COOLING AND VENTILATION AT CERN

CERN-CLS Meeting

Cooling & Ventilation Group
M. Nonis – 18th October 2019

CERN

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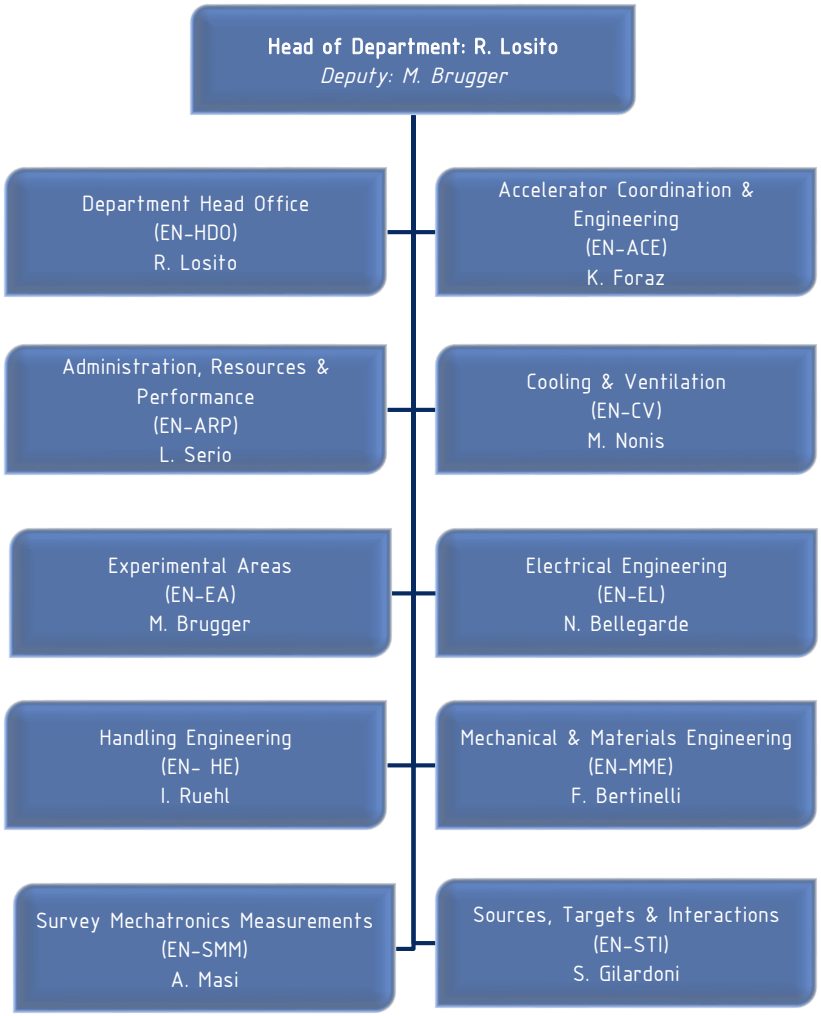
DEPARTMENT

