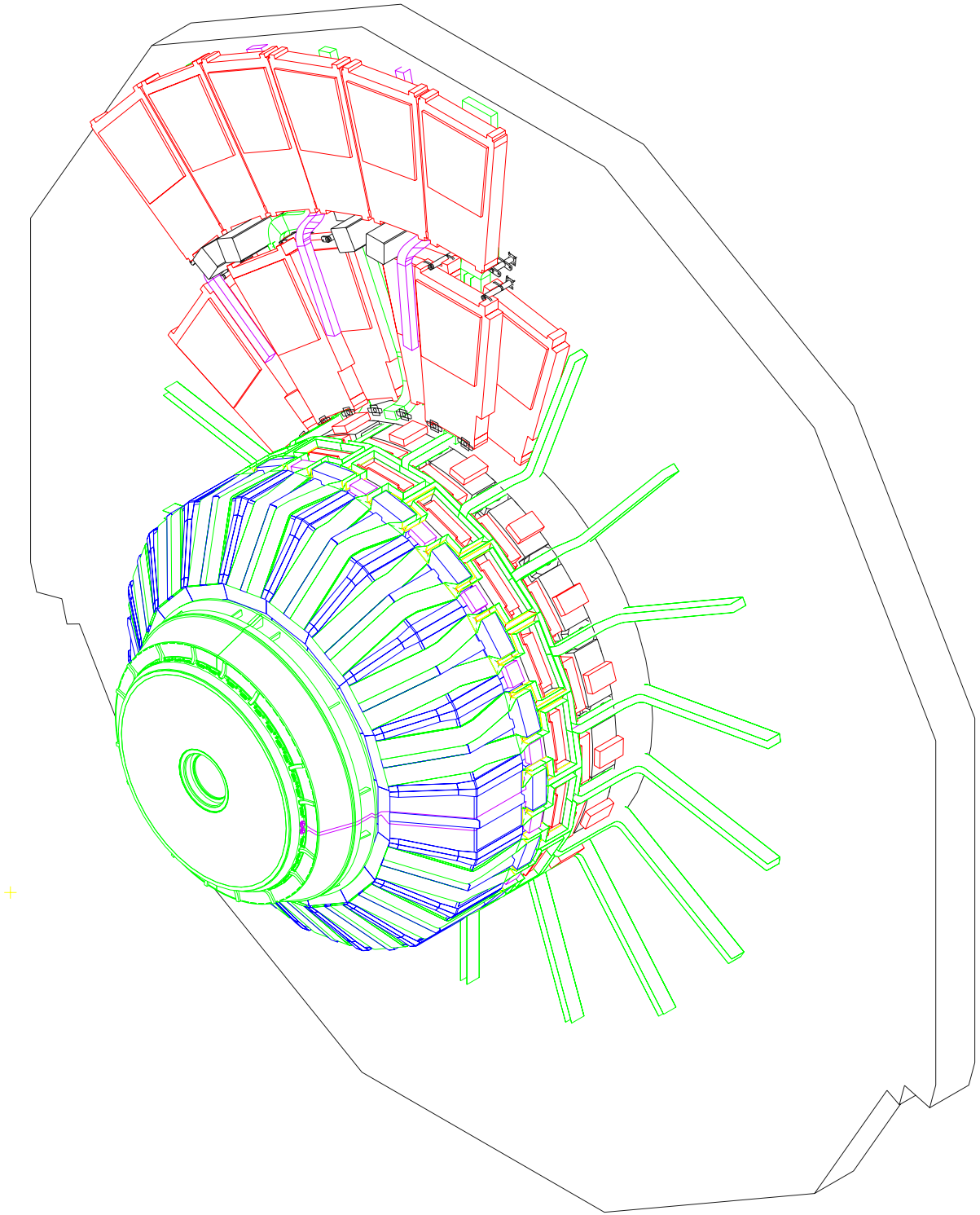
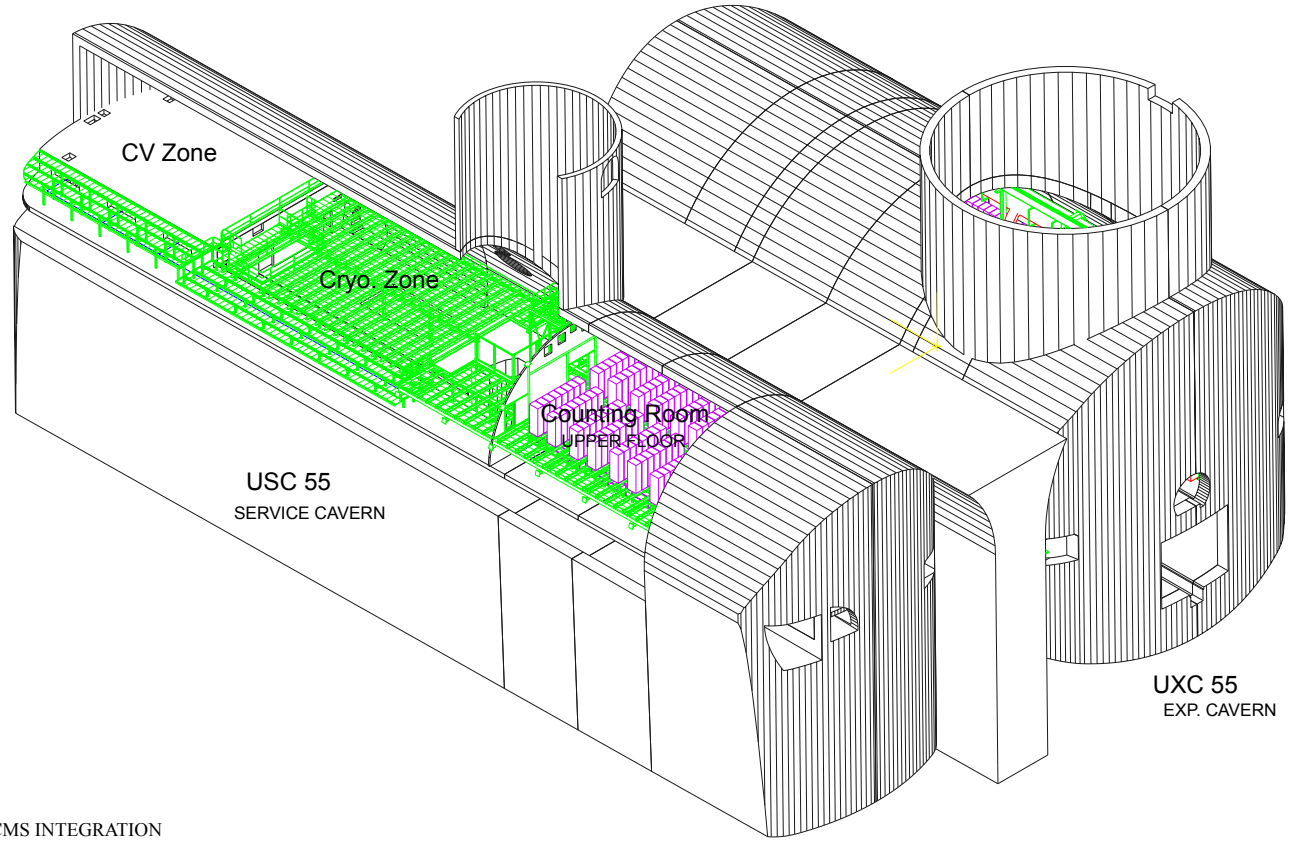


