

ABSTRACT

The 3.0 GeV ALBA Synchrotron Light Source, in operation with users since 2012, is looking forward to an upgrade aimed at enhancing the brightness and coherence fraction of the delivered X-ray beam. The Storage Ring (SR) will be completely renewed but we plan on keeping the same orbit length and the position of the ID source points. The energy of the electrons will be preserved and the same injector will be used. Major part of the Insertion Devices and Front Ends will be kept; new ones will feed two additional long Beamlines (230m-275m), included on the project.

The “dark period” is foreseen for 2030-2031. This paper presents the strategic plans being developed to test and assemble the new SR components, the dismantling of the present SR and the seamless installation of the upgraded SR. Emphasizing a cost-effective and time-efficient approach, we have started the planning by focusing on optimizing spaces and equipment movements necessary for the upgrade process..

Upgrade considerations

- Storage Ring (SR) Magnets (MA), Vacuum (VC), Diagnostics (DI) and Injection (IN) upgraded
- Insertion Devices (ID), Radiofrequency (RF) and Front Ends (FE) kept
- Tunnel, Injector and services kept

- Existing ID&BL positions maintained
- RF change location in tunnel and Service Area (SA)
- SR MA tested and mounted on girders in advance. VC assembled by sectors in advance (NEG ex-situ activation)

ALBA II pre-assembly spaces

The required spaces to store the ALBA II parts, testing and assembly have been estimated (see Table 1). We have studied which of the actual spaces in our warehouse, experimental hall and laboratories could be used for this purpose. Half of our warehouse could be used for storing & testing the PS and testing & assembly girders and MA (see Figure 1).

An additional space of 1000m² is required for storing MA and girders before and after assembly. Moreover, 400m² are required to store the present ALBA SR after removal. For both, a temporary warehouse is being considered using part of our plot (see Figure 1).

Service area

ALBA II will require more equipment and therefore, more racks. We have estimated the number of racks per subsystem (see Table 2). An increase of 50% in number of racks is foreseen for ALBA II.

	ALBA	ALBA II
Injector & others	155	187
SR_PC	58	128
SR_VC	34	34
SR_RF	19	50
SR_FE	20	36

Table 2. Number of racks for ALBA and ALBA II

	MA	GIRDERS	VC	PS
Storage	300m ²	900m ²	60m ²	300m ²
Testing	65m ²		220m ²	150m ²
Assembly		200m ²		
Storage Ring Assembled	800m ²		50m ²	300m ²

Table 1. Estimated space requirements. Girders storage includes plinths and mechanics.

Furthermore, the RF cavities and plants for ALBA II change location. Nowadays, the RF cavities are located inside the ALBA SR arc of sectors 6, 10 and 14. This is not possible in ALBA II, where the arcs have much more magnets and less space between them. The RF cavities have to be relocated in two straight sections between arcs (sectors 8-9 & 12-13). Therefore, a large reorganization of the Service Area is being planned, which will also include new electrical distribution.