Engineering Department

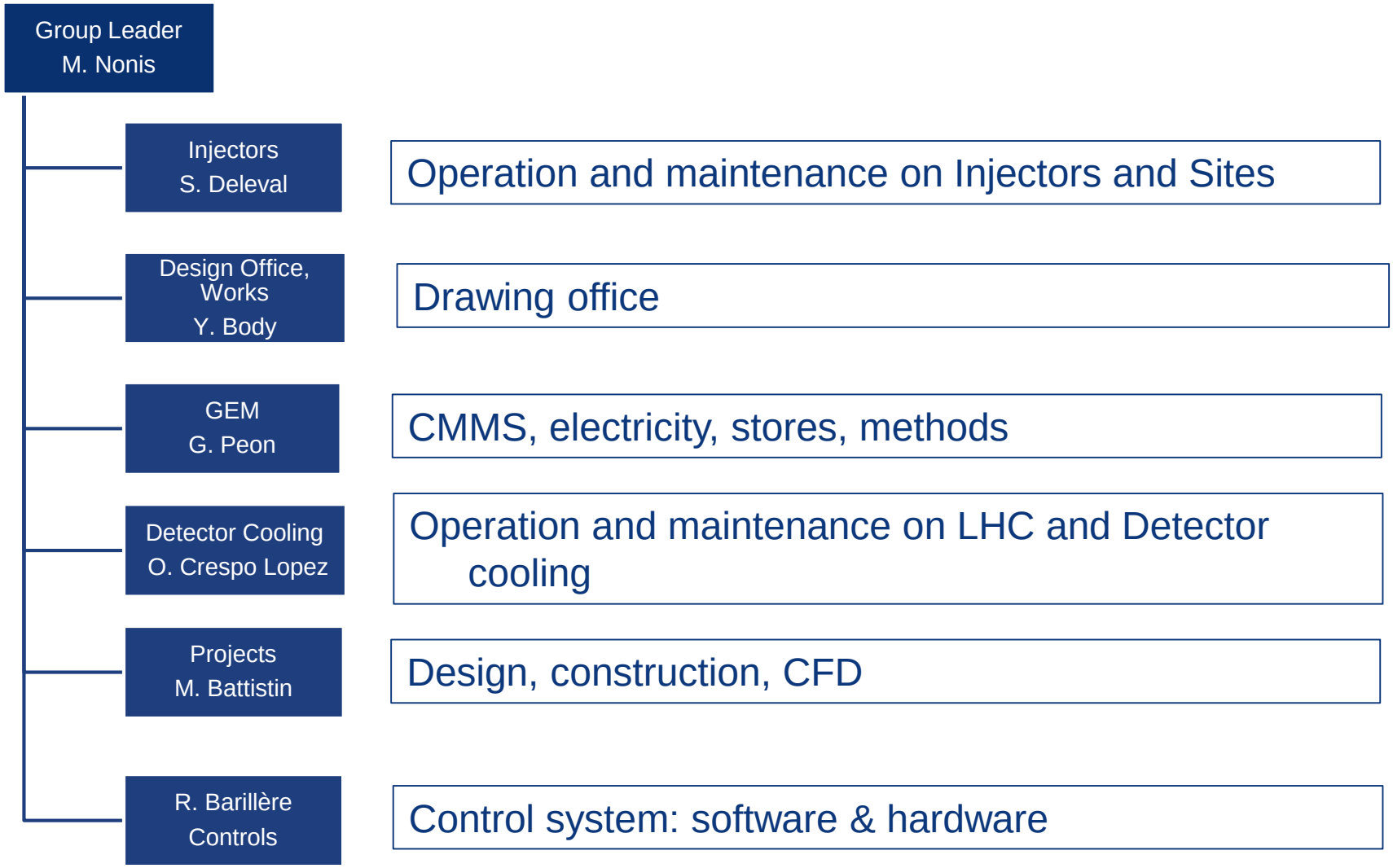


- Operation
  - Infrastructure
  - Accelerators
  - Experimental Areas
- Projects
  - Consolidation
  - Upgrades
  - New facilities
  - Design & Manufacturing
- Studies

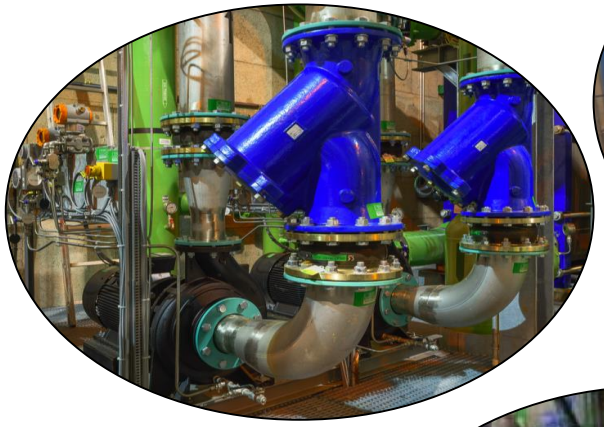
Cooling and Ventilation Group: mandate

- **Operation and maintenance** of water cooling, compressed air, sumps, ventilation and air conditioning plants in the technical areas (for accelerators, Experiments, computing center) and special system for detector cooling:
  - continuous improvement of plants reliability and availability
  - methods,
  - cost reduction.
- **Project** management:
  - Design and construction of new plants,
  - Upgrade, modification of existing plants,
  - Consolidation of old/obsolete plants.
- **CFD** simulation (mainly cooling systems for detectors)

Cooling and Ventilation Group Organizzazione



Installations



Water cooling (accelerators, experimental areas, computing center, laboratories);

Water network and fire fighting;

Supms and drainage pumping systems.

Compressed air production and distribution.

Ventilation, air conditioning for underground and technical buildings:

- Caverns, tunnel;
- Industrial halls, control rooms, laboratories, clean rooms.

Detector cooling

Power and control cubicles for CV plants.

Cooling Plants

Equivalent to a small town of 25'000 inhabitants, 6% Geneva Canton.
Annual consumption reduced by 40% in last 8 yrs.

Cooling towers (450 MW)	27
Chilled water station: 6-12°C (73 MW)	41
Cooling station (raw water, demineralized water, C_3F_8, C_6F_{14})	150
Pipework	800 km
Water distribution network: 3 stations	5'400 m^3/h
Water consumption (peak)	1'260 m^3/h





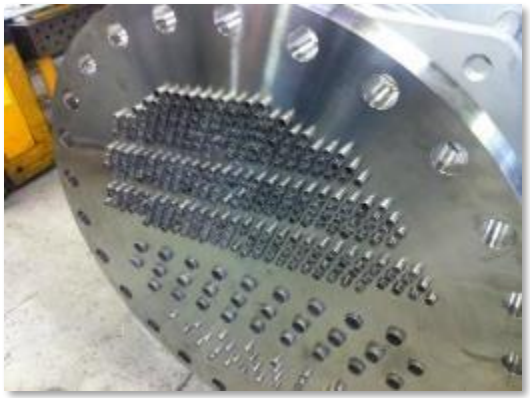

Impianti ventilazione, distribuzione fluidi

HVAC	1’500 units from 2’000 to 120’000 m3/h per unit
Fire fighting systems	800 points
Compressed air	14 stations distribution network 200 km
Demineralised water production	20 m3/h - 0.1 µS/cm

