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REFERENCE : [OTHER REFERENCES]

REPORT

INTEGRATION OF RR13 AND RR17 CAVERNS

Abstract

This document summarizes the changes in the RR13 and RR17 service caverns for the HL-LHC era.

It contains:

- 1) Equipment presently installed (01/10/2016)
- 2) The list of the necessary modifications in order to fulfill the requirements for the HL-LHC lay-out in reference (baseline June 2016)
- 3) The R2E requirements to be fulfilled by the equipment to be installed in the RR

Each equipment owner requiring space in the LS3 in the above mentioned RRs shall provide request to the HL-LHC integration and be listed in this document, which will be the base for the preparation of the LS3 RRs activities and their phasing. In addition to being listed in this document they will commit to be compliant with the listed R2E requirements.

TRACEABILITY

Prepared by: M. Alcaide León

Date: 2016-10-14

Verified by: P. Fessia

Date: 20YY-MM-DD

Approved by: N. Surname [Project hierarchy Ex. WP Leader, PL, ...]

Date: 20YY-MM-DD

Distribution: N. Surname (DEP/GRP) (in alphabetical order) can also include reference to committees

Rev. No.	Date	Description of Changes (major changes only, minor changes in EDMS)
X.0	20YY-MM-DD	[Description of changes]

1 LOCATION OF RR13 AND RR17 CAVERNS

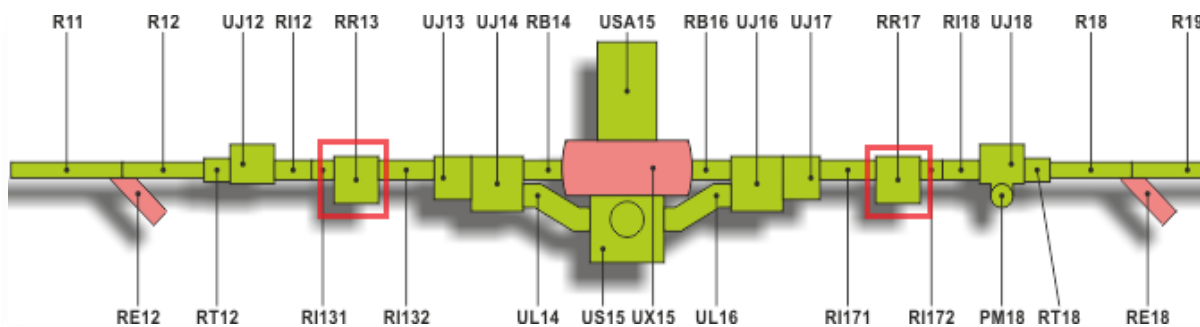


Figure 1: LHC Point-1 area layout showing the location of RR13 and RR17

2 EQUIPMENT AND ITS LOCATION AS OF 01/10/2016

Figures 2 and 3 gives an overview of the installed equipment and its function in the RR13 cavern. Please note that the figures show only the RR13. RR17 is equivalent, only symmetric in its arrangement towards the interaction point.

