

East Hall under construction - 1962

East Area Cost and Schedule Review 2019 AC power distribution / DC cabling

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21.11.2019



ENGINEERING
DEPARTMENT



EAST AREA RENOVATION



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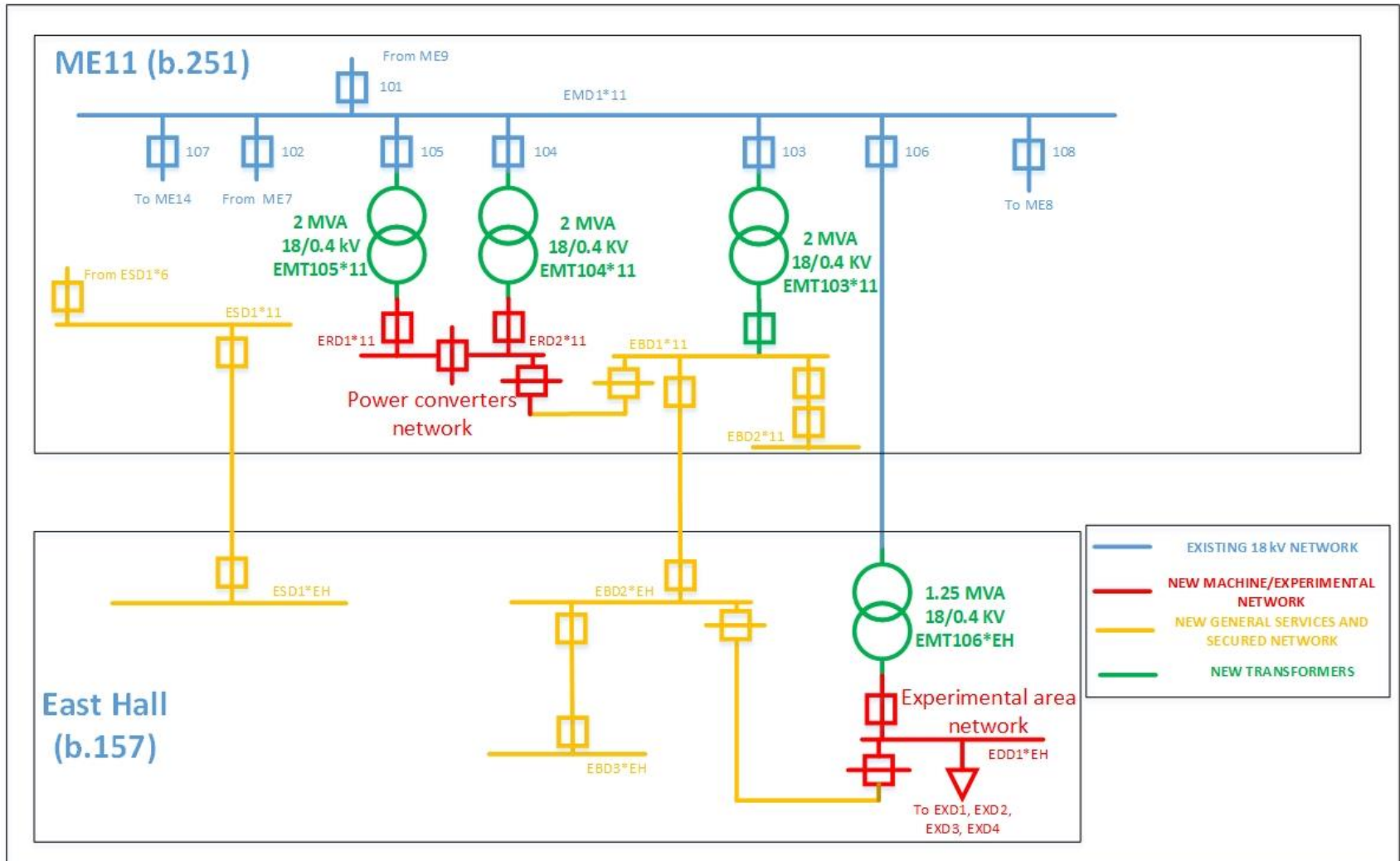
- Scope
- Completed activities
- Worksite preparation and procurement
- Planning
- Budget
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Scope