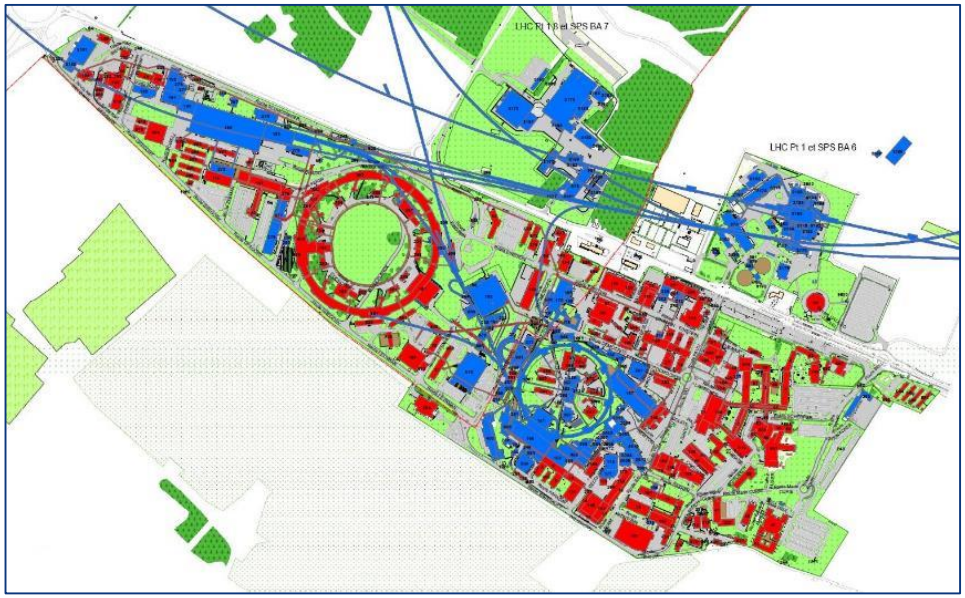
Detector cooling

30 systems for ATLAS-CMS-ALICE-LHCb-TOTEM

- -70 ÷ +20 ° C / 0.2÷90 bar
- Water, perfluorocarbons (PFC), Novec
- Radiation tolerance – Dielectricity – materials compatibility

