AIRAH seminar :
How to avoid making HVAC&R mistakes

Tuesday 8th November 2011

“There are lots of ways simple piping systems can go wrong”

Morgan Smith
Triple-M

- Much focus for ductwork design and coordination because of its size
- Selecting equipment capacities and parameters down to 2 decimal places
- Trying to make systems somehow fit into plantrooms that are never big enough
- Builder asking for plinth and penetration setouts before systems are coordinated
- Long lead time items requiring handings to be confirmed and ordered before coordination …

  sometimes before the contract has been signed!

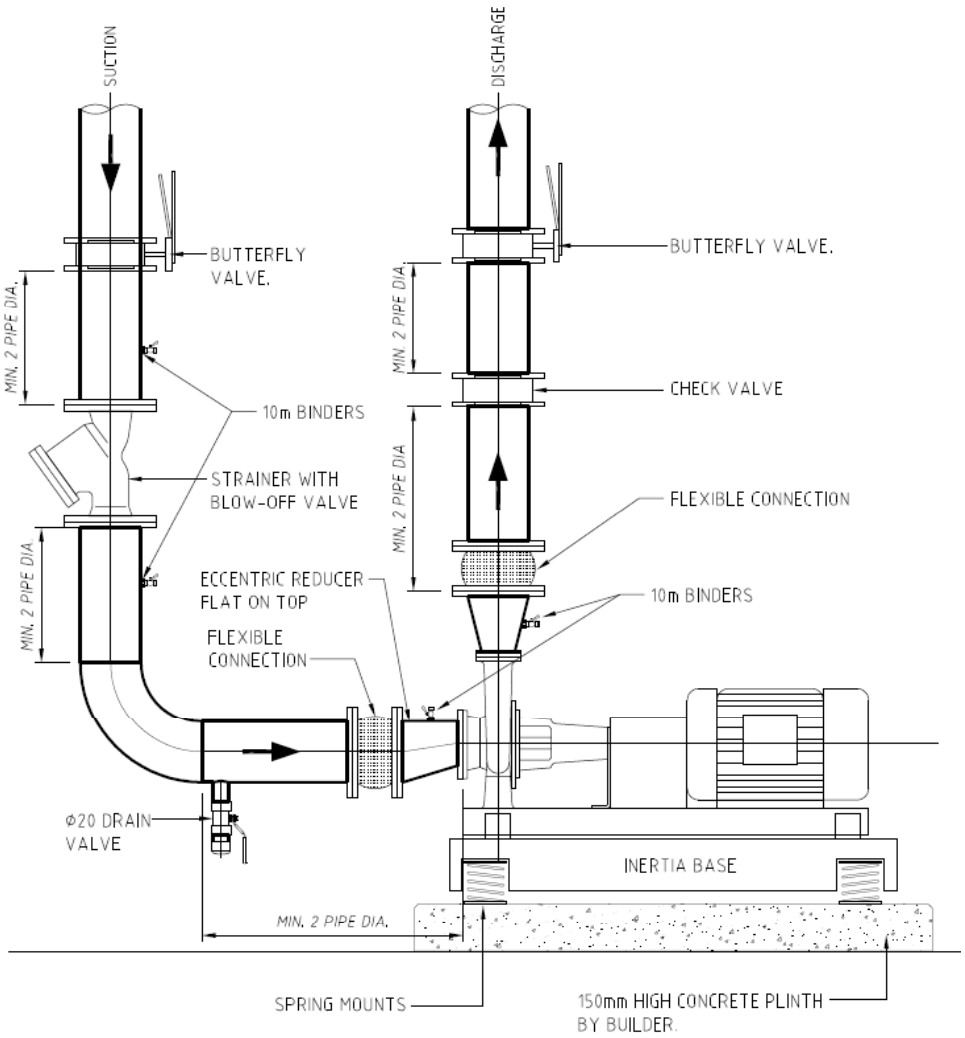
Plantroom piping design considerations

- Main plant locations
- Future plant provisions
- Service, access, egress clearances
- Major plant replacement provisions
- Constructability & structural supports
- Minimise bends, fittings etc ($ + time)