COOLING SYSTEMS

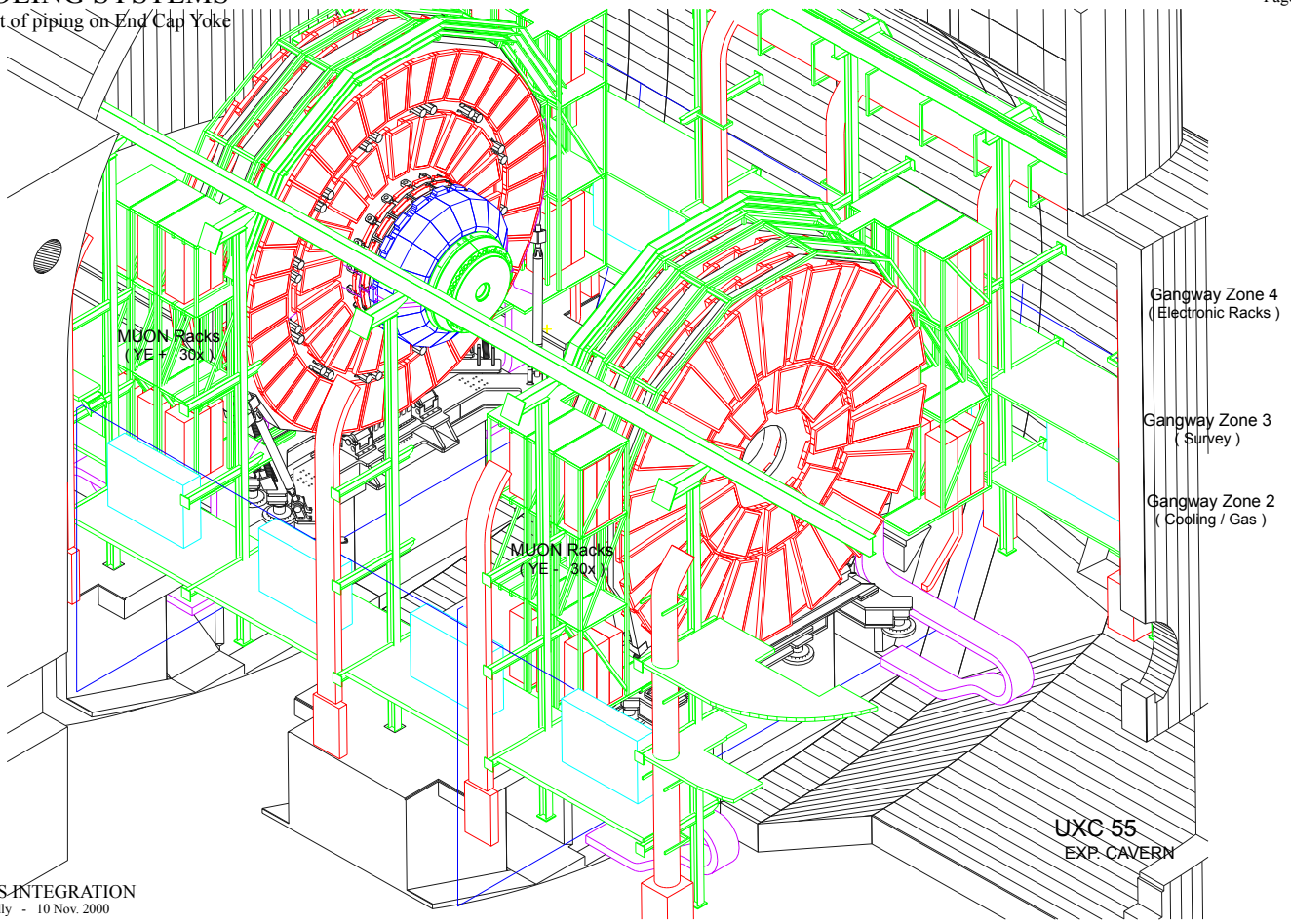
Layout of piping from USC to UXC



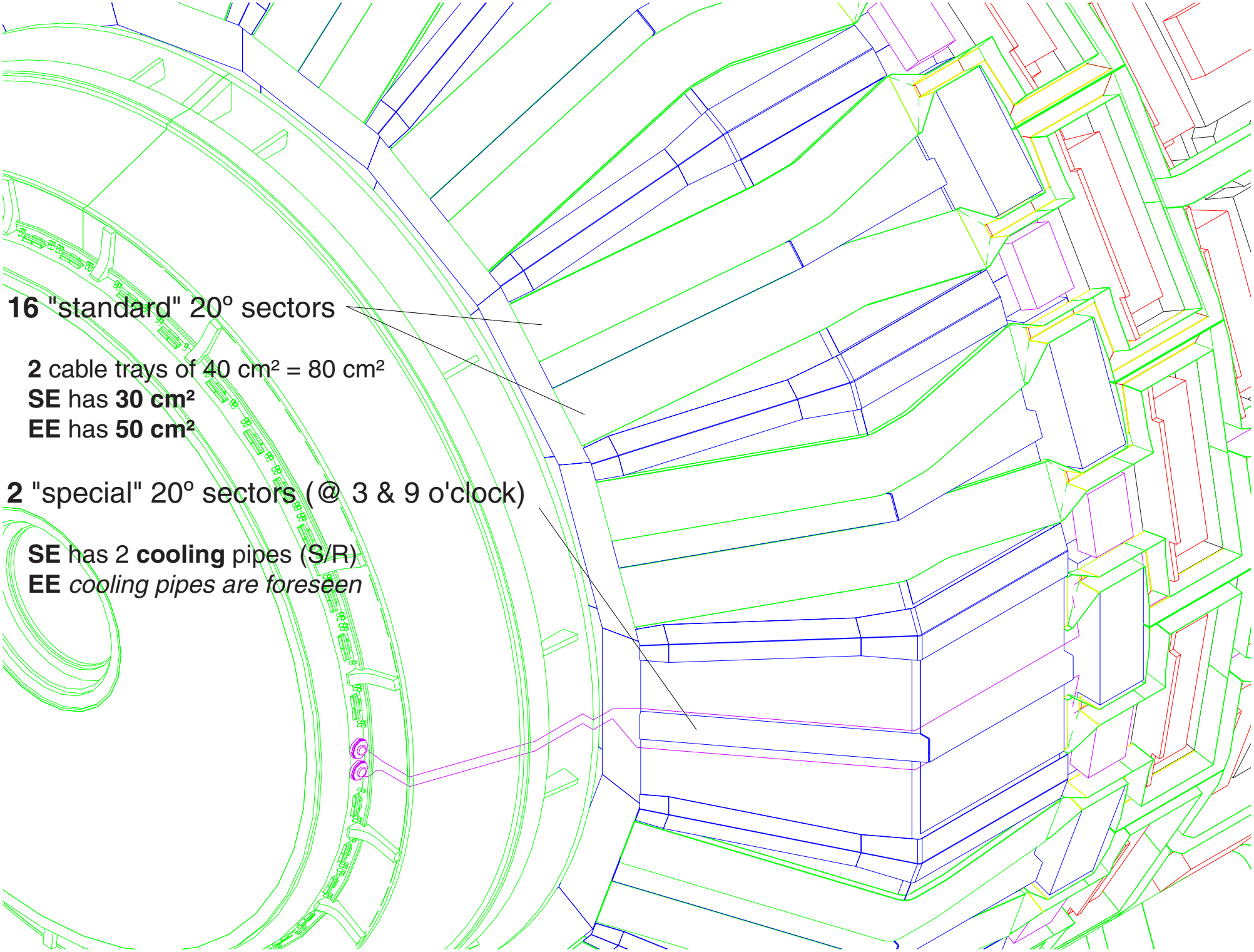
CMS INTEGRATION
S. Bally - 10 Nov. 2000

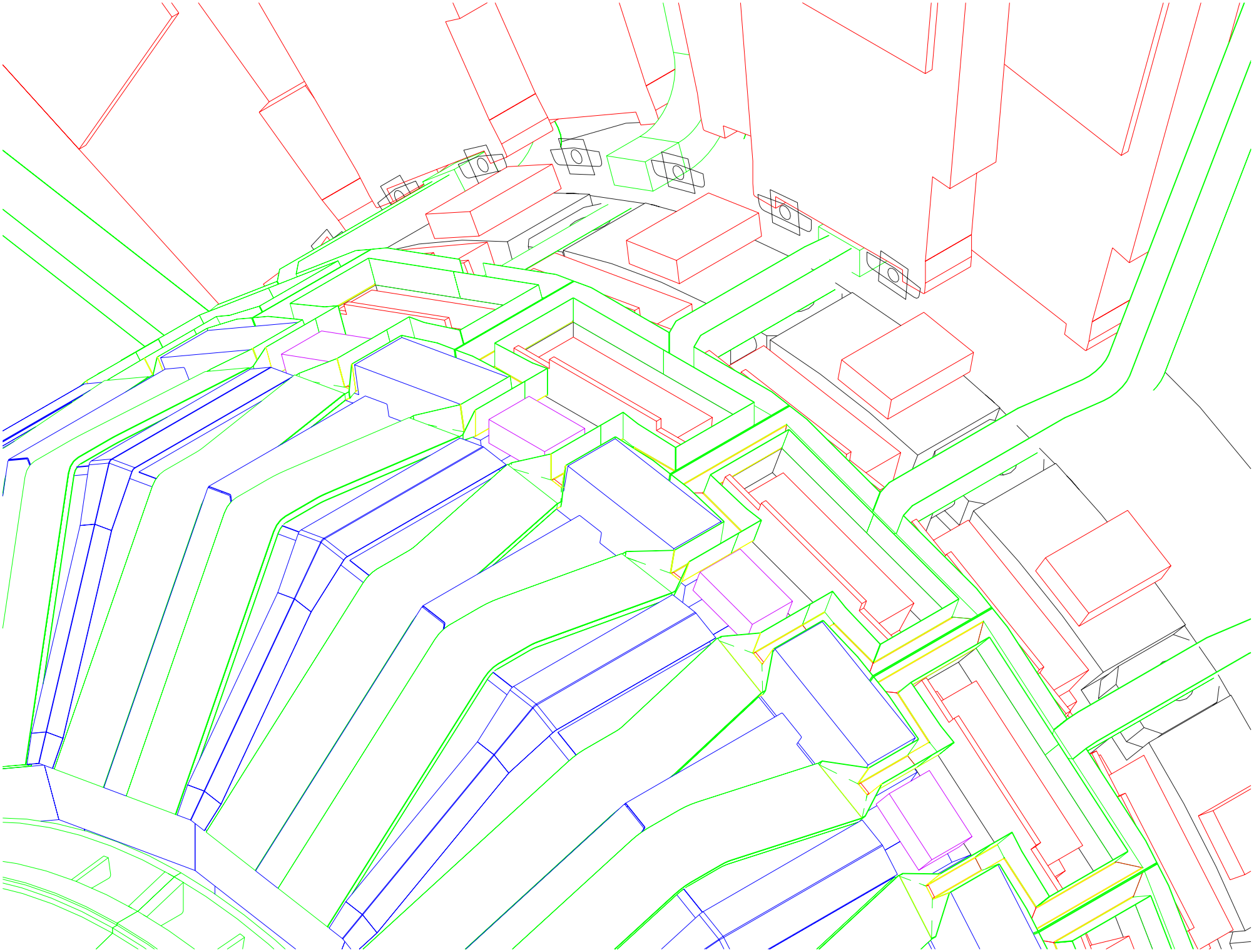
COOLING SYSTEMS

Layout of piping on End Cap Yoke

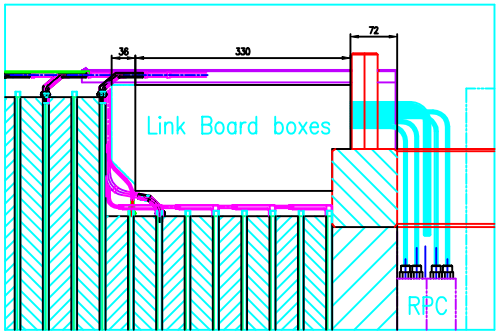


CMS INTEGRATION
S. Bally - 10 Nov. 2000

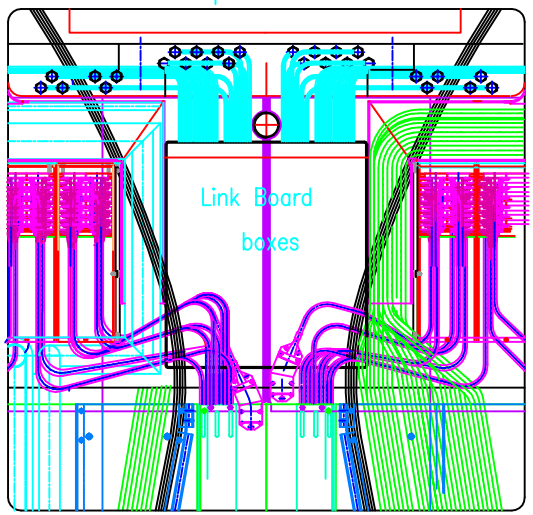

16 "standard" 20° sectors
2 cable trays of 40 cm² = 80 cm²
SE has **30 cm²**
EE has **50 cm²**
2 "special" 20° sectors (@ 3 & 9 o'clock)
SE has 2 **cooling** pipes (S/R)
EE *cooling pipes are foreseen*