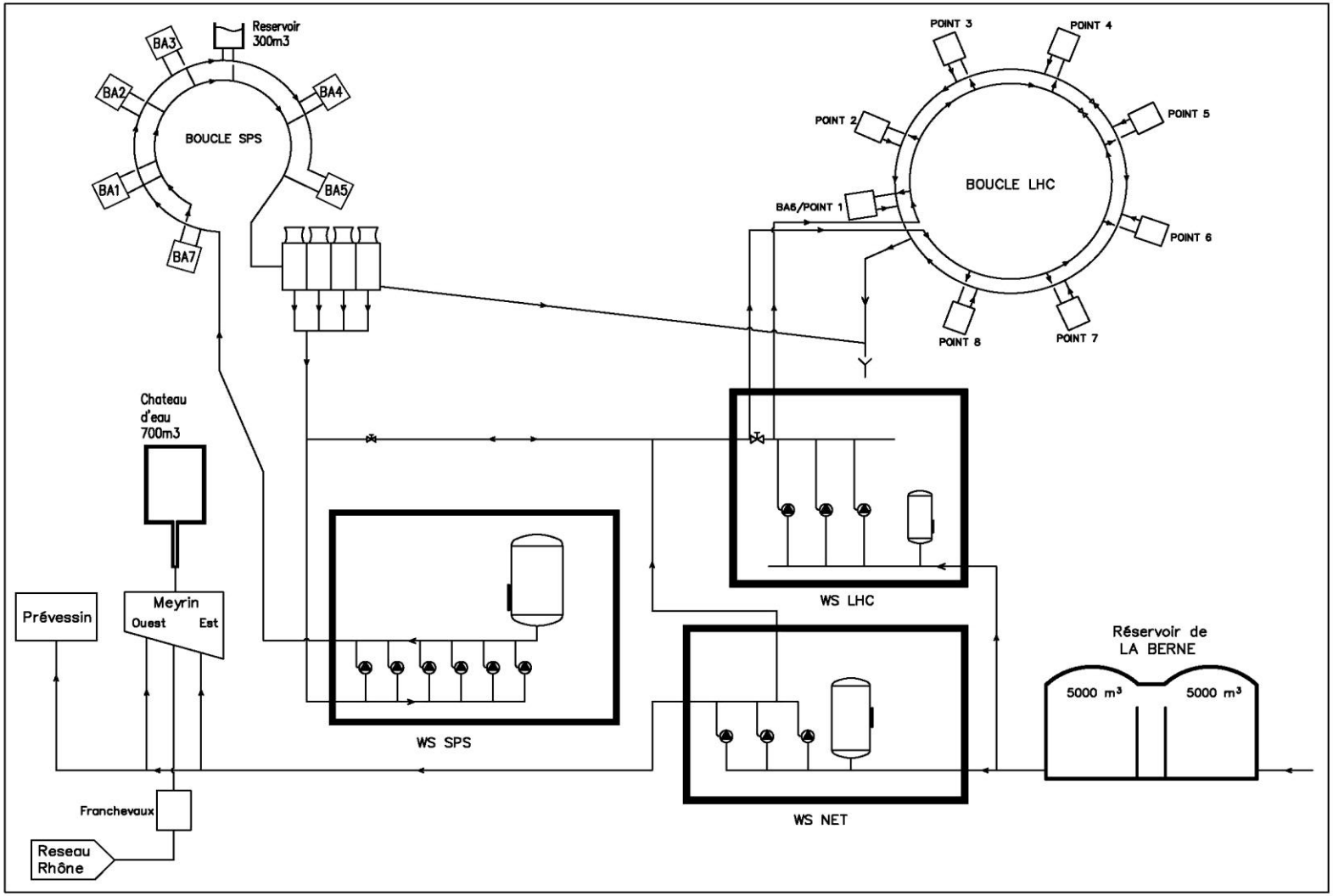


Buildings under CV responsibility

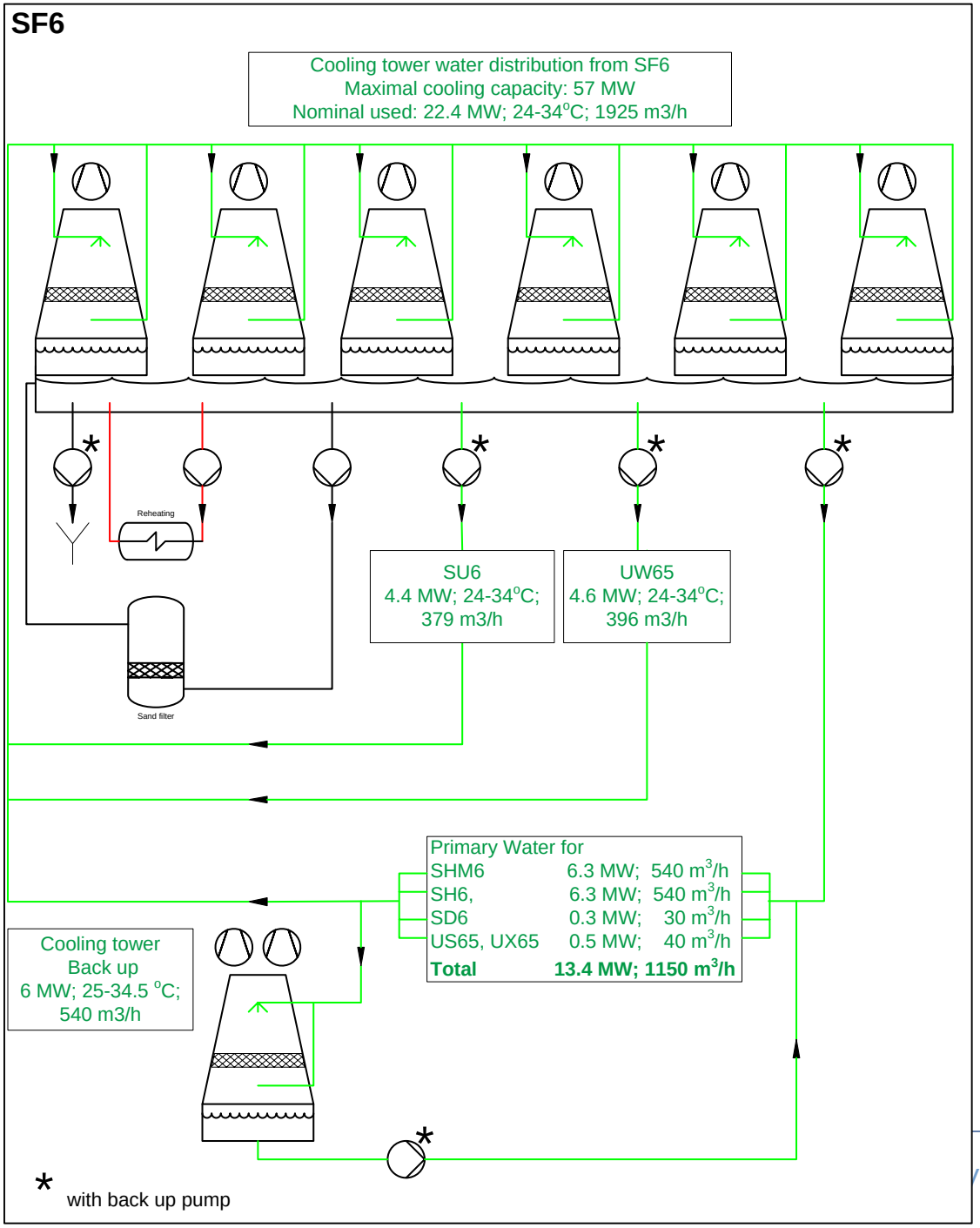


Meyrin :	131 bldgs -	25 barracks
Prevessin:	45 bldgs -	24 barracks
LHC & SPS Points:	220 bldgs -	116 barracks