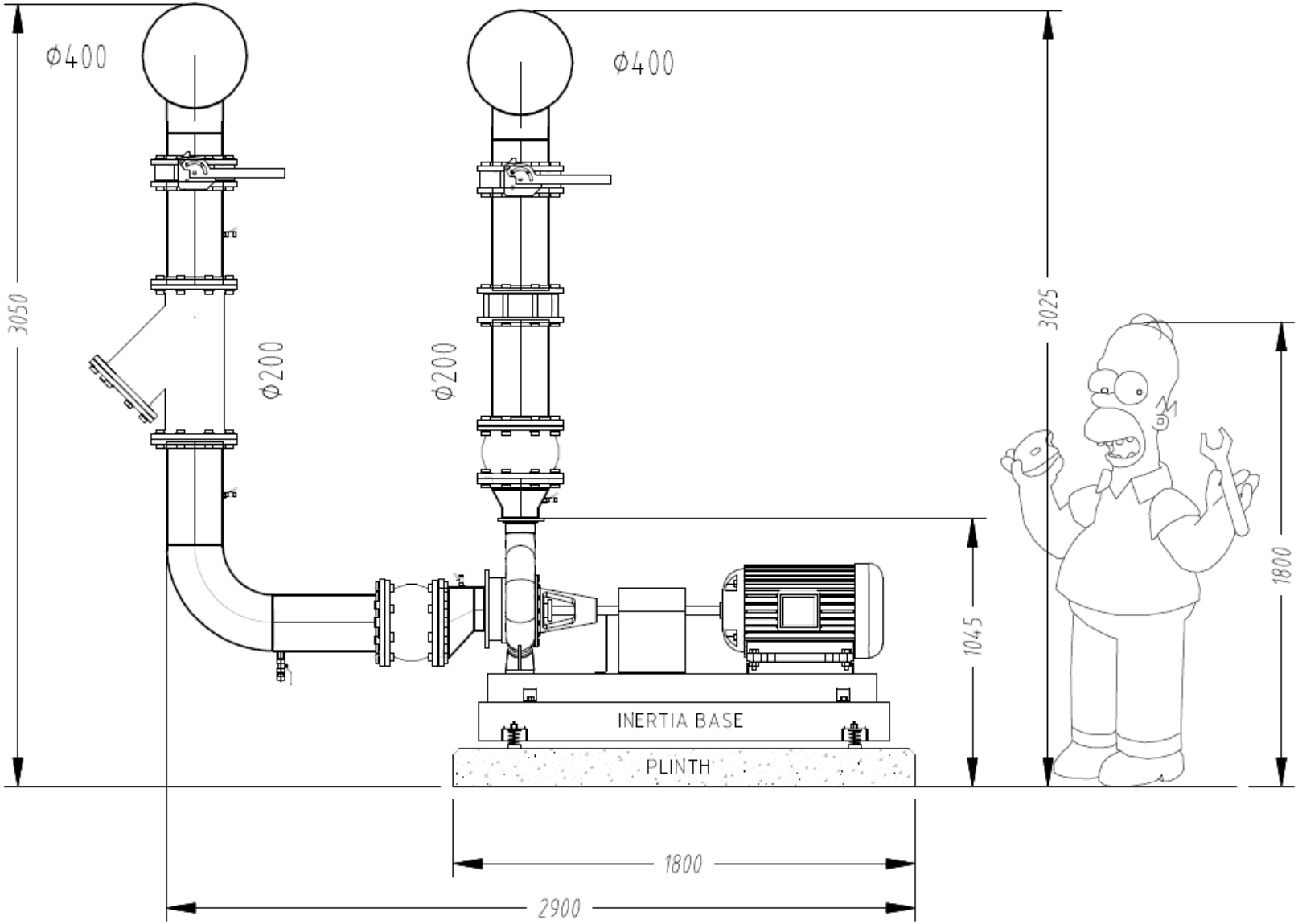
Pipe performance design considerations

- Maintain recommended straight pipe lengths before and after equipment
  - Pump inlets
  - Modulating valves i.e. field bypass
  - Flow meters
  - Pressure & temperature sensors

Standard pump arrangement



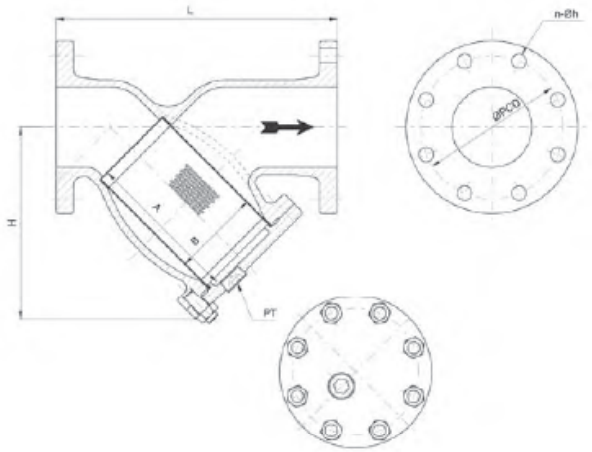
Example 200mm pump arrangement



- Appreciate the actual size of pipe mounted fittings and equipment.

…they are bigger than a single line schematic symbol!

HYFLO CAST IRON Y-TYPE STRAINERS



'HYFLO' CAST IRON SPECIFICATION

Cast iron 'Y' type strainer with replaceable stainless steel mesh, drilled and tapped blowdown connection, flanged to AS2129, Table 'E'. Available FBE coated to 350 microns in accordance AS/NZ:4158-1996. Standard strainers are green, FBE coated strainers are blue.

PRESSURE/TEMPERATURE RATING

Maximum Working Pressure: 1400 kPa (203 PSI) @ 20°C.
Maximum Working Temperature: 165°C @ 700 kPa.
Hydrostatically Tested at 2100 kPa.

MATERIAL SPECIFICATION

Ref.	Component	Material
1	Body	Cast Iron ASTM A126 GR.B.
2	Screen	Stainless Steel 304
3	Cover	Cast Iron ASTM A126 GR.B.
4	Bolts	Steel
5	Nuts	Steel
6	Drain Plug	Galvanized Steel
7	Gasket	Rubber