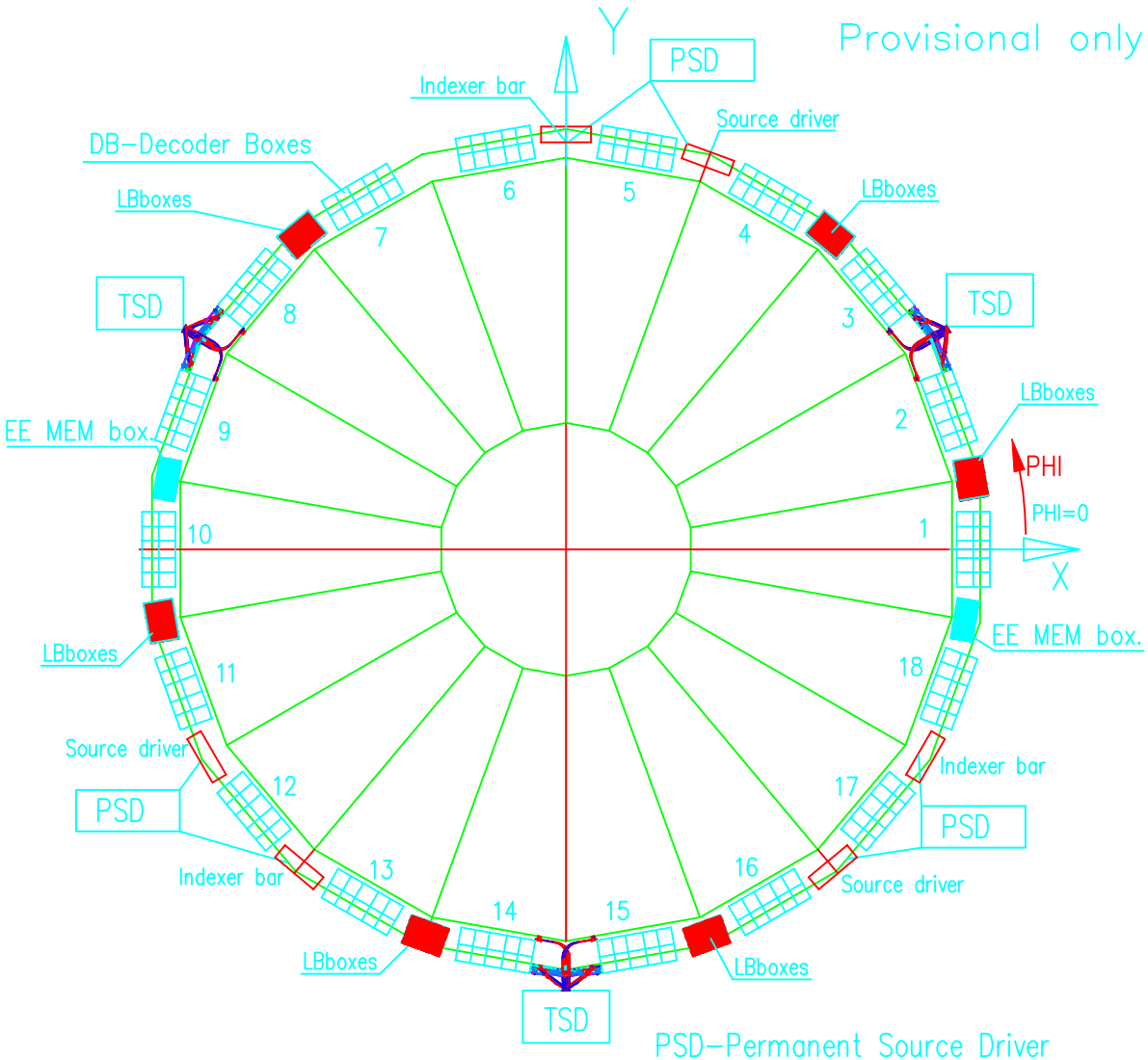
Side view



Top view



Provisional only



View from I.P.
HE(–)

PSD–Permanent Source Driver
TSD–Temporary Source Driver
1...18 HE sectors numbering in PHI

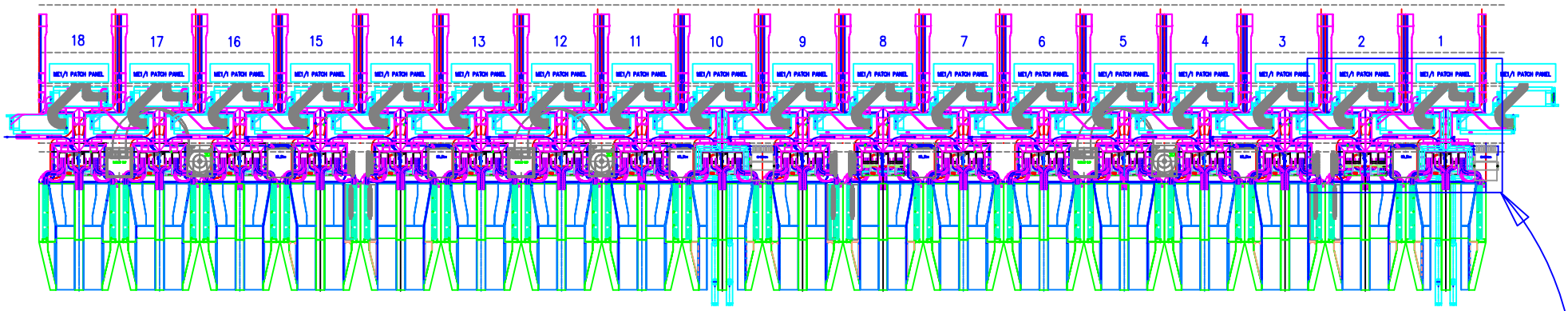
PROJECTION

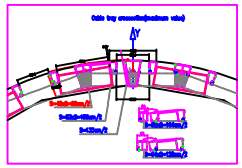
RPC Link Board boxes arrangement Lay–out

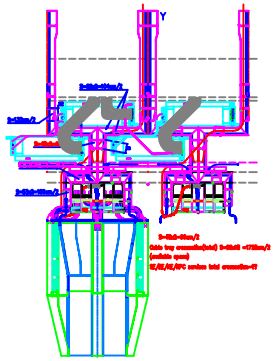
ACAD version: 14	Date:25.06.01
File name: Link_B_Box.dwg	CMS Endcap Detectors
CERN, Integration group of CMS, A.Surkov	

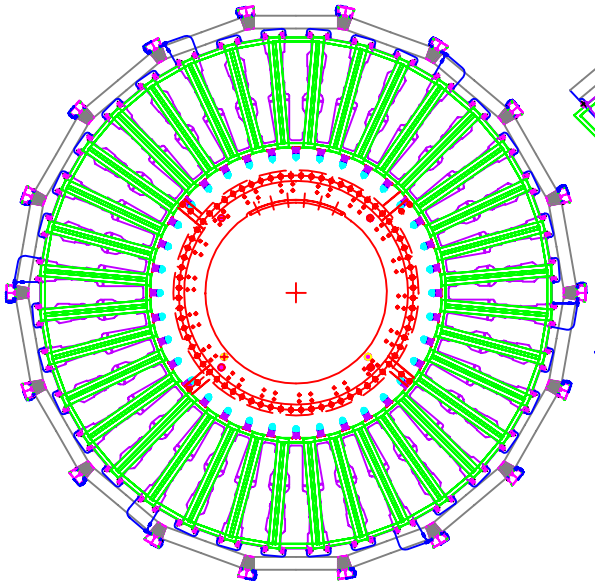
Endcap(-)

Provisional only

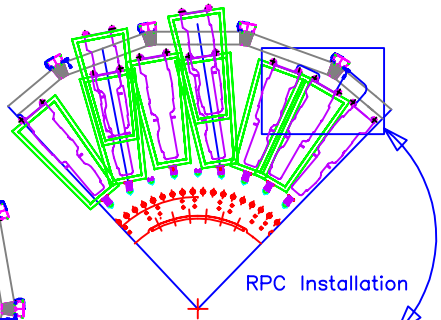


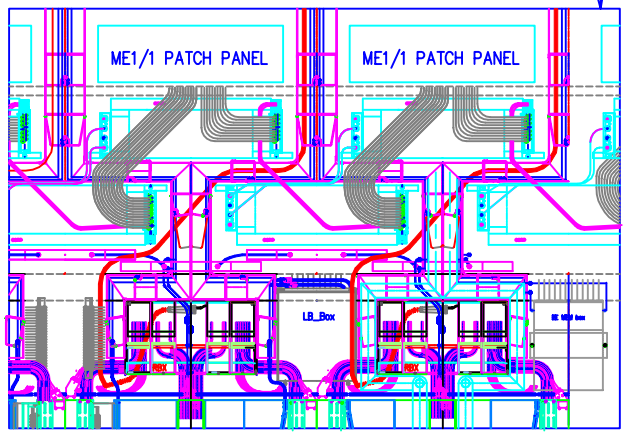






RPC Cooling Layout





CMS Endcap Detectors

Cable trays & services

PROJECTION

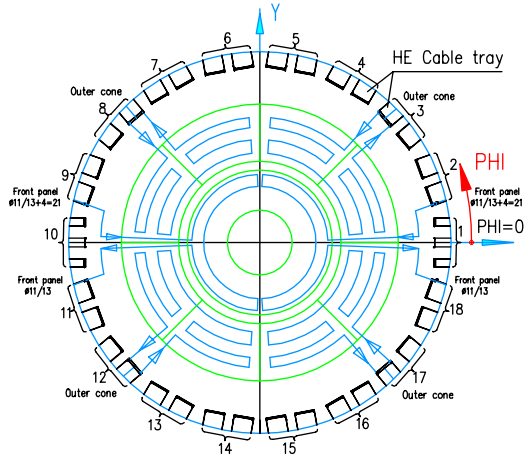
ACAD version: 14	Date:21.02.2002
File name: Endcap005.dwg	

CMS Endcap Detectors

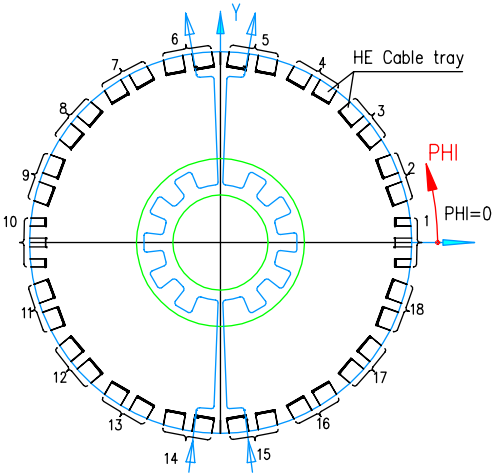
CERN, Integration Group of CMS. A.Surkov

