



ACE
COORDINATION UNIT
Facility, Site & Safety coordination

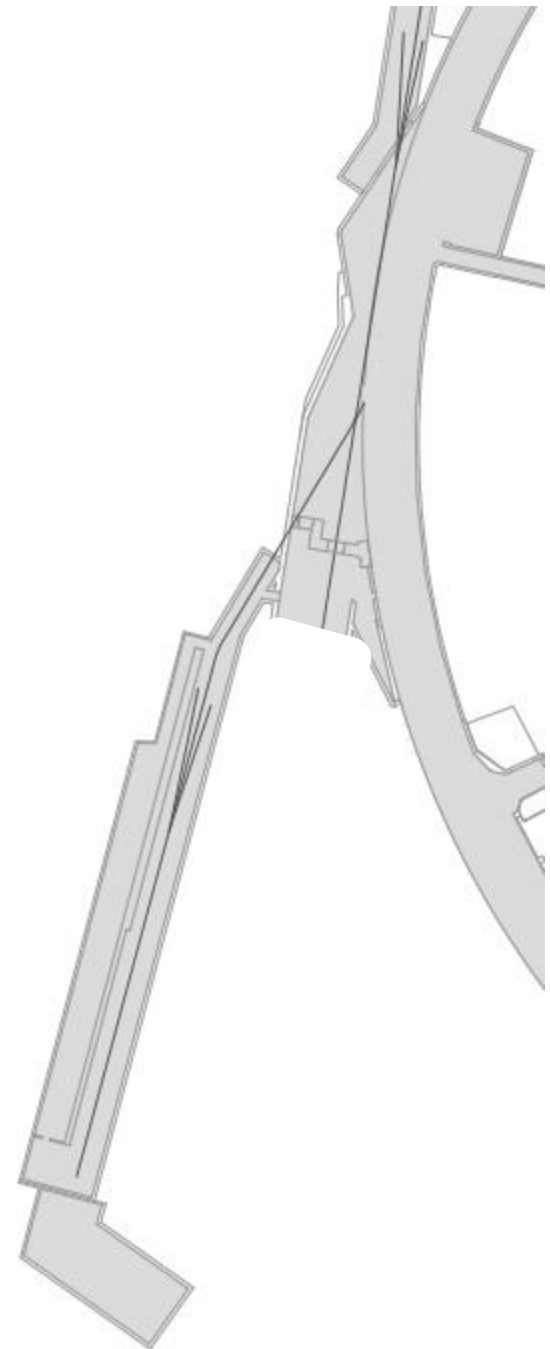
Linac 4 to PSB Connection Project

A. Berjillos EN/ACE/OSS

Meeting#1_2018

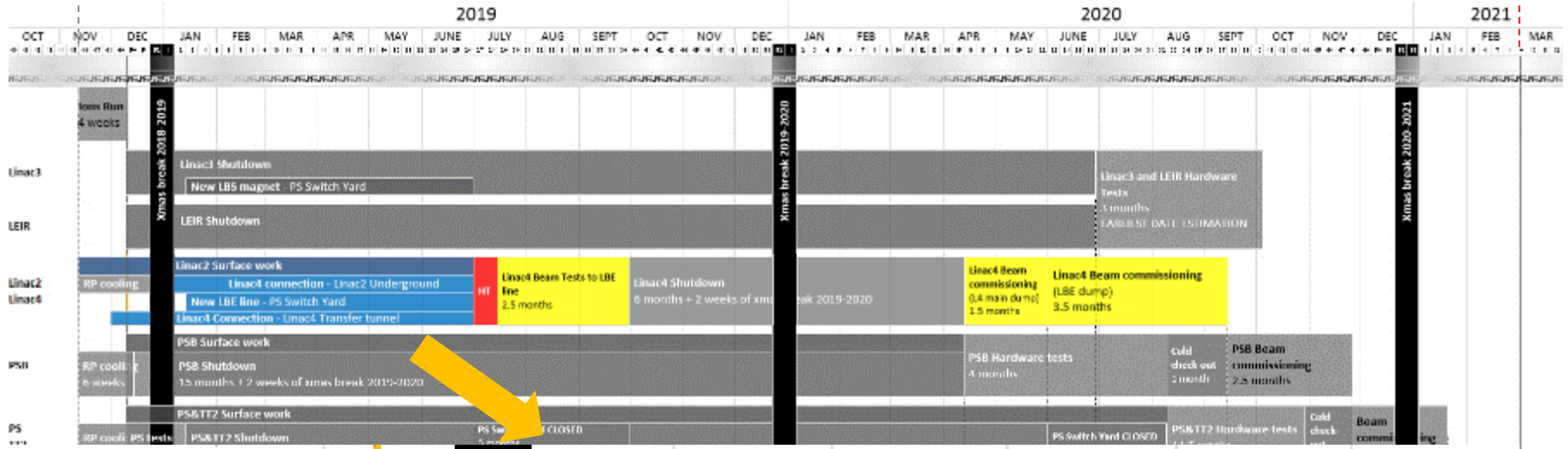


ENGINEERING
DEPARTMENT

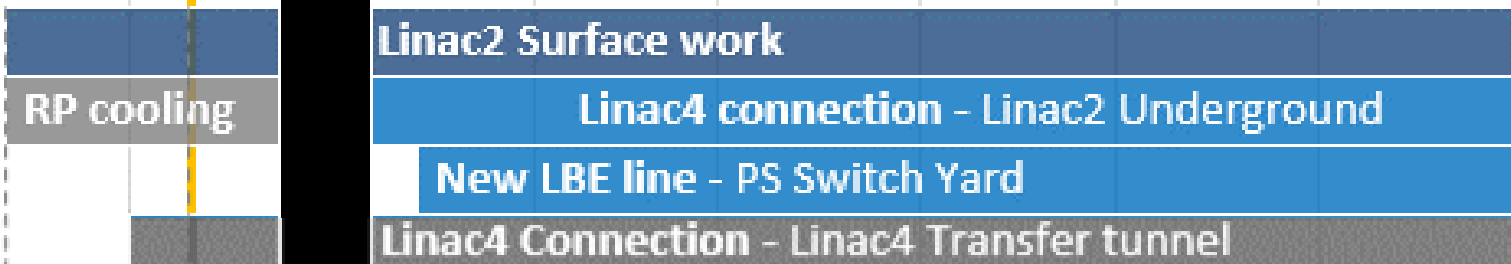


Week 46
 12/11/2018

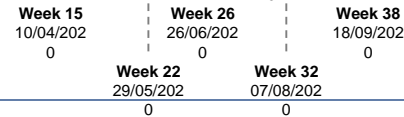
Master Schedule of the Long Shutdown 2 (2019-2020)



