST HAVE GOOD CONTROLS
AND SAVVY OPERATORS**

Existing Plant in Old Post Office



- 2 water cooled centrifugal chillers – 500 tons each – converted to R134A
- 17 years old when design started (2003)
- Constant flow system with 3-way valves at air handlers



- Needed a total of 2500 tons
- Originally planned to replace old chillers
- 3 new chillers – variable primary flow
- Why replace machines with life remaining?
- Can we vary the flow through the old chillers?



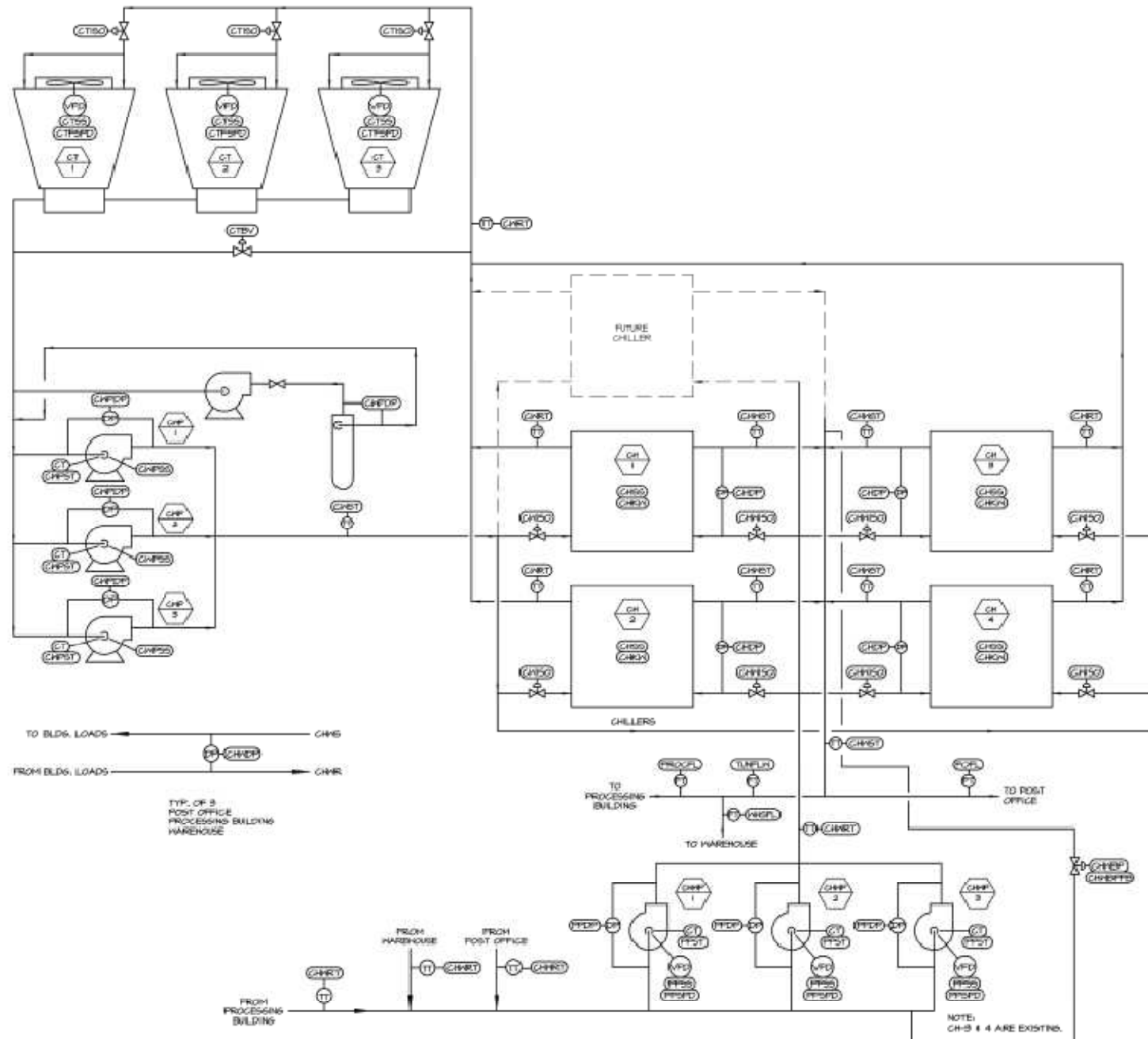


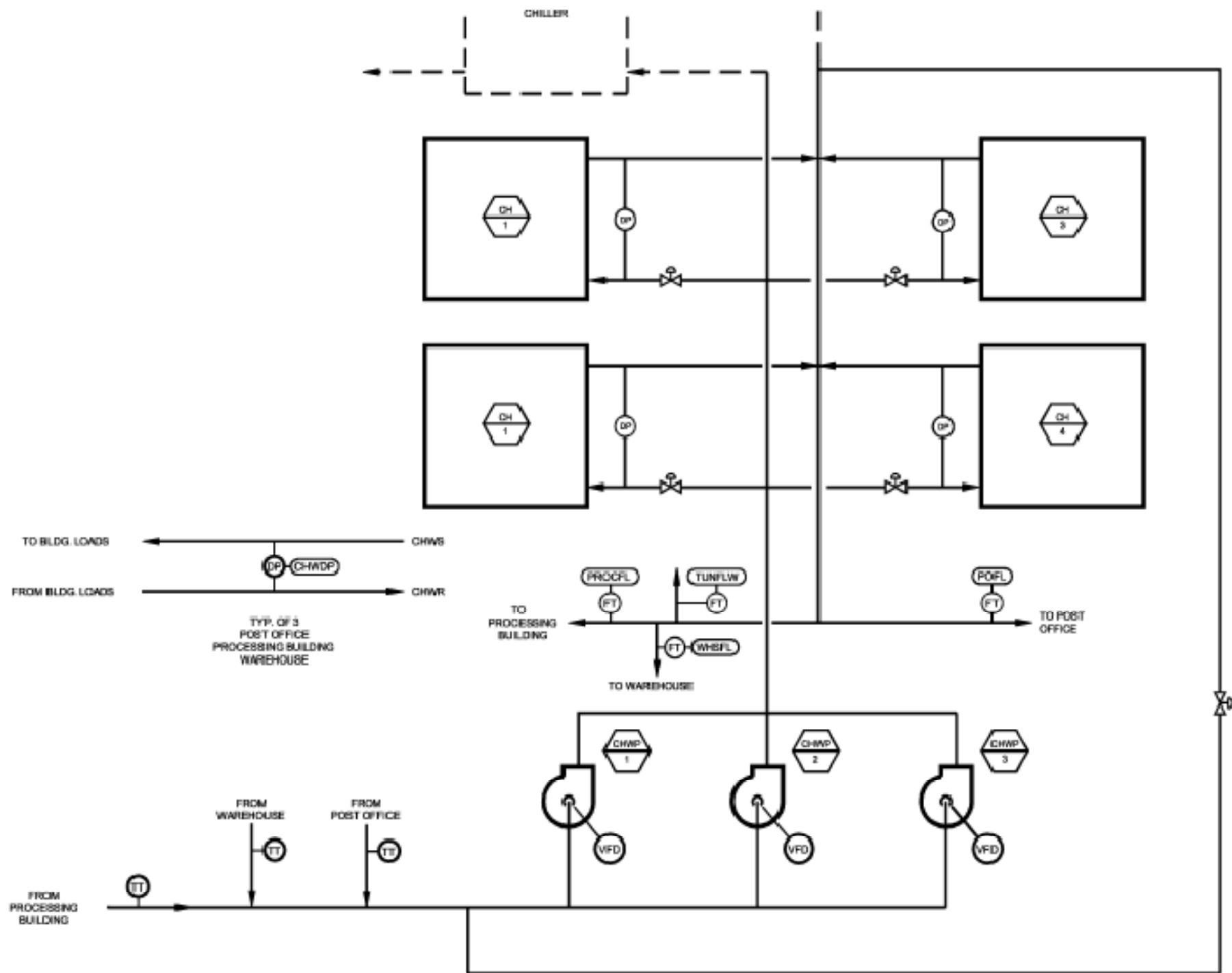
- Flow on old chillers could be reduced to 30% of original design flow
- Obtained evaporator pressure drop curves
- Settled on a minimum of 40% of design flow
- Limited rate of change of flow when an old chiller was running

- Installed 2 new 850 ton machines
- Variable frequency drive on one of the new chillers
- Flow could drop as low as 25% of max evaporator flow
- Made selections near peak of evaporator flow capability









Lessons Learned

- Communicate
Communicate
Communicate
- Just because
someone says they
did it doesn't mean
it's done. Double
Check