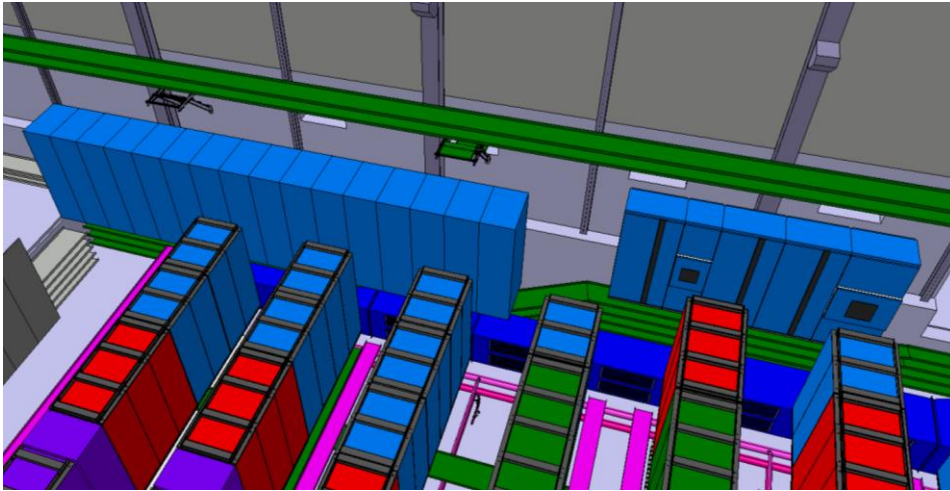
Main activities:

- Replacement of the existing AC networks (dismantling and new installation) with the related civil works
 - General services network
 - Secured network
 - Machine network dedicated to TE-EPC and experimental areas
- Replacement of the existing 48Vdc system
- Decontamination of the oil-contaminated transformer pits
- Installation of new emergency lighting system in both buildings
- Installation of radiation resistant lighting in the primary area, mixed zone and T8 in b. 157
- De-cabling campaigns
- Cable ladders installation
- DC Cabling to supply the magnets from the converters
- Pulling of signal cables for all the users (Users' budget)

