



# **UPRs safety exits from the new HL-LHC underground technical galleries in Point 1 and Point 5 to the LHC: integration of safety services and cabling**

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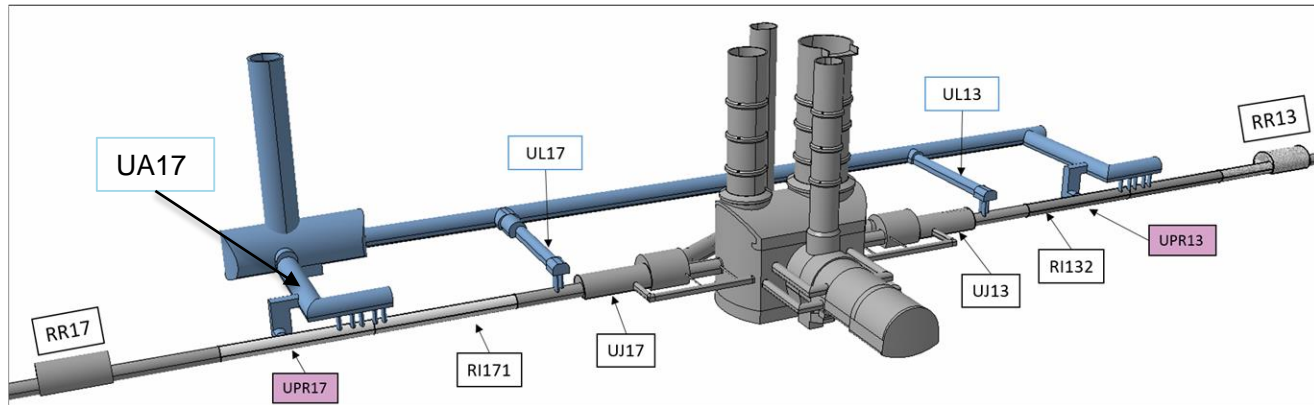
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3. ODH Detection integration
4. Access, Fire Detection and Red Phones integration

## *General overview*

# HL-LHC Infrastructure

Example: Point 1



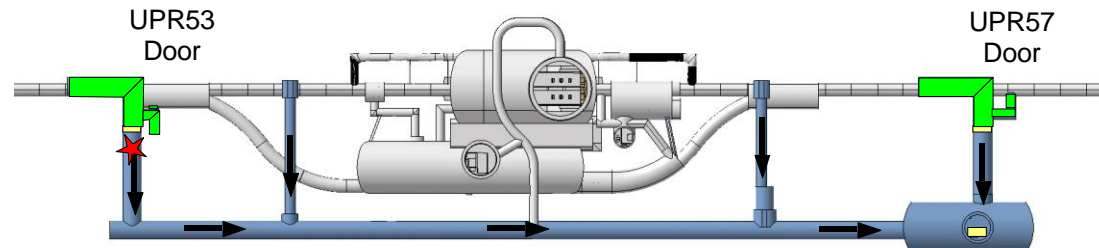
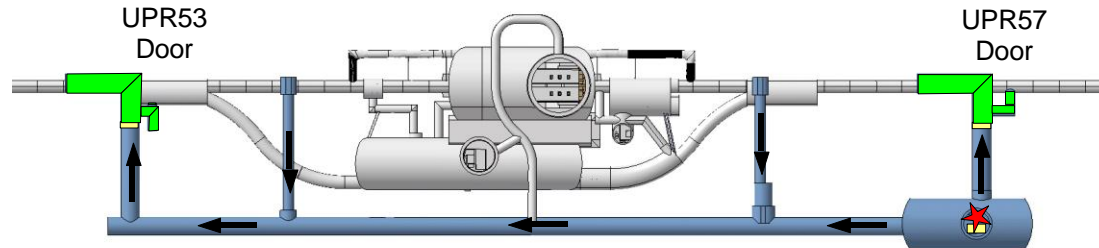
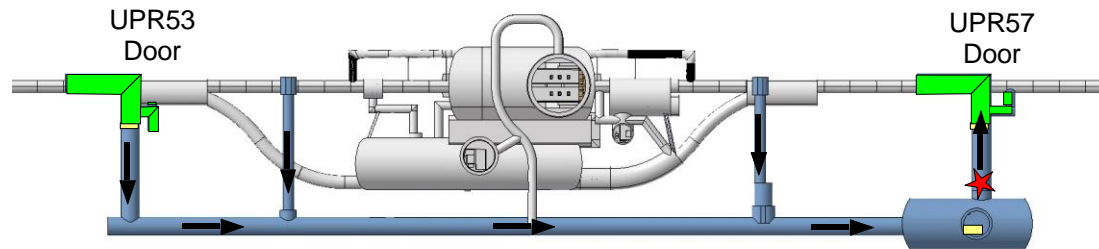
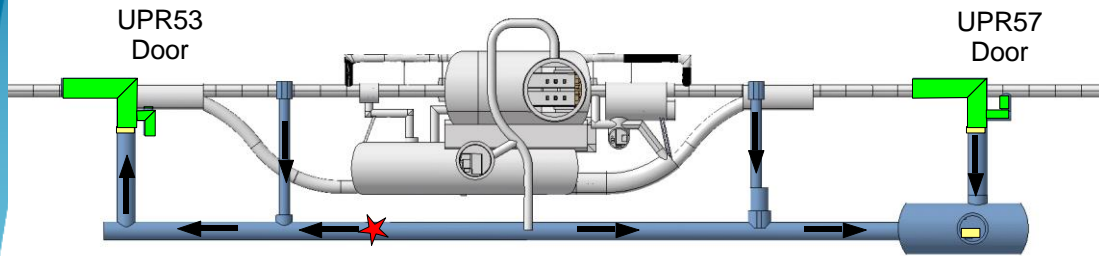
REFERENCE : ST0816906\_01