Linac2
 Linac4

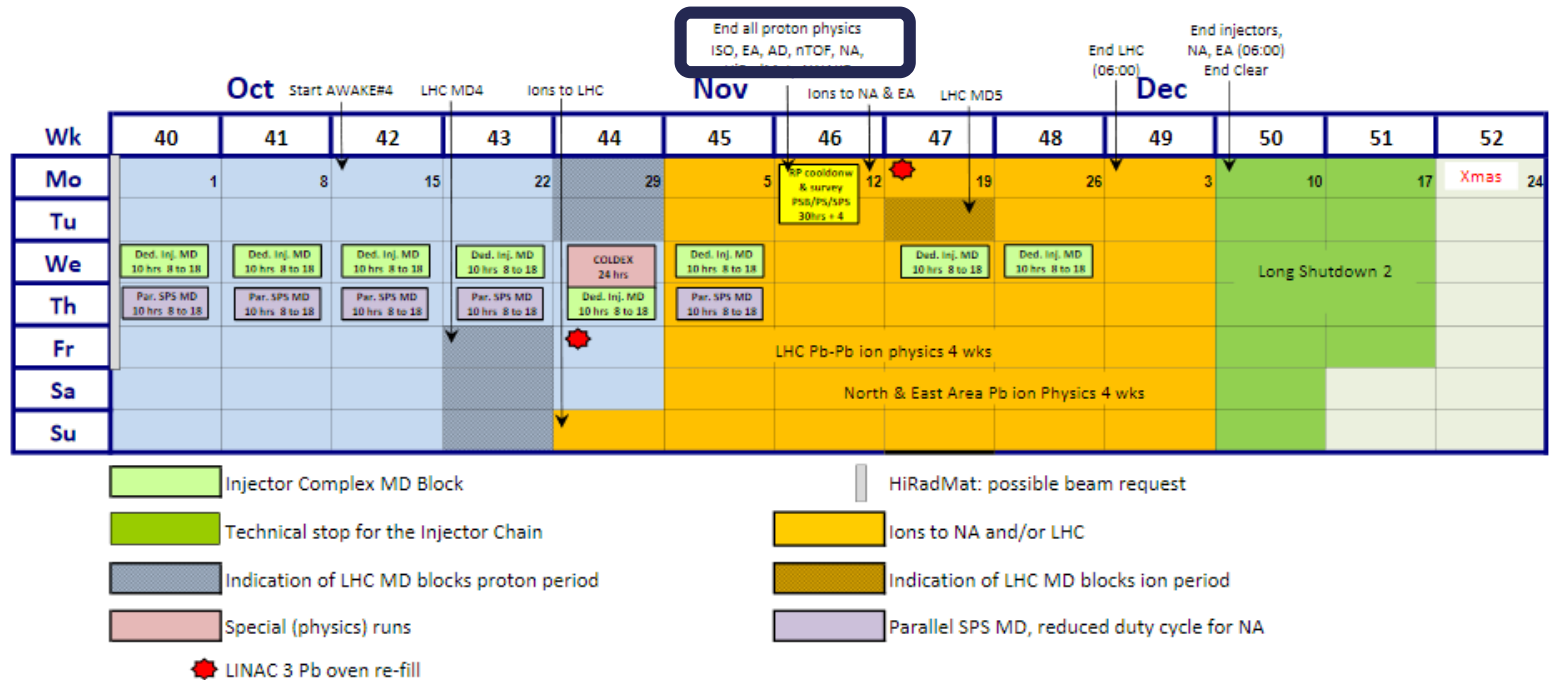


Linac 4 is not on the critical path of LS2



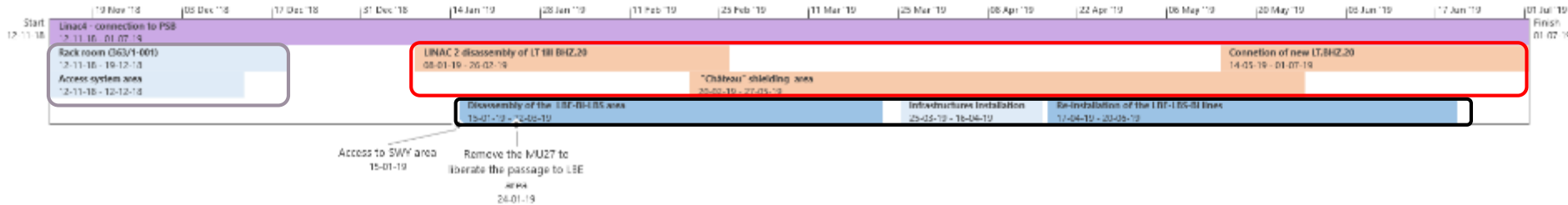
Injector Accelerator Schedule 2018

Approved by Research board on 06.12.2017



- **Key-date to start the connection:**
 - **Linac 4 stop → 3rd Dec'2018**
 - **Linac 2 stop → 12th Nov'2018**
 - **12th November 2018** for L2 activities outside of the access controlled area
 - **7th January 2019** for L2 activities inside of the access controlled area

Linac 4 Connection Planning EDMS 1858655



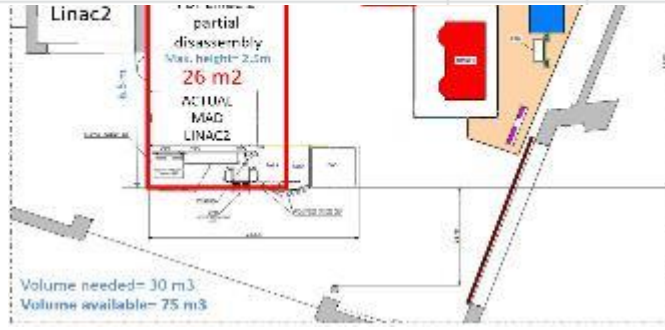
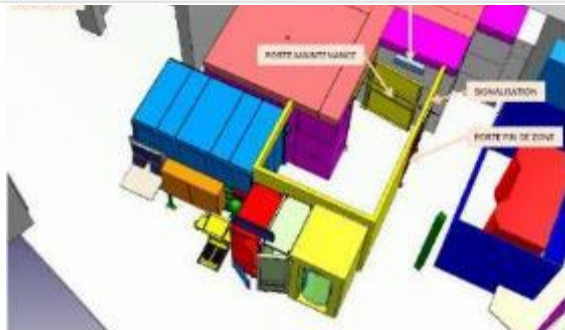
Task Name	Duration	Start	Finish
1 Main Constraints	216 days	12-11-18	01-10-19
1.1 Linac 2 shutdown	0 wks	12-11-18	12-11-18
1.2 Linac4 shutdown	0 days	03-12-18	03-12-18
1.3 RP Cool down PS	6 wks	12-11-18	21-12-18
1.4 Access to SWY area	0 days	15-01-19	15-01-19
1.5 Remove the MU27 to liberate the passage to LBE area	0 days	24-01-19	24-01-19
1.6 RP Cool down Linac2	6 wks	12-11-18	21-12-18
1.7 Linac4 beam test to LBE line	66 days	01-07-19	01-10-19