BASKET SPECIFICATIONS

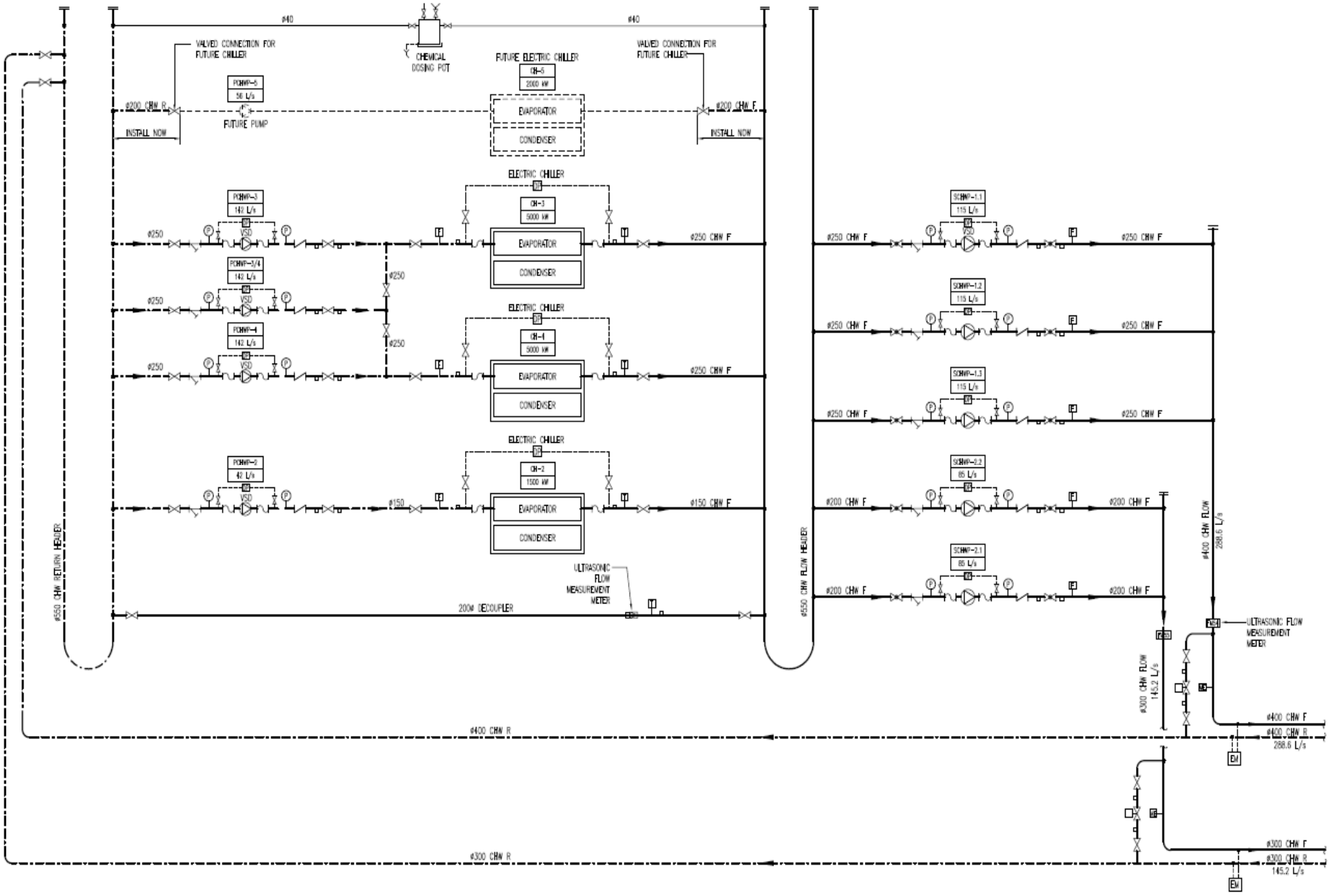
Stainless steel perforated with 3mm holes.
Available for purchase separately.

DIMENSIONS - mm

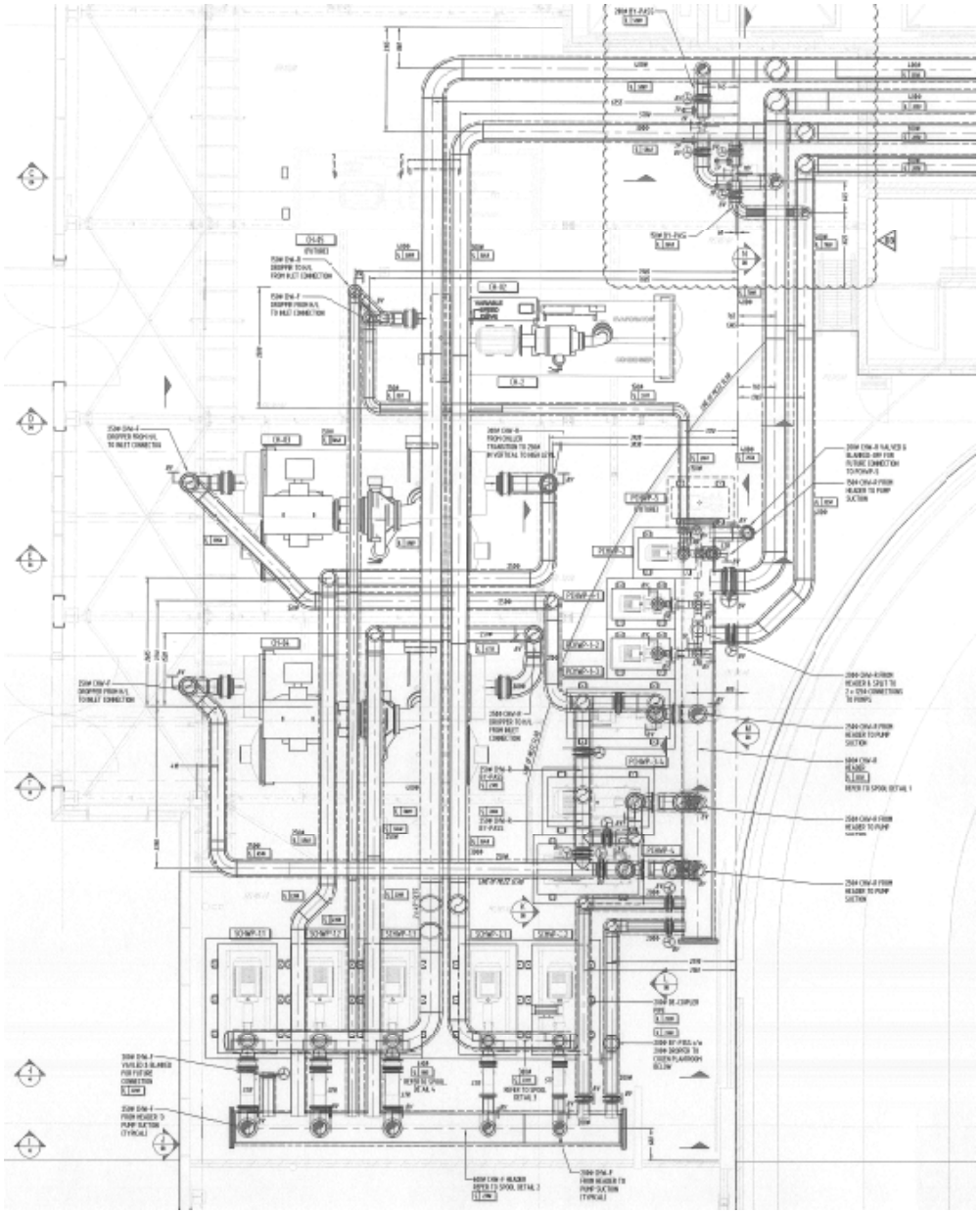
SIZE	50	65	80	100	125	150	200	250	300	350
A	110	135	155	205	225	260	318	400	475	545
B	58	71	87	112	136	165	211	359	305	365
H	172	203	222	241	292	321	416	483	559	735
L	225	273	292	352	416	470	543	660	762	949
PT	15	25	25	25	32	40	40	50	50	50
Kg*	10	15	19	30	45	60	110	170	300	420