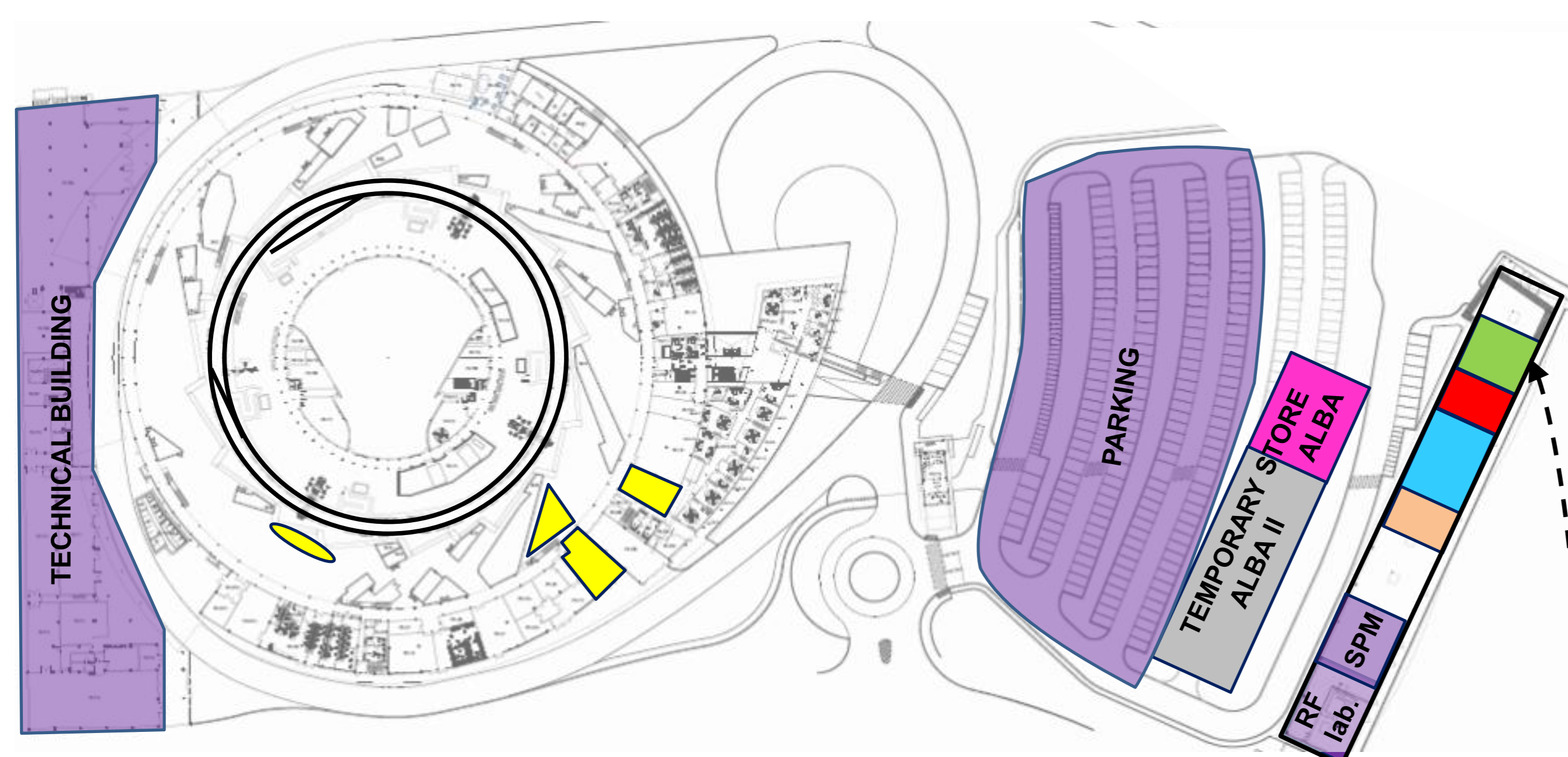


Figure 1. Tentative site map with planned spaces for storing, testing and assembling. 400m² to store the present ALBA SR is foreseen (Pink).