Activities OUTside of the Linac 2 access controlled area

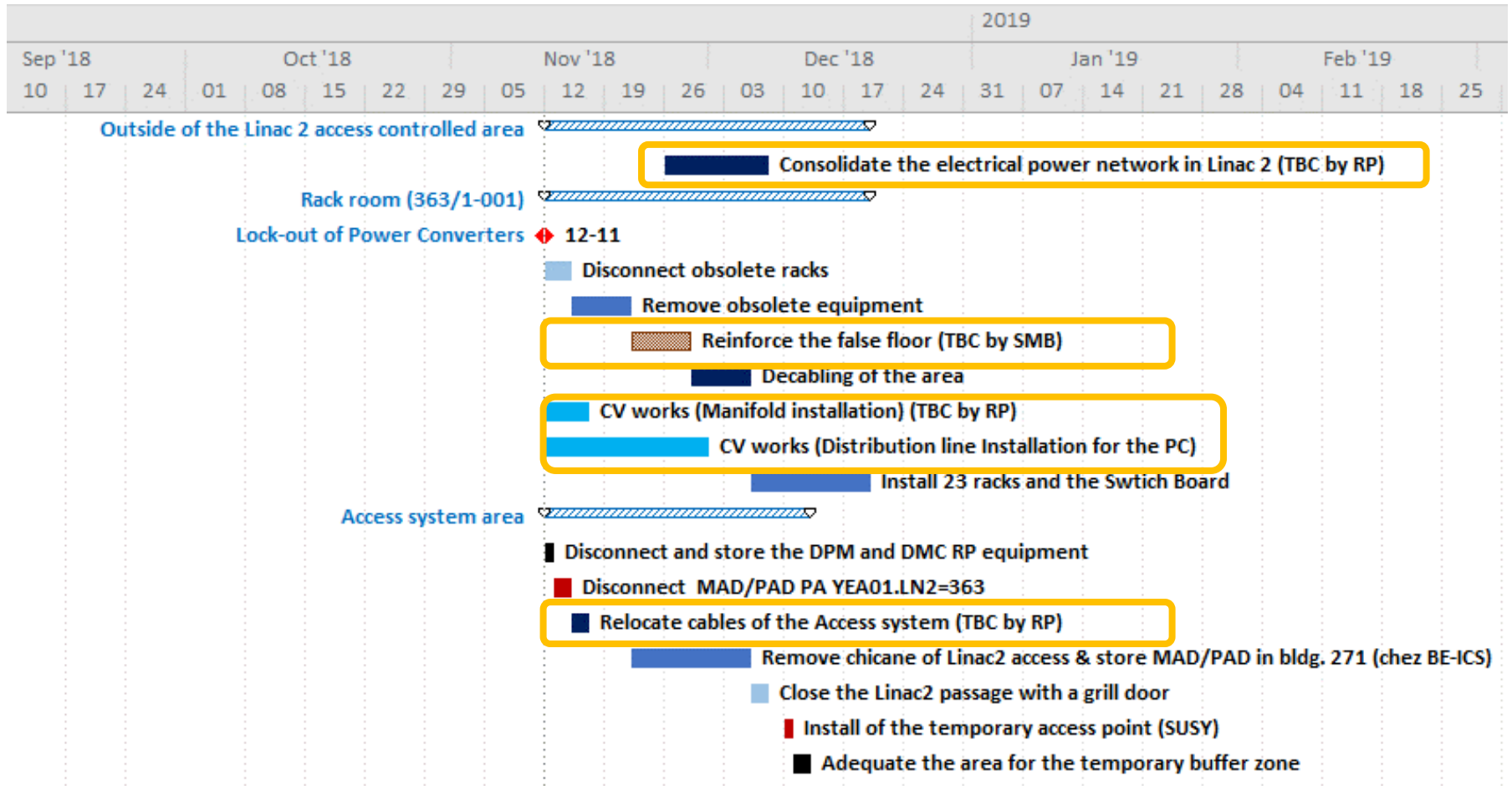
- Re-configuration of the Linac 2 rack room in 363/1-001
- Cabling/Decabling activities
- Removal of the Linac2 access system
- Electrical power consolidation, outside and inside of L2 tunnel
 - This activity is **out of L4 project scope** → James Devine, EN-EL

Main Activities OUTside of the Linac 2 access controlled area

Task Name	Duration	Start	Finish	Groups
<ul style="list-style-type: none"> <ul style="list-style-type: none"> 2 Outside of the Linac 2 access controlled area 	28 days	12-11-18	19-12-18	
<ul style="list-style-type: none"> <ul style="list-style-type: none"> 2.1 Consolidate the electrical power network in Linac 2 (TBC by RP) 	10 days	26-11-18	07-12-18	EN-EL
<ul style="list-style-type: none"> <ul style="list-style-type: none"> 2.2 Rack room (363/1-001) 	28 days	12-11-18	19-12-18	
<ul style="list-style-type: none"> <ul style="list-style-type: none"> 2.2.1 Lock-out of Power Converters 	0 days	12-11-18	12-11-18	TE-EPC
<ul style="list-style-type: none"> <ul style="list-style-type: none"> 2.2.2 Disconnect obsolete racks 	3 days	12-11-18	14-11-18	Equipment owner
<ul style="list-style-type: none"> <ul style="list-style-type: none"> 2.2.3 Remove obsolete equipment 	5 days	15-11-18	21-11-18	EN-HE
<ul style="list-style-type: none"> <ul style="list-style-type: none"> 2.2.4 Reinforce the false floor (TBC by SMB) 	5 days	22-11-18	28-11-18	SMB-SE
<ul style="list-style-type: none"> <ul style="list-style-type: none"> 2.2.5 Decabling of the area 	5 days	29-11-18	05-12-18	EN-EL
<ul style="list-style-type: none"> <ul style="list-style-type: none"> 2.2.6 CV works (Manifold installation) (TBC by RP) 	5 days	12-11-18	16-11-18	EN-CV
<ul style="list-style-type: none"> <ul style="list-style-type: none"> 2.2.7 CV works (Distribution line Installation for the PC) 	15 days	12-11-18	30-11-18	EN-CV
<ul style="list-style-type: none"> <ul style="list-style-type: none"> 2.2.8 Install 23 racks and the Switch Board 	10 days	06-12-18	19-12-18	EN-HE
<ul style="list-style-type: none"> <ul style="list-style-type: none"> 2.3 Access system area 	23 days	12-11-18	12-12-18	
<ul style="list-style-type: none"> <ul style="list-style-type: none"> 2.3.1 Disconnect and store the DPM and DMC RP equipment 	1 day	12-11-18	12-11-18	HSE-RP
<ul style="list-style-type: none"> <ul style="list-style-type: none"> 2.3.2 Disconnect MAD/PAD PA YEA01.LN2=363 	2 days	13-11-18	14-11-18	BE-ICS
<ul style="list-style-type: none"> <ul style="list-style-type: none"> 2.3.3 Relocate cables of the Access system (TBC by RP) 	2 days	15-11-18	16-11-18	EN-EL
<ul style="list-style-type: none"> <ul style="list-style-type: none"> 2.3.4 Remove chicane of Linac2 access & store MAD/PAD in bldg. 271 (chez BE-ICS) 	10 days	22-11-18	05-12-18	EN-HE
<ul style="list-style-type: none"> <ul style="list-style-type: none"> 2.3.5 Close the Linac2 passage with a grill door 	2 days	06-12-18	07-12-18	EN-ACE-COS
<ul style="list-style-type: none"> <ul style="list-style-type: none"> 2.3.6 Install of the temporary access point (SUSY) 	1 day	10-12-18	10-12-18	BE-ICS
<ul style="list-style-type: none"> <ul style="list-style-type: none"> 2.3.7 Adequate the area for the temporary buffer zone 	2 days	11-12-18	12-12-18	HSE-RP



