Progress of overall tunnel design toward the basic design

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CFS design flow, currently on-going

Revise the lattice for ILC250 and create geometry file

Optics Deck (as of Feb. 2020) -> Geometry file (CSV format)

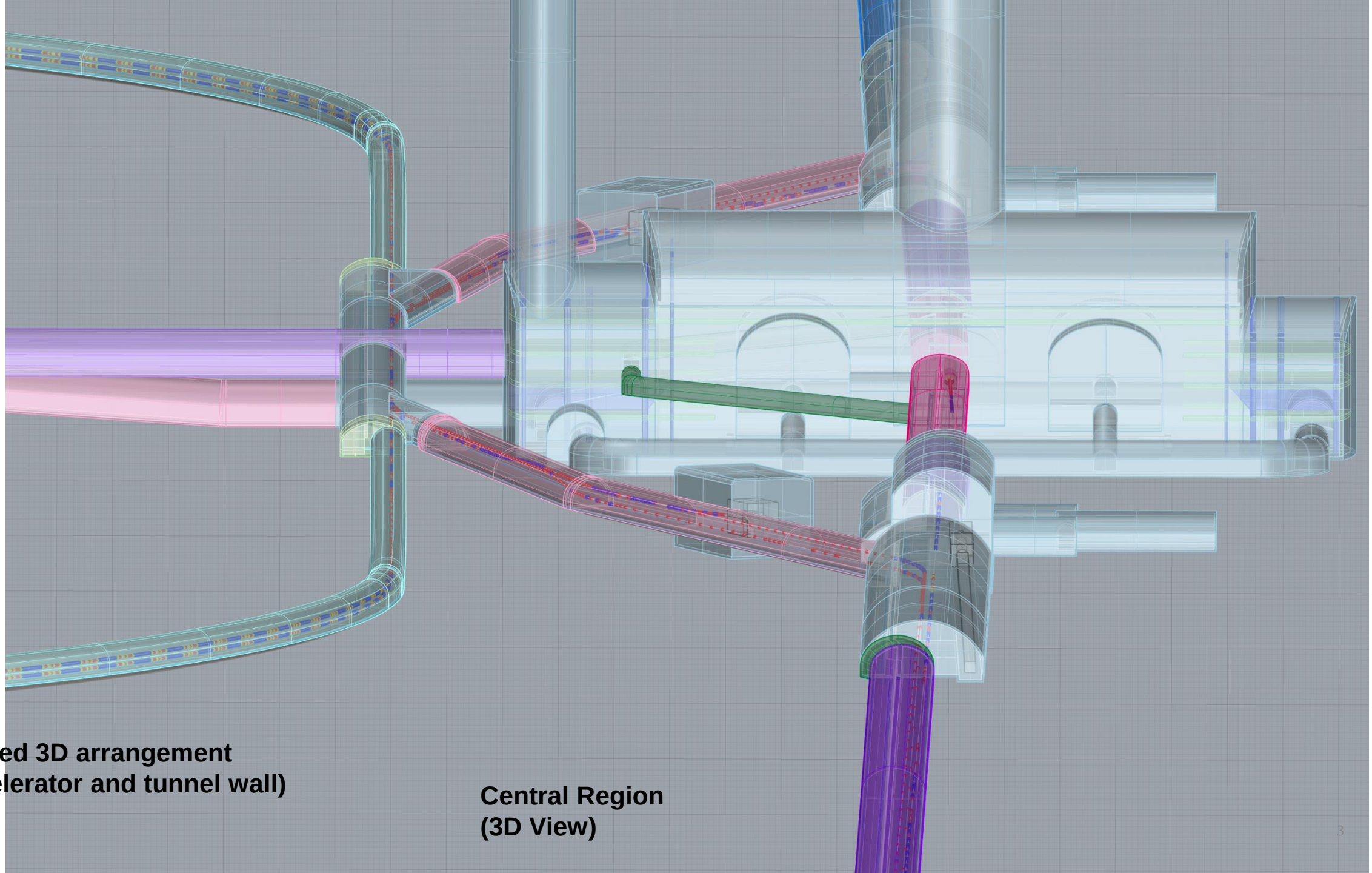
Create 3D arrangement of accelerator components