DRAFT

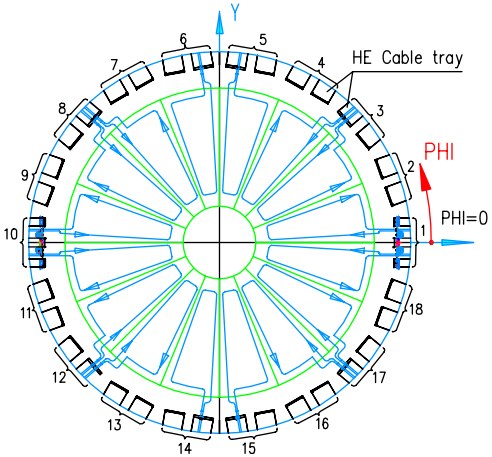
Outer & front

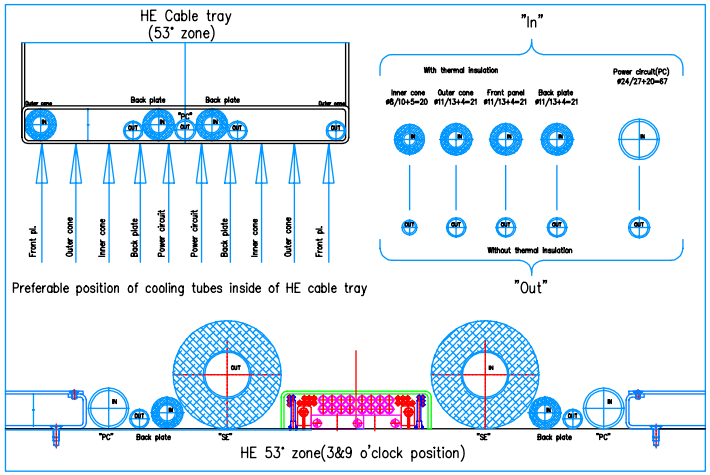


Inner cone

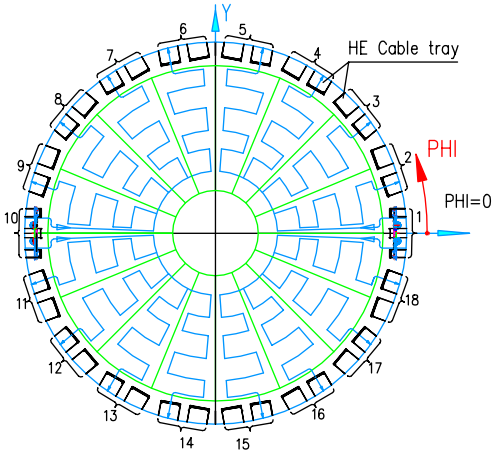


Back plate

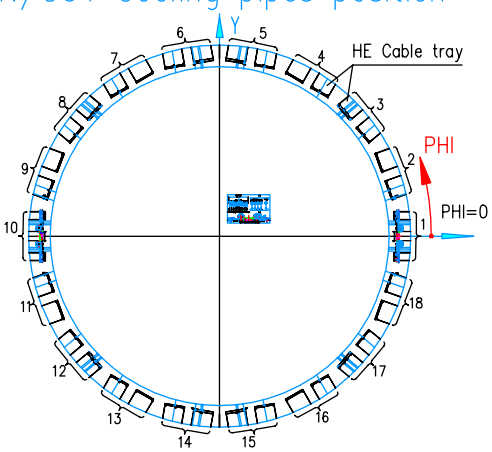




Power circuit



IN/OUT Cooling pipes position



EE cooling pipes(in, out) arrangement

View from I.P.

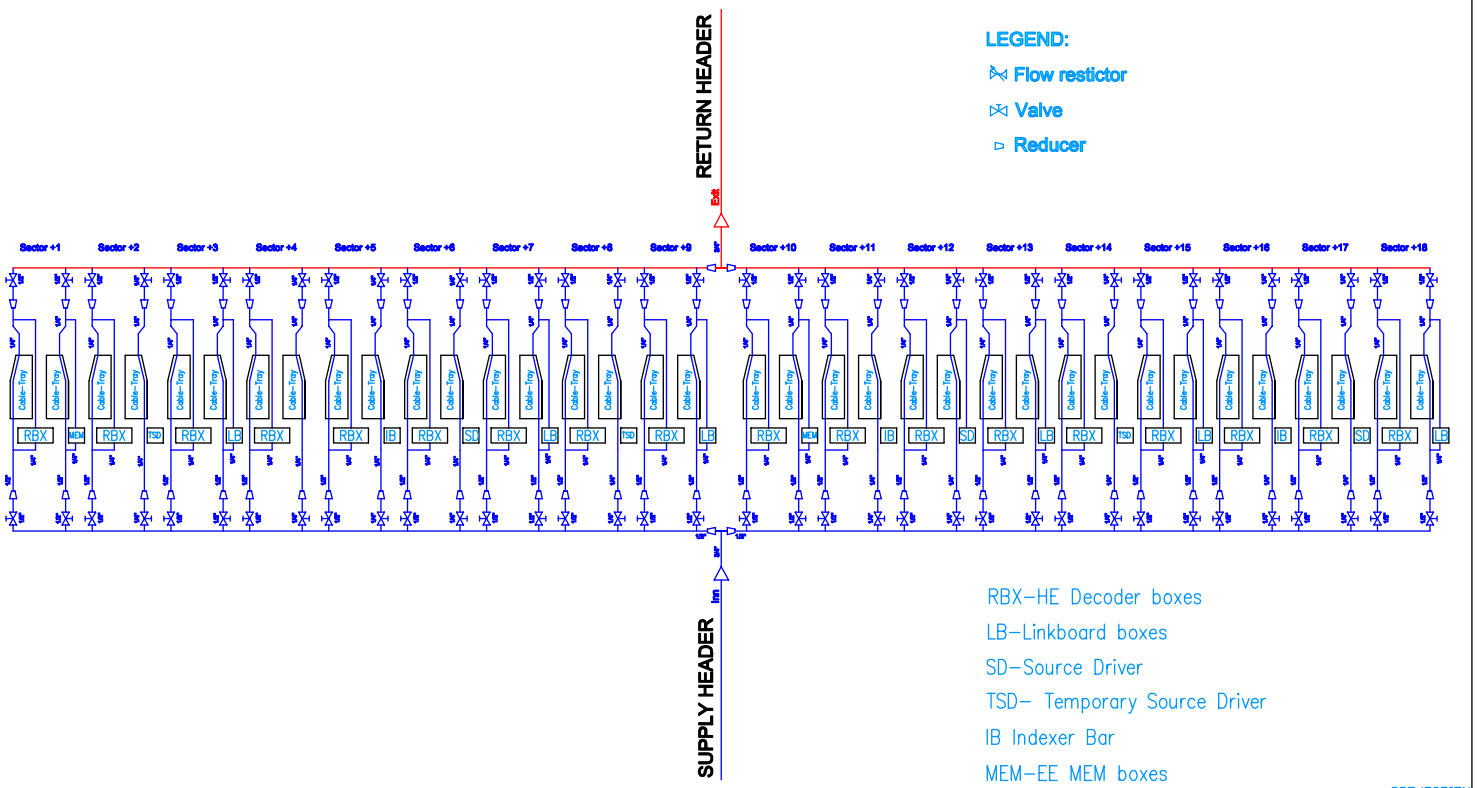
EE(−)

1...18 HE Cable trays numbering in PHI

PROJECTION

ACAD version: 14	Date:26.07.01
File name: ECALcooling_layout	CMS Endcap Detectors
CERN, Integration group of CMS, A.Surkov	

Provisional only



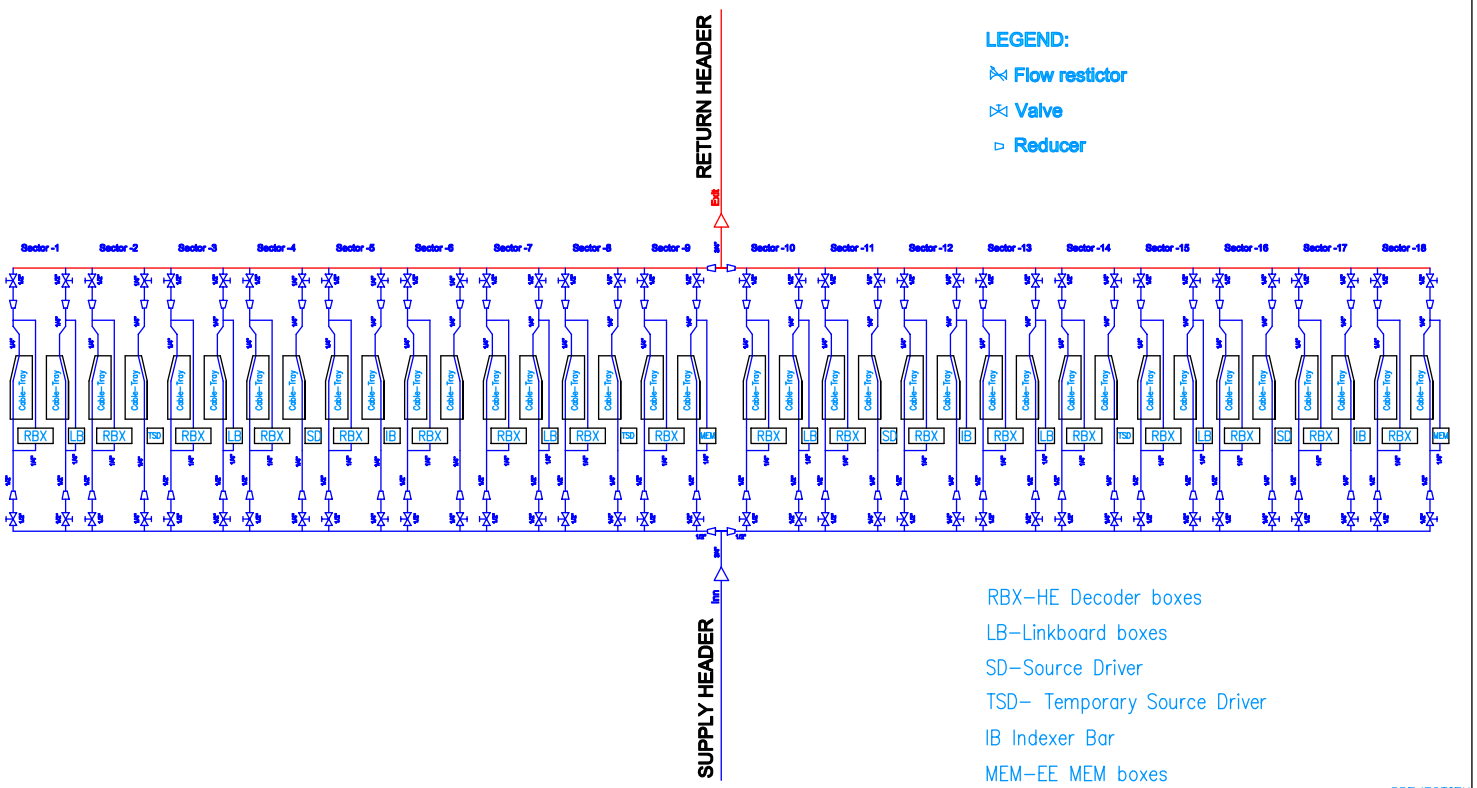
RBX–HE Decoder boxes
LB–Linkboard boxes
SD–Source Driver
TSD– Temporary Source Driver
IB Indexer Bar
MEM–EE MEM boxes

PROJECTION

Cooling circuits for HE(+)

ACAD version: 14	Date:30.09.01
File name: HEcooling_layout	CMS Endcap Detectors
CERN, Integration group of CMS, A.Surkov	