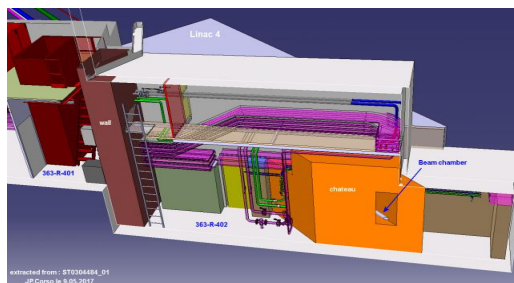
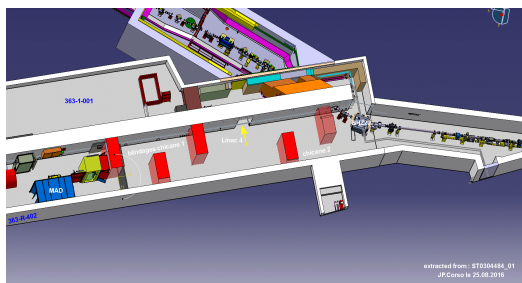
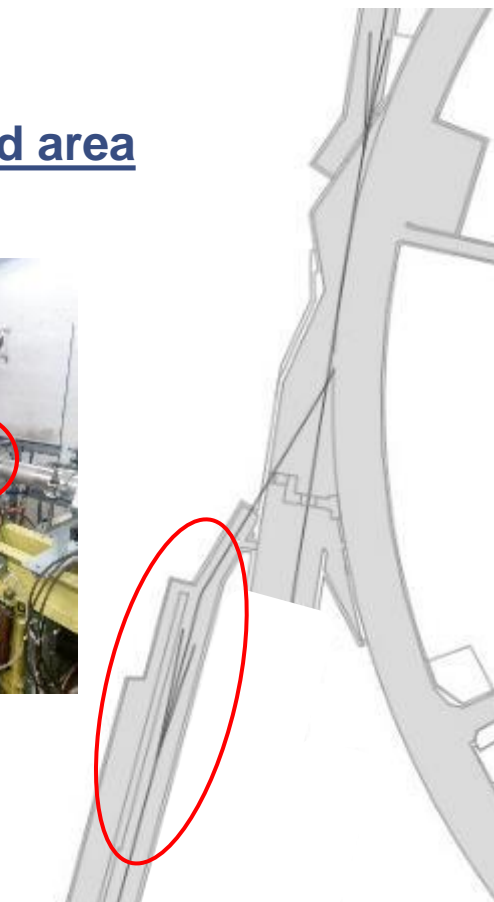
Main Activities OUTside of the Linac 2 access controlled area



Linac 4 Connection

Main Activities INSIDE of the Linac 2 access controlled area

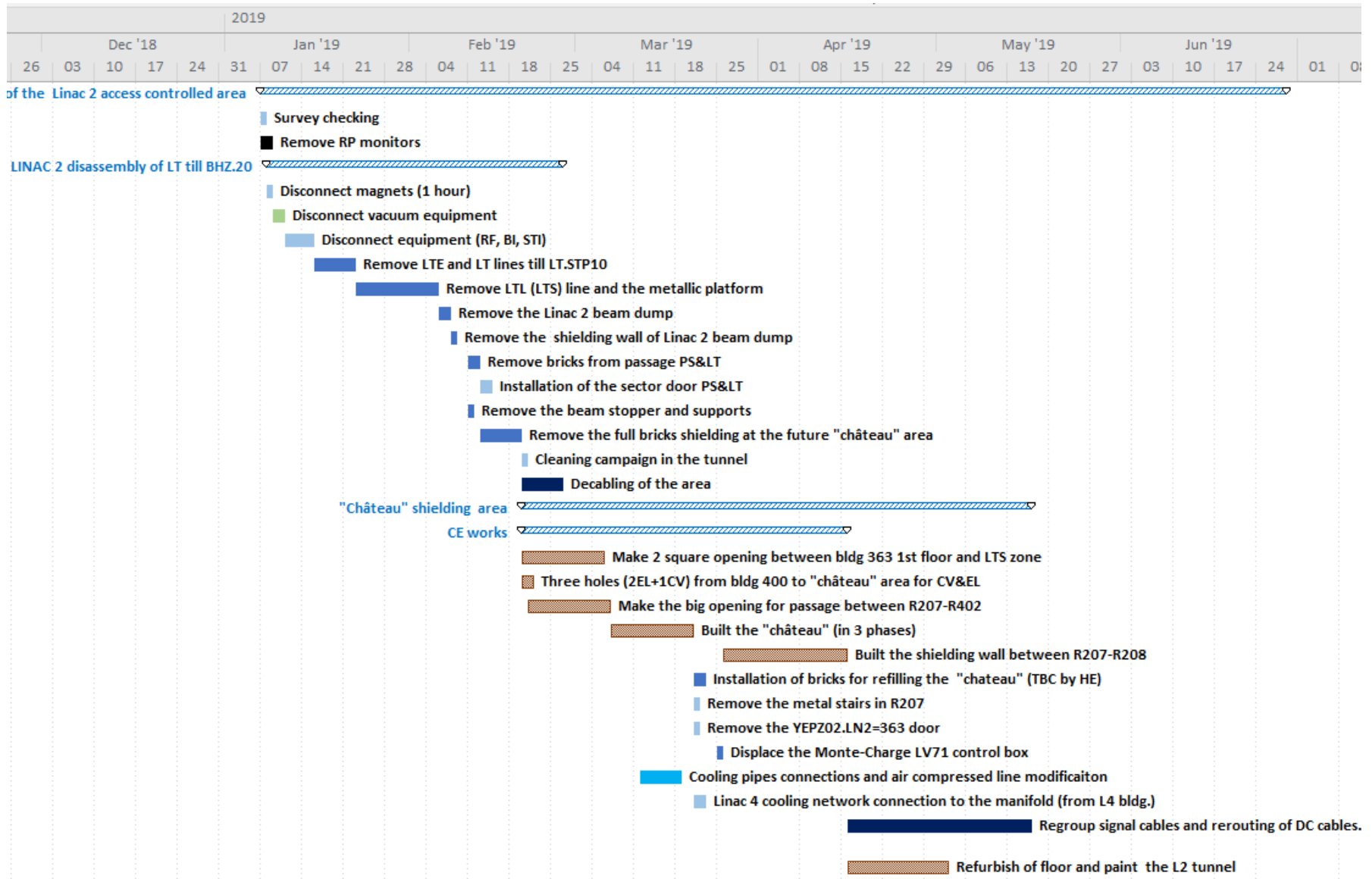
- Removal of the beam lines, LT-LTE-LTL (former LTS) lines
- Removal/Modification of infrastructures
 - Chateau shielding area
 - Removal of the existing bricks shielding
 - Make the passage from L4 to L2
 - Build the 'chateau' shielding
 - Build the new shielding between R207-R208
 - EN-CV activities
 - EN-EL activities
- Installation of the new LT.BHZ20 and completion of the beam line
- Installation of the chicanes
- Installation and commissioning of the access system in the tunnel