Courtesy: S. Maridor

Hilumi tunnel

Slide from: CSAP LHC #36 on 28.09.2017  
Christelle GAINANT

# UPR evacuation (After LS2)



★ Incident      ■ No-working area      ■ Nominal evacuation path

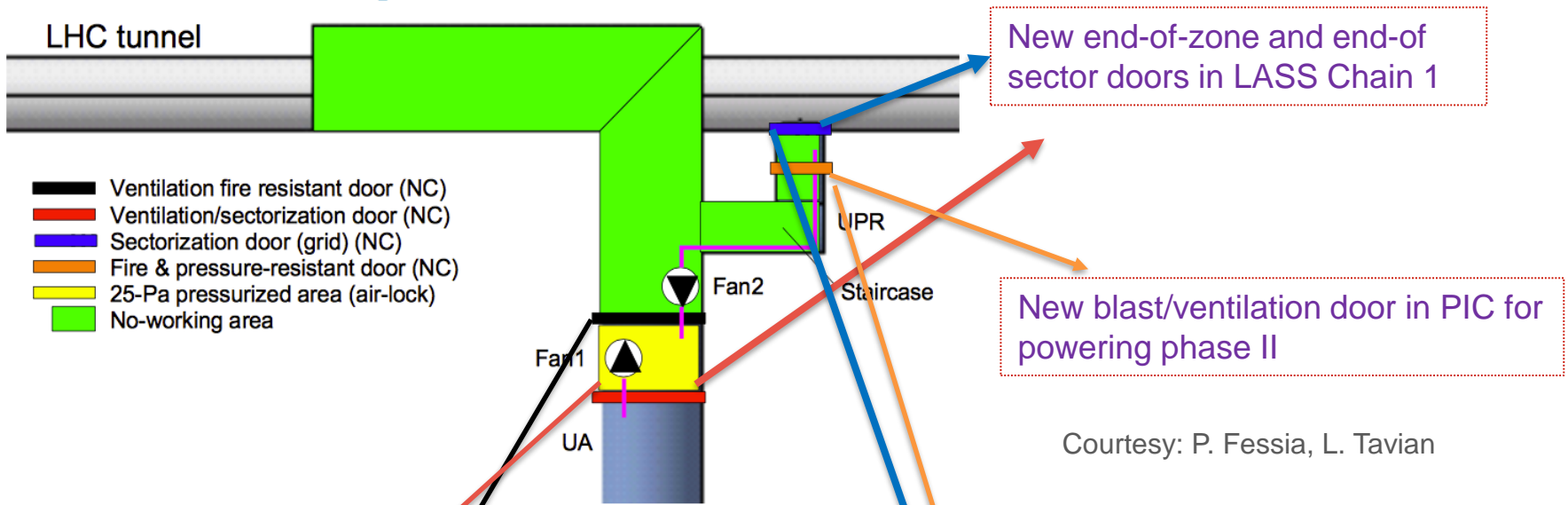
■ Degraded evacuation path      ■ Pressurized areas

- The evacuation medium:
  - The PM\_7 shaft with pressurized lift and stair case.
  - Doors (0.9 m x 1.7/2.1 m) at both ends of HL-LHC underground galleries.
- Evacuation rules:
  - in case of evacuation signal, the personnel has first to try to evacuate via the PM\_7.
  - If the hazard is blocking the evacuation path, the personnel has to evacuate via the UPR exit doors connected to the LHC tunnel.

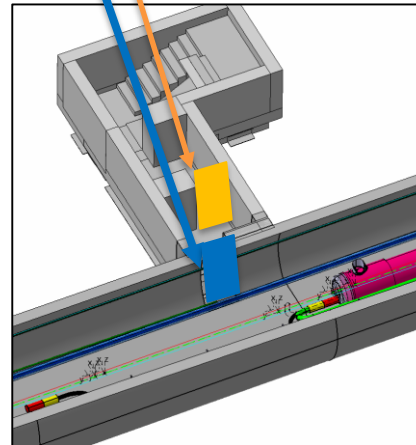
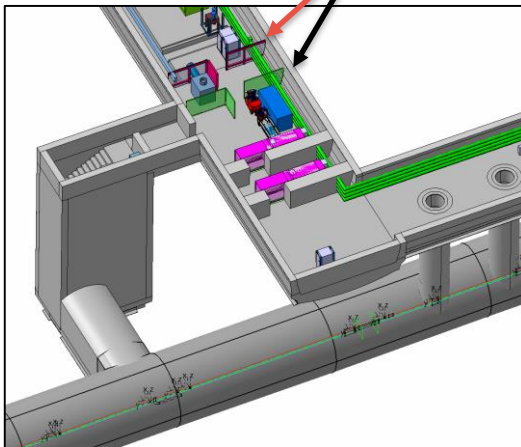
Courtesy: P. Fessia, L. Taviani