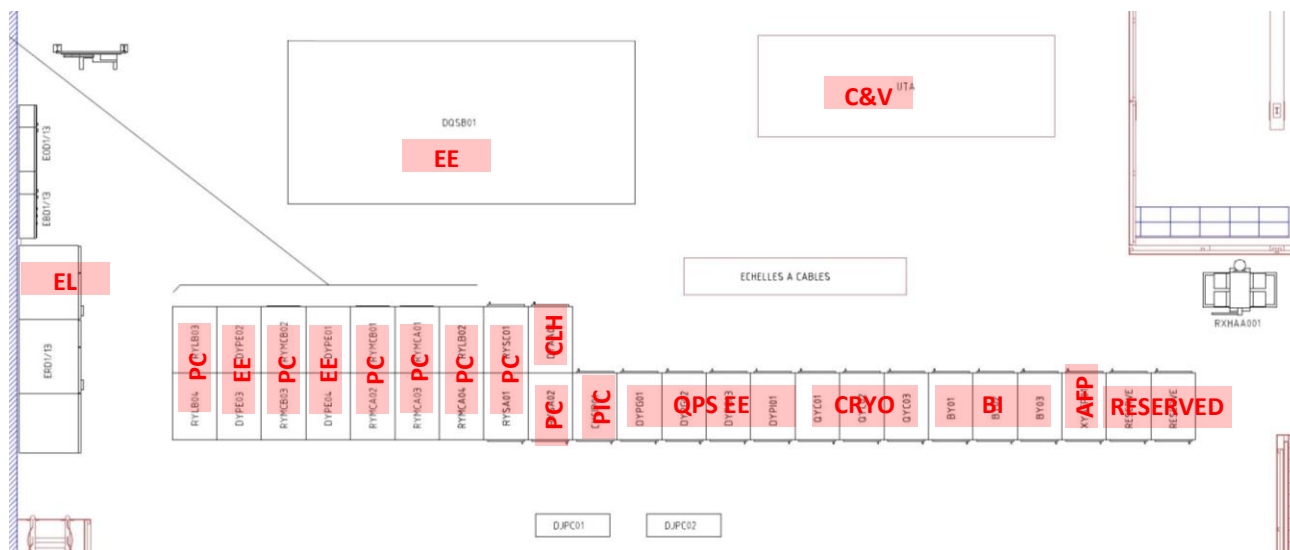


Figure 2: Present layout of the installed equipment in the first floor of RR13



Figure 3: Present layout of the installed equipment in the ground floor of RR1

The following figures are views of the Catia 3D model for RR13.

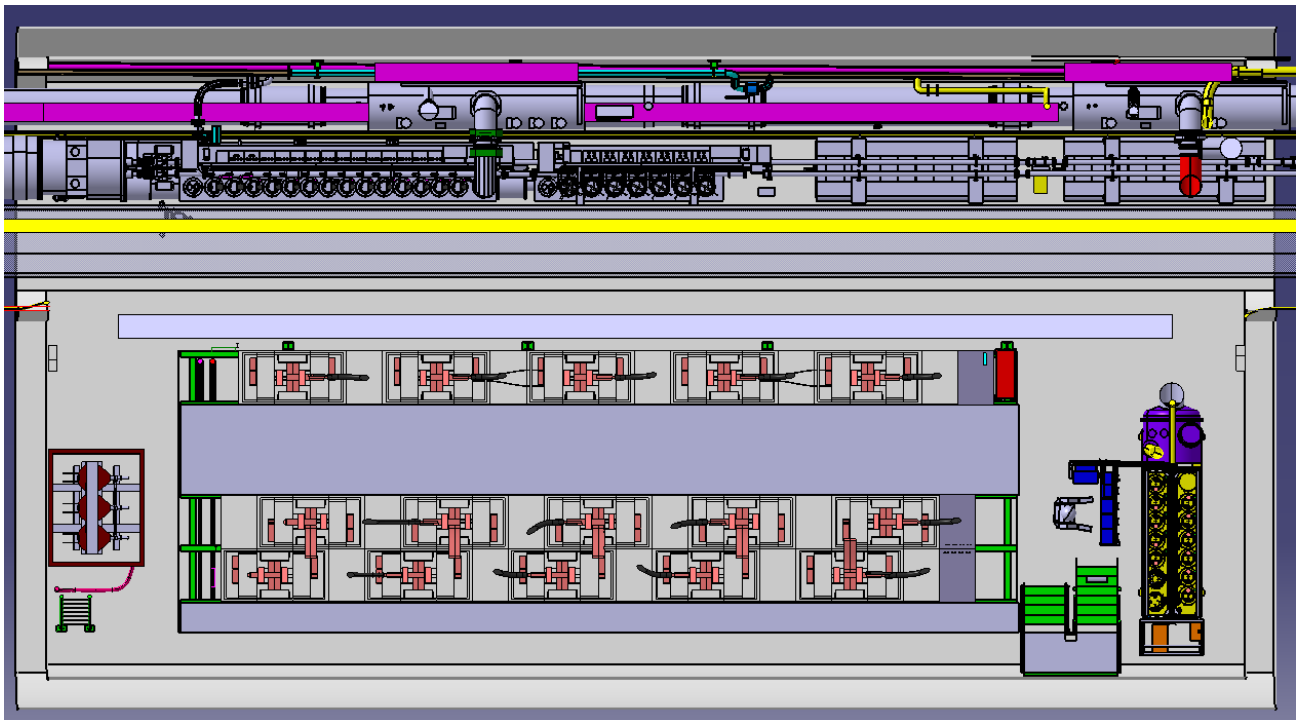


Figure 4: Present CAD drawing layout of the installed equipment in the ground floor of RR13 + LHC half cell, ST number ST0509462