Scope of AC Power distribution

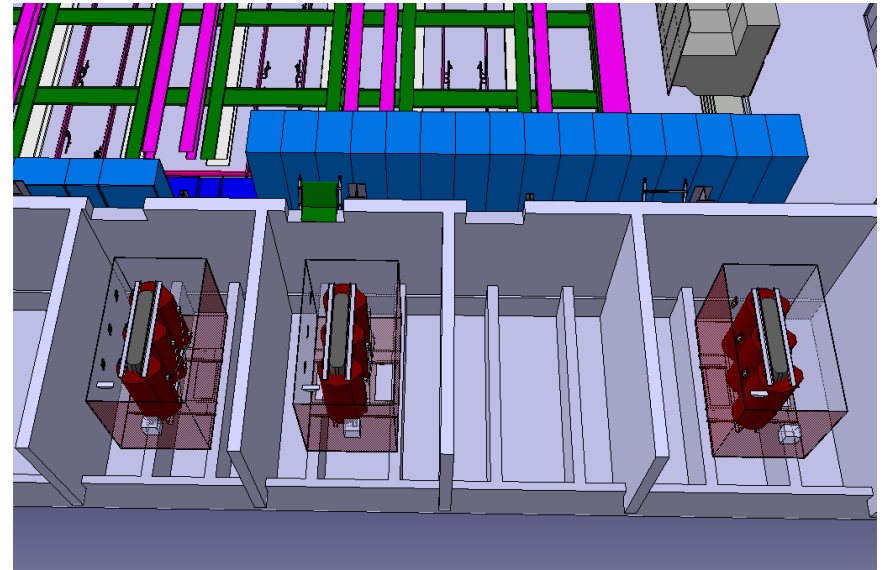


Ongoing design for AC Power distribution

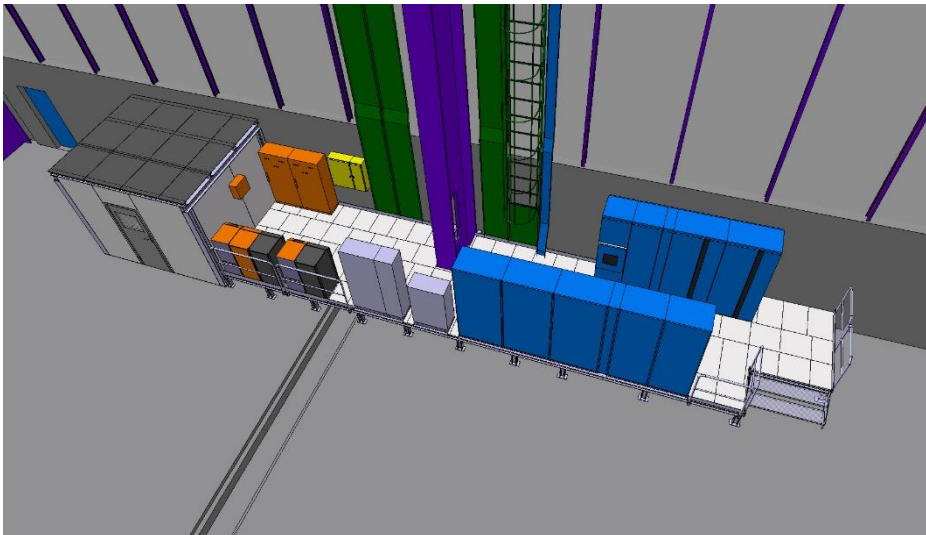
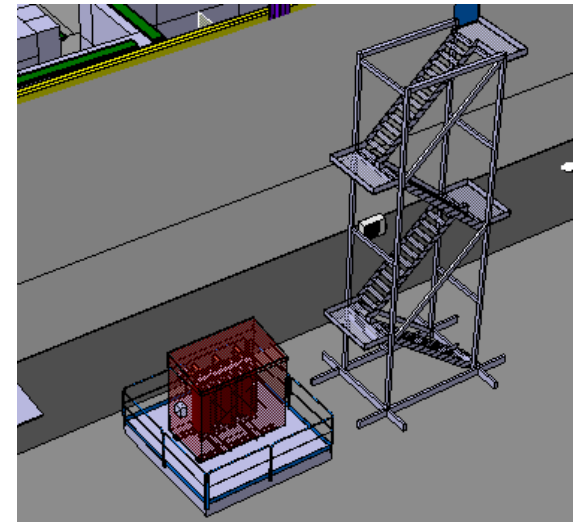
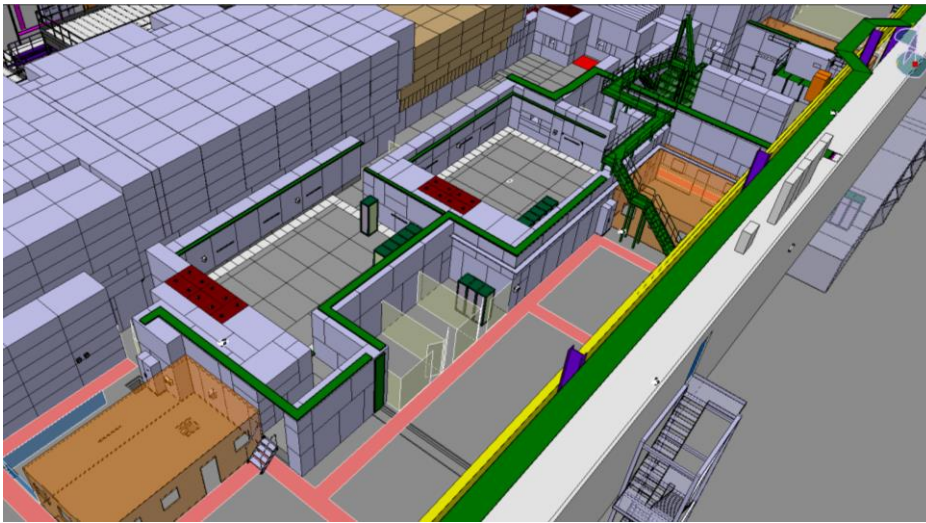


Position of the new type 1 and 4 switchboards in b. 251 with the cables access from the transformers' rooms.

Position of the new three transformers in their dedicated rooms.



Ongoing design for AC Power distribution



From the top left clockwise:
cable trays structure for the
experimental areas,
transformer's base and
dedicated area for the
switchboards in b. 157