Provisional only

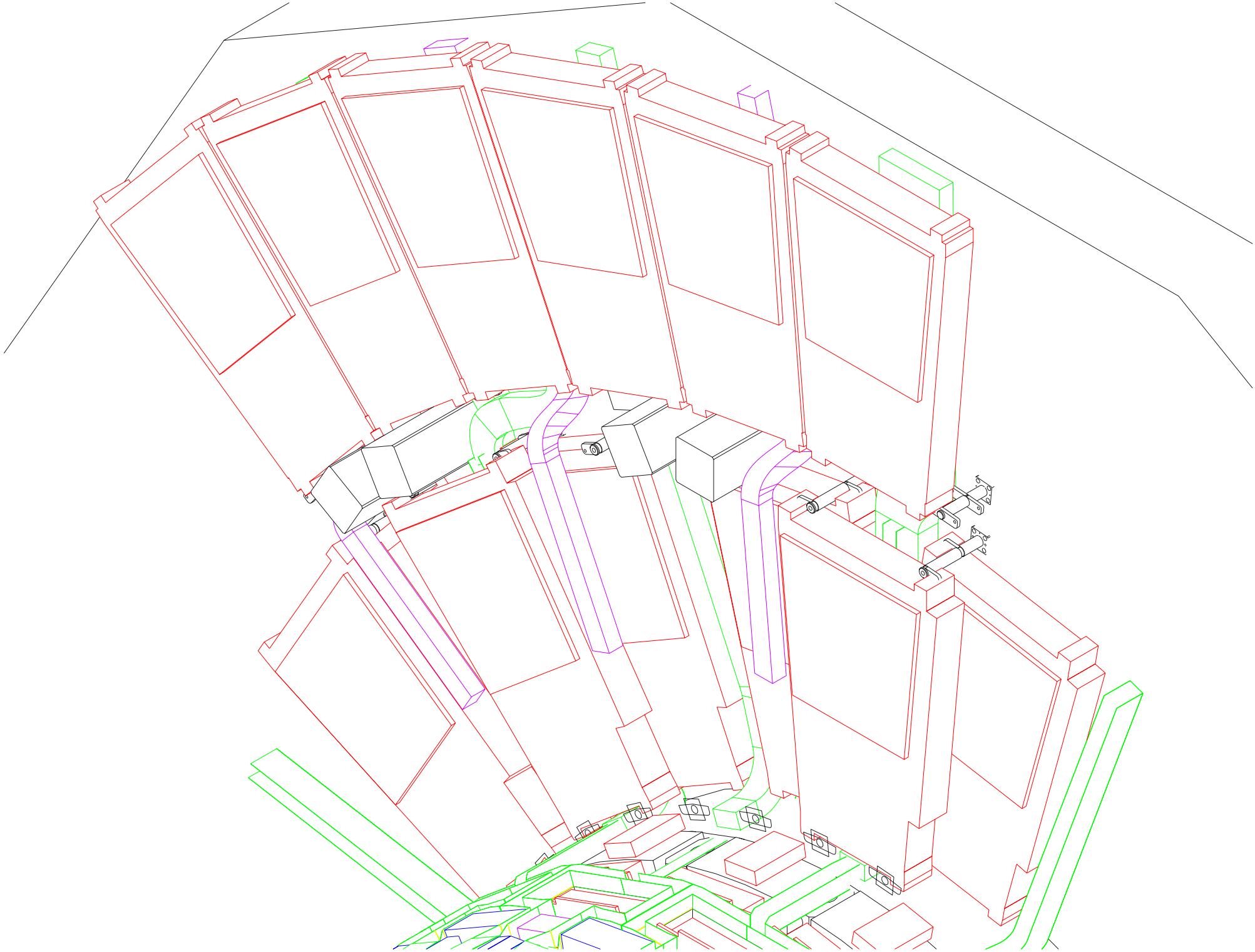


RBX–HE Decoder boxes
LB–Linkboard boxes
SD–Source Driver
TSD– Temporary Source Driver
IB Indexer Bar
MEM–EE MEM boxes

PROJECTION

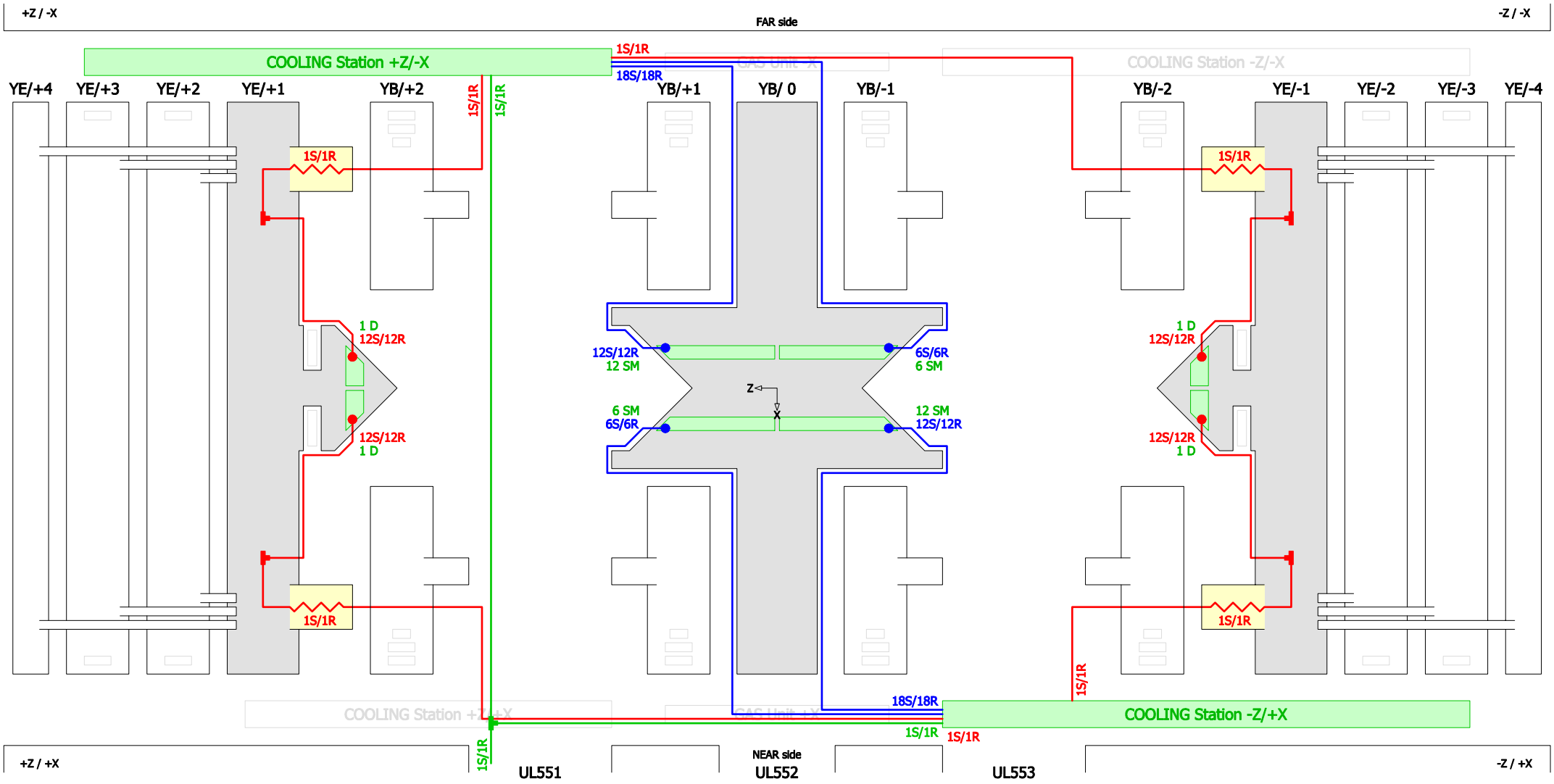
Cooling circuits for HE(–)

ACAD version: 14	Date:30.09.01
File name: HEcooling_layout	CMS Endcap Detectors
CERN, Integration group of CMS, A.Surkov	



COOLING
REGULATING Circuit

ECAL
BARREL (EB) & ENDCAP (EE)



COOLING ROUTING

UXC55 (only EB/EE, SE, TK)

ENDCAP (+)

EE(+) ECAL Endcap
SE(+) PRESHOWER

COOLING STATION
ECAL (EB/EE)

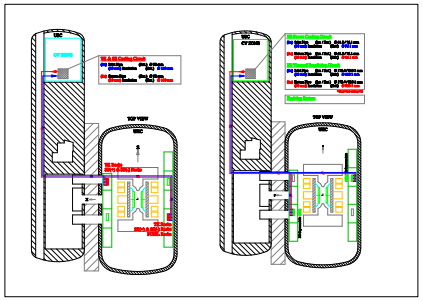
BARREL (0)
Central Wheel

EB ECAL Barrel
TK TRACKER

COOLING STATION
TRACKER & PRESHOWER

Z
Y
X

COOLING
"ALL CMS"



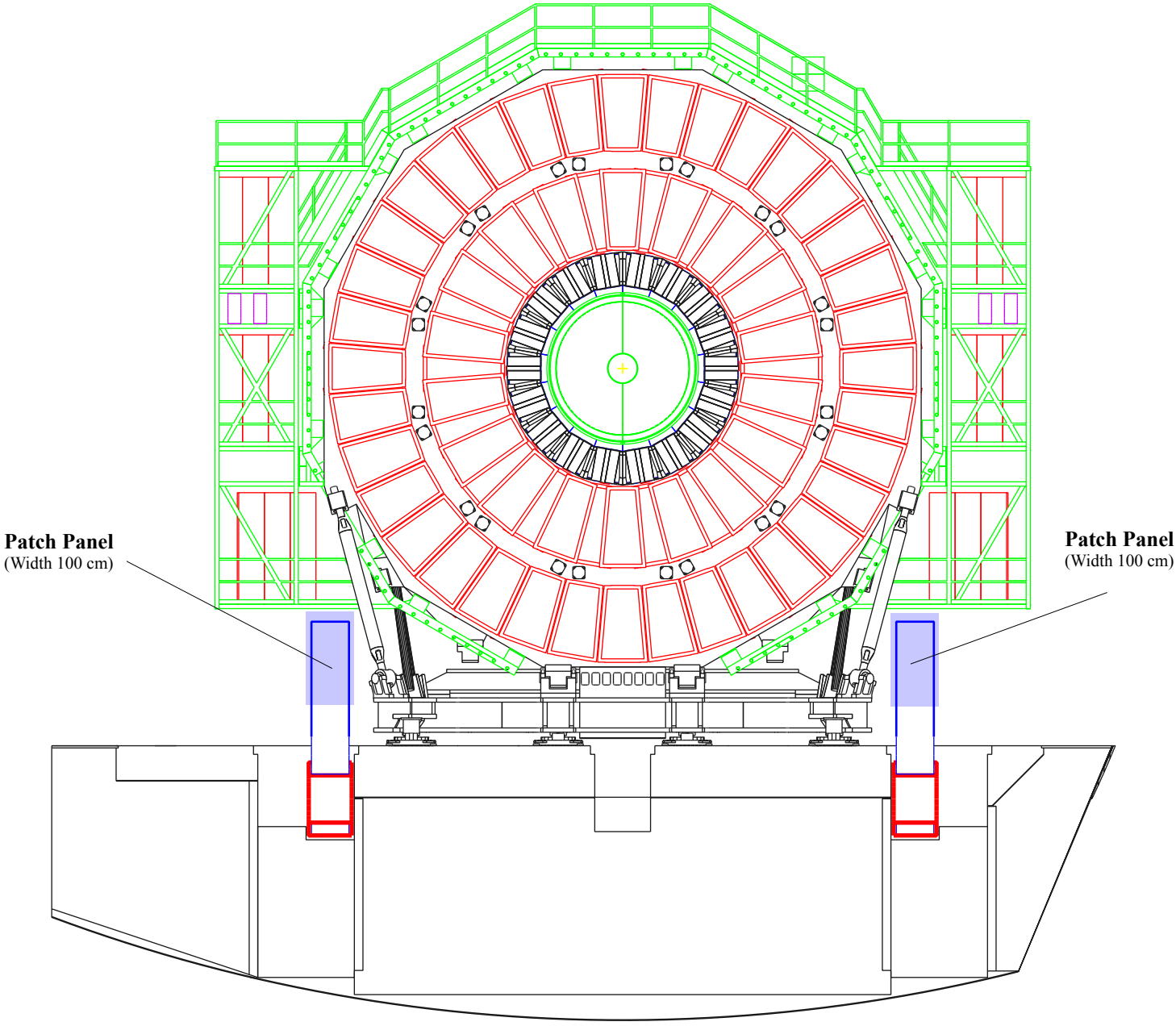
GAS
"ALL CMS"