# UPR Doors

## The UA/UPR pressurized airlocks

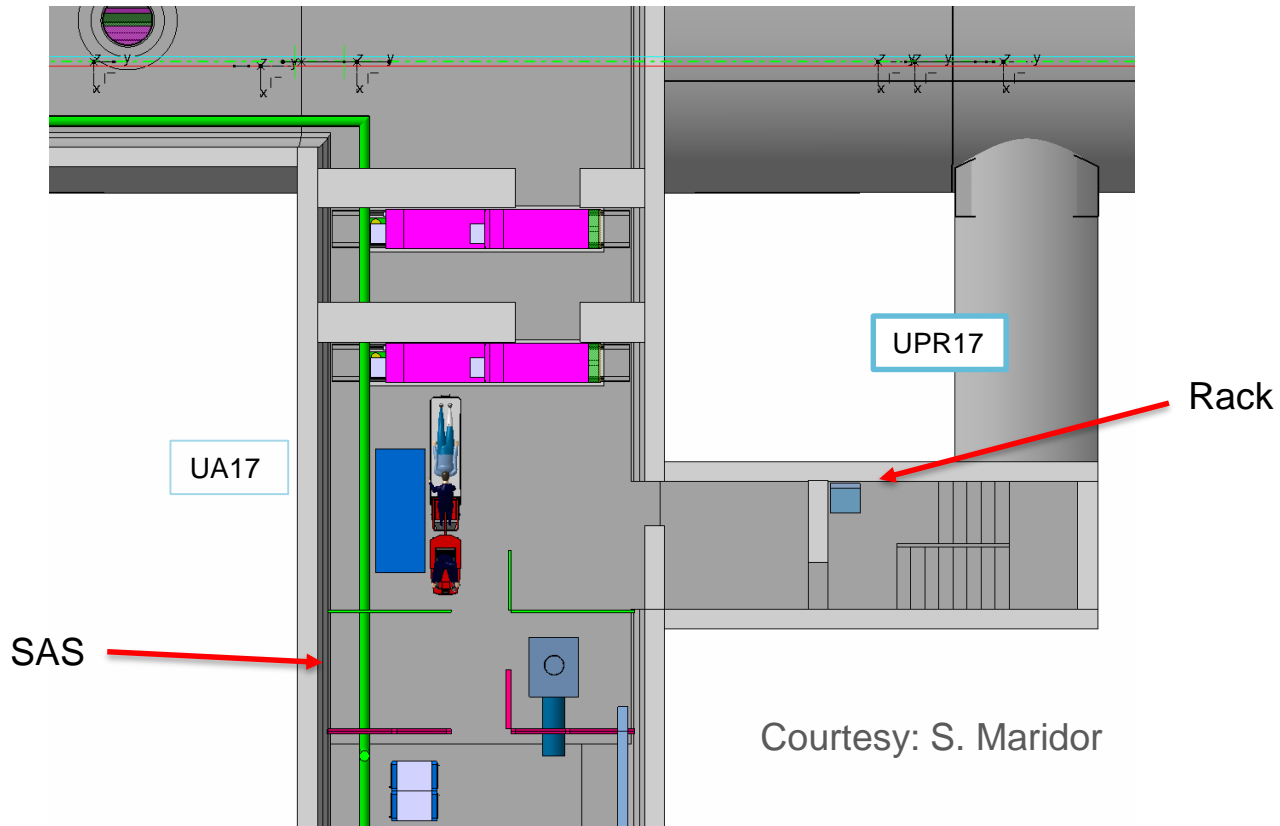


Courtesy: P. Fessia, L. Tavian



# UPR: connection to UA

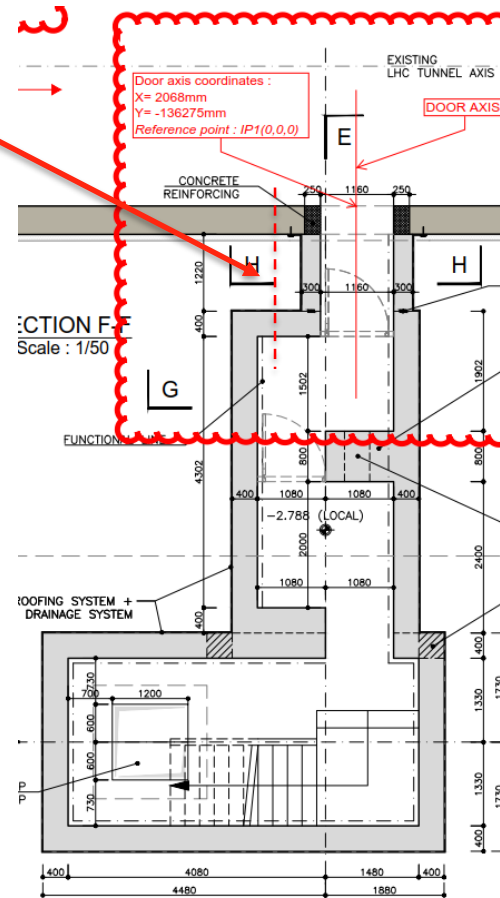
RI171 (LHC Tunnel)