Activities Inside of the L2 access controlled area

Task Name	Duration	Start	Finish	Groups
3 Inside of the Linac 2 access controlled area	120 days	07-01-19	28-06-19	
3.1 Survey checking	1 day	07-01-19	07-01-19	EN-SMM
3.2 Remove RP monitors	2 days	07-01-19	08-01-19	HSE-RP
3.3 LINAC 2 disassembly of LT till BHZ.20	36 days	08-01-19	26-02-19	
3.3.1 Disconnect magnets (1 hour)	1 day	08-01-19	08-01-19	
3.3.2 Disconnect vacuum equipment	2 days	09-01-19	10-01-19	TE-VSC
3.3.3 Disconnect equipment (RF, BI, STI)	3 days	11-01-19	15-01-19	
3.3.4 Remove LTE and LT lines till LT.STP10	5 days	16-01-19	22-01-19	EN-HE
3.3.6 Remove LTL (LTS) line and the metallic platform	10 days	23-01-19	05-02-19	EN-HE
3.3.7 Remove the Linac 2 beam dump	2 days	06-02-19	07-02-19	EN-HE
3.3.8 Remove the shielding wall of Linac 2 beam dump	1 day	08-02-19	08-02-19	EN-HE
3.3.9 Remove bricks from passage PS<	2 days	11-02-19	12-02-19	EN-HE
3.3.10 Installation of the sector door PS<	2 days	13-02-19	14-02-19	EN-ACE-COS
3.3.11 Remove the beam stopper and supports	1 day	11-02-19	11-02-19	EN-HE
3.3.12 Remove the full bricks shielding at the future "château" area	5 days	13-02-19	19-02-19	EN-HE
3.3.13 Cleaning campaign in the tunnel	1 day	20-02-19	20-02-19	
3.3.14 Decabling of the area	5 days	20-02-19	26-02-19	EN-EL
3.4 "Château" shielding area	59 days	20-02-19	16-05-19	
3.4.1 CE works	39 days	20-02-19	15-04-19	
3.4.1.1 Make 2 square opening between bldg 363 1st floor and LTS zone	10 days	20-02-19	05-03-19	SMB-SE
3.4.1.2 Three holes (2EL+1CV) from bldg 400 to "château" area for CV&EL	2 days	20-02-19	21-02-19	SMB-SE
3.4.1.3 Make the big opening for passage between R207-R402	10 days	21-02-19	06-03-19	SMB-SE
3.4.1.4 Built the "château" (in 3 phases)	10 days	07-03-19	20-03-19	SMB-SE
3.4.1.5 Built the shielding wall between R207-R208	15 days	26-03-19	15-04-19	SMB-SE
3.4.2 Installation of bricks for refilling the "chateau" (TBC by HE)	2 days	21-03-19	22-03-19	EN-HE
3.4.3 Remove the metal stairs in R207	1 day	21-03-19	21-03-19	EN-ACE-COS
3.4.4 Remove the YEPZ02.LN2=363 door	1 day	21-03-19	21-03-19	EN-ACE-COS
3.4.5 Displace the Monte-Charge LV71 control box	1 day	25-03-19	25-03-19	EN-HE
3.4.6 Cooling pipes connections and air compressed line modification	5 days	12-03-19	18-03-19	EN-CV
3.4.7 Linac 4 cooling network connection to the manifold (from L4 bldg.)	2 days	21-03-19	22-03-19	
3.4.8 Regroup signal cables and rerouting of DC cables. BHZ.20,30 and 40 new DC cabling included	20 days	16-04-19	16-05-19	EN-EL
3.4.9 Refurbish of floor and paint the L2 tunnel	10 days	16-04-19	02-05-19	SMB-SE

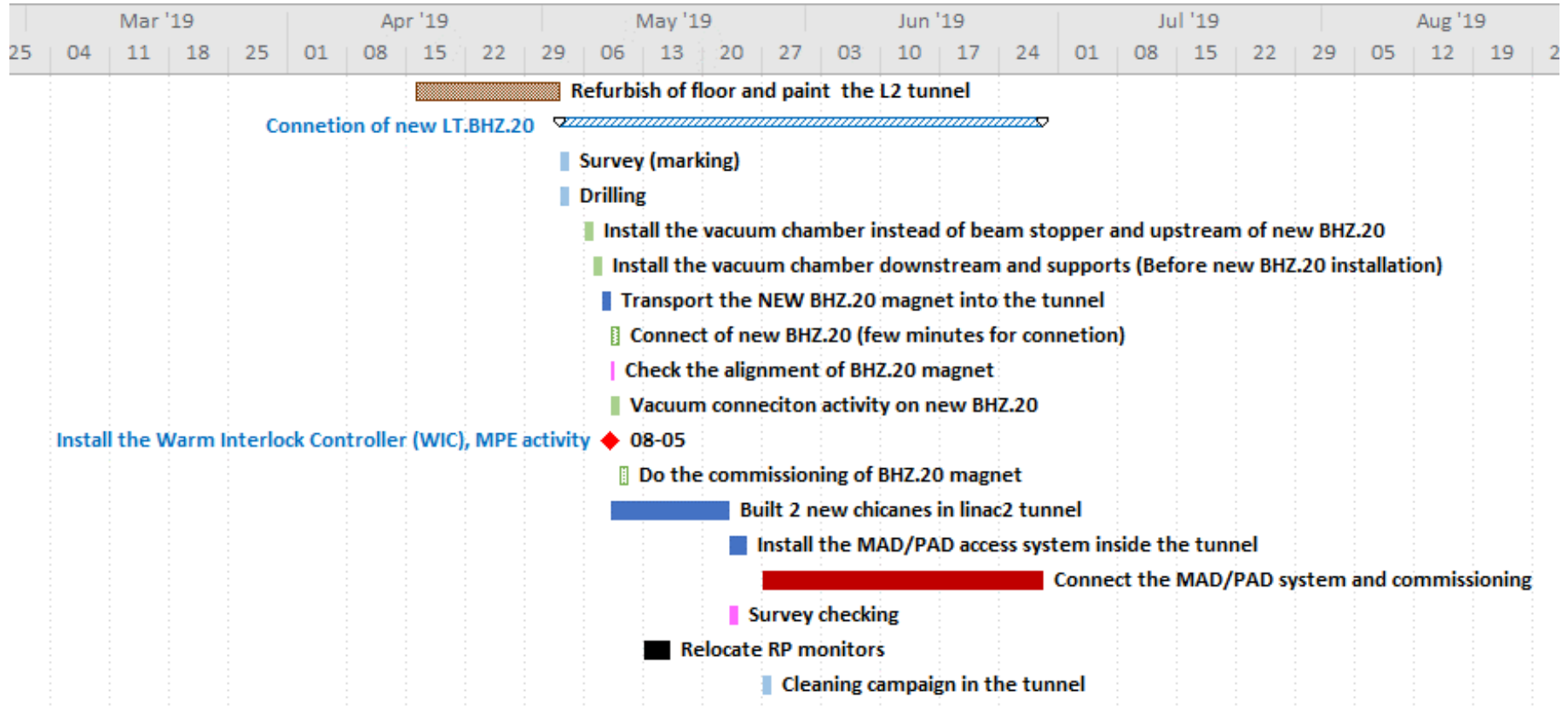
Activities Inside of the L2 access controlled area



