16 Building, infrastructure, and site

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The layout of the building is determined by the circumference of the storage ring and the booster synchrotron. If both machines are operated with a 100 MHz RF system, the circumference must have a harmonic number corresponding to the wavelength of the RF system, which is 3 m. The circumference of the storage ring is 348 m and the circumference of the booster synchrotron is 324 m. The corresponding radii are 55.386 m for the storage ring and 51.566 m for the booster synchrotron; the difference between the two is 3.82 m. Around the storage ring is the outer shielding wall. The distance between the storage ring and the wall is determined by the required length of the front ends (roughly 16 m). The overall dimensions of the machine tunnel are presented in Fig. 16.1 for one quadrant. A cross-section of the tunnel with the locations of the storage ring and booster synchrotron is shown in Fig. 16.2.

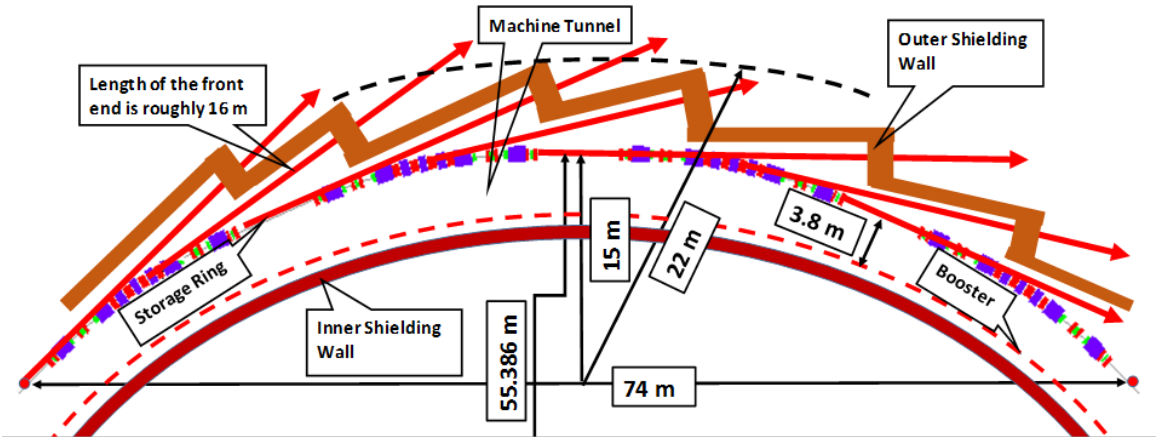

Fig. 16.1: The required dimensions for the machine tunnel and the shielding walls in one quadrant

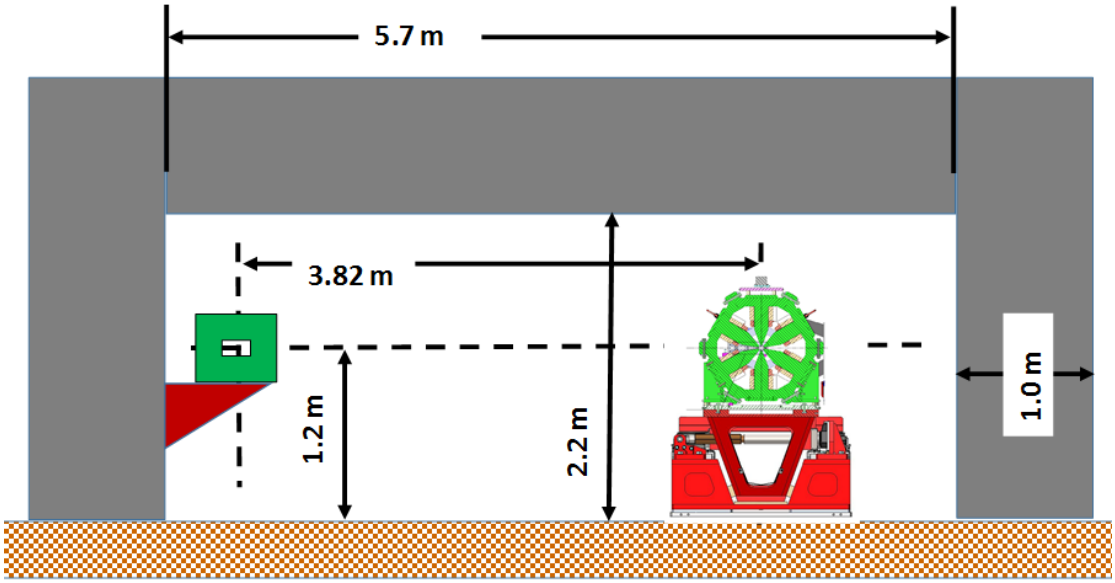

Fig. 16.2: Cross-section of the machine tunnel with the booster synchrotron on the left-hand side and the storage ring on the right-hand side.