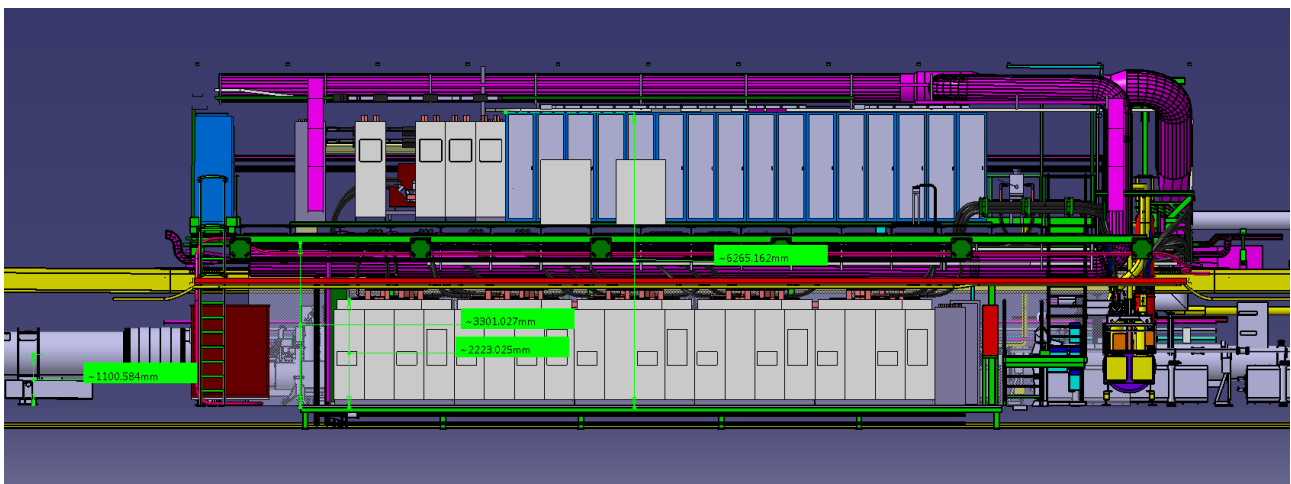


Figure 5: Present CAD drawing layout of the installed equipment in RR13 with equipment heights, ST number ST0509462

3 R2E SPECIFICATIONS FOR EQUIPMENT IN RR13/RR17

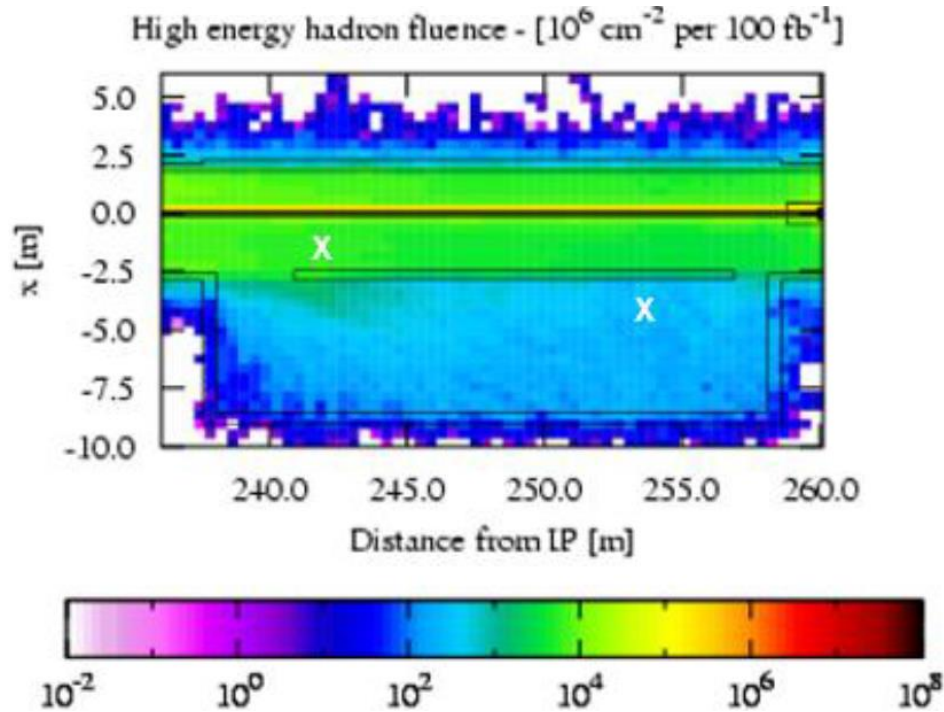


Figure 6: Expected radiation conditions in RRs, from “Expected radiation conditions in IR1 and IR5”, F. Cerutti for the FLUKA Team, 2009

4 CABLING DE-INSTALLATION

The next table contains the cables coming out of the RR13 cavern that need to be de-installed. These will be the cables belonging to circuits feeding Q1, Q2, Q3, D1 and D2 or any of its components.