PT - pipe thread BSP. Screen dimensions are approximate only. * Weights are approximate only.

Design Schematic



Installed Plan



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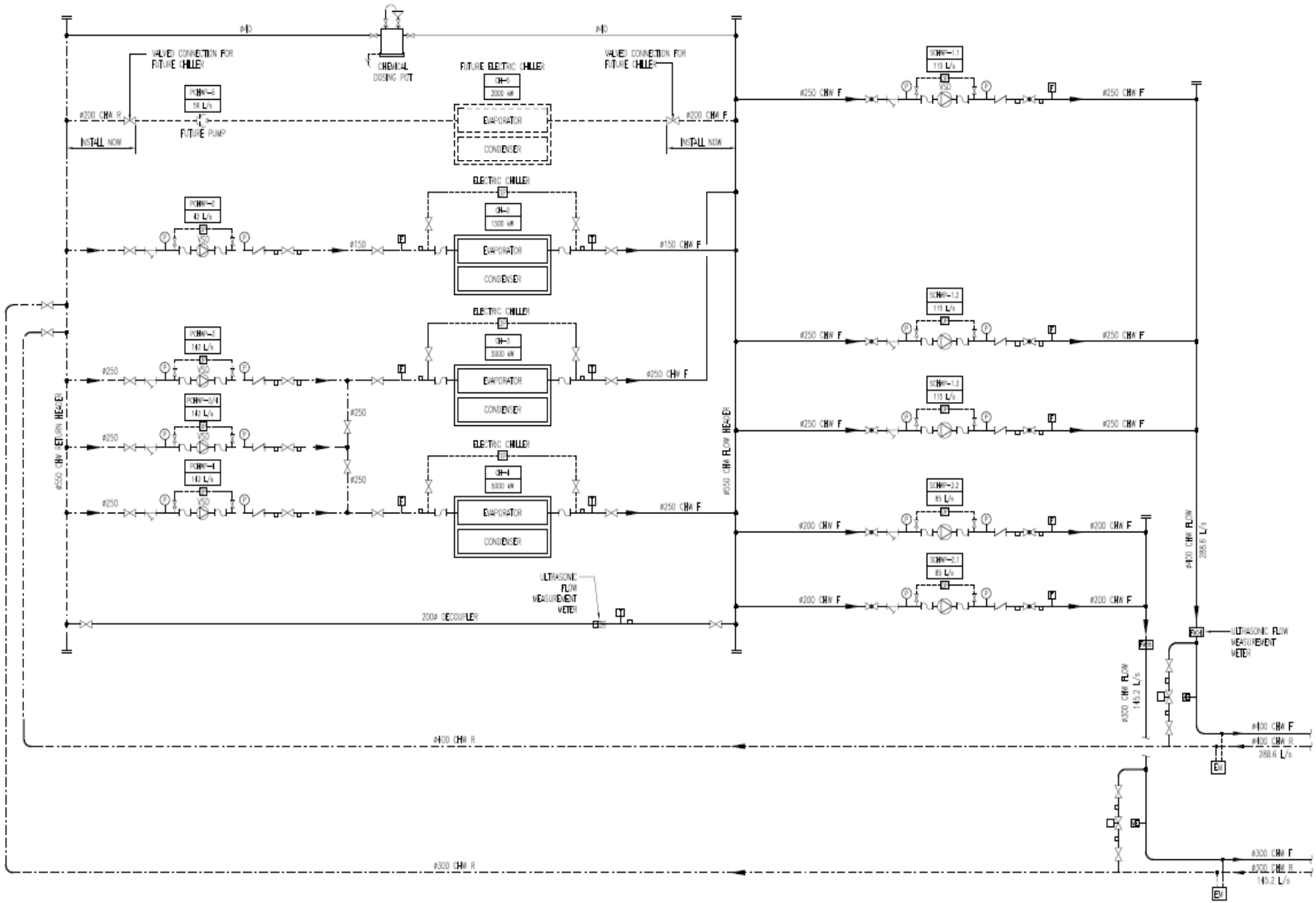
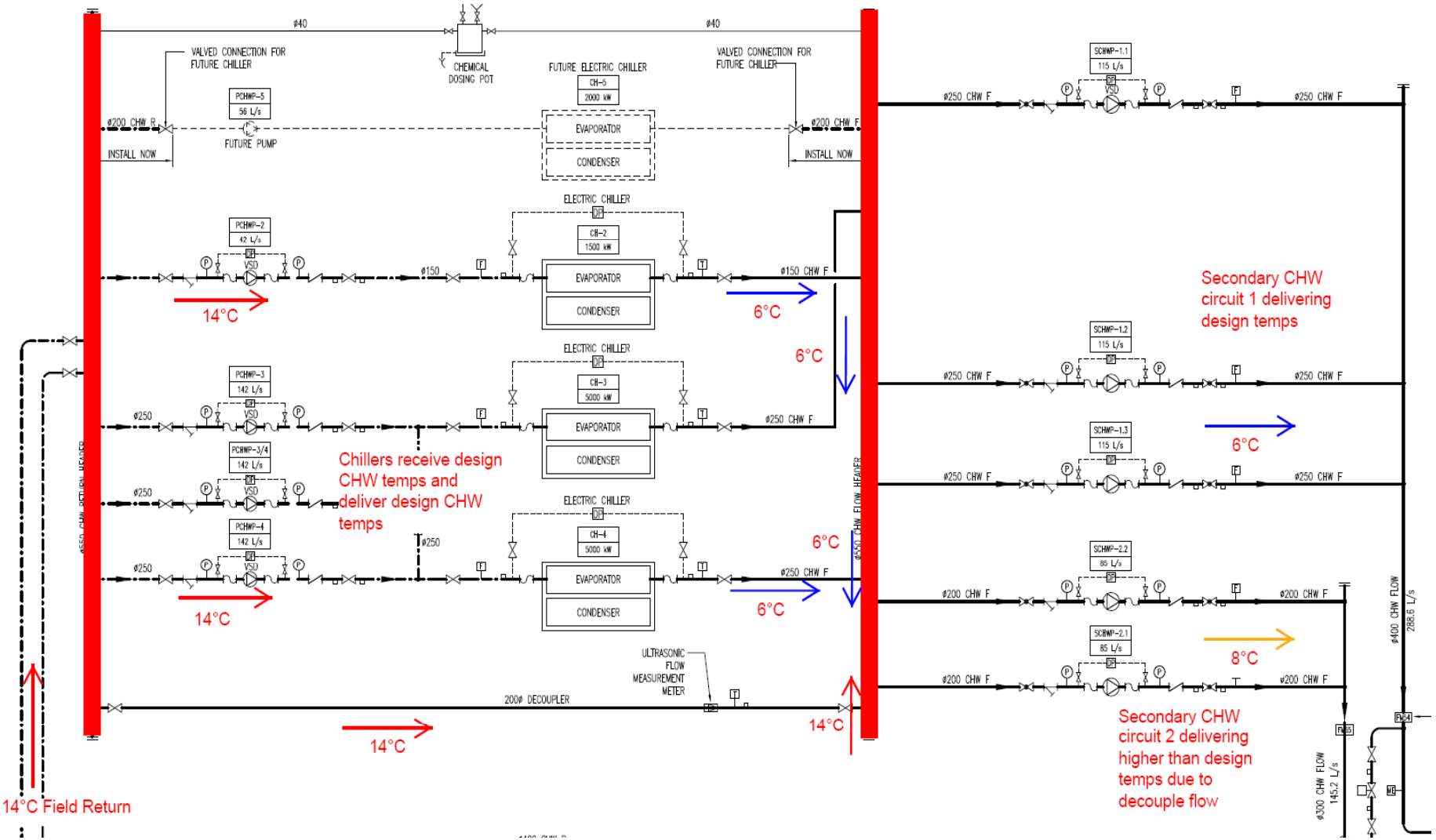
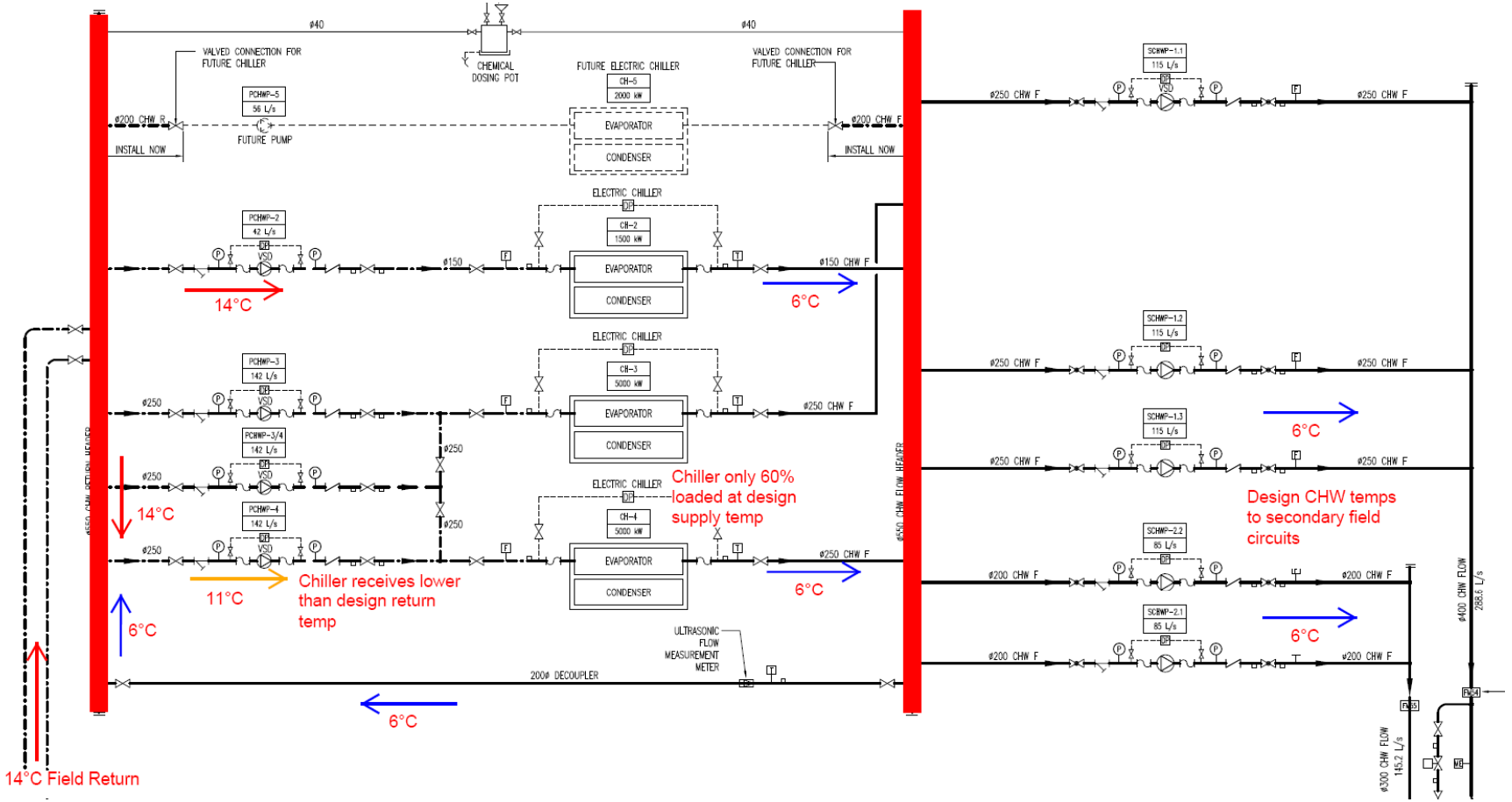