Activities Inside of the L2 access controlled area

Task Name	Duration	Start	Finish	Groups
▲ 3.5 Connexion of new LT.BHZ.20	39 days	03-05-19	28-06-19	
3.5.1 Survey (marking)	1 day	03-05-19	03-05-19	EN-SMM
3.5.2 Drilling	1 day	03-05-19	03-05-19	EN-ACE-COS
3.5.3 Install the vacuum chamber instead of beam stopper and upstream of new BHZ.20	1 day	06-05-19	06-05-19	TE-VSC
3.5.4 Install the vacuum chamber downstream and supports (Before new BHZ.20 installation)	1 day	07-05-19	07-05-19	TE-VSC
3.5.5 Transport the NEW BHZ.20 magnet into the tunnel	1 day	08-05-19	08-05-19	EN-HE
3.5.6 Connect of new BHZ.20 (few minutes for connexion)	1 day	09-05-19	09-05-19	TE-MSD
3.5.7 Check the alignment of BHZ.20 magnet	4 hrs	09-05-19	09-05-19	EN-ACE-SU
3.5.8 Vacuum connexion activity on new BHZ.20	1 day	09-05-19	09-05-19	TE-VSC
3.5.9 Install the Warm Interlock Controller (WIC), MPE activity	0 days	08-05-19	08-05-19	TE-MPE
3.5.10 Do the commissioning of BHZ.20 magnet	1 day	10-05-19	10-05-19	TE-MSD
3.5.11 Built 2 new chicanes in linac2 tunnel	10 days	09-05-19	22-05-19	EN-HE
3.5.12 Install the MAD/PAD access system inside the tunnel	2 days	23-05-19	24-05-19	EN-HE
3.5.13 Connect the MAD/PAD system and commissioning	23 days	27-05-19	28-06-19	BE-ICS
3.5.14 Survey checking	1 day	23-05-19	23-05-19	EN-ACE-SU
3.5.15 Relocate RP monitors	3 days	13-05-19	15-05-19	HSE-RP
3.5.16 Cleaning campaign in the tunnel	1 day	27-05-19	27-05-19	

Activities INside of the L2 access



L4 connection activities INside of the SWY area



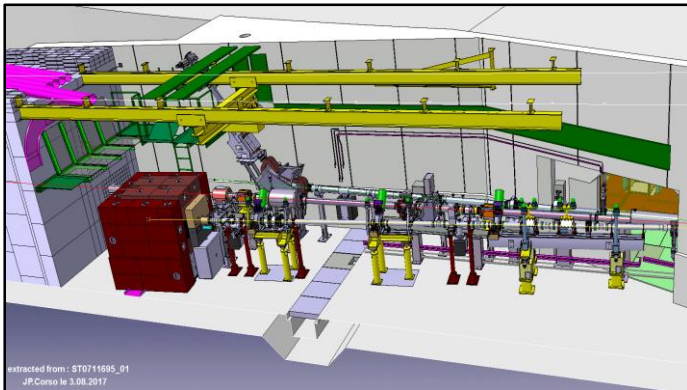
Task Name	Duratio	Start	Finish	Groups
4 Consolidation of LT & LTB lines	18.5 days	15-01-19	08-02-19	
4.1 Pulsed quadrupole 1magnet QFW70 (LT)	4 days	15-01-19	18-01-19	
4.1.1 Pulsed quadrupole 1magnet QFW70 (LT)	4 hrs	15-01-19	15-01-19	TE-MS
4.1.2 Transport activity	1 day	15-01-19	16-01-19	EN-HE
4.1.3 Alignment activity	4 hrs	16-01-19	16-01-19	EN-ACE-SU
4.1.4 Vacuum activity	2 days	17-01-19	18-01-19	TE-VSC
4.1.5 Warm Interlock Controller (WIC), MPE activity	0 days	16-01-19	16-01-19	TE-MPE
4.2 Pulsed corrector 2magnets dhz/dvt.40 and 50 (LT)	5 days	21-01-19	25-01-19	
4.2.1 Pulsed corrector 2magnets dhz/dvt.40 and 50 (LT)	4 hrs	21-01-19	21-01-19	TE-MS
4.2.2 Transport activity	2 days	21-01-19	23-01-19	EN-HE
4.2.3 Alignment activity	4 hrs	23-01-19	23-01-19	EN-ACE-SU
4.2.4 Vacuum activity	2 days	24-01-19	25-01-19	TE-VSC
4.2.5 Warm Interlock Controller (WIC), MPE activity	0 days	25-01-19	25-01-19	TE-MPE
4.3 New pulsed quadrupole 4 magnets (LTB)	10 days	25-01-19	08-02-19	
4.3.1 Pulsed corrector 4magnets (LTB)	1 day	28-01-19	28-01-19	TE-MS
4.3.2 Transport activity	6 days	29-01-19	05-02-19	EN-HE
4.3.3 Alignment activity	4 hrs	06-02-19	06-02-19	EN-ACE-SU
4.3.4 Vacuum activity	2 days	06-02-19	08-02-19	TE-VSC
4.3.5 Warm Interlock Controller (WIC), MPE activity	0 days	08-02-19	08-02-19	TE-MPE
4.3.6 Test & Inspections (including commissioning of new equipment) for LT, LTB, BI	10 days	25-01-19	08-02-19	TE-MS



TBC by TE-MS and Checked with PS activities

L4 connection activities INSIDE of the SWY area

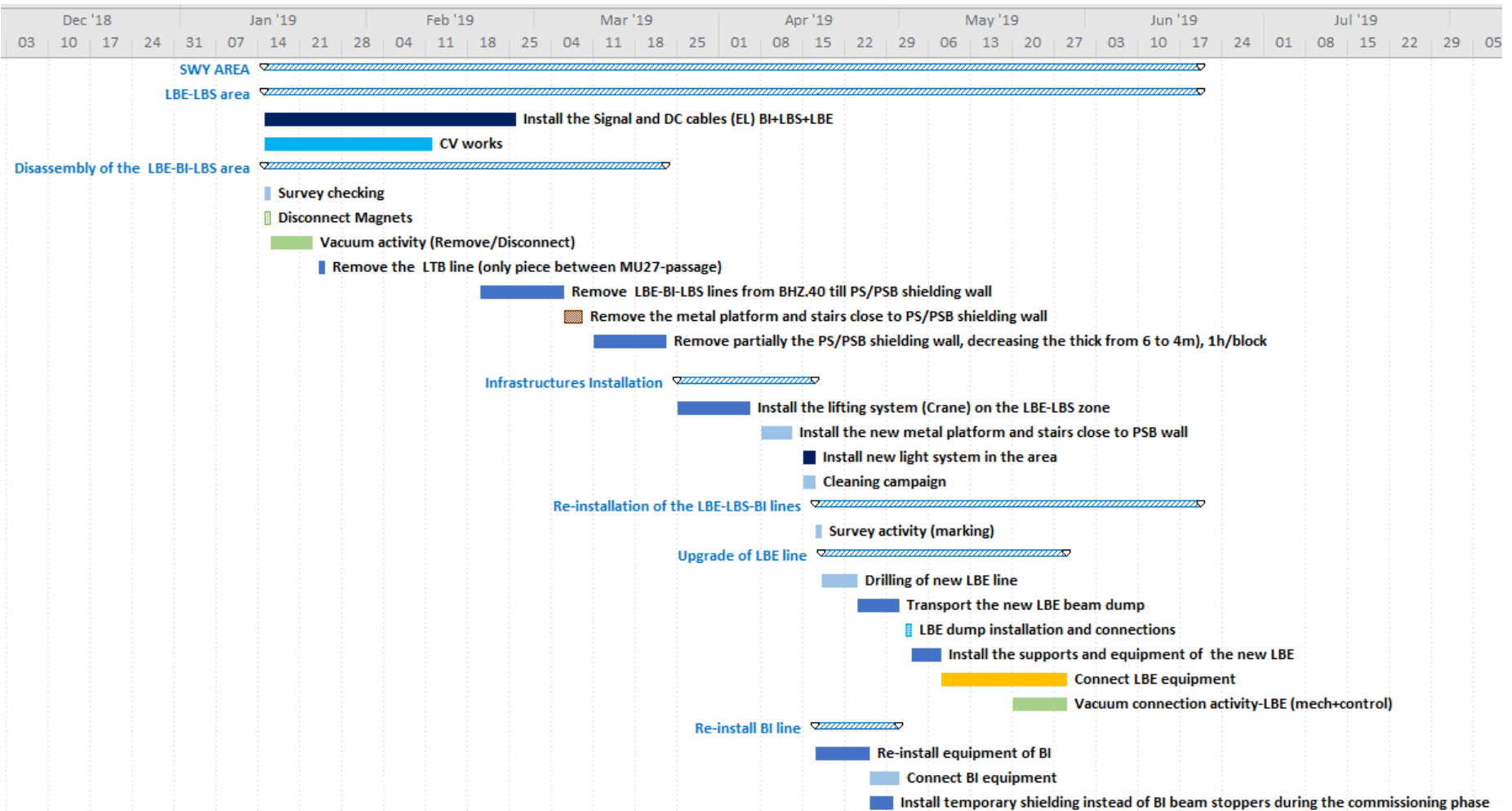
- Removal of the LBE-LBS- BI, from LTB.BHZ40 up to the wall shielding
- Removal of metal platform and partially the wall shielding (decreasing the thickness from 6 to 4 m)
- Installation a new crane and a new platform
- Re-installation of BI and new LBE lines
 - Temporary shielding instead of the BI stoppers
- Re-installation of the LBS line is out of the L4 connection project scope, it could be done after L4 test → Ideally, at the same time of LBE installation, if the magnet LBS.BVT10 is ready