Table 1: Provisional sample list of cables to be de-installed in RR13

Cable code	Dscription	1 PF	1 Element	2PF	2 Element
1106259	CICPL.L1#A-DQQDI.RD2.L1	CYCIP01=RR13	CIPCL.L1	DYPG01=RR13	RD2.L1
1120541	CICPL.L1#B1-DQQDI.RD2.L1	CYCIP01=RR13	CIPCL.L1	DYPG01=RR13	RD2.L1
1106232	CIPCL.L1#B1-PC.RD2.L1	CYCIP01=RR13	CIPCL.L1	RD2.L1=RR13	0
1104934	ALIM REDRESSEUR RD2.L1	ERD1/13	ERD114/13	ERP114/13	RD2.L1
1120506	INTERLOCK DEBIT SUR CÂBLE REFROIDIS	FJECR01=RR13	0	RD2.L1=RR13	0
1109431	MID POINT D2 L1	QJBRA.A4L1=RI132	LBRCC.4L1=RI132	QJLAA.A7L1=RR13	DFBLA.RR13=RR13

1124544	D30 VTAPS ROUTING FOR RD2 PROTECTION IN L1	QJBRA.A4L1=RI1 32	D2.4L1	QJLAA.A7L1=RR 13	DFBLA01=RR1 3
1110559	TT821,822	QJBRA.A4L1=RI1 32	D2.A4L1=RI1 32	QYC01=RR13	0
1110560	EH821,822	QJBRA.A4L1=RI1 32	D2.A4L1=RI1 32	QYC01=RR13	0
1110561	LT821,822,823	QJBRA.A4L1=RI1 32	D2.A4L1=RI1 32	QYC01=RR13	0
1110642	PROTECTION D2	QJLAA.A7L1=RR 13	DFBLA.A7L1= RR13	DYPG01=RR13	0
1126937	OVERHEATING PROTECTION	RD2.L1=RR13	CHASSIS	DFBLA.A7L1=RR 13	DFLCS.RR13.1 &2
1105075	ALIM. RD2.L1 (PH+)	RD2.L1=RR13	RD2.L1	DFBLA.A7L1=RR 13	DFLCS.RR13.1
1106242	CIPCA.L1#B2- PC.RQ10.L1B1&RQ1 0.L1B2	CYCIP01=RR13	CIPCA.L1	RQ10.L1B1=RR1 3	RQ10.L1B1+
1105076	ALIM. RD2.L1 (PH-)	RD2.L1=RR13	RD2.L1	DFBLA.A7L1=RR 13	DFLCS.RR13.2
1110527	WORLDVIP RES D COMMON TRUNC	RJFGD12=RR13	RQ10.L1B1= RR13	RJFGD13=RR13	RD2.L1=RR13
1110528	WORLDVIP RES D COMMON TRUNC	RJFGD13=RR13	RD2.L1=RR13	RJFGD14=RR13	RQ5.L1B2=RR1 3
1119636	WORLDVIP RES CONVERTISSEUR DROP	RJFGD13=RR13	RD2.L1=RR13	RD2.L1=RR13	0

5 CABLING INSTALLATION

Table 2: List of cables to be installed

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6 LIST OF EQUIPMENT IN RR13/RR17

The annex 1 consists of a table list with the present status as of October 2016 of all the equipment installed in the RR13/RR17 caverns and it describes its main users and owners. It also shows if the listed equipment will be kept, modified or de-installed for HL-LHC as well as new equipment to install.

7 RR13/17 LAYOUTS OF EQUIPMENT TO BE DE-INSTALLED

The next drawings (annex 2), figures 7, 8, 9 and 10 show the installed equipment and the status for HL-LHC. The equipment with red colour code is the equipment that will be removed from the cavern. In floor 0, the power converter that feeds the D2 magnet will be removed and there will be space to install up to 4 racks with three PC (± 120 A) to feed the orbit correctors (Q4, Q5 and Q6), if needed. In the first floor of RR13/RR17 the racks belonging to the Forward detectors of ATLAS experiment will be de-installed as well as some components of the racks that feed from Q1 to D2.

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Annexe 1**Table 3: Equipment installed in RR13 during LHC, its main users and equipment to be installed for HL-LHC**

Type of System	Owner	Main Users ¹	Rack Identifier	Floor	Keep/ de-install/ Modify	New equipment/ Comments
Powering Interlock Controller (PIC)	TE-MPE	PC, QPS, BIS, Cryogenics, UPS, AUG	CYCIP01	1	Modify	
Beam Position Monitors/Beam Loss Monitor	BE-BI	Beam Orbit reader	BY01	1	Modify	
			BY02	1	Modify	
			BY03	1	Empty/Spares	
Current Lead Heaters	TE-MPE	Temperature regulation of the top part of current leads	DYAA01	1	Modify	
Power Converters	TE-EPC	DFBL	RYLB01 (LHC120A/10V)	0	Kepp	
			RYLC01 (LHC120A/10V)	0	Keep	
	TE-EPC	Power Converters	RYMCB01 (LHC600A/10V)	1	Keep	
			RYMCB02 (LHC600A/10V)	1	Keep	
			RYMCB03 (LHC600A/10V)	1	Keep	
			RYMCA01 (LHC600A/10V)	1	Keep	