The service area with a width of 10 m and a walking area of width 2.2 m around it must be added along the inner side of the machine tunnel. An area of diameter 74 m, called the courtyard, will remain

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available in the middle of the main building. Part of this area can be used for laboratories and offices (as at the SLS). The overall layout of the inner part of the building is presented in Fig. 16.3.

On the outer side of the machine tunnel is the experimental area for setting up the beam lines; the radius of this area is 73 m and it has a walking area of width 2.2 m around it. The length of the beam lines from the shielding wall to the walking area is around 22 m. The arrangement of the linac bunker in the vicinity of the machine tunnel is presented in Fig. 16.4. The linac bunker has length 22 m and width 4 m. In front of the linac bunker is the service area for all the racks needed to operate the different components of the linac.

The cross-section of the main building is presented in Fig. 16.5, showing the experimental hall, the linac bunker, and the service and walking areas. A site walk is needed to cross the experimental hall. For the installation of the machines and beam lines, two cranes with a capacity of 15 tons are needed.

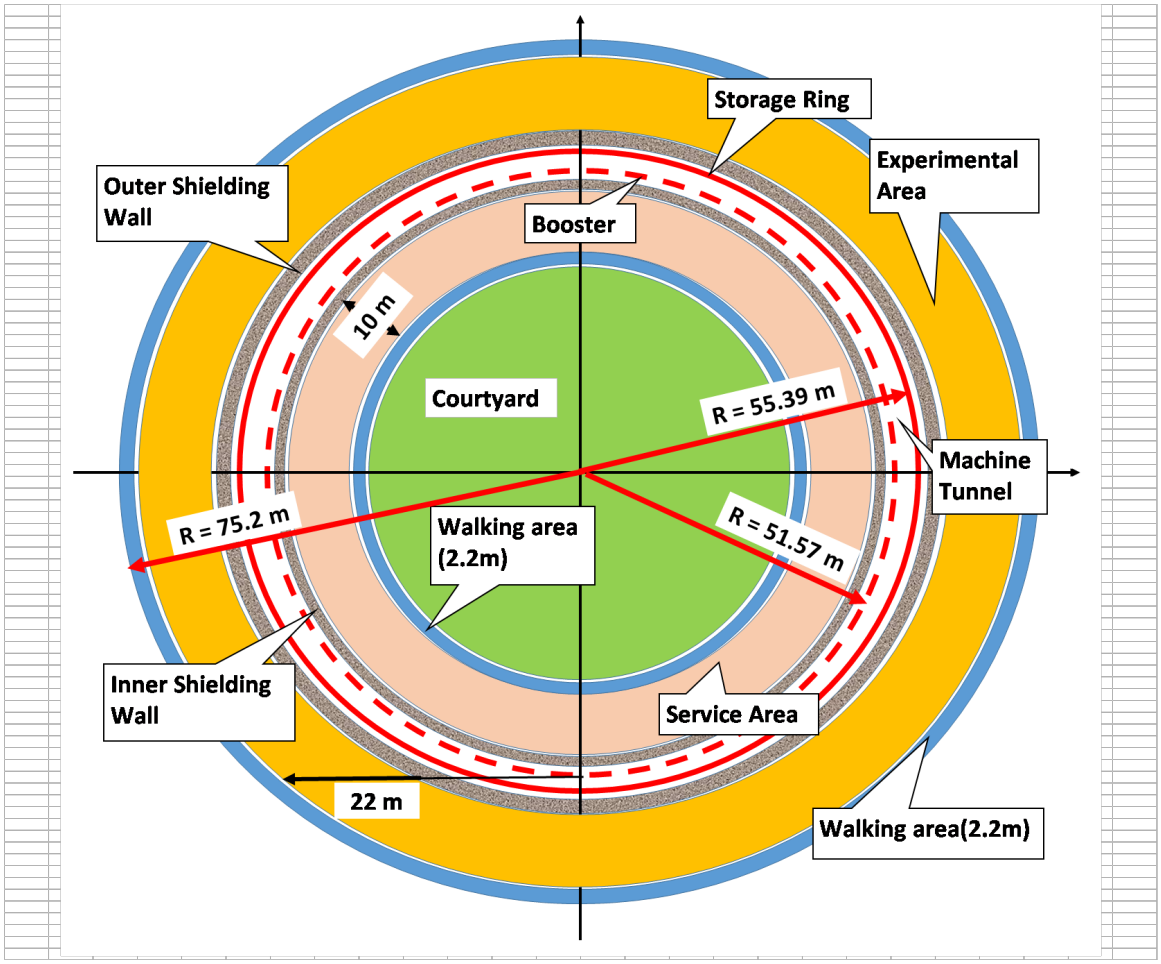

Fig. 16.3: The layout of the inner part of the main building

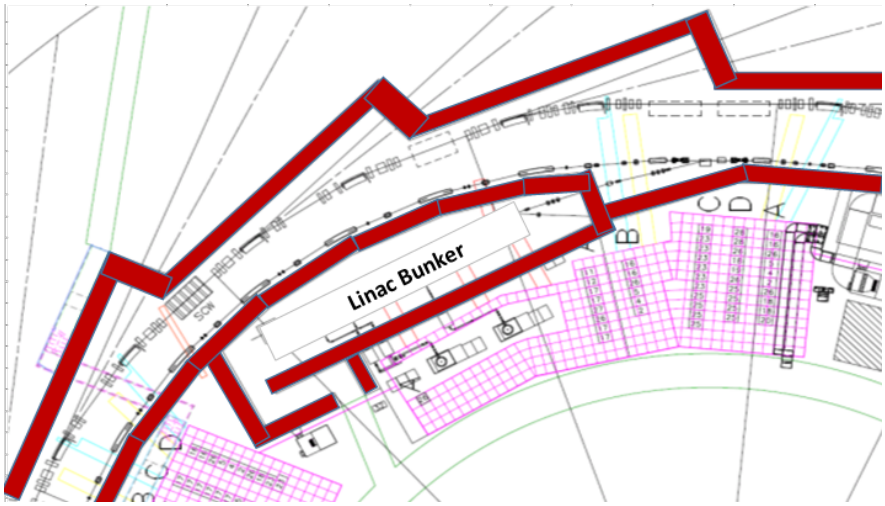

Fig. 16.4: The arrangement of the linac bunker near the machine tunnel

The cranes have to span the experimental hall, the machine tunnel, and the service area. Adjacent to the experimental hall are the laboratories and offices. As shown in Fig. 16.5, laboratories and offices can also be erected near the service area in the middle of the building.