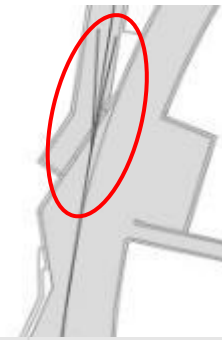
L4 connection activities INside of the SWY area

Task Name	Duratio	Start	Finish	Groups
▾ 5 SWY AREA	107.5 days	15-01-19	20-06-19	
▾ 5.1 LBE-LBS area	107.5 days	15-01-19	20-06-19	
5.1.1 Install the Signal and DC cables (EL) BI+LBS+LBE	6 wks	15-01-19	25-02-19	EN-EL
5.1.2 CV works	20 days	15-01-19	11-02-19	EN-CV
▾ 5.1.3 Disassembly of the LBE-BI-LBS area	49 days	15-01-19	22-03-19	
5.1.3.1 Survey checking	1 day	15-01-19	15-01-19	EN-SMM
5.1.3.2 Disconnect Magnets	1 day	15-01-19	15-01-19	TE-MSC
5.1.3.3 Vacuum activity (Remove/Disconnect)	5 days	16-01-19	22-01-19	TE-VSC
5.1.3.4 Remove the LTB line (only piece between MU27-passage)	1 day	24-01-19	24-01-19	EN-HE
5.1.3.5 Remove LBE-BI-LBS lines from BHZ.40 till PS/PSB shielding wall	10 days	20-02-19	05-03-19	EN-HE
5.1.3.6 Remove the metal platform and stairs close to PS/PSB shielding wall	3 days	06-03-19	08-03-19	SMB-SE
5.1.3.7 Remove partially the PS/PSB shielding wall, decreasing the thick from 6 to 4m), 1h/block	10 days	11-03-19	22-03-19	EN-HE
▾ 5.1.4 Infrastructures Installation	17 days	25-03-19	16-04-19	
5.1.4.1 Install the lifting system (Crane) on the LBE-LBS zone	10 days	25-03-19	05-04-19	EN-HE
5.1.4.2 Install the new metal platform and stairs close to PSB wall	5 days	08-04-19	12-04-19	SMB-SE-CEB
5.1.4.3 Install new light system in the area	2 days	15-04-19	16-04-19	EN-EL
5.1.4.4 Cleaning campaign	2 days	15-04-19	16-04-19	
▾ 5.1.5 Re-installation of the LBE-LBS-BI lines	41.5 days	17-04-19	20-06-19	
5.1.5.1 Survey activity (marking)	1 day	17-04-19	17-04-19	EN-SMM
▾ 5.1.5.2 Upgrade of LBE line	26 days	18-04-19	28-05-19	
5.1.5.2.4 Drilling of new LBE line	2 days	18-04-19	23-04-19	EN-ACE-COS
5.1.5.2.5 Transport the new LBE beam dump	5 days	24-04-19	30-04-19	EN-HE
5.1.5.2.6 LBE dump installation and connections	1 day	02-05-19	02-05-19	EN-STI
5.1.5.2.7 Install the supports and equipment of the new LBE	3 days	03-05-19	07-05-19	EN-HE
5.1.5.2.8 Connect LBE equipment	15 days	08-05-19	28-05-19	BE-ABP
5.1.5.2.10 Vacuum connection activity-LBE (mech+control)	7 days	20-05-19	28-05-19	TE-VSC
▾ 5.1.5.3 Re-install BI line	8 days	17-04-19	30-04-19	
5.1.5.3.1 Re-install equipment of BI	5 days	17-04-19	25-04-19	EN-HE
5.1.5.3.2 Connect BI equipment	3 days	26-04-19	30-04-19	equipment owner
5.1.5.3.3 Install temporary shielding instead of BI beam stoppers during the con	2 days	26-04-19	29-04-19	EN-HE

L4 connection activities INside of the SWY area

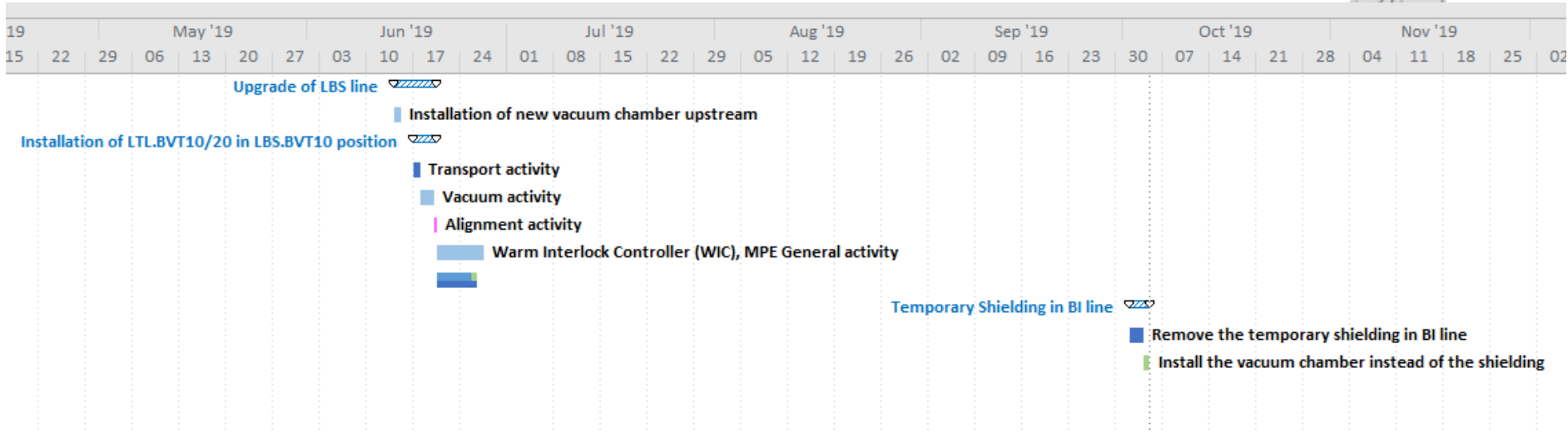
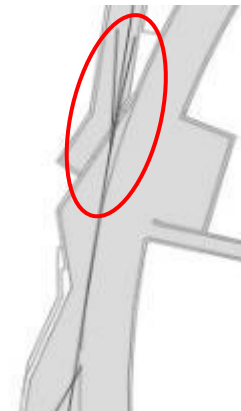