¹"Point 1 Equipment Inventory", G. Spiezia, M. Brugger. EDMS No 1086566

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			RYMCA02 (LHC600A/10V)	1	Keep	
			RYMCA03 (LHC600A/10V)	1	Keep	
			RYMCA04 (LHC600A/10V)	1	Keep	
			RYSA01 (Spares parts), RYSA02 (Spares parts)	1	Empty	
			RYSC01 (Powered spares)	1	Keep	
			RYSA03 (Powered spares)	0	Keep	
	TE-EPC	RQ5.L1B2 RQ5L1B1	RYHG01 (6kA) RYHG02 (6kA)	0	Keep	
	TE-EPC	RQ4.L1B1 RQ4.L1B2	RYHG03 (6kA) RYHG04 (6kA)	0	Keep	
	TE-EPC	RD2.L1	RYHG05 (6kA)	0	De-install	Up to four racks with three PC (±120 A) Type RYL%
	TE-EPC	RQ10.L1B2 RQ10.L1B1	RYHG06 (6kA) RYHG15 (6kA)	0	Keep	
	TE-EPC	RQ9.L1B2 RQ9.L1B1	RYHG07 (6kA) RYHG14 (6kA)	0	Keep	
	TE-EPC	RQ8.L1B2 RQ8.L1B1	RYHG08 (6kA) RYHG13 (6kA)	0	Keep	
	TE-EPC	RQ7.L1B2 RQ7.L1B1	RYHG09 (6kA) RYHG12 (6kA)	0	Keep	
	TE-EPC	RQ6.L1B2 RQ6.L1B1	RYHG10 (6kA) RYHG11 (6kA)	0	Keep	
Energy Extraction Switch for Dipole Magnets	TE-MPE	Dipole Magnets	DQSB01	1	Keep	

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Energy Extraction	TE-MPE	Interface module for 13 kA EE system	DYPI01	1	Modify	
General Quench Protection	TE-MPE	Protection D2, Q7, Q8, Q9, Q10	DYPG01	1	Modify	
General Quench Protection	TE-MPE	Protection Q4, Q5, arc correctors	DYPG02	1	Keep	
General Quench Protection	TE-MPE	Protection Q6, arc correctors, protection main circuits	DYPG03	1	Modify	
Energy Extraction	TE-MPE	600 A energy extraction systems	DYPE01	1	Keep	
			DYPE02	1	Keep	
			DYPE03	1	Keep	
			DYPE04	1	Keep	
Cryogenics Instrumentation and Electronics	TE-CRG	Conditioners, measuring temperature, pressure, liquid helium level and digital valves status; Actuators, providing AC and DC power.	QYC01	1	Keep	
			QYC02,	1	Keep	
			QYC03 (Spare)			
Rack experiment AFP (Atlas Forward Proton)	ATLAS	Atlas Forward Proton Experiment	XYAFP01	1	De-install	
Electric equipment	EN-EL	RR Equipment	ERD1/13, EBD1/13, EOD1/13, DJPC01, DJPC02, RXHAA001	1	Modify	
Electric equipment, Transfo 18KV/0.4KV 0.63VA	EN-EL	RR Equipment	EMT402/13	0	Keep	
Cooling and Ventilation Equipment	EN-CV	LHC Tunnel/Caverns ventilation	UTA	1	Keep	

Annexe 2

Possible modification of the shielding for HL-LHC

Substitute for 4 racks type RYL_ with capacity for three PC (± 120 A)

Baseline for DFBLA.RR13, to be reused. In study.