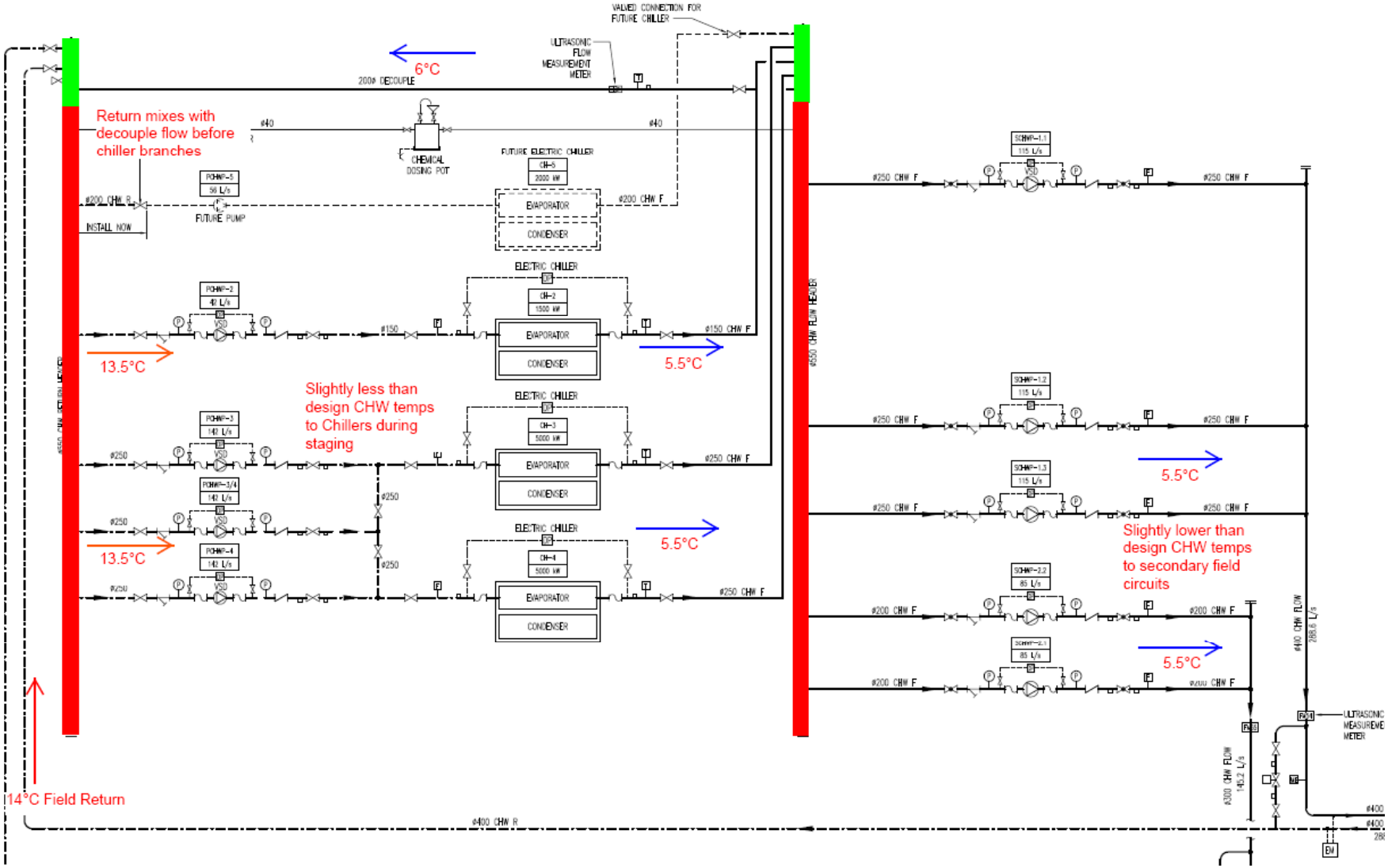
Primary < Secondary Flow Scenario



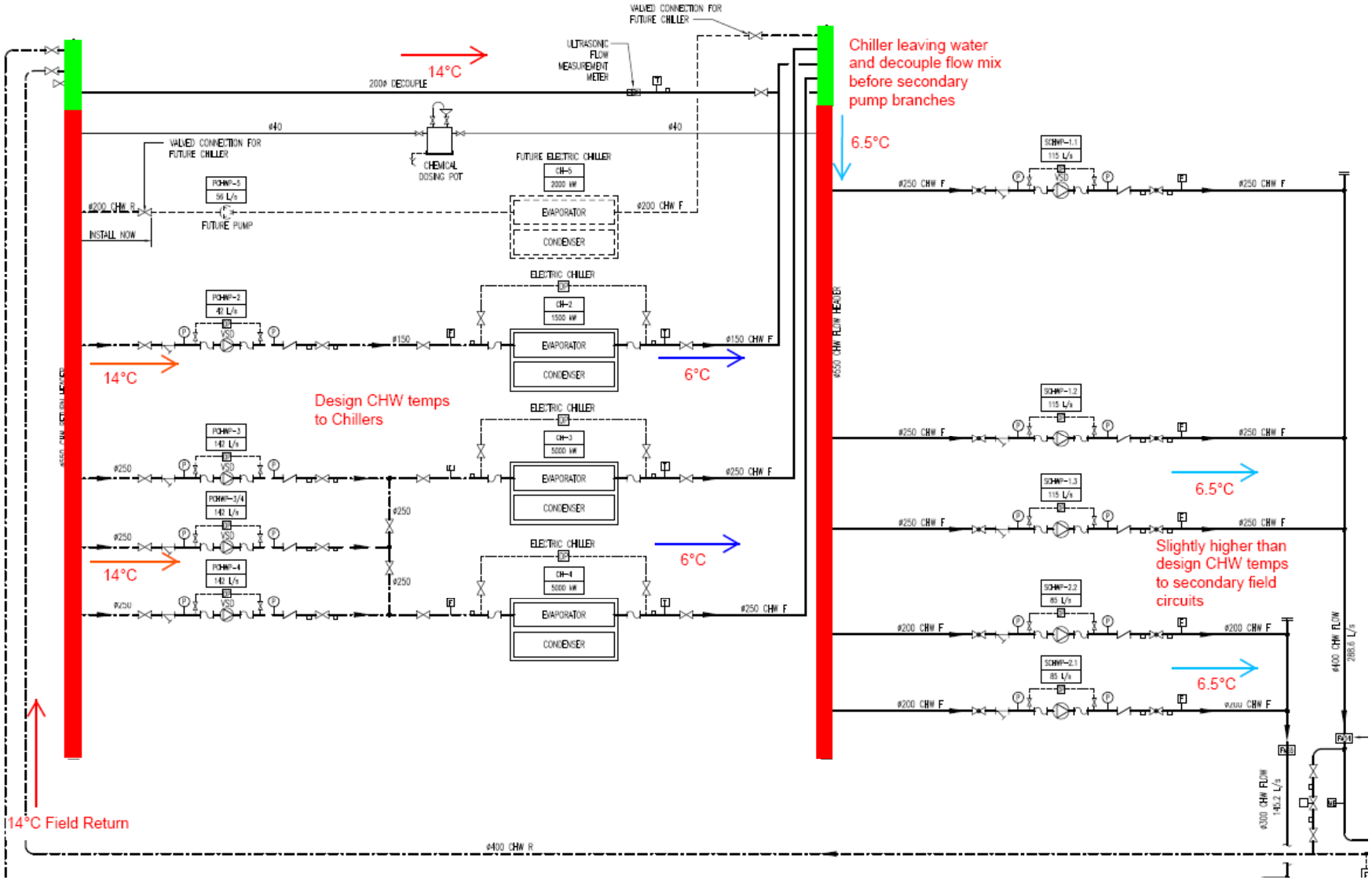
Primary > Secondary Flow Scenario



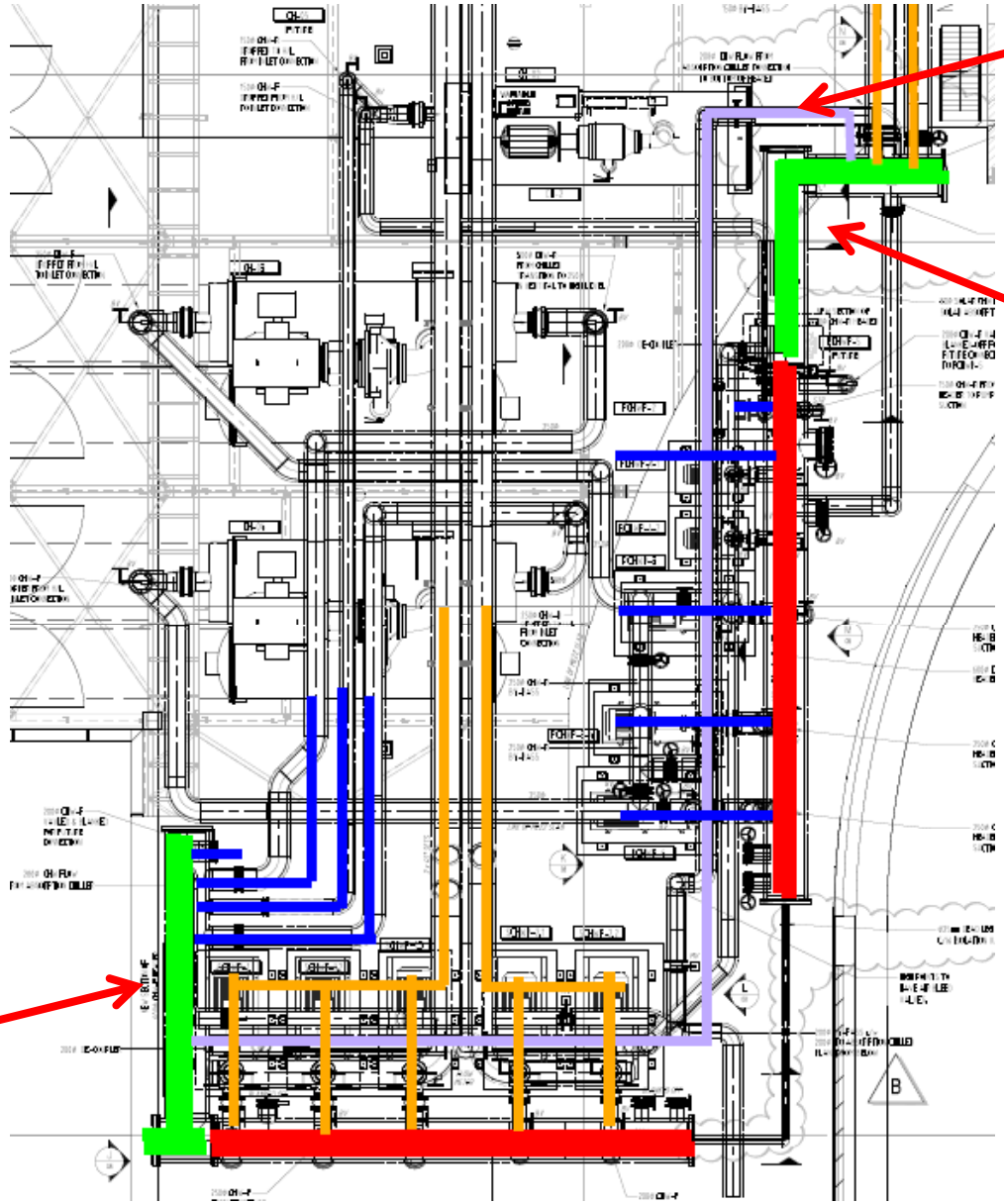
Modified Schematic Primary > Secondary



Modified Schematic Primary < Secondary



Modified Plan



Decouple line relocated

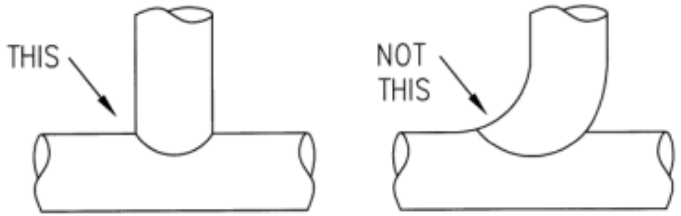
Return Header Extension

Supply Header Extension