Geometry file -> 3D accelerator components (by step format)

Create 3D tunnel arrangement, draw out 2D arrangement

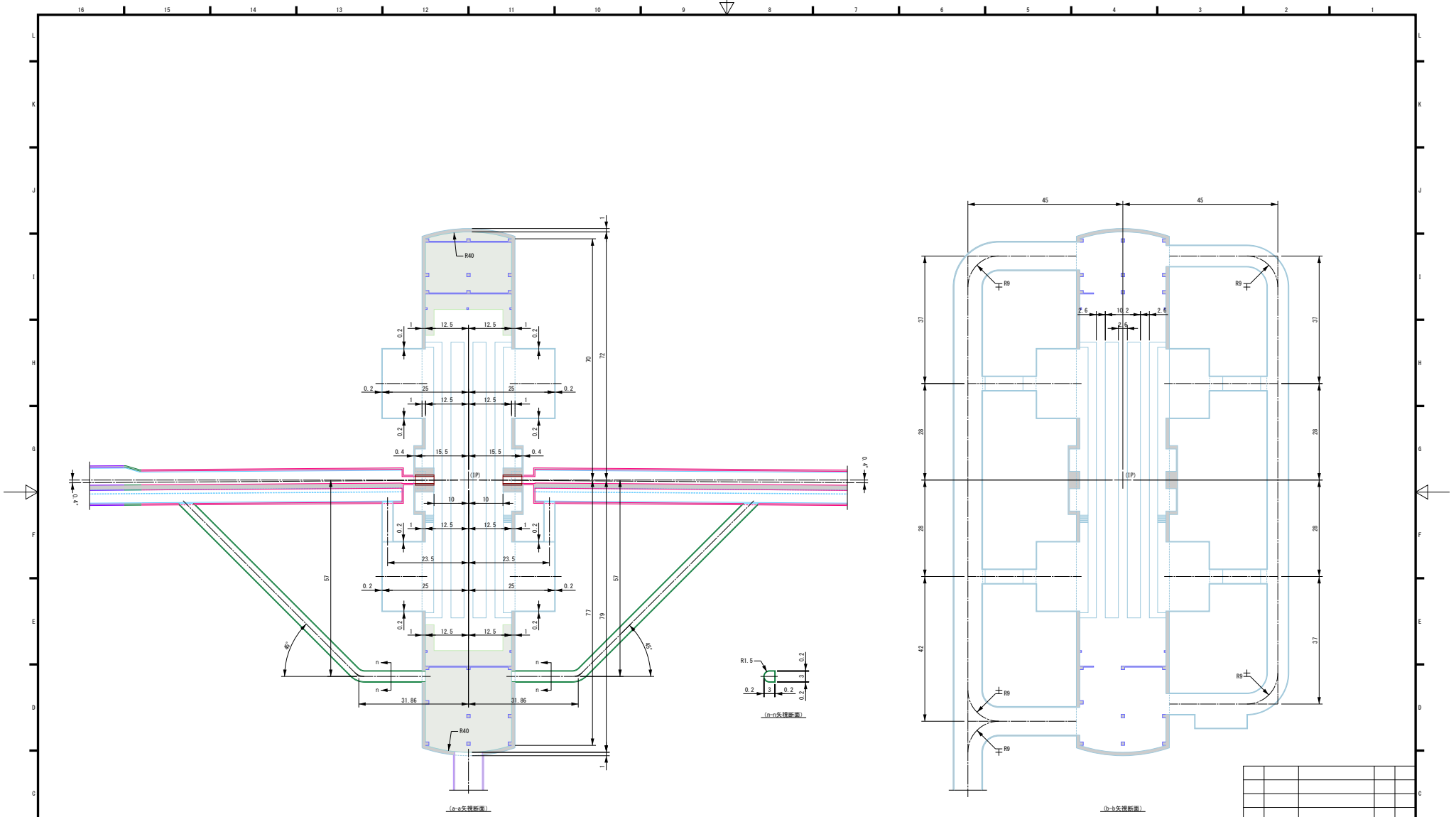
Check any interference and check tunnel shape, then feedback to the tunnel design