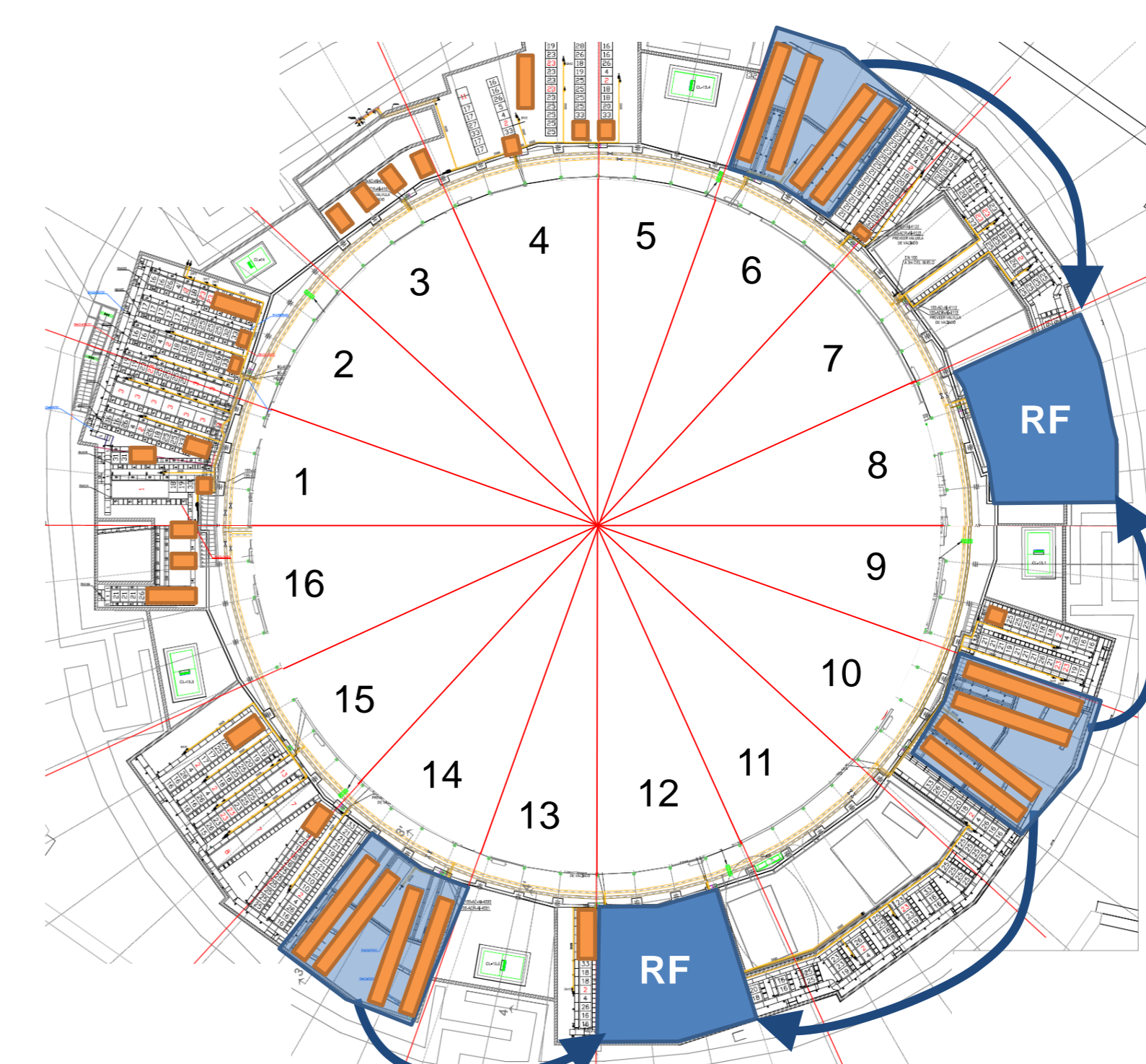


Figure 2. SA view of ALBA II. Possible new rack locations in orange.

Preliminary timeline

We are planning a “dark period” of two years; 2030-2031. Firstly, one year for removal and installation; including SR, racks, cabling,... Secondly six months for SR commissioning. Finally, six months to set up the Beamlines.

In this plan we are considering:

- Before the “dark period” the MA will be mounted and prealigned on the girders. The PS tested and assembled in new racks. The 16 VC arcs assembled and baked out.
- A full removal of the tunnel roof at the beginning of the dark period, that will give more flexibility during the removal and assembly.

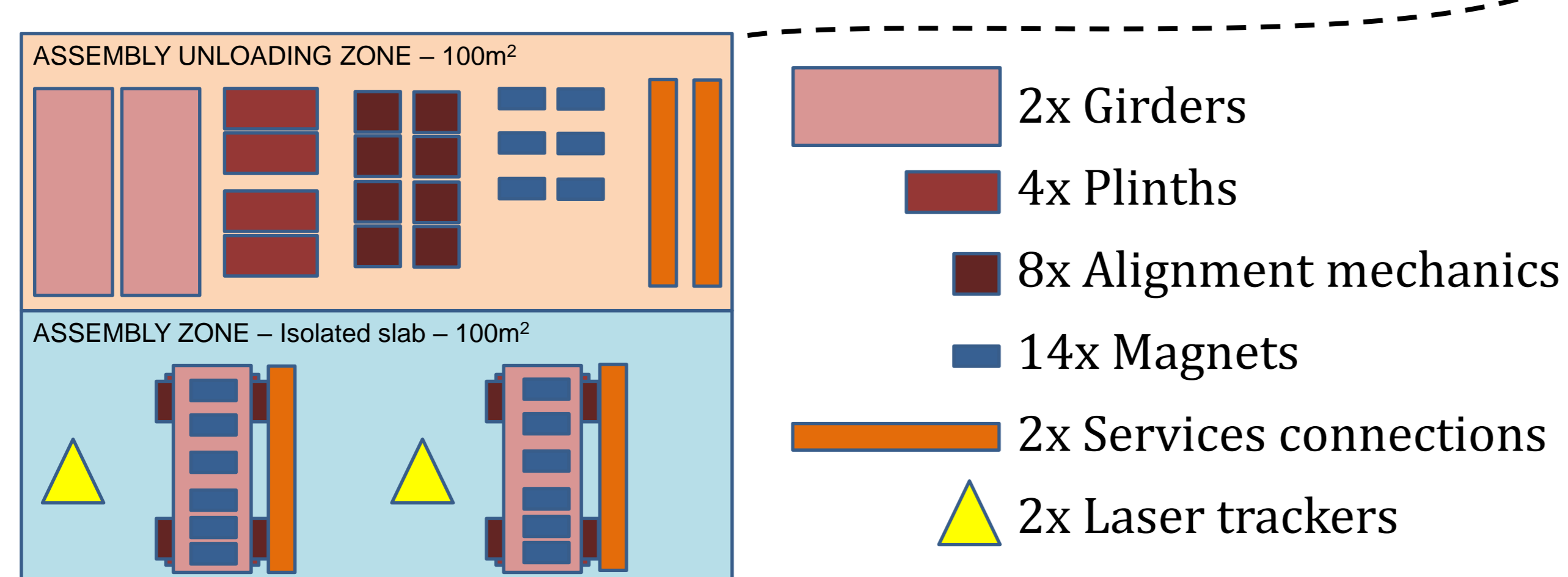


Figure 3. SR girders and magnets assembly area. 2 girders/week.

CONCLUSIONS

The design of the removal, assembly and installation for the ALBA II upgrade is ongoing. The spaces required for the whole process are being considered as well as the reorganization of the Service Area. However, before having a detailed plan, many questions have to be answered: Recabling the Insertion Devices? Aligning the new SR straights to the nominal position or to the present position? Which parts of the Front Ends we need to move out&in the tunnel? And many other...