ENDCAP (-)

EE(-) ECAL Endcap
SE(-) PRESHOWER

CABLE CHAINS

ENDCAP PATCH PANELs



NEAR (X+) CABLE CHAIN

OPTICAL FIBRES
GAS
Specific Cooling
CABLES
SNIFFER

FAR (X-) CABLE CHAIN

GAS
GENERAL COOLING
CABLES
N2

CABLE CHAINS

ENDCAP

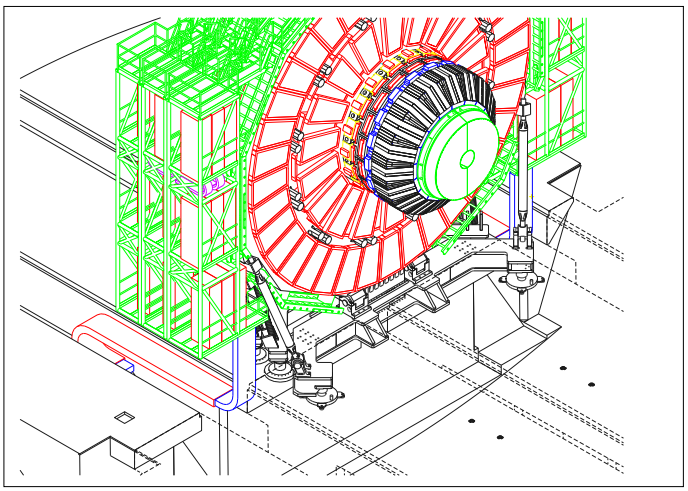
File: Cable chain info 2001/09/19

Item	Description of items	# of items	size (mm)	rack space	far cable chain section (cm**2)	near cable chain section (cm**2)	# of items	size (mm)	rack space	far cable chain section (cm**2)	near cable chain section (cm**2)	# of items	size (mm)	rack space	far cable chain section (cm**2)	near cable chain section (cm**2)	# of items	size (mm)	rack space	far cable chain section (cm**2)	near cable chain section (cm**2)
Current availability				12	2.000	2.000			6					6					0		
Complete endcap total					**1,692.5**	**1,604.3**															
Disk totals				**16.33**	1,355.4	1,284.1			4.99	88.6	110.8			**9.33**	143.7	104.7			**6.33**	104.8	51.9
CMS infrastructure	Infrastructure totals			0	157.8	9.8			0	49.6	3.9			0	49.6	3.9			0	48.2	3.9
N2	fire inertion system	3	68		138.7		1	68		46.2		1	68		46.2		1	68		46.2	
sniffer, far side	fire monitoring	5	14			9.8	1	14		2.0		1	14		2.0		1	14		2.0	
sniffer, near side	"	9	14		17.6		2	14			3.9	2	14			3.9	2	14			3.9
main power	230 v. normal power	1	12		1.4		1	12		1.4		1	12		1.4						
CSC	CSC totals			5.33	37.5	205.8			4.99	39.0	106.9			3	37.5	52.7			0	0.0	0.0
CSC gas rack	rack-mounted gas distribution			1					1					1							
HV box	distribution boxes	5		1			10		2			5		1							
VME crates	CSC trigger crates	18		3			12		1.33			6		0.67							
alignment crate		1		0.33			1		0.33			1		0.33							
slow control		1					1		0.33												
LV boxes		6					12					12									
water manifolds	1.5" supply/return	2	38		28.9		2	38		28.9		2	38		28.9						
compressed air	gas rack valves	20	6			7.2	10	6			3.6	5	6			1.8					
Ar-CO2 gas	supply	5	29			42.1	2	29			16.8	1	29			8.4					
	return	5	45			101.3	2	45			40.5	1	45			20.3					
	purge	1	17			2.9	1	17			2.9	1	17			2.9					
	back-up	1	17			2.9	1	17			2.9	1	17			2.9					
HV cables		5	12		7.2		5	12		7.2		5	12		7.2						
HV cables					0.0		5	12			7.2				0.0						
LV power cable	twisted pair, shielded	1	12		1.4		2	12		2.9		1	12		1.4						
optical fibers	11 per crate	198	5			49.5	132	5			33.0	66	5			16.5					
RPC	RPC totals			11	161.5	48.0								6.33	56.6	48.0			6.33	56.6	48.0
RPC gas rack				2										1					1		
HV + LV boxes		27		9								15		5			15		5		
link boards		15	400x300x230									48	400x300x230				48	400x300x230			
link boards (nose)		6	400x300x230																		
slow control												1		0.33			1		0.33		
compressed air		20	6		7.2							5	6		1.8		5	6		1.8	
RPC gas	supply	8	23		42.3							2	23		10.6		2	23		10.6	
	return	8	29		67.3							2	29		16.8		2	29		16.8	
	purge	1	17		2.9							1	17		2.9		1	17		2.9	
	back-up	1	17		2.9							1	17		2.9		1	17		2.9	
HV + LV cables		27	12		38.9							15	12		21.6		15	12		21.6	
optical fibers		192	5			48.0						192	5			48.0	192	5			48.0
ME1/1	ME1/1 totals			0	159.6	0.0															
LV boxes																					
HV boxes																					
patch panel																					
HV	25-conductor	18	16		46.1																
LV	5v digital	72	8.4		50.8																
	5v analog	72	6.6		31.4																
	3.8v	72	6.6		31.4																
Slow control	4 twisted pairs	1	6		0.4																
SE	SE totals			0	286.1	312.0															
LV - 5v analog		38	15		42.8	42.8															
LV 5v digital		38	15		42.8	42.8															
LV control		38	16		48.6	48.6															
bias voltage		38	15		42.8	42.8															
heating films		4	15		4.5	4.5															
dry nitrogen	only at 6 & 12 o'clock	2	10		1.0	1.0															
cooling fluid	C6F14 (only at 3 & 9 o'clock)	4	72		103.7	103.7															
optical fibers	60 fibers/cable	32	9			25.9															
EE	EE totals			0	419.9	549.5															
fibre optic readout	"loose" tube, 60 fibers	160	9			129.6															
High Voltage	RG58 - 6mm dia.	640	4		51.2	51.2															
Power LV	14AWG, 2.13mm dia.	160	16		204.8	204.8															
slow controls		16	10		8.0	8.0															
monitoring & contr	fiber optic	4	8		1.3	1.3															
monitoring cables		24	2		0.5	0.5															
monitoring bus		2	4.6		0.2	0.2															
dry nitrogen		4	10		2.0	2.0															
smoke detection		2	10		1.0	1.0															
Cooling pipes	inlet	24	33		130.7	130.7															
	return	24	13		20.3	20.3															

Sub detector		Cables	Opt. Fibres		Tubes
SE		42	20		4
EE		46	160		4
"	HV	640			
HE		57	18		2
CSC		7	198		14
RPC		27	192		18

Other systems

- Hydraulic (Jacks, ...)
- Pneumatic (Jacks, ...)
- N2
- Sniffer (plastic)
- Compressed Air
- Purging