L4 connection activities INSIDE of the SWY area



Task Name	Duration	Start	Finish	Groups
▲ 5.1.5.4 Upgrade of LBS line	4.5 days	14-06-19	20-06-19	
5.1.5.4.1 Installation of new vacuum chamber upstream	1 day	14-06-19	14-06-19	
▲ 5.1.5.4.2 Installation of LTL.BVT10/20 in LBS.BVT10 position	3.5 days	17-06-19	20-06-19	TE-MSc
5.1.5.4.2.1 Transport activity	1 day	17-06-19	17-06-19	EN-HE
5.1.5.4.2.2 Vacuum activity	2 days	18-06-19	19-06-19	
5.1.5.4.2.3 Alignment activity	4 hrs	20-06-19	20-06-19	EN-ACE-SU
6 Warm Interlock Controller (WIC), MPE General activity	5 days	20-06-19	27-06-19	TE-MPE
▷ 7 Reinstall piece of LTB	4 days	20-06-19	26-06-19	EN-HE
▲ 8 Temporary Shielding in BI line	3 days	02-10-19	04-10-19	
8.1 Remove the temporary shielding in BI line	2 days	02-10-19	03-10-19	EN-HE
8.2 Install the vacuum chamber instead of the shielding	1 day	04-10-19	04-10-19	TE-VSC

Activities after the L4 test to LBE line



Roadmap of the coordination:

- Linac 4 connection coordination 2018 Kick-off meeting → **7th May 2018** ✓
- If needed, a meeting on 28th May 2018 with the groups' feedback included on the planning for discussion → Detailed updated planning will be ready for end of July
- Work Package Analysis meeting → **31st May 2018** (see next slides)
- From June onwards, Linac 4 connection project will be included in the PS/PSB/Linac2-3 coordination meeting, on Thursdays at 10:30.

Information about the Project:

- Estimation of waste declared on HSE-RP-RW database → R. Charousset ✓
- Estimation of the needed storage areas declared on LS2 Sharepoint → J. Meignan ✓
- PLAN tool:
 - LBE
 - ID 10932, magnets ✓
 - ID 11400, BLM ✓
 - ID 10004, LBE dump ✓
 - ID 11511, Linac2 Disassembly ✓
- Status of ECRs → Information available on : <https://indico.cern.ch/event/724137/>



Work Package Analysis (WPA)

List of the WPA in the PS	Names based on coordination or project contact list	Main Coordination Unit contact
• LIU LINAC4 connection and associated tests	(A. Berjillos/J. Coupard)	A. Berjillos
• LIU BTP modification	(J. Coupard/L. Feliciano)	J. Coupard
• LIU B.269 modification	TE-EPC (K. Papastergiou)	F. Pedrosa
• LIU Turning the 80 MHz cavity in SS88 and SS89	BE-RF (C. Rossi)	F. Pedrosa
• LIU New KFA45 installation (including the part in the ring and the part in B.365)	TE-ABT (L. Feliciano)	F. Pedrosa
• LIU B.355 modifications	TE-F... (et)	F. Pedrosa
• LIU B.365 modifications	... (Djordjevic)	F. Pedrosa
• LIU New demineralised water circuit	... (S. Deleval)	F. Pedrosa
• Warm water and ventilation duct replacement (in 80 meters of the machine)	EN-CV (J. Rodary)	F. Pedrosa
• Refurbishment of 47 Main Units (including the modifications of ...)	TE-MSD (D. Bodart)	F. Pedrosa
• Refurbishment of quadrupole windings (36 quadrupoles in the SWY, TT2, FTA, FTN, F12 and TT10 (TT2 side) + BHZ377 and BHZ378 + Stopper 152 and 157)	TE-MSD (D. Bodart, A. Newborough)	F. Pedrosa
• F61 modification	EN-EA (S. Evrard)	F. Pedrosa
• New WIC system in the PS and TT2	TE-MPE (R. Mompo)	F. Pedrosa

Courtesy of J. Coupard

Further information on : <https://indico.cern.ch/event/724958/>

Work Package Analysis (WPA)

WPA	Draft to be sent before	WPA meeting
LIU New KFA45 installation	14.May.2018	17.May.2018
Warm water pipes and ventilation duct replacement	14.May.2018	17.May.2018
LIU BTP modification	19.May.2018	24.May.2018
LIU New demineralised water circuit	19.May.2018	24.May.2018
LIU LINAC4 connection and associated tests	28.May.2018	31.May.2018
Refurbishment of 47 Main Units	04.June.2018	07.June.2018
Refurbishment of quadrupoles, bendings	04.June.2018	07.June.2018
Power network consolidation	11.June.2018	14.June.2018
F61 modification	18.June.2018	21.June.2018
New WIC system in the PS and TT2	18.June.2018	21.June.2018
LIU B.355 modifications	25.June.2018	28.June.2018
LIU B.365 modifications	25.June.2018	28.June.2018
LIU Turning the 80 MHz cavity in SS88 or SS89	02.July.2018	05.July.2018
LIU B.269 modification	09.July.2018	12.July.2018

Courtesy of F. Pedrosa

Work Package Analysis (WPA)

WPA	Presence required	
LIU LINAC4 connection and associated tests (WP owner: (A. Berjillos/J. Coupard))	<u>GROUP</u>	<u>PERSON</u>
	BE-ABP	C. Mastrostefano / R. Scrivens / E. Mahner
	BE-ICS	D. Chapuis / L. Hammouti
	BE-RF	G. Piccinini / S. Ramberger
	EN-ACE	A. Berjillos / J. Coupard / F. Pedrosa
	EN-CV	G. Petrika / S. Deleval
	EN-EL	G. Georgiev
	EN-HE	C. Bertone / J.L. Grenard / J. Fermanel / Y. Seraphin
	EN-SMM-ASG	T. Dobers
	EN-STI	D. Grenier / E. Grenier-Boley
	HSE-RP	G. Dumont / J.F. Gruber / J. Vollaire
	SMB-SE	A. Martinez / D. Pazem
	TE-EPC	D. Nisbet / C. Coupat
	TE-MPE	R. Mompo
TE-MSD	A. Newborough	
TE-VSC	J. Ferreira / J. Hansen	

Thank you for your attention.

Q's?