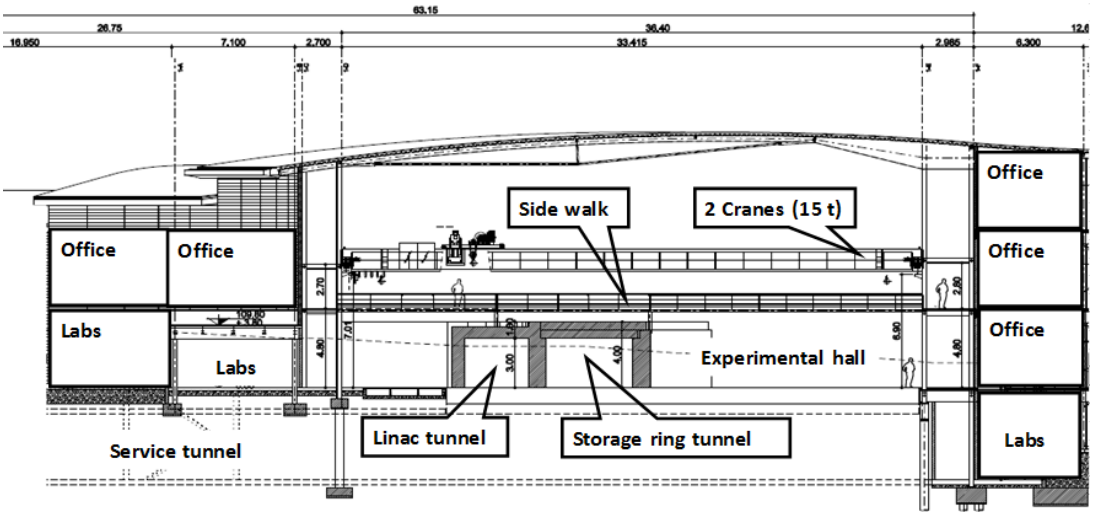

Fig. 16.5: Cross-section of the main building according to the layout of ALBA

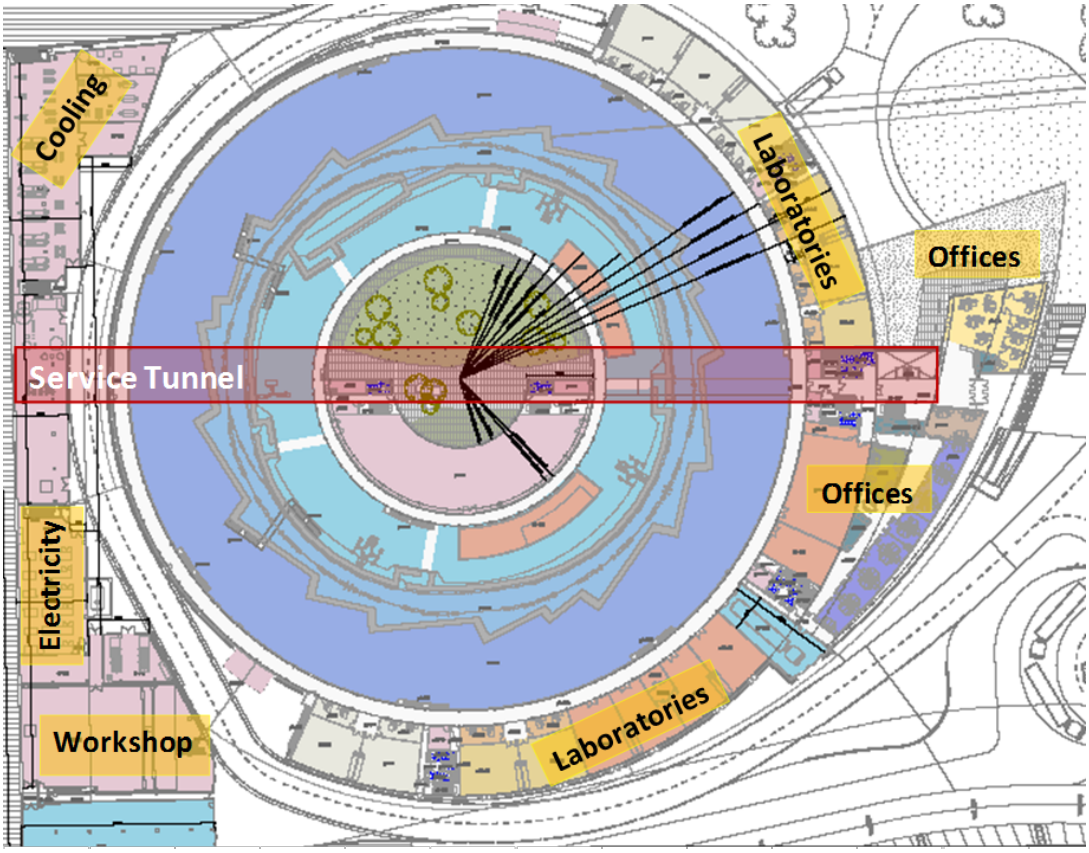

Fig. 16.6: Top view of the ALBA building, showing the spaces for the infrastructure, offices, and laboratories