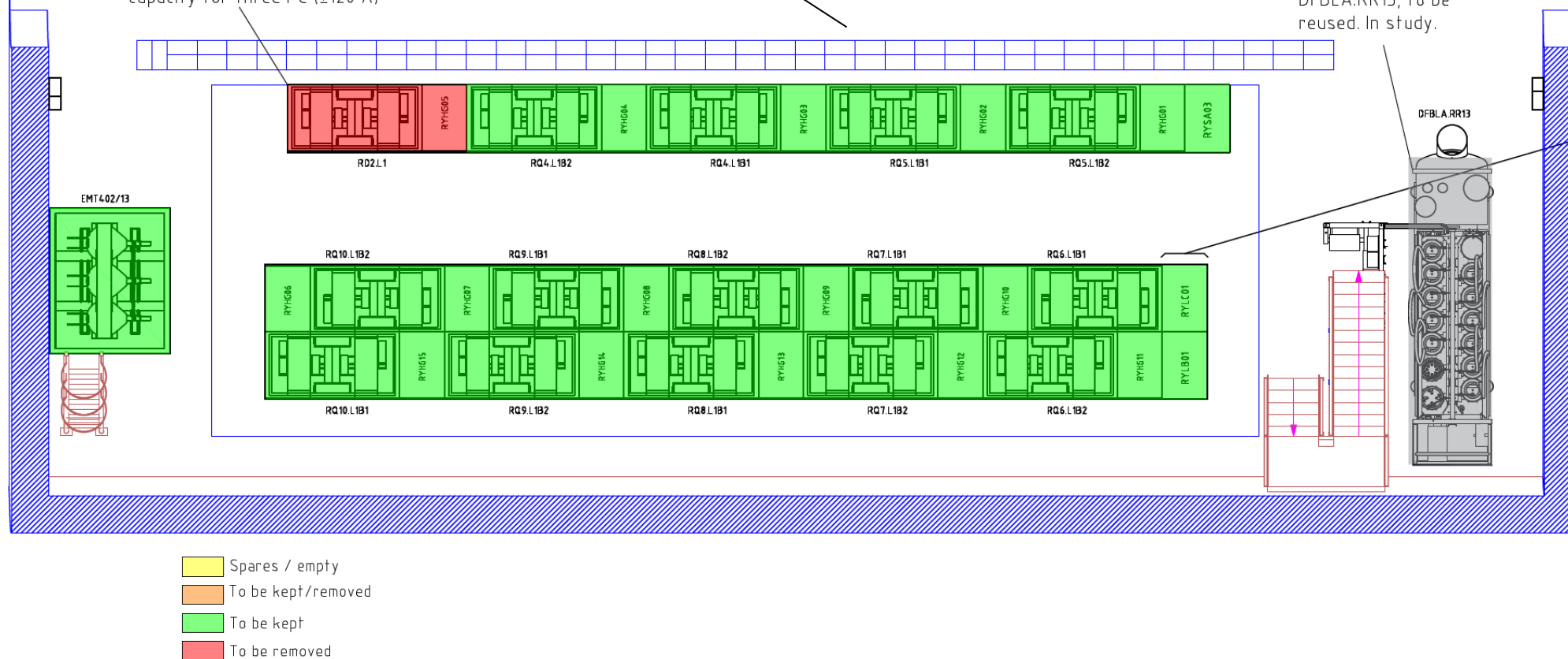


Figure 7: RR13 Floor 0 equipment to be removed

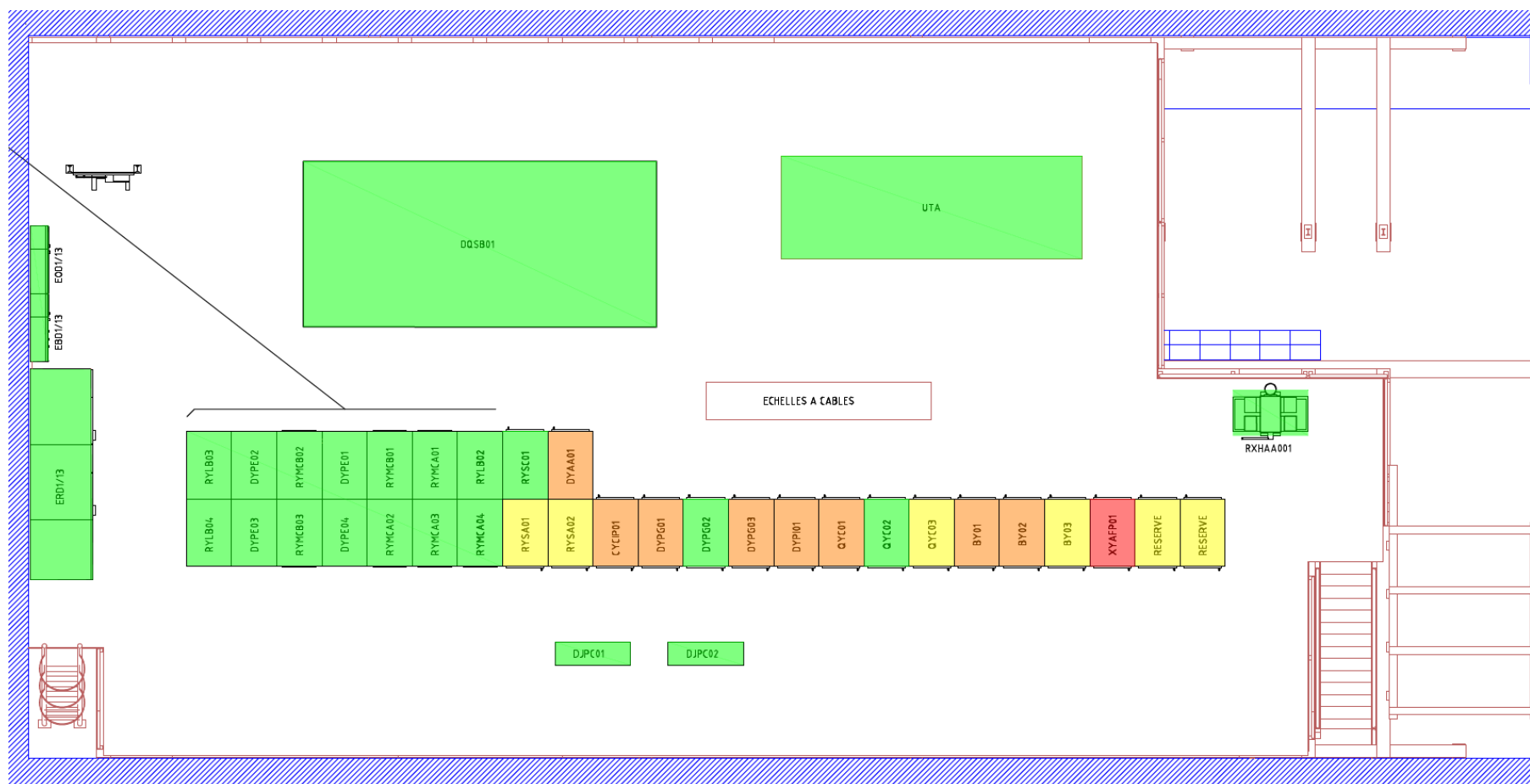