Completed activities for AC Power distribution



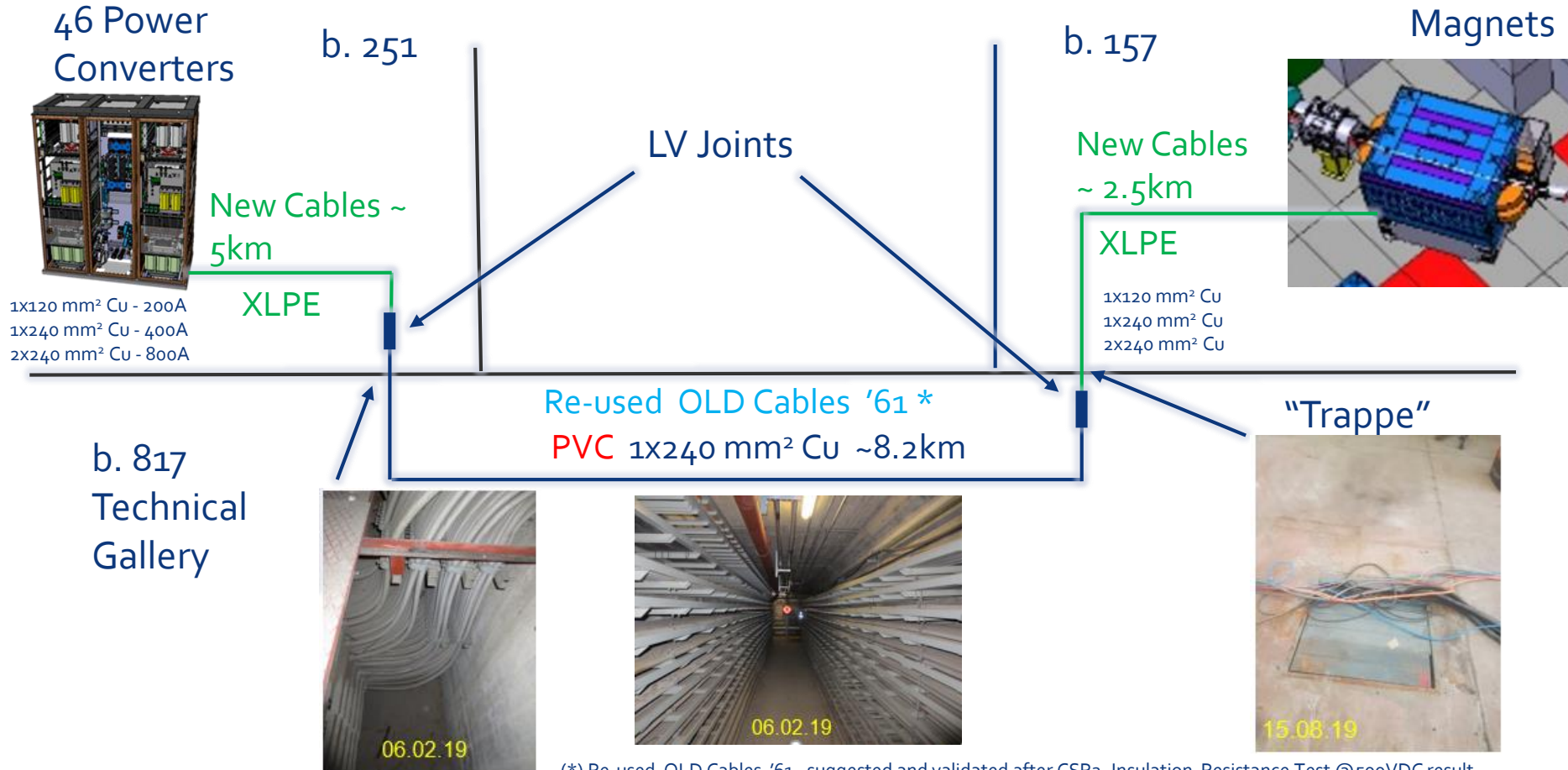
Transformers' pits emptying and cleaning in b. 251