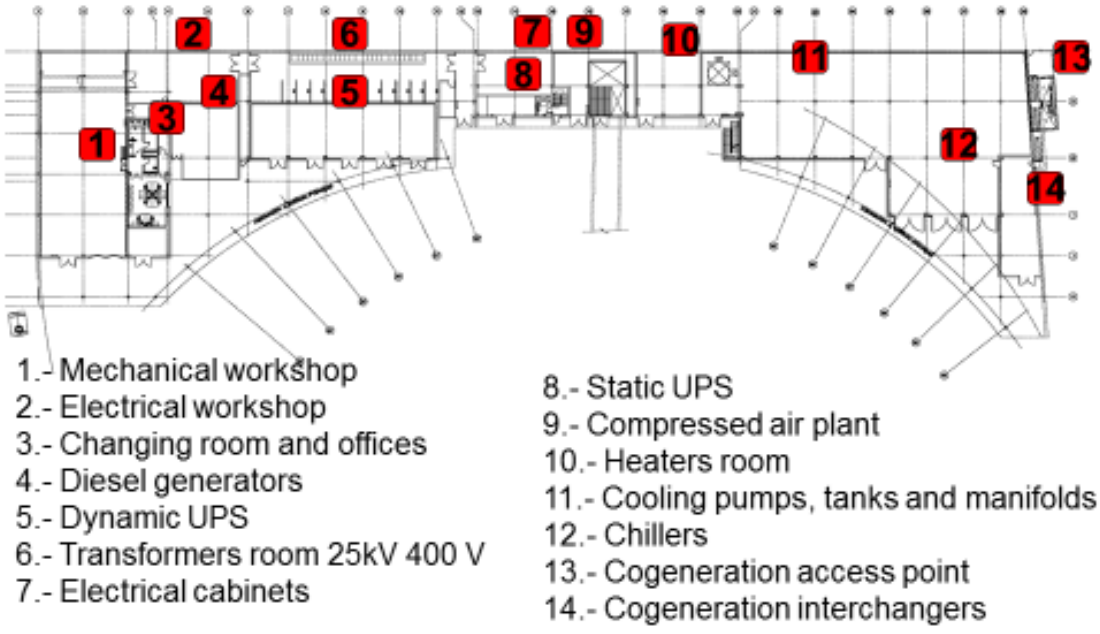

Fig. 16.7: The location of the different infrastructure components in the technical building of ALBA

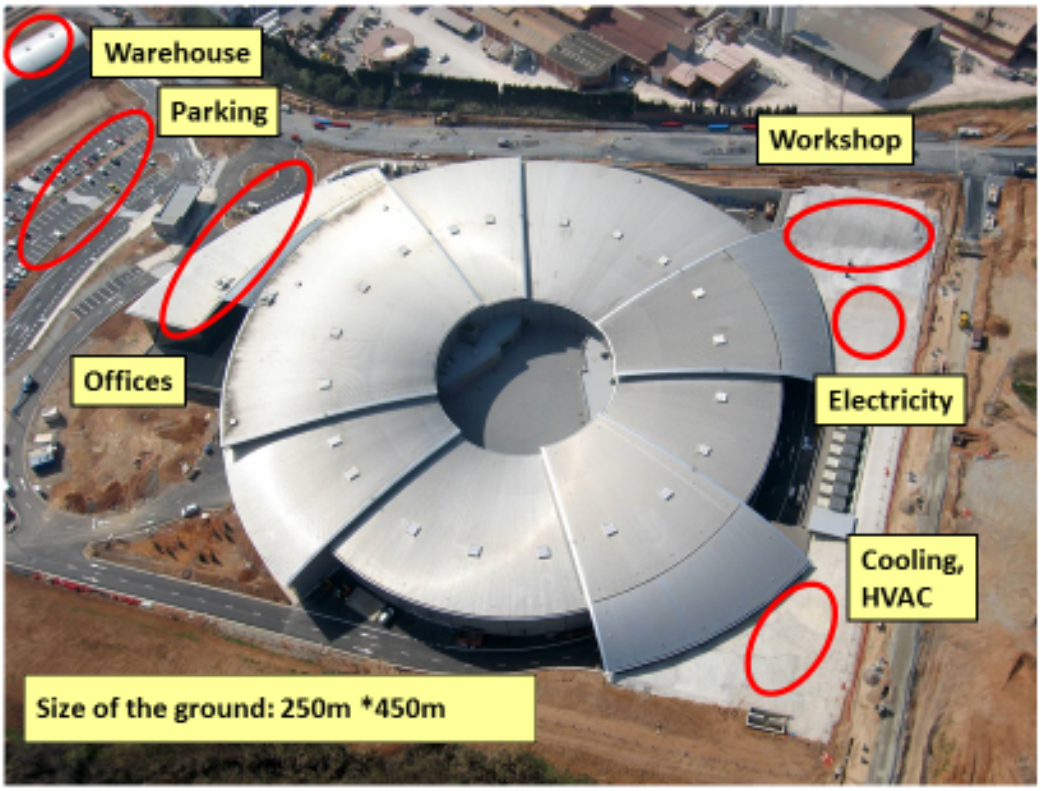

Fig. 16.8: Aerial view of the ALBA site, showing the spaces for the building, infrastructure, offices, parking, etc.