Courtesy: S. Maridor

# UPR connection to LHC tunnel: P1

TWO CORES OF 150 MM



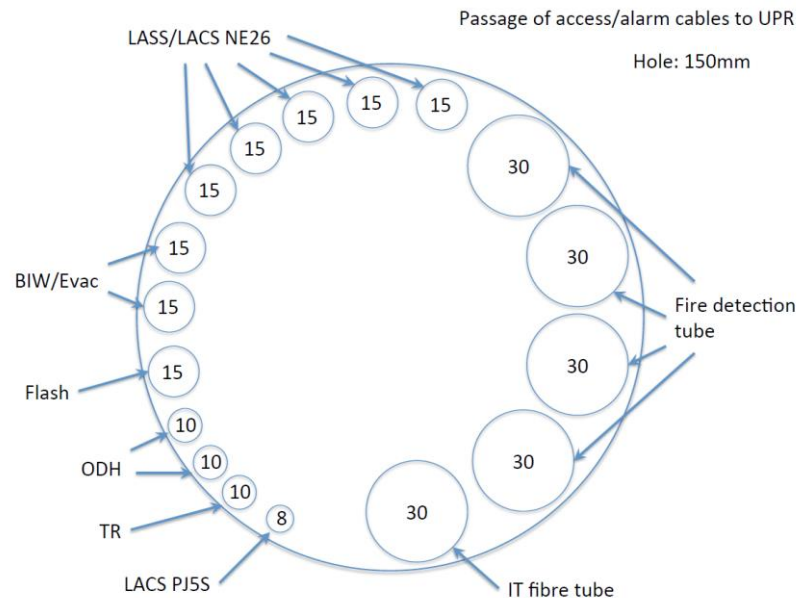




*List of services between UPRs and LHC tunnel*

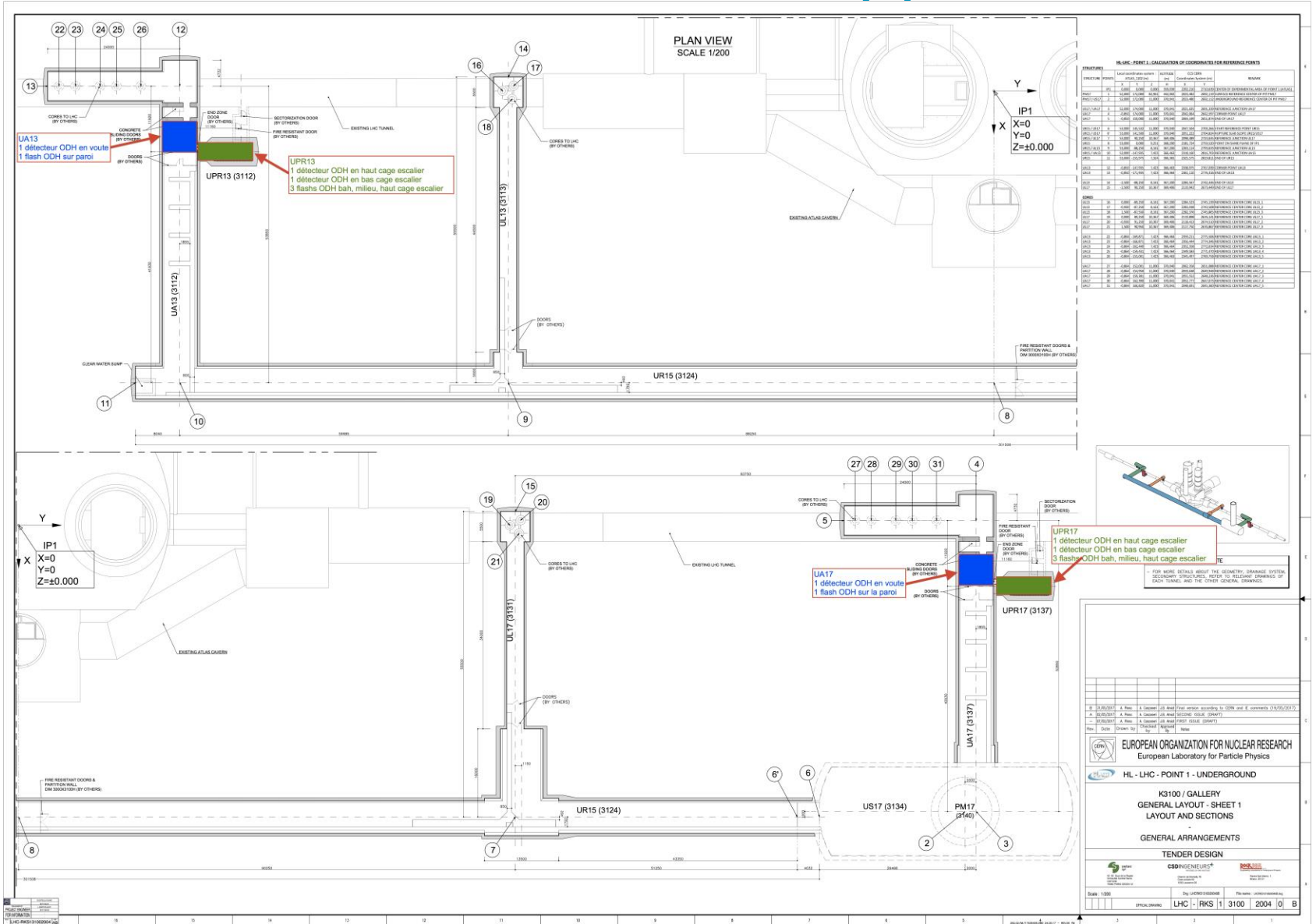
# List of services between UPRs and LHC

		Dimensions	Origin of cable	CORE 1 (150 MM)	CORE 2 (150 MM)
Signal/Fire detection/Ethernet	Alarms and accesses	1 x 8mm LACS (PJ55)	USC15, USC55	x	
	ODH	2 x 10mm	USC15, USC55	x	
	TR	1 x 10mm	USC15, USC55	x	
	Alarms and accesses	5 x 15mm (LASS/LACS NE26)	USC15, USC55	x	
	Evacuation	2x 15mm (BIW/EvAC)	USC15, USC55	x	
	Fire detection	4 x 30mm metal tubes	USC15, USC55	x	
	Flash lights	1 x 15mm	USC15, USC55	x	
	IT fibre (Ethernet sumps and SAS included)	1 x 30mm tube (fibre optic, estimate)	USC15, USC55	x	
Power cables	Pressurisation ventilators	2 x TBD (two different power sources)			x
	Sump pumps	1 x TBD			x
	Safety lights	TBD			x