Switchboards removal in b. 251



DC Cabling Scheme

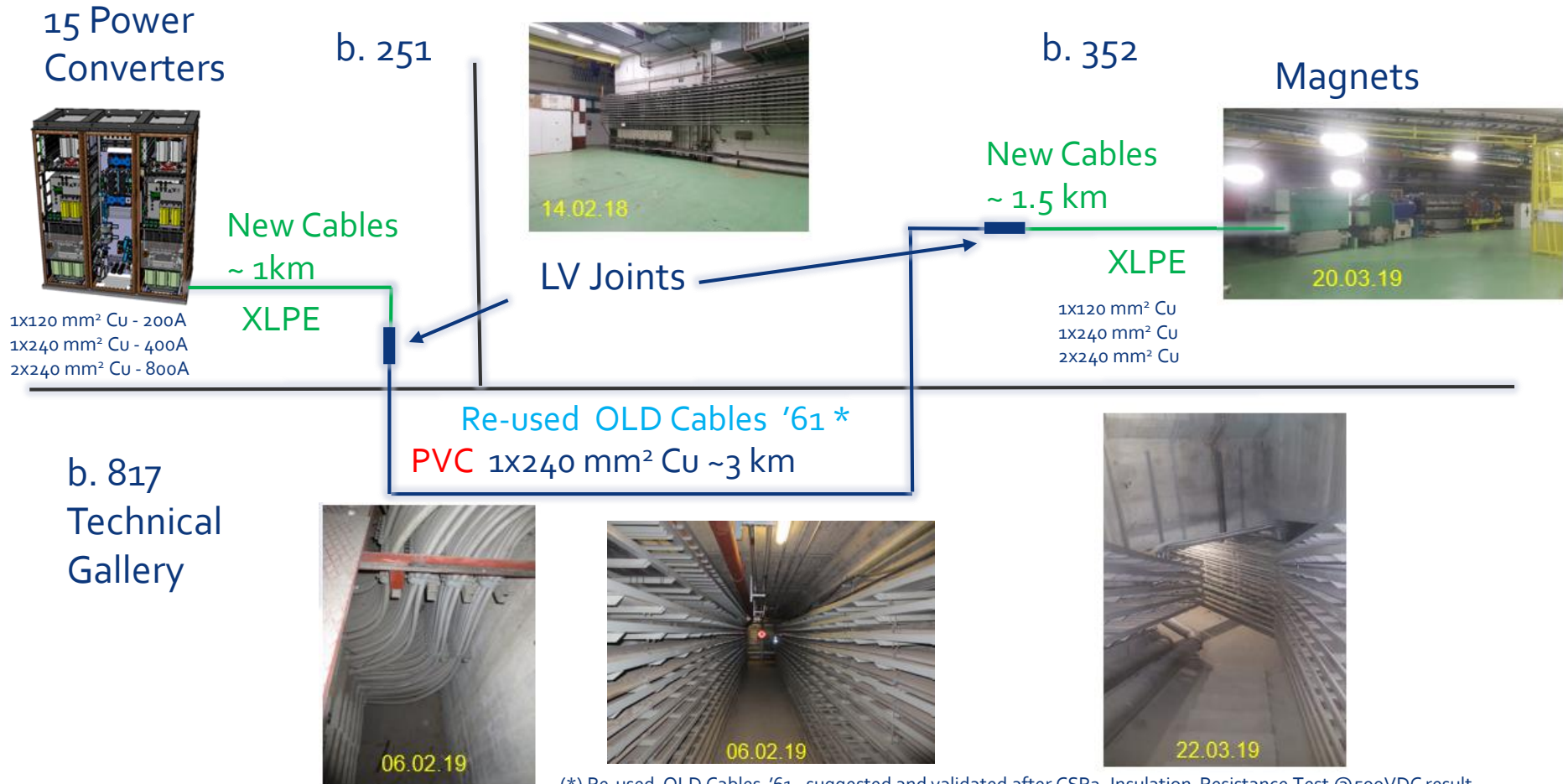
- DC Cabling scheme b. 251 to b. 157



(* Re-used OLD Cables '61, suggested and validated after CSR2. Insulation Resistance Test @500VDC result completed Nov 2019

DC Cabling Scheme

- DC Cabling scheme b. 251 to b. 352



(*) Re-used OLD Cables '61 , suggested and validated after CSR2. Insulation Resistance Test @500VDC result completed Nov 2019

M. Polenghi, 21.11.2019

Signal Cables - Summary

Ticket	Group	System	Submitted by	Cable Quantity	Cable Length (km)	Estimated Budget (kCHF)	Connectors	Remarks
RQF0971375	BE-BI	BTV SYSTEM	Stephane Burger	32	3.42	24.2	Yes	
RQF0971821	BE-BI	BEAM INSTRUMENTATION	Philippe Carriere	136	14.5	See remarks	Yes	Ongoing – clarification required
RQF0979073	BE-ICS	ACCESS SYSTEM	Borin Morand	14	6.53	54	Yes	
RQF0967931	BE-ICS	FIRE DETECTION	Denis Raffourt	18	1.1	13	Yes	
RQF0844633	BE-ICS	GAZ SYSTEM	Nicolas Broca	73	See remarks	See remarks	No	Ongoing – clarification required
RQF0981360	BE-ICS	ACCESS SYSTEM	Borin Morand	30	See remarks	See remarks	Yes	Ongoing – clarification required
RQF0971485	EN-EA	GAZ SYSTEM	Erwan Harrouch	46	See remarks	See remarks	See remarks	On hold – request uncompleted
RQF1002872	EN-SMM	MULTI-TARGET SYSTEM	Jerome Landaro	36	1.6	29	Yes	
RQF0959986	EN-SMM	COLLIMATORS	Jerome Landaro	20	See remarks	See remarks	Yes	Ongoing – clarification required
RQF1002859	EN-SMM	CONTROL FOR CHARM	Jerome Landaro	8	See remarks	See remarks	Yes	On hold – request uncompleted
RQF0959969	EN-SMM	BEAM STOPPERS	Jerome Landaro	42	See remarks	See remarks	Yes	On hold – request uncompleted
RQF0971704	HSE-RP	RP SYSTEM	Jeremy Rosset-Lanchet	48	3.9	See remarks	No	Ongoing – clarification required
RQF0863828	TE-EPC	ETHERNET	Jose Luis Gomez Costa	67	1.4	31	Yes	Option with 'gaine capri' (without is 14kCHF)
RQF0965683	TE-MPE	INTERLOCK SYSTEM (WIC)	Adrian Fontan	125	7.7	110	Yes	
RQF1012045	TE-VSC	VACUUM SYSTEM	Jose De La Gama Serrano	32	See remarks	See remarks	Yes	On hold – request uncompleted