Water network distribution

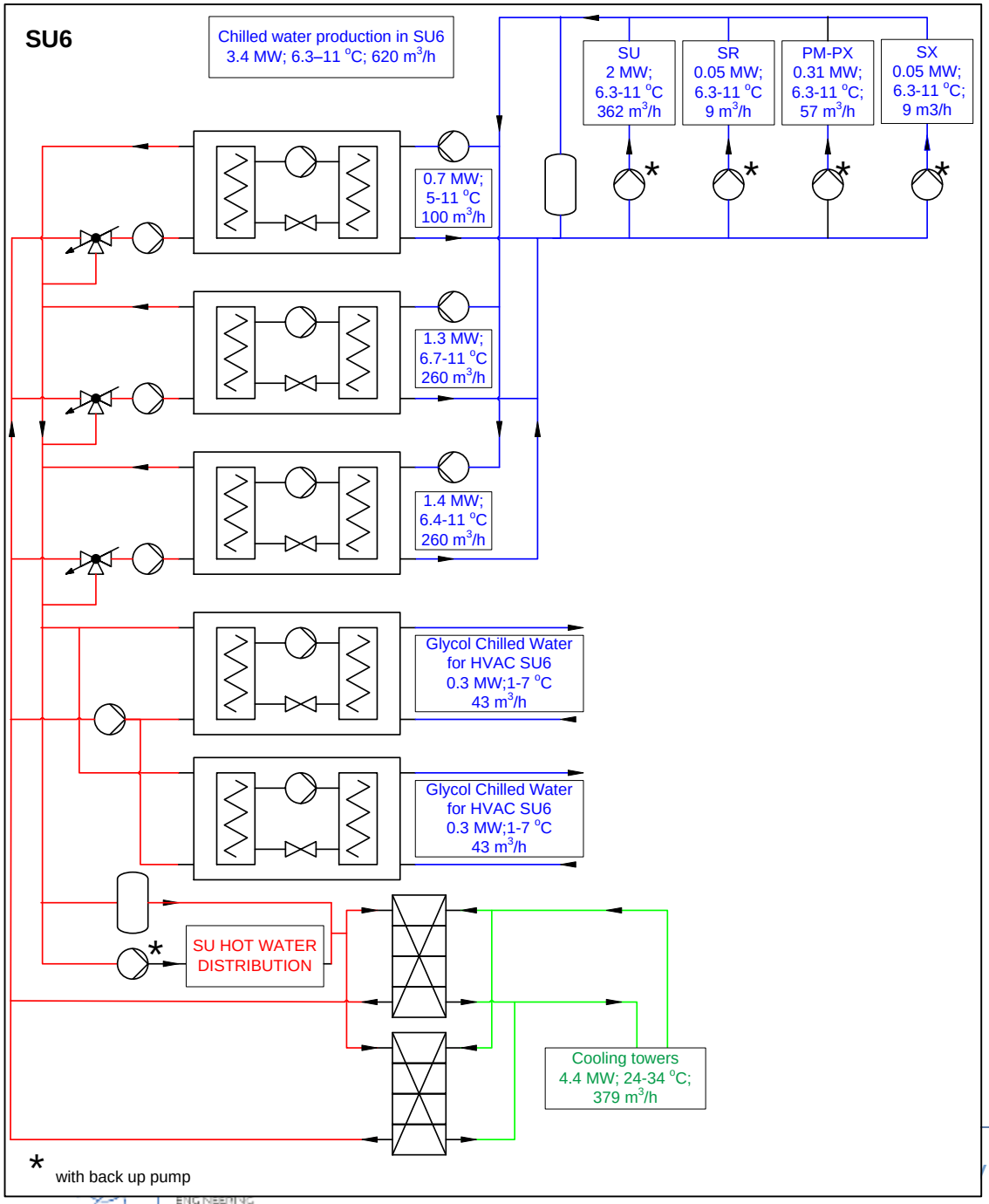


LHC cooling



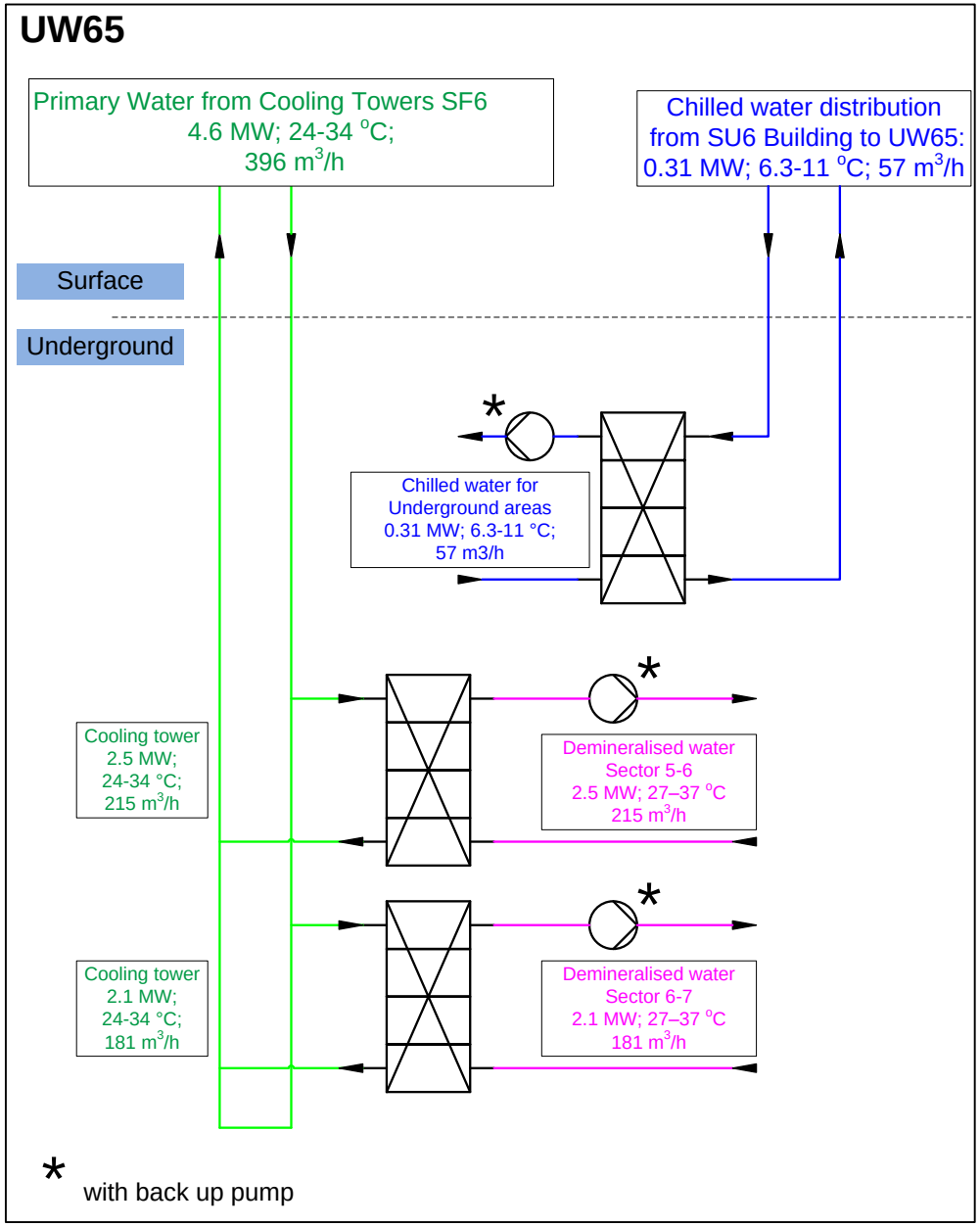