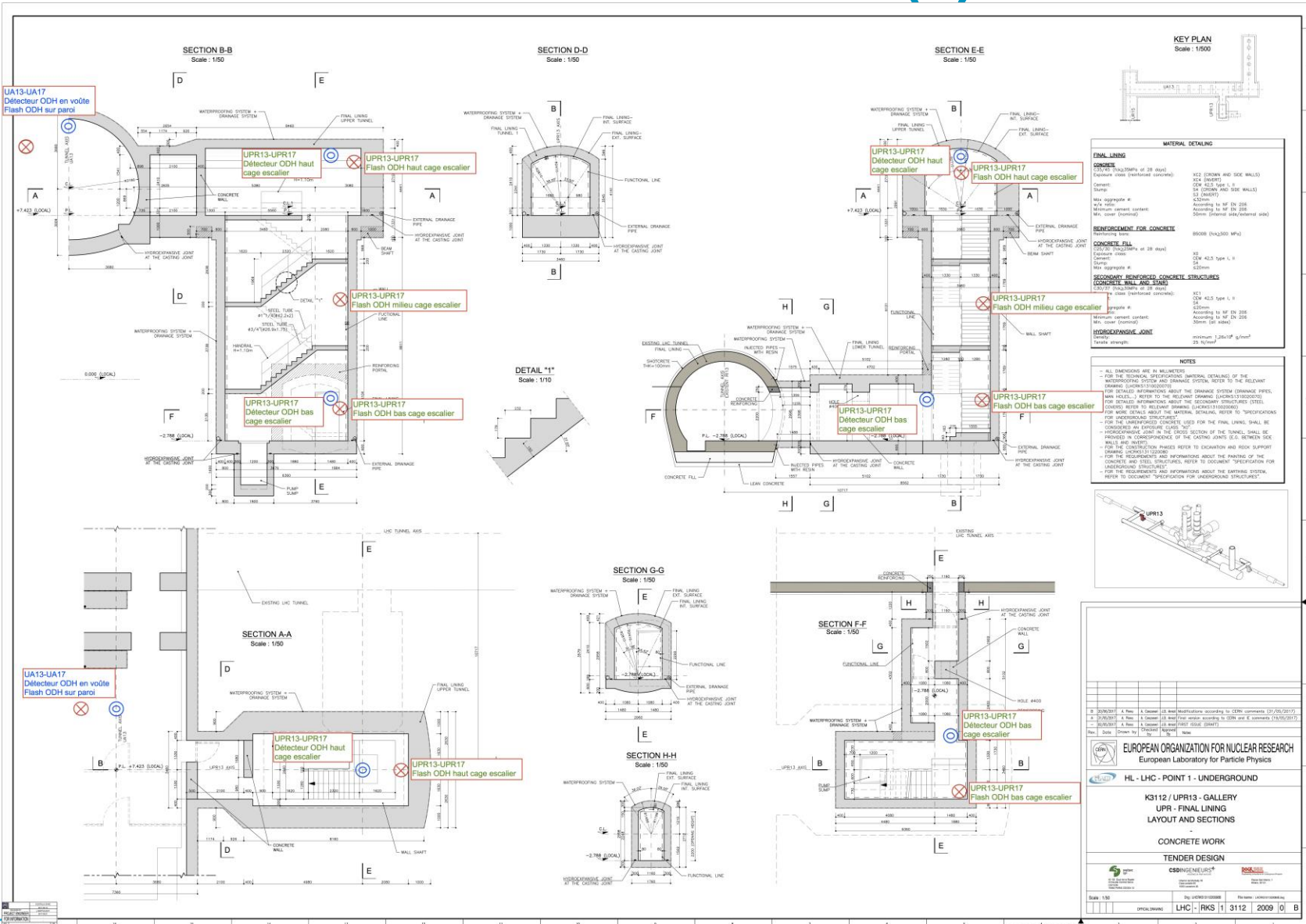


## *ODH Detection*

# ODH: UPR13/17 (1)

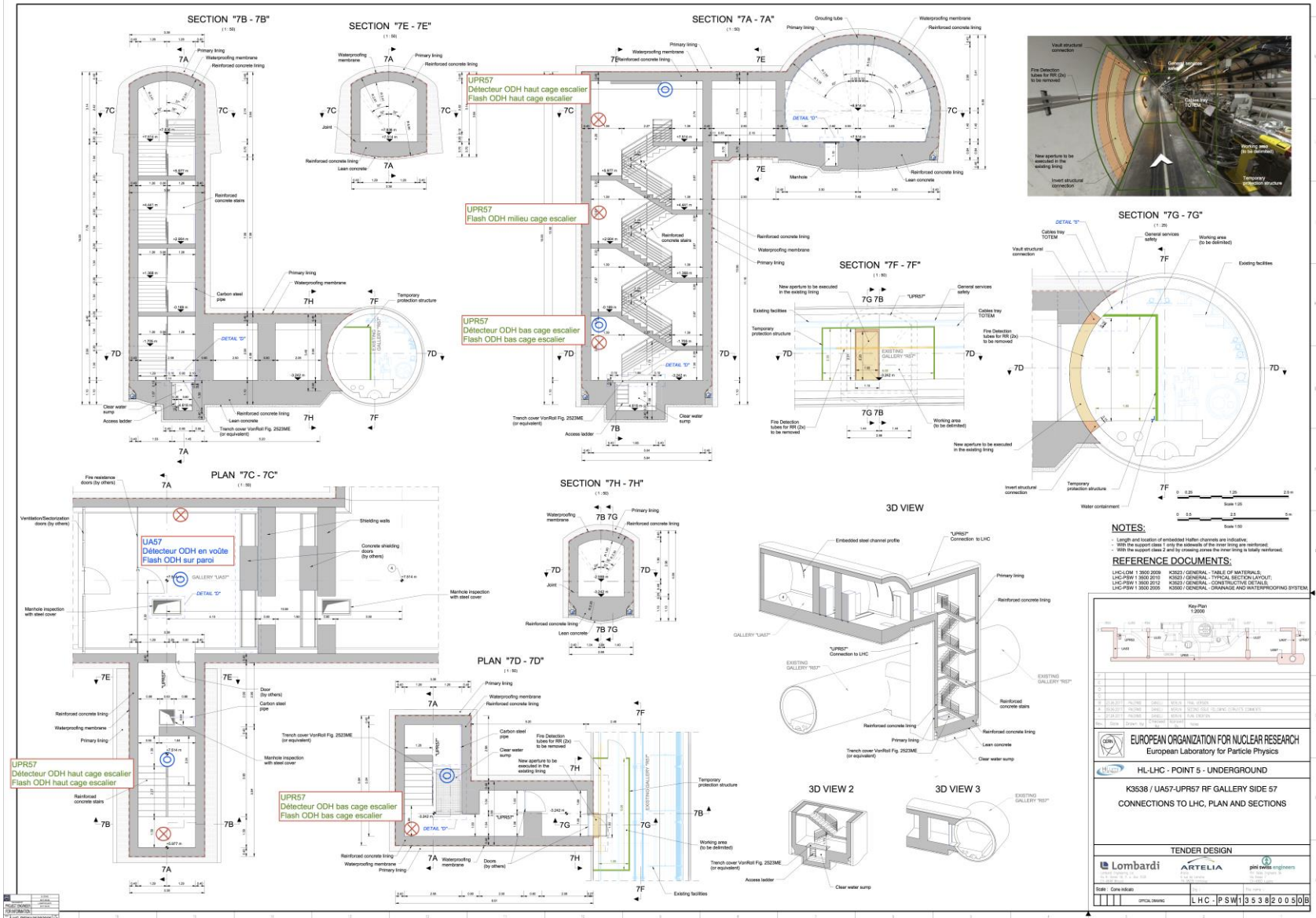


# ODH UPR13/UPR17 (2)

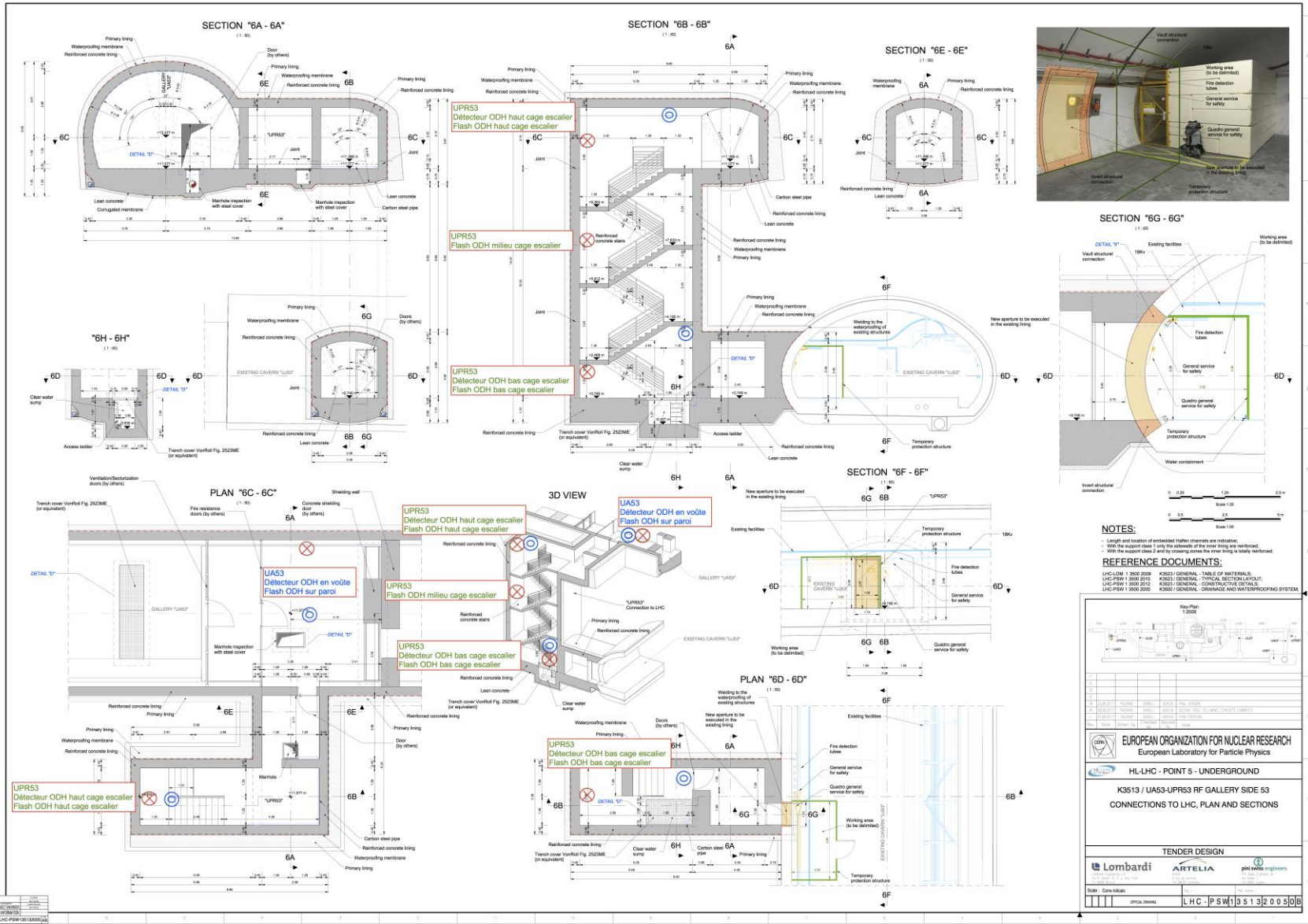




# ODH: UPR57



# ODH: UPR53



**NOTES:**  
 Length and location of embedded fiber channels are indicative. With the support class 1 only the side walls of the inner lining are reinforced, with the support class 2 and by covering them the outer lining is easily reinforced.