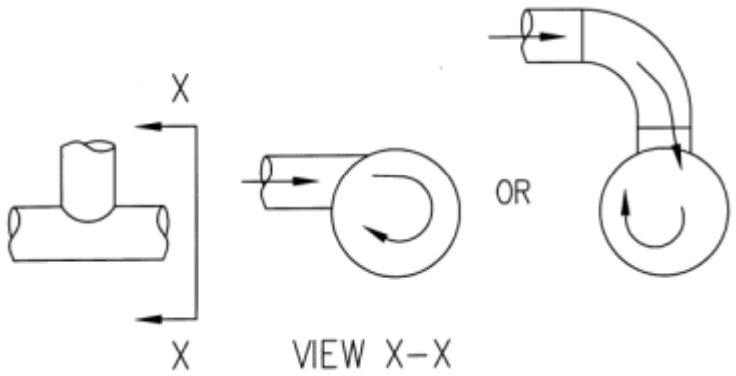
Ways of preventing thermal mixing problems

- Design plantrooms large enough to incorporate all equipment with required clearances, access etc
- Flag possible shortfalls in space allocation early as possible with builder & designer
- If spatial constraints are expected work through all possible solutions in the design phase and avoid leaving it for site to “sort out” during construction
- Allow for long pipe runs between connections (as long as practical 10…20 pipe diameters)

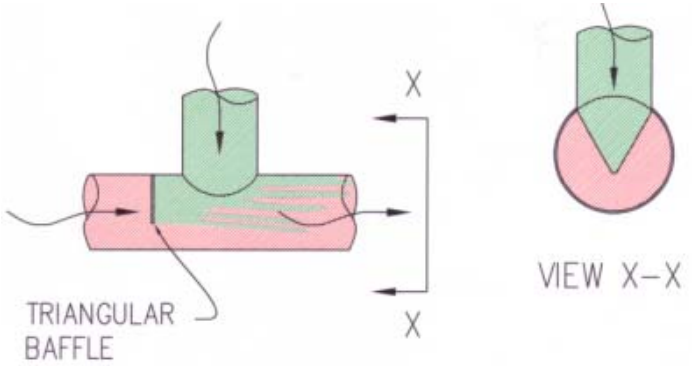
- High turbulence fittings to induce mixing



- Swirling Tees



- Mixing baffles to create turbulence



- Possible controls solutions using flow meters and variable speed pumps to minimise net decouple flow (last resort)

Questions?