Primary and secondary side:
N+1 redundancy

LHC Chilled water



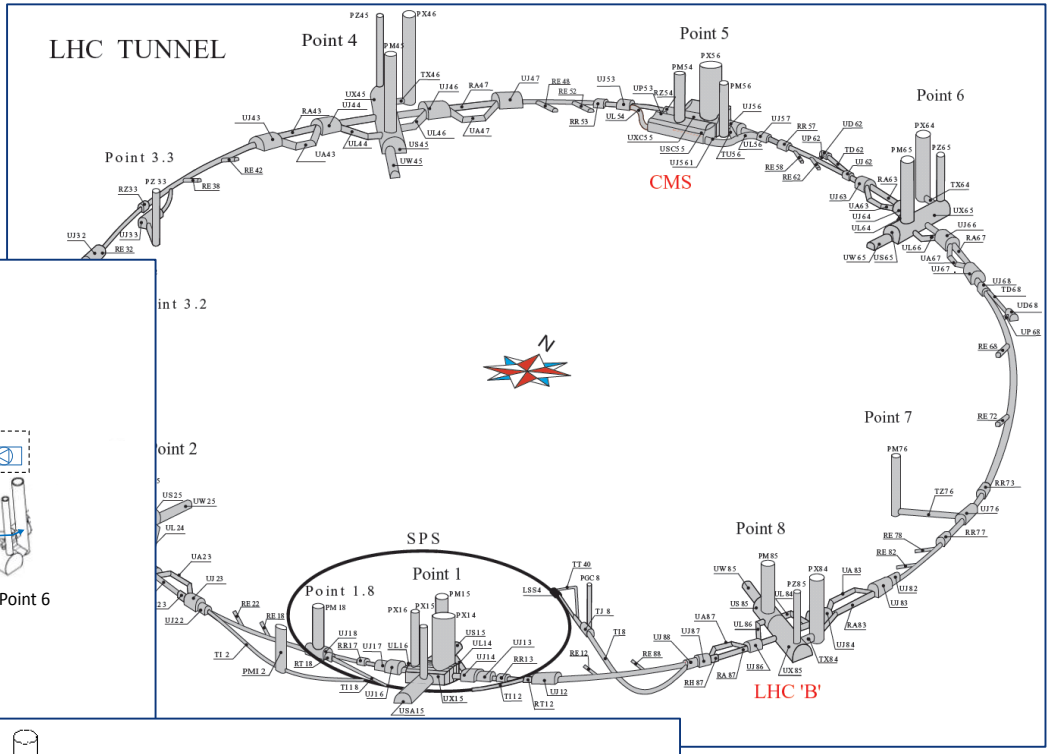
Primary and secondary side:
N+1 redundancy