Figure 8: RR13 Floor 1 equipment to be removed

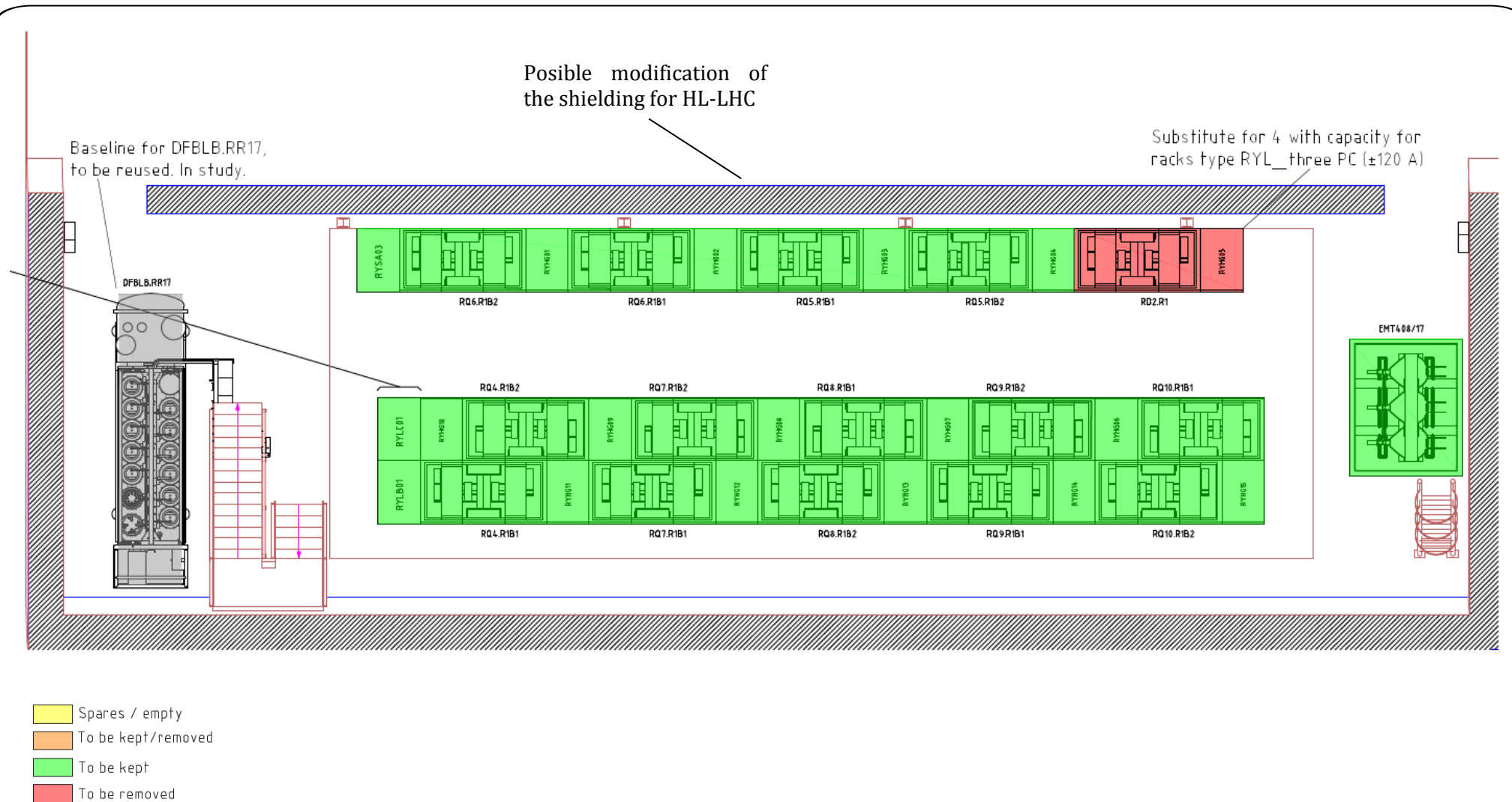