Communication is a two way street

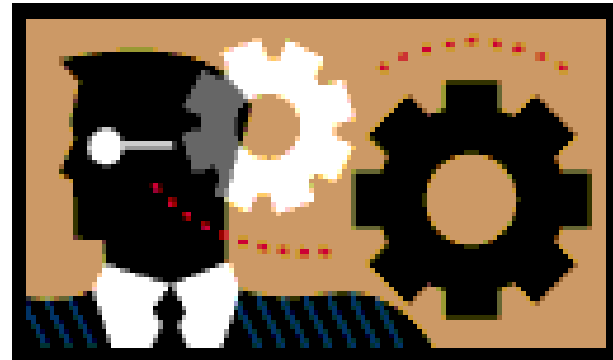
Communication

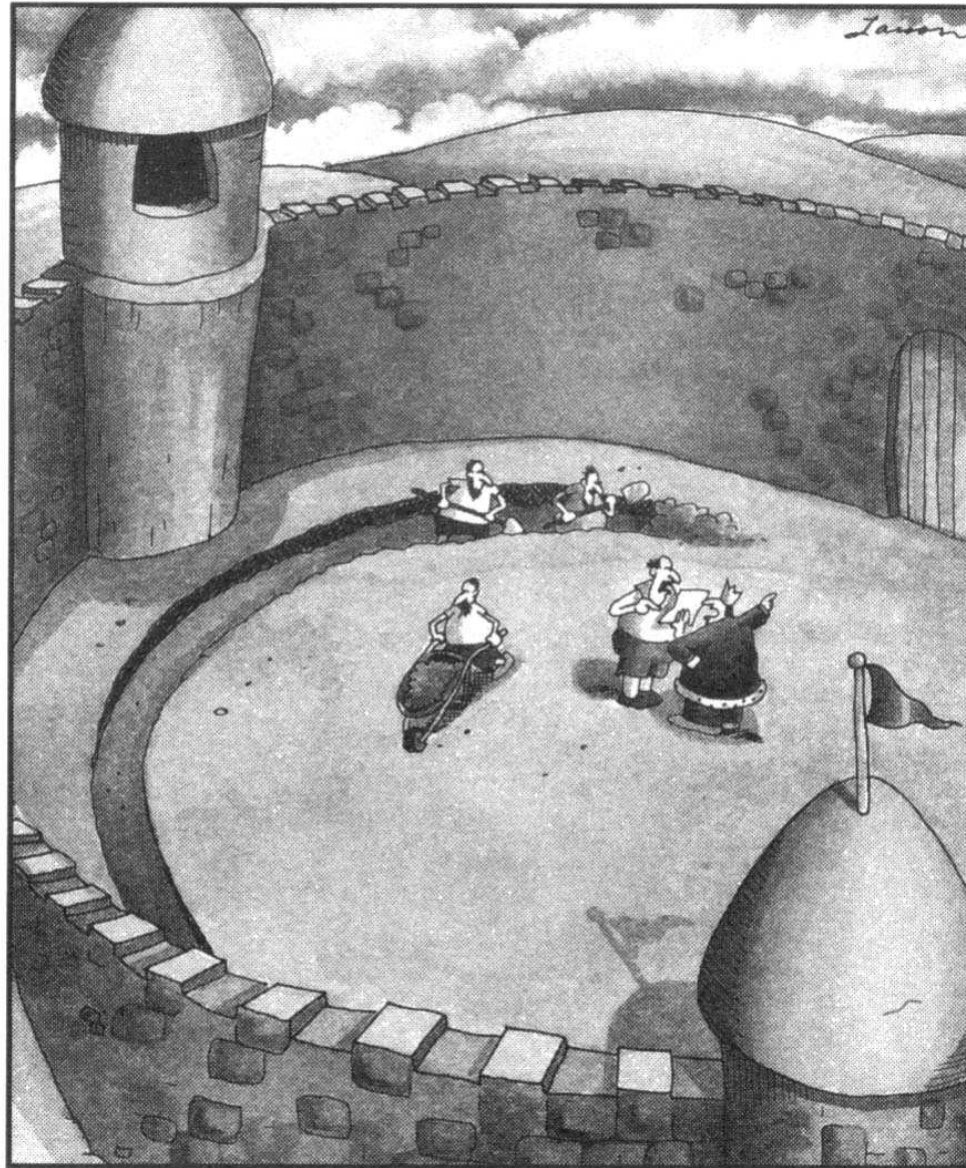
- A Woman: without her, man is nothing.



Communication Take 2

- A woman, without her man, is nothing.





Suddenly, a heated exchange took place between the engineer and the moat contractor.

"I know that you believe you understand what you think I said, but I'm not sure you realize that what you heard is not what I meant."

Robert McCloskey