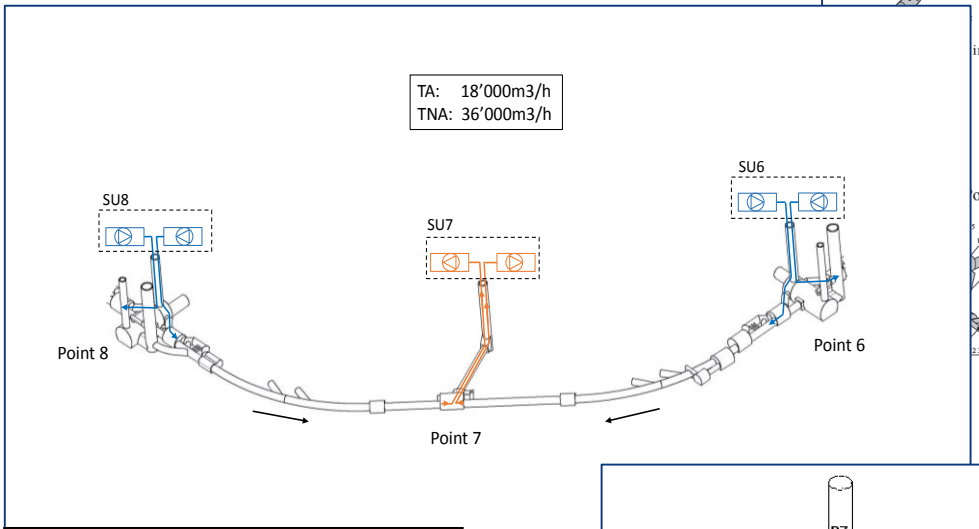
LHC underground



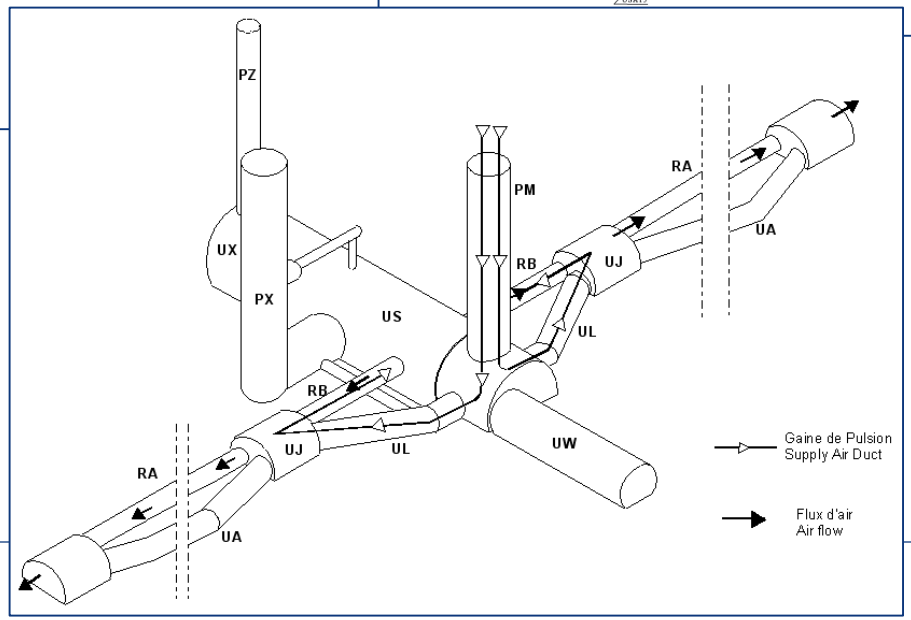
Primary and secondary side:
N+1 redundancy