Fig. 16.9: Aerial view of the SOLEIL site, showing the spaces for the building, infrastructure, offices, parking, etc.

The organization of the space near the experimental hall required for infrastructure such as cooling, electricity, and workshops is shown in Fig. 16.6. The connections for the machine, beam lines,

and offices go through a ‘service tunnel’ under the experimental hall. The arrangement of the different infrastructure components is presented in Fig. 16.7.

The arrangement of the experimental hall, technical building, offices, laboratories, etc. is different at the different light sources. Figure 16.8 shows the ALBA site and Fig. 16.9 the SOLEIL site. Figure 16.10 is a diagram of the overall ALBA site. With the greater circumference of the machine, an overall size of 300 m × 500 m is required for the SEE-LS project.

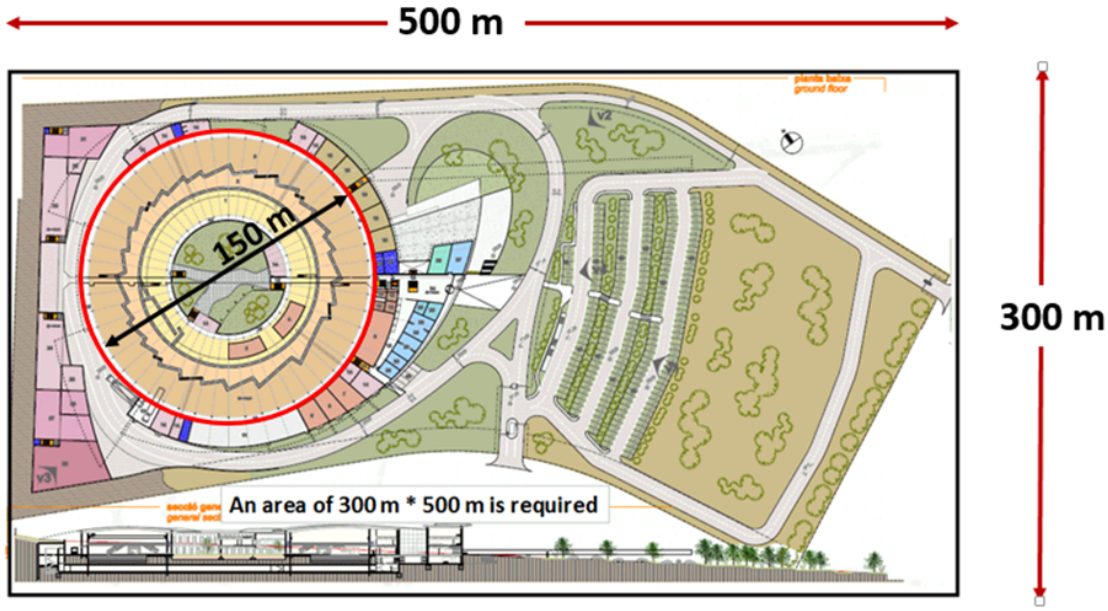

Fig. 16.10: ALBA site, showing the spaces for the building, infrastructure, offices, parking, etc. Overall an area of 300 m × 500 m is needed.

The requirements for the site are the following.

- The overall size of the site should be about 300 m × 500 m.
- In view of potential future upgrades, and considering a lifetime of the facility of 30 years, the possibility of expanding the site by about 50% would be an advantage.
- The site should be very stable, and no vibrations (e.g. from nearby traffic) should disturb the stability of the building and the beam.
- A good connection to the electric power grid should exist.
- Easy access is important, including easy road access and a not-too-distant airport.
- A guest house, or at least hotel accommodation in the vicinity, should be available.