Worksite preparation and procurement for AC Power distribution

Worksite preparation	128,4 wks	Wed 13/09/17	Fri 13/03/20	67%
Writing of the CDR of the AC distribution	1 day	Wed 13/09/17	Wed 13/09/17	100%
Perform detailed design of the AC Distribution	10 mons	Mon 07/01/19	Fri 11/10/19	90%
Transformers and switchboard type 1-2-4 procurement (TESAR, ABB, HAZEMEYER)	4,8 mons	Mon 20/05/19	Mon 30/09/19	100%
48Vdc procurement	3 mons	Mon 01/07/19	Fri 20/09/19	100%
S213 contract works procurement (COMSA)	6 mons	Mon 30/09/19	Fri 13/03/20	20%
Lighting study and wiring execution drawings	4 wks	Mon 04/11/19	Fri 29/11/19	30%
Integration drawings and related mechanical execution drawings	14 wks	Mon 02/09/19	Fri 06/12/19	70%
Switchboards type 3 procurement	3 mons	Mon 02/12/19	Fri 21/02/20	10%

The procurement for the different installations and services is mainly based on frame contracts.

The order of the services/materials is on going.

The design is almost completed: the detailed definition for execution will be released soon.

Activities planning b. 251 for AC Power distribution

General dismantling activities	26,6 wks	Mon 25/02/19	Wed 28/08/19	95%
Existing transformers removal in ME11	1 wk	Tue 05/03/19	Mon 11/03/19	100%
Transformers oil retention pit pollution analysis in ME11	2 wks	Mon 11/03/19	Fri 22/03/19	100%
ERD switchboards dismantling	1 mon	Mon 25/02/19	Fri 22/03/19	100%
Transformers oil retention pits cleaning in ME11	3 wks	Mon 10/06/19	Fri 28/06/19	100%
Supply of EMT108*8 change in ME11	1 wk	Mon 24/06/19	Fri 28/06/19	100%
Switchgears reconfiguration and removal	1 wk	Mon 01/07/19	Fri 05/07/19	100%
Switchboards and sockets dismantling in tech. gallery	4 wks	Thu 01/08/19	Wed 28/08/19	80%
Decabling and installation	46 wks	Mon 19/08/19	Fri 03/07/20	6%
<i>Civil works for new transformers installation in ME11</i>	<i>4 wks</i>	<i>Mon 19/08/19</i>	<i>Fri 13/09/19</i>	<i>60%</i>
Cable trays installation in the transformers rooms	1 wk	Mon 18/11/19	Fri 22/11/19	0%
Transformers installation in b.251	1 wk	Mon 25/11/19	Fri 29/11/19	0%
<i>All cable trays installation</i>	<i>8 wks</i>	<i>Mon 16/12/19</i>	<i>Fri 07/02/20</i>	<i>0%</i>
Type 4 switchboards installation by Hazemeyer	1 wk	Mon 10/02/20	Fri 14/02/20	0%
Type 1 switchboard installation by ABB	1 wk	Mon 17/02/20	Fri 21/02/20	0%
Type 4 switchboards incomers cabling	1 wk	Mon 24/02/20	Fri 28/02/20	0%
Type 1 switchboard incomers cabling	1 wk	Mon 02/03/20	Fri 06/03/20	0%
18kV cables pulling and terminals in b.251	1 wk	Mon 27/01/20	Fri 31/01/20	0%
AC cable pulling for TE-EPC converters	4 wks	Mon 09/03/20	Fri 03/04/20	0%
AC cable terminals for TE-EPC converters	2 wks	Mon 20/04/20	Fri 01/05/20	0%
Earthing racks	2 wks	Mon 04/05/20	Fri 15/05/20	0%
AC commissioning for TE-EPC	2 wks	Mon 22/06/20	Fri 03/07/20	0%
AC cable pulling for GS and SN and switchboards type 3 installation	6 wks	Mon 04/05/20	Fri 12/06/20	0%
AC old cable removal (in parallel or after mounting of new lines)	6 wks	Mon 04/05/20	Fri 12/06/20	0%
AC Commissioning GS and SN	1 wk	Mon 15/06/20	Fri 19/06/20	0%

Except for the dismantling activities, all the installations still have to start.