LHC Ventilation





AHU: N+1 redundancy



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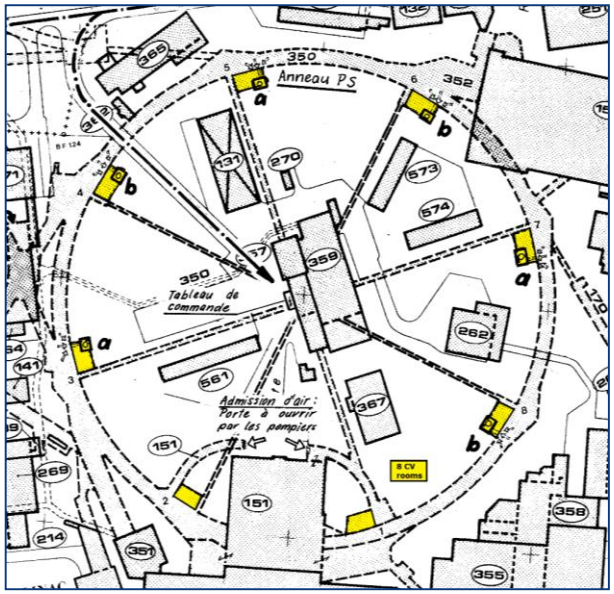
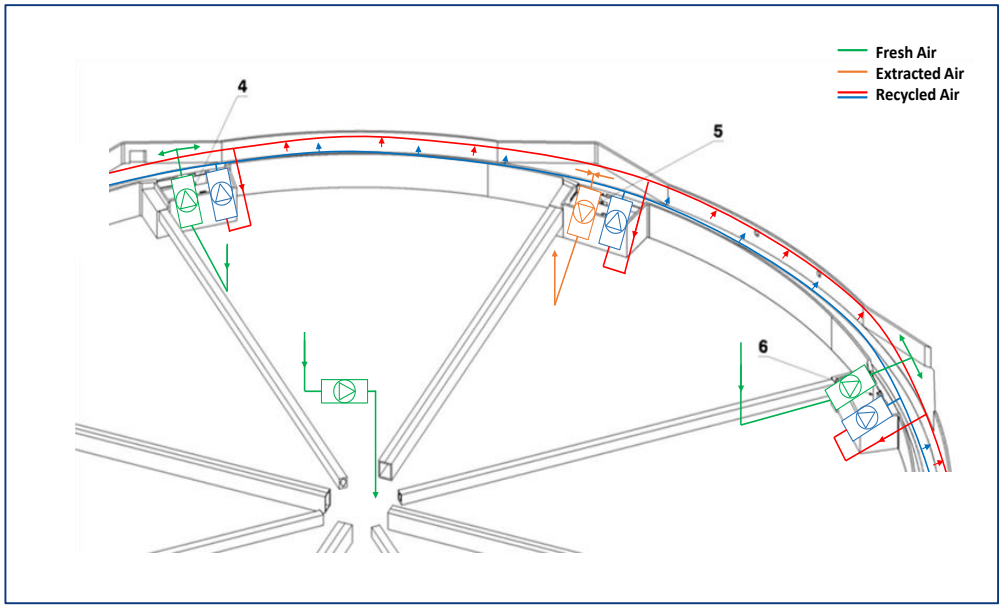
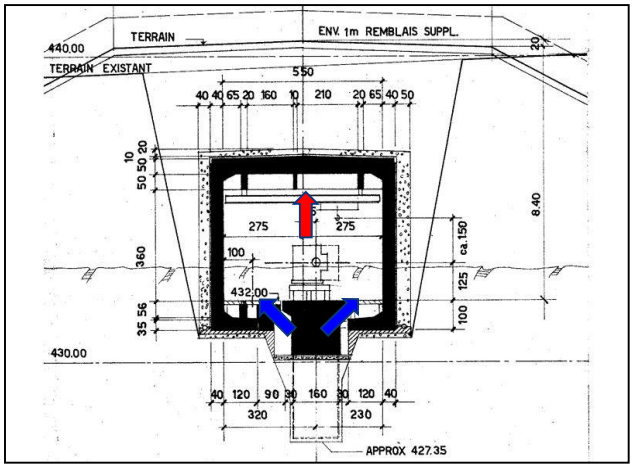
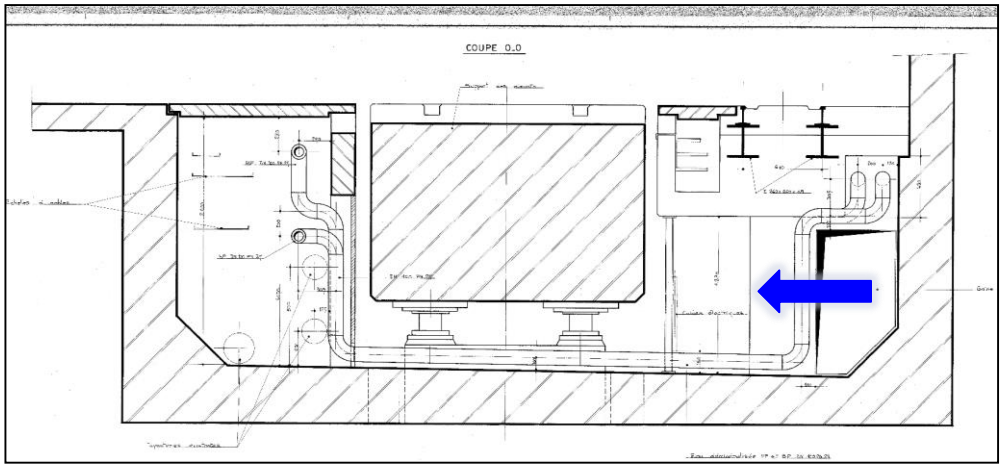
PS ventilation







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