**REFERENCE DOCUMENTS:**  
 LHC-LOM 1 2000 2000 K3025 GENERAL - TABLE OF MATERIALS  
 LHC-PRW 1 2000 2010 K3025 GENERAL - PHYSICAL SECTION LAYOUT  
 LHC-PRW 1 2000 2012 K3027 GENERAL - CONSTRUCTIVE DETAILS  
 LHC-PRW 1 2000 2020 K3028 GENERAL - DRAINAGE AND WATERPROOFING SYSTEM

REV.	DATE	DESCRIPTION	BY	CHK.
1	2012-10-15	ISSUE FOR TENDER	...	...
2	2012-10-15	...	...	...
3	2012-10-15	...	...	...
4	2012-10-15	...	...	...
5	2012-10-15	...	...	...
6	2012-10-15	...	...	...
7	2012-10-15	...	...	...
8	2012-10-15	...	...	...
9	2012-10-15	...	...	...
10	2012-10-15	...	...	...
11	2012-10-15	...	...	...
12	2012-10-15	...	...	...
13	2012-10-15	...	...	...
14	2012-10-15	...	...	...
15	2012-10-15	...	...	...
16	2012-10-15	...	...	...
17	2012-10-15	...	...	...
18	2012-10-15	...	...	...
19	2012-10-15	...	...	...
20	2012-10-15	...	...	...