Activities planning b. 157 for AC Power distribution

b. 157	43 wks	Mon 18/11/19	Fri 11/09/20	0%
<i>Civil works for new transformer installation in b.157</i>	1 wk	Mon 18/11/19	Fri 22/11/19	0%
Transformer installation in b.157	1 wk	Mon 25/11/19	Fri 29/11/19	0%
UPS moving	1 wk	Wed 04/12/19	Tue 10/12/19	0%
<i>Civil work for platform in EN-EL area</i>	2 wks	Mon 02/12/19	Fri 13/12/19	0%
Cable trays installation in the platform	3 wks	Mon 06/01/20	Fri 24/01/20	0%
Type 1/2 switchboards installation and incomers terminals in b.157	2 wks	Mon 27/01/20	Fri 07/02/20	0%
18kV cables pulling and terminals in b.157	1 wk	Mon 03/02/20	Fri 07/02/20	0%
Dismantle the current LV systems (Cabling and Switchboard) in b.157	7 mons	Mon 02/03/20	Fri 11/09/20	0%
Cable trays for general services installation	6 wks	Mon 06/01/20	Fri 14/02/20	0%
AC cable pulling for GS and SN and switchboards type 3 installation	8 wks	Mon 02/03/20	Fri 24/04/20	0%
Commissioning GS and SN	1 wk	Mon 27/04/20	Fri 01/05/20	0%
<i>Machine network cable trays installation</i>	2 mons	Fri 15/05/20	Thu 09/07/20	0%
AC cable pulling for machine network and switchboards type 3 installation	8 wks	Fri 10/07/20	Thu 03/09/20	0%
Commissioning machine network	1 wk	Fri 04/09/20	Thu 10/09/20	0%

Except for some cables dismantling activities, all the installations still have to start.

Budget for AC Power distribution

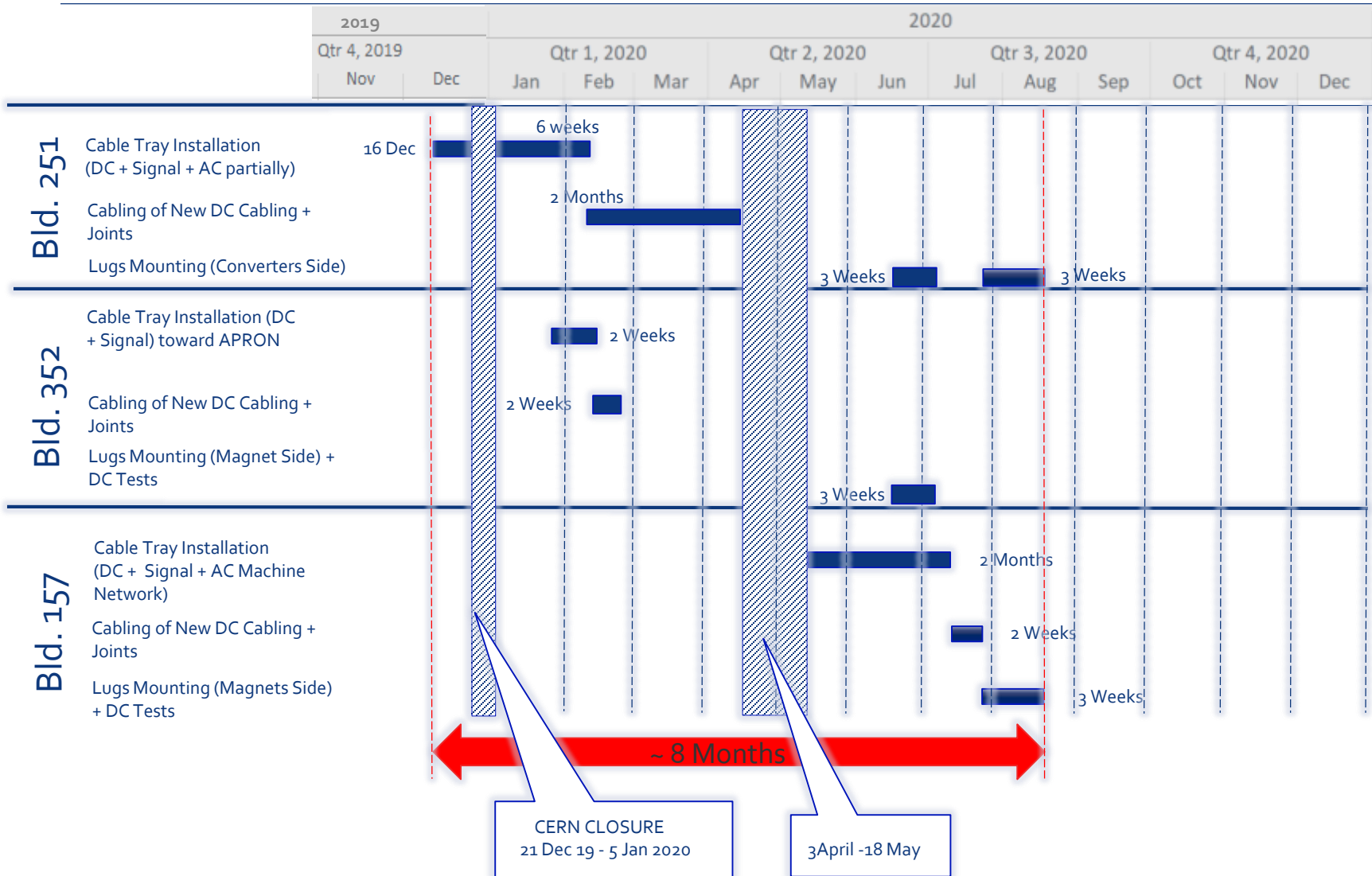
On the base of the CET extraction of 03.11.2019. EUR/CHF = 1.15