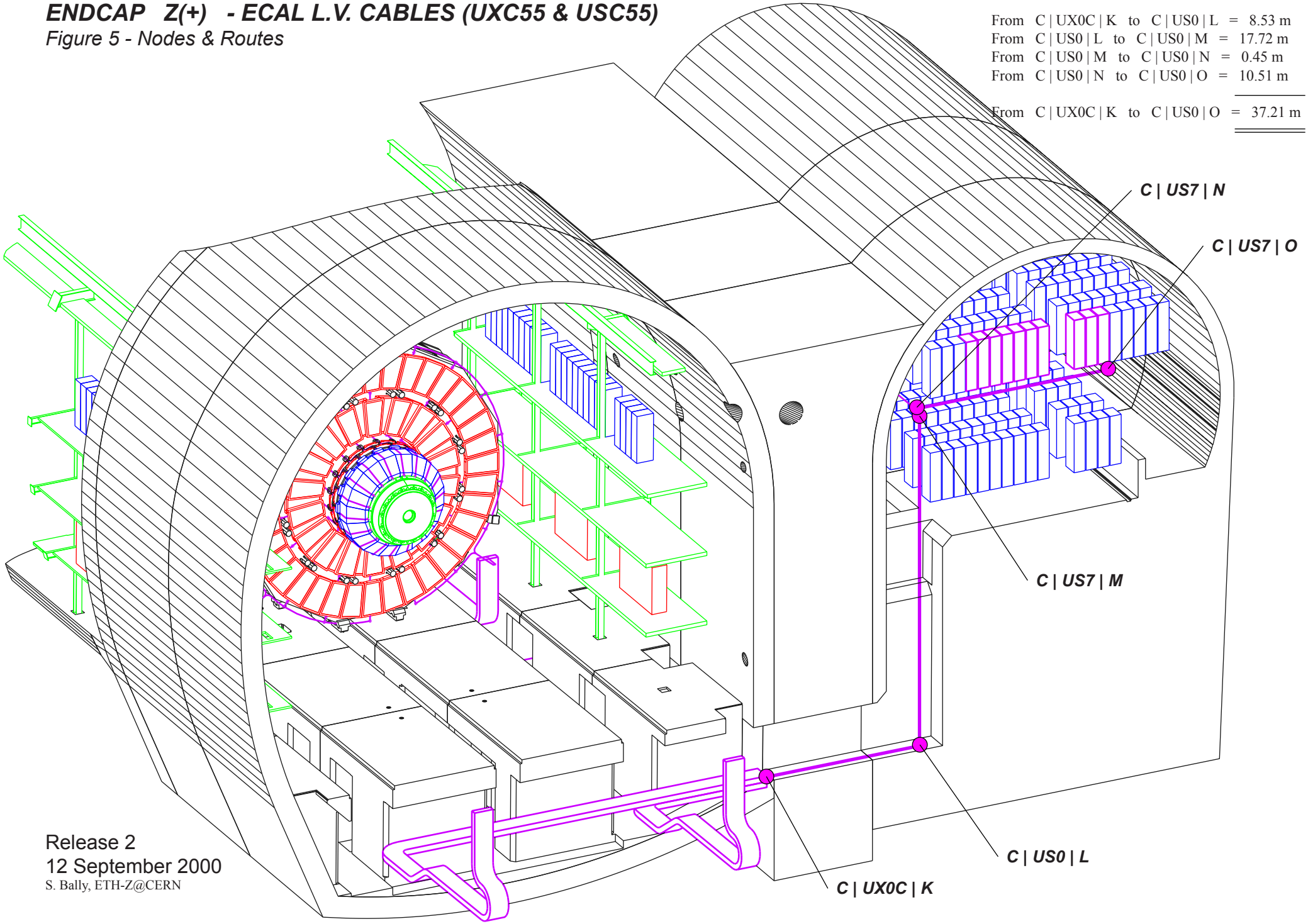
CMS INTEGRATION - SERVICES

ENDCAP Z(+) - ECAL L.V. CABLES (UXC55 & USC55)

Figure 5 - Nodes & Routes

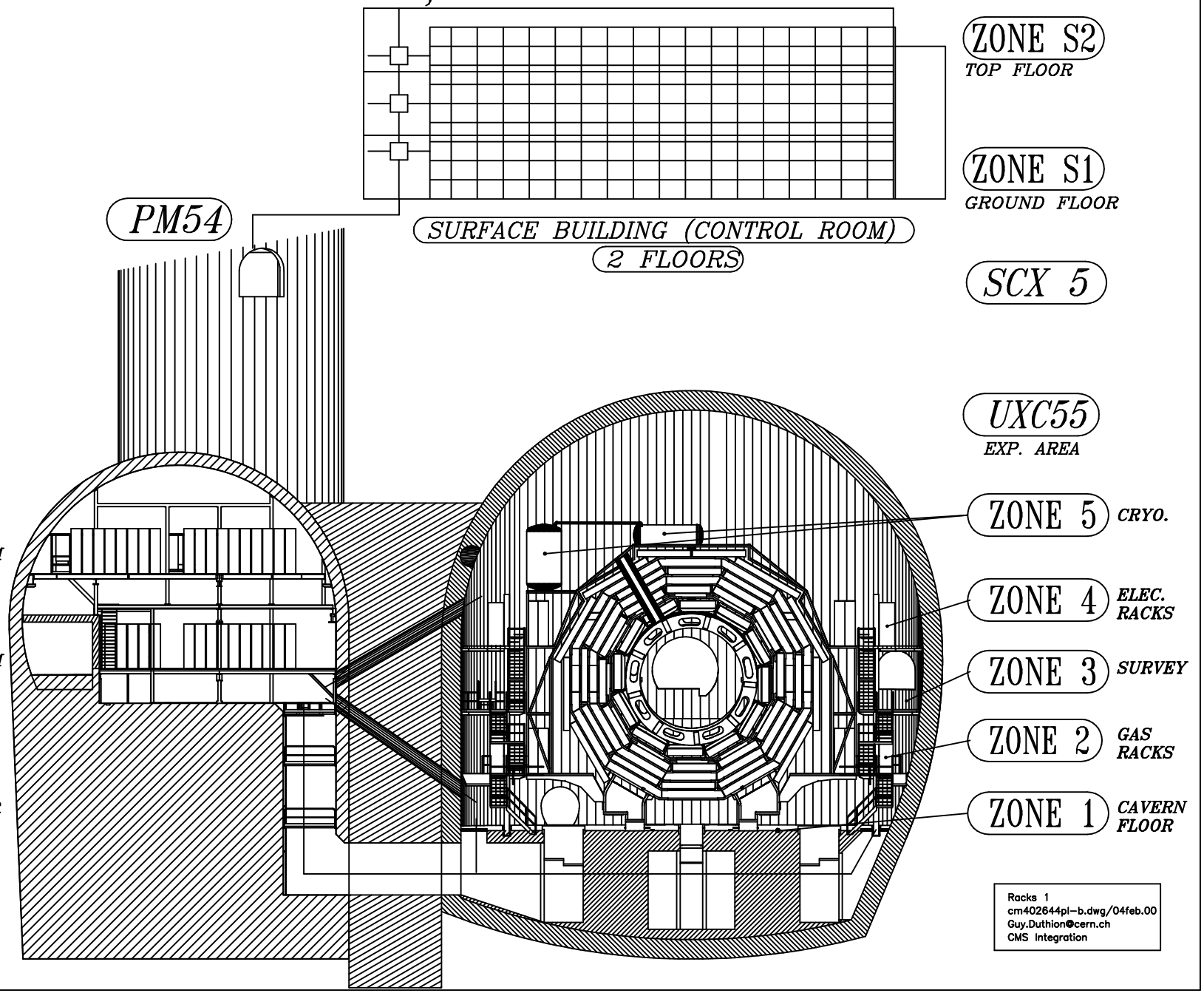
DISTANCE

From	C | UX0C | K	to	C | US0 | L	=	8.53 m
From	C | US0 | L	to	C | US0 | M	=	17.72 m
From	C | US0 | M	to	C | US0 | N	=	0.45 m
From	C | US0 | N	to	C | US0 | O	=	10.51 m
From	C | UX0C | K	to	C | US0 | O	=	37.21 m



Release 2
12 September 2000
S. Bally, ETH-Z@CERN

CMS RACK NUMBERING SYSTEM
ZONES FOR UXC 55, USC 55 & SCX 5

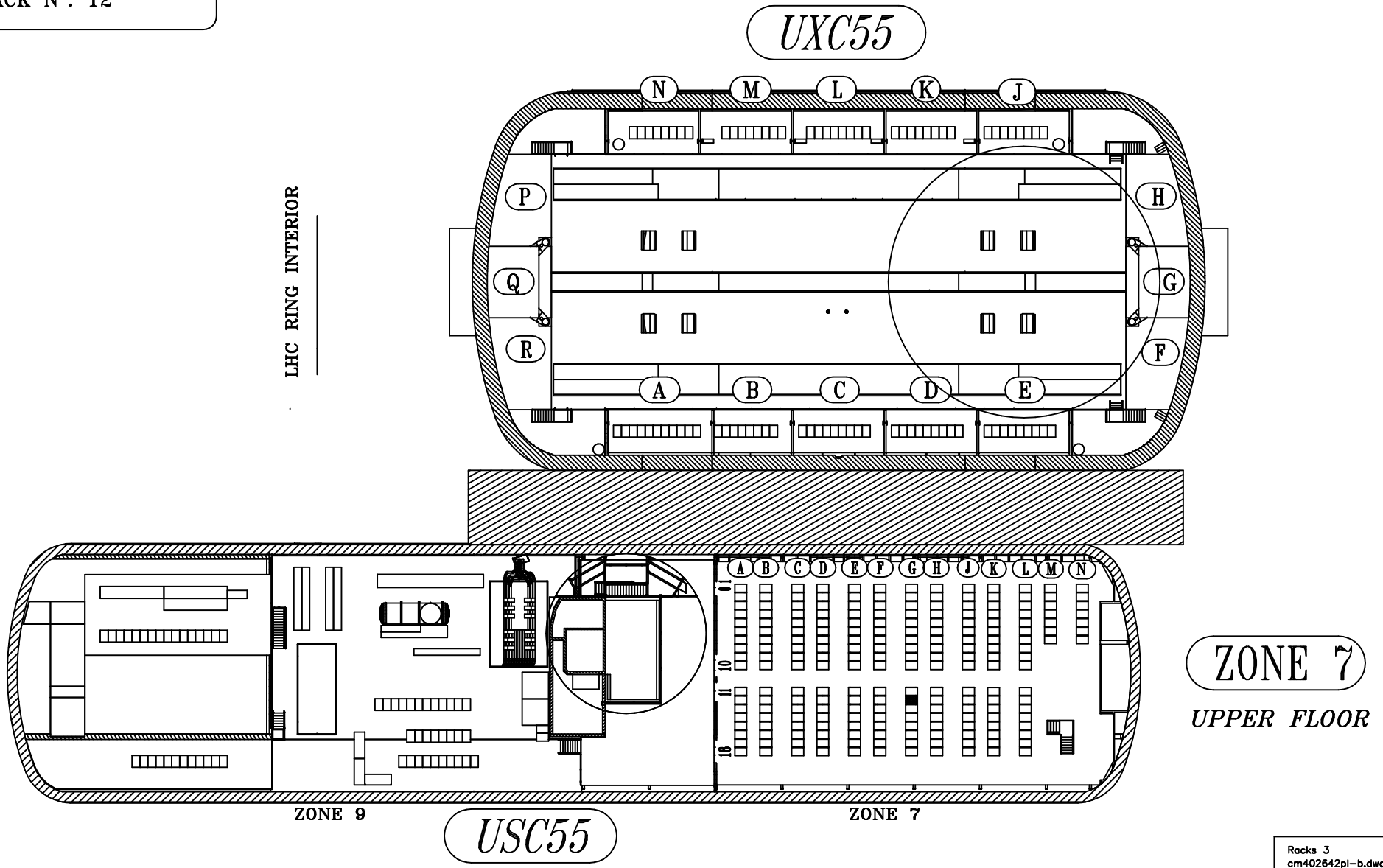


RACK ADDRESS EXAMPLE

■ (7G12)