Figure 9: RR17 Floor 0 equipment to be removed

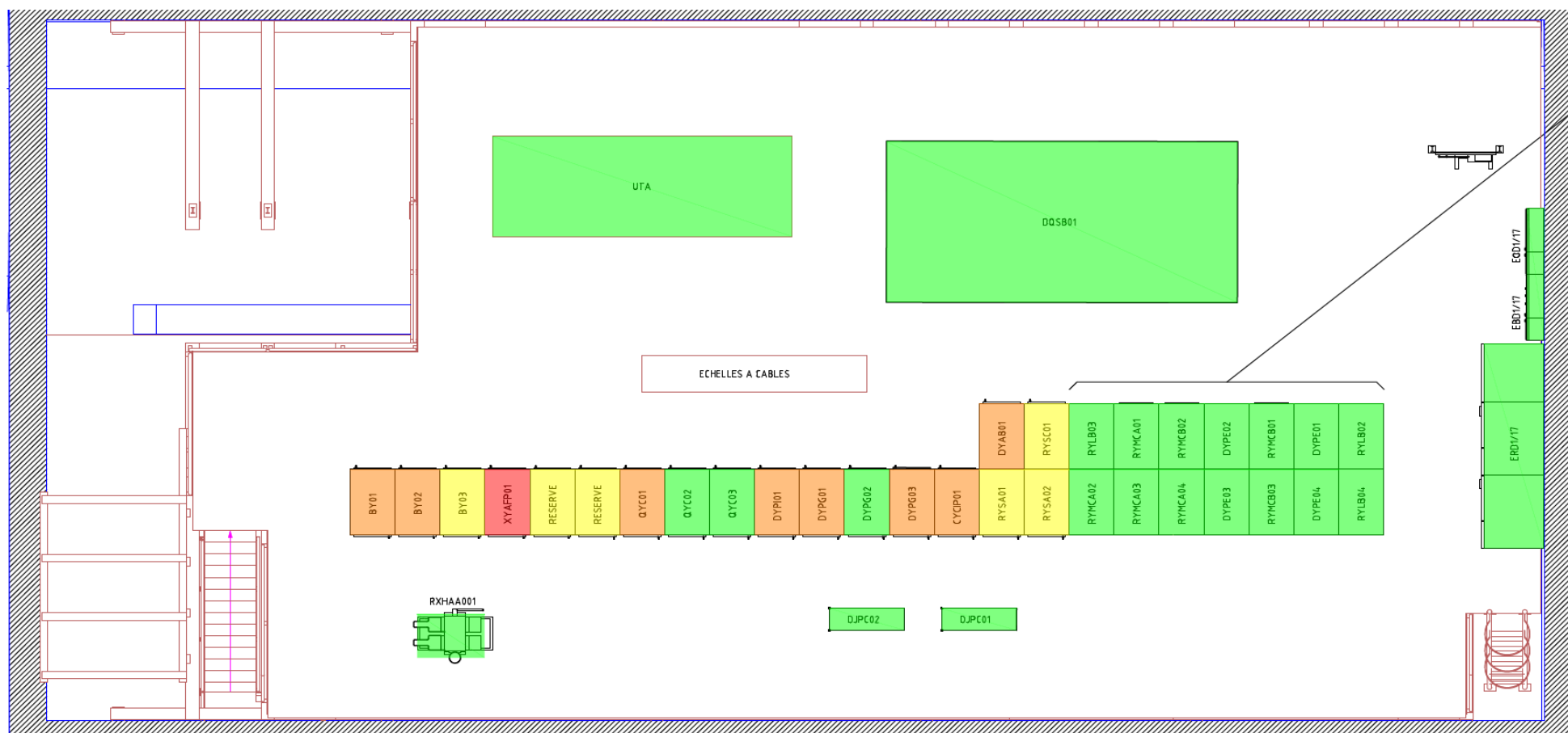


Figure 10: RR17 Floor 1 equipment to be removed