Activity	Committed [kCHF]	Paid [kCHF]	Total [kCHF]	Status
Transformer and switchboards procurement (TESAR, ABB, HAZEMEYER, BORRI)	537	16	608	Procurement completed. Waiting for manufacturing and installation.
Type 3 switchboards and cabling	24	9	780	Waiting for the final design and quotation.
Dismantling activities	15	42	256	On going.
Total	576	67	1.644	

The budget addressed to ENP is currently of 1,901 kCHF for an estimated cost to completion of 1644 kCHF.

A big part of the budget is still just a forecast due to the late start of the activities and the ongoing unknowns evaluation of an old and complex system to replace

Activities planning for FC – DC Cabling



Budget for FC – DC Cabling

EN-EL-FC: Fibre Optics and Cabling

Budget Envelope for :
EXEEHUO

Updated on : [17.04.2019]

Option 2: Récupération des câbles DC 1x240mm2													All values are in (kCHF)				
													Do not modify the protected cells				
Project part EN-EL-FC	User Name	System/ Group	DIC/DIF/ reference	Work Unit ID	Description	Expenses (kCHF)						Comments	Workpackage		Budget code		
						2017	2018	2019	2020	2021	Total		Number	Holder			
DC cabling																	
BURDELSKI Pavel	S. Evrard	EN-EA	[XXXXXX]	[if 10 20 30]	Démontage des câbles DC (Nouvelle partie) DC (Bat 263) Preparation & Work Supervision	0	0	331	0	0	331	Incluant les boîtiers DC (Bat 251, 157, 352, 156) (54 kCHF engaged - 544 cables of 11km) (Lignes DC depuis 157 -> coffrets Bat 263) engaged 72kCHF - removed 481 cables of 10km	[if applic.]	[if applic.]			
DE LUCA Davide	S. Evrard	EN-EA	[XXXXXX]	[if 10 20]	Installation nouveaux câbles DC Fourniture, tirage & raccordements Preparation & Work Supervision	0	0	0	620	0	620	Selon longueurs données par EN-EA	[if applic.]	[if applic.]		51291	
DE LUCA Davide	S. Evrard	EN-EA	[XXXXXX X]	[if 10 20 30 applic.]	Installation nouveaux cheminements Cables Trays Building 251 Cable Trays Building 157/352 Preparation & Work Supervision	0	0	0	358	0	358	Project integration studies didn't sufficiently progress to provide an accurate estimation. The value provided remains in order of +- 25%.	[if applic.]	[if applic.]		51291	
DE LUCA Davide	S. Evrard	EN-EA	[XXXXXX]	[if 10 20]	Démontage complémentaires Busbars Bat 156 Preparation & Work Supervision	0	0	0	0	0	0	De-scoped from project.	[if applic.]	[if applic.]		51291	
Budget Envelope (kCHF) for this part:						0	0	331	978	0	1309						

Decabling → 331 kCHF
DC Cables → 620 kCHF
Cable Trays → 358 kCHF } 1.309 kCHF

- Needs to re-profile the budget for de-cabling from 2019 to 2020 due to delay on DC cable verifications upon asbestos discovery at bldg. 251.
- Budget for replacing OLD DC Cables not included in this EN-EL-FC budget.

Risk analysis

#	Risk	Impact	Risk Level	Mitigation
1	Additional users requests or requests different from reality	Need to replace cables and modify switchboards	Low	TE-EPC transformers have already been oversized to cover future changes
2	UPS users needs higher than the installed power	Need to replace the UPS in b. 157	Medium	To avoid an unnecessary overcost we will evaluate the effective power consumption and in case we will replace the UPS
3	Cost estimation incertitude	Change in the budget profile	Medium	Keep an acceptable margin in the budget
4	Not respect of HSE Safety recommendation in case of accident / fire for de-cabling OLD DC Cables as per Safety Request Form (2.10.19) EDMS 2244879 v.1	Project liability in case of accident	High	Allocate Budget (re-profiling) for the de-cabling of OLD DC Cables in the gallery of b. 817
5	Delay in DC Cabling activities and additional costs	Late commissioning of F61 beam line and PS hardware commissioning	Medium	Project decision on Integration DC cable routing in the "Trappe" Bat 157 by Dec 2019 . Confirm the DC routing to "freeze" lengths of DC cables by DEC 2019
6	Project Integration study delays in b.157 for cable trays	Will affect the DC cable length and the cost estimation for cable trays in b. 157	Medium	Project to "freeze" the Integration in b. 157 by DEC 2019

Thanks for your attention !



EAST AREA RENOVATION