ZONE : 7
ROW : G
RACK N°: 12

CMS RACK NUMBERING SYSTEM
USC 55 , UPPER FLOOR



ZONE 7

UPPER FLOOR

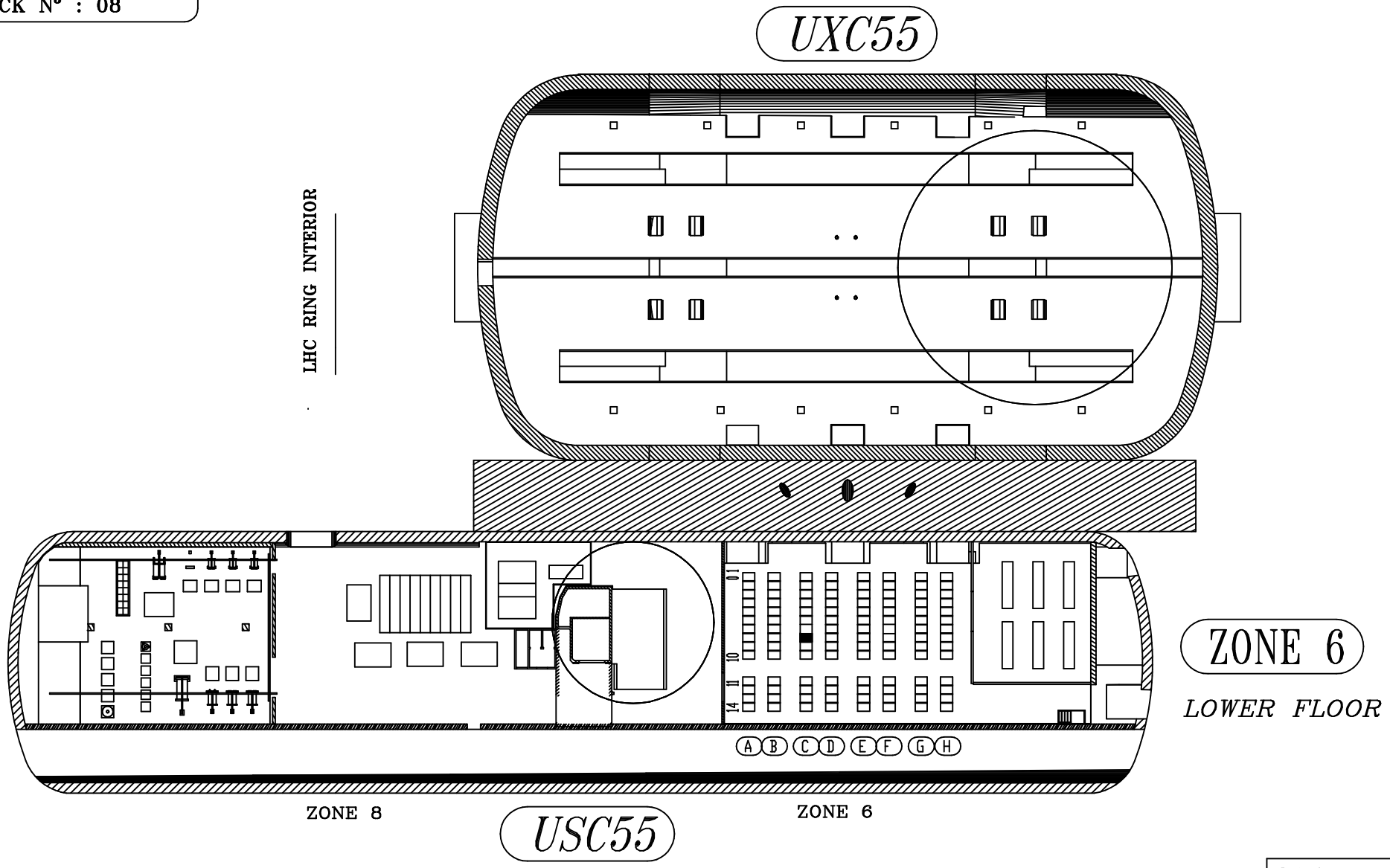
Racks 3
cm402642pl-b.dwg/04feb.00
Guy.Duthion@cern.ch
CMS Integration

RACK ADDRESS EXAMPLE

■ 6C08

ZONE : 6
ROW : C
RACK N° : 08

CMS RACK NUMBERING SYSTEM
USC 55, LOWER FLOOR



ZONE 6

LOWER FLOOR

Racks 2
cm402643pl–b.dwg/04feb.00
Guy.Duthion@cern.ch
CMS Integration

Rack Layout in USC55 (version 3.2)

Both floors are shown. There is a passageway between the 14th and 15th racks on the upper floor. Row A is closest to the shaft. Rack 1 is closest to the interaction hall (UXC55). Rack rows are spaced 1.5 m front face to front face (B-C,D-E,F-G,H-J)) and 1.0 m rear face to rear face (A-B,C-D,E-F,G-H,J-K).*There is a 30 cm (optional in upper floor, required in lower floor) gap between racks 7 and 8 for a structural beam. #There is a 30 cm gap between racks 6C07 and 6C08 and also between 6F07 and 6F08 for a vertical structural beam. Nominally, racks are spaced apart by 5 cm, but can be pushed together on request. Definition of abbreviations. Information about racks. Pictures of Rack Layout.

+Z			Upper	Floor	(Zone 7)					-Z
	A	B	C	D	E	F	G	H	J	K
01	EBE Lt Mn	EBE DCS	EB R100	EE R100	Cal Reg Trig	EE R100	HCAL HTR	HCAL Calib	HPD HV	TOTEM
02	EBE Lt Mn	EBE DCS	EB R100	EE Tr Rer	Cal Reg Trig	EE Tr Rer	HCAL HTR	HCAL Calib	HPD HV	TOTEM
03	EBE Lt Mn	EBE DCS	EB R100	EE R100	Cal Reg Trig	EE R100	HCAL HTR	HCAL Calib	HPD HV	TOTEM
04	EBE Laser	EBE DCS	EB R100	EE R100	Cal Reg Trig	EE R100	HCAL HTR	HCAL Calib	HPD HV	TOTEM
05	x	EBE DCS	EB CSRP	EE Tr Rer	Cal Reg Trig	EE Tr Rer	HCAL HTR	HCAL Calib	HPD HV	TOTEM
06	EE HV	EBE DCS	EB CSRP	EE R100	Cal Reg Trig	EE R100	HCAL HTR	HCAL Contr	HPD HV	TOTEM
*07	EE HV	DAQ	EB TTC	EB R100	Cal Reg Trig	EB R100	HCAL HTR	HCAL Contr	EE HV	TOTEM
*08	EB HV	x	EB TTC	EB R100	Cal Reg Trig	EB R100	HCAL HTR	EE LV	EE HV	LESS
09	EB HV	x	EE TTC	EB R100	Cal Reg Trig	EB R100	DAQ	EE LV	EB HV	LESS
10	EB HV	EE LV	EE TTC	EB R100	Cal Reg Trig	EB R100	x	EE LV	EB HV	LESS
11	EB HV	EE LV	x	x	x	x	EB LV	EE LV	EB HV	LESS
12	EB HV	EE LV	EB LV	EB LV	x	x	EB LV	EE LV	EB HV	LESS
13	ASSM	EE LV	EB LV	EB LV	EB LV	EB LV	EB LV	EB LV	EB HV	LESS
14	ASSM	EE LV	EB LV	EB LV	EB LV	EB LV	EB LV	EB LV	Presh. Misc.	ASSM
					<-- Passageway -->					
15	ASSM	Presh. Misc.	EB LV	EB LV	EB LV	EB LV	EB LV	EB LV	Presh. LV/HV	ASSM
16	ASSM	Presh. LV/HV	EB LV	EB LV	EB LV	EB LV	EB LV	EB LV	Presh. LV/HV	ASSM
17	ASSM	Presh. LV/HV	EB LV	EB LV	EB LV	EB LV	EB LV	EB LV	Presh. LV/HV	ASSM
18	Ctrl/Safety	Presh. LV/HV	Ctrl/Safety	EB LV	Ctrl/Safety	EB LV	Ctrl/Safety	EB LV	Ctrl/Safety	ASSM

+Z Lower Floor (Zone 6) -Z

	A	B	C	D	E	F	G	H
01	DAQ	Track. FED	Track. FED	Track. FEC	Opt.Cpl.	Presh. FEC	DT TR/RO	Pixel PS
02	Track. PS	Track. FED	Track. FED	Track. FEC	TTC/FM	DT TrkFnd	Pixel FEC	Pixel PS
03	Track. PS	Track. FED	DAQ	RPC Trig	TTC/FM	DT TrkFnd	Pixel FED	Pixel Ctrl
04	Track. PS	DAQ	Track. FED	RPC Trig	Global	DT TrkFnd	DAQ	Track. PS
05	Track. PS	Track. FED	Track. FED	RPC Trig	Cal Global	CSC TrkFnd	CSC FED	Track. PS
06	Track. PS	Track. FED	Track. FED	RPC Trig	Reserve	CSC TrkFnd	CSC FED	Track. PS
*07	Track. PS	Track. FED	DAQ#	RPC Trig	DAQ	x#	CSC FED	Track. PS
*08	Track. PS	DAQ	Track. FED#	RPC Trig	DT FED	DT SC#	x	Track. PS
09	Track. PS	Track. FED	Presh. FED	RPC Trig	x	DT HV	x	Track. PS
10	Track. PS	Track. FED	Presh. FED	RPC Trig	RPC EC HV	DT HV	CSC HV	Track. PS
11	Track. PS	CSC HV	Track. Ctrl	x	RPC EC HV	DT HV	CSC HV	Track. PS
12	CSC HV	CSC HV	Track. Ctrl	ME1/1 HV	RPC B HV	DT HV	CSC HV	Track. PS
13	CSC HV	CSC HV	Track. Ctrl	ME1/1 HV	RPC B HV	DT HV	CSC HV	Track. PS
14	HEALTH	Ctrl/Safety	Track. Ctrl	Ctrl/Safety	RPC B HV	Ctrl/Safety	CSC HV	Ctrl/Safety

<-- Passageway -->

Version History:

2.1: 26.05.99: Starting Point
2.2: 01.09.99: Added ME1/1 HV in H11, H12
2.3: 06.09.99: Removed 15th rack from each row in the lower floor
2.4: 04.09.99: Changed Row I to J and labelled all rows with 2 digits
2.5: 01.06.00: ECAL Revisions
2.6: 19.07.00: Preshower FEC, Laser & LV/HV additions, Track. PS from 11 to 20.
2.7: 07.02.01: Add new rack row K and 8 ASSM Racks, redistribute EE LV & EB LV
2.8: 30.05.01: Remove DCS, add Ctrl/Safety, redistribute Track. PS, CSC HV, ME1/1 HV, Presh. HV/LV (+add 1), add 2 CSC FED, add 5 RPC HV
2.9 : 25.10.01: Move Presh. LV/HV/Misc to Upper Floor, redistribute EBE HV/LV,add DAQ Racks,reduce/move CSC & DT Trackfinder Racks
3.0 : 01.11.01: Remove lower floor passageway. Move upper floor passageway to between racks 14 and 15 in each row. Correct # EE LV, EB HV.
3.1 : 10.12.01: Exch. RPC B/EC for 8 RPC Trig., add Opt. Cpl,TTC/FM, and reserve, move Track/Presh. FEC, CSC & DT TrkFnd, ME1/1 HV
3.2 : 07.02.02: Add Pixel racks: 2PS, FED,FEC,Ctrl.Move CSC FED &HV, DT HV, RPC EC HV,DAQ,Track.PS

Last Updated on 07.02.02
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