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HL-LHC - POINT 5 - UNDERGROUND

K3513 / UA53-UPR53 RF GALLERY SIDE 53 CONNECTIONS TO LHC, PLAN AND SECTIONS

**TENDER DESIGN**

Lombardi  
 ARTELIA  
 gpi engineering

Scale: Core Index

OPTIONAL DRAWING

LHC - P SW | 13 | 5 | 3 | 2 | 0 | 5 | 0



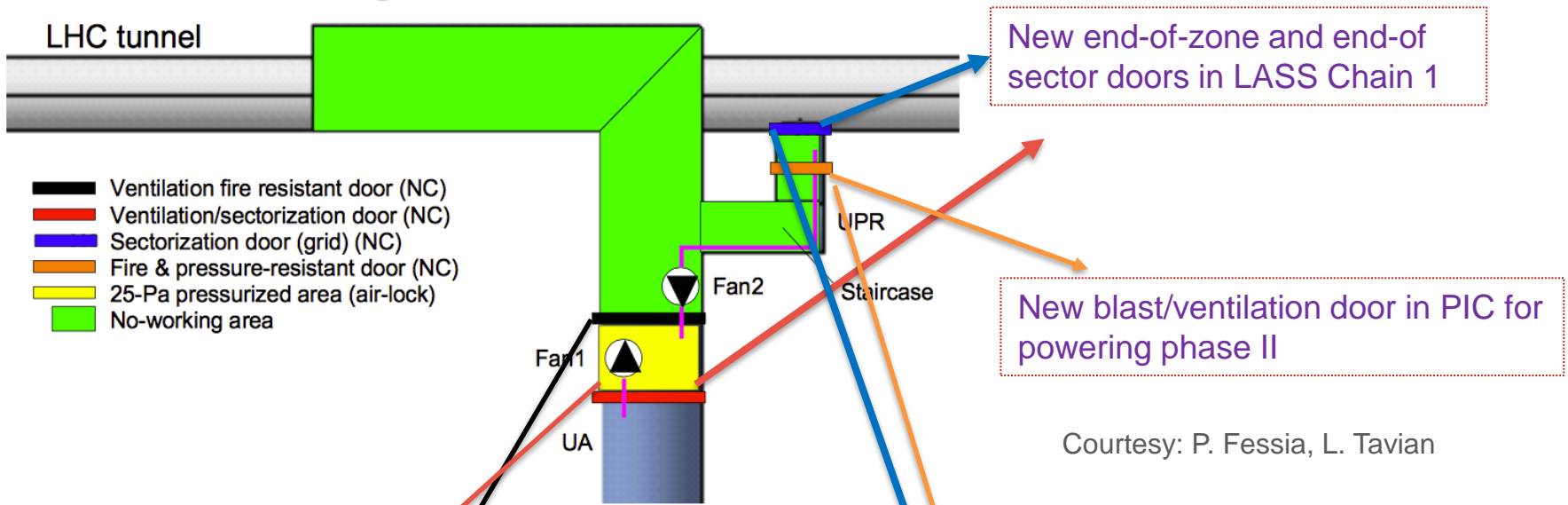
## *Access, Fire Detection and Red Telephones*

# Access, Fire Detection and Red Telephones

- Access system consists of the following doors:
  - Combined end-of-zone and ventilation door in UA.
  - Ventilation in UA (this and the above door delimit the 25 Pa overpressure sas).
  - One patrol box in the UA.
  - Grate door as sector door in UPR (entry into the LHC tunnel)
  - Pressure resistant ventilation door in UPR (capable of withstanding overpressure from an unrestricted He-release from the LHC cryostats.
  - Two LHC access system junction boxes are to be installed for cabling of the two UA doors and UPR doors, respectively. One junction box can manage two doors and a patrol box.
- Fire detection:
  - By suction tubes pulled from service areas of P1 and P5. Conservative reservation of two tubes for UA and two for UPR.
- Red telephones:
  - One in the UA (above) one in the UPR (below). One single cable to connect the two. Again, conservative estimate.

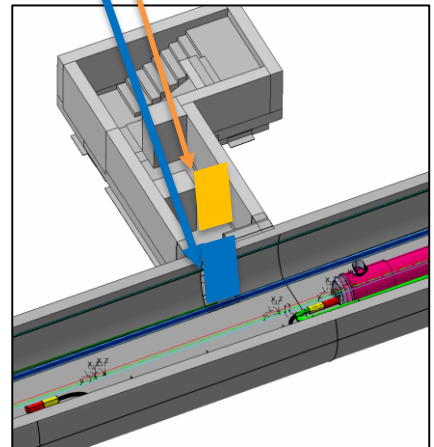
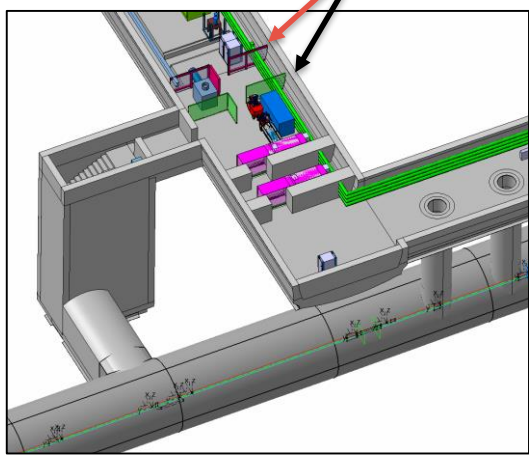
# UPR Doors

## The UA/UPR pressurized airlocks



- Ventilation fire resistant door (NC)
- Ventilation/sectorization door (NC)
- Sectorization door (grid) (NC)
- Fire & pressure-resistant door (NC)
- 25-Pa pressurized area (air-lock)
- No-working area

Courtesy: P. Fessia, L. Tavian



# Open issues

- Pre-DIC
- HL-LHC water collection system
- LHC-ECR ready by March
- Integration of cables



***Thank you !***