This presentation

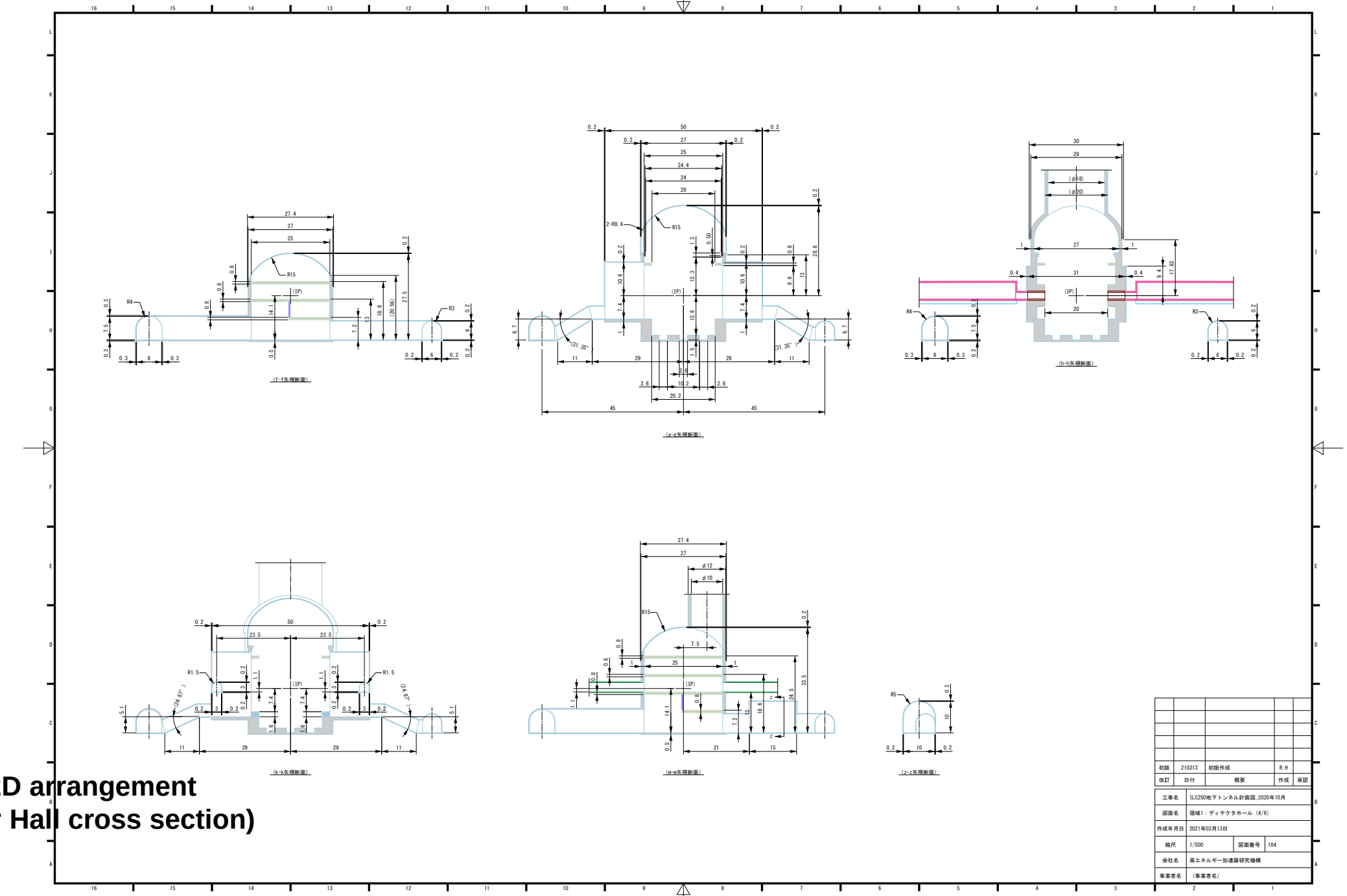


created 3D arrangement (accelerator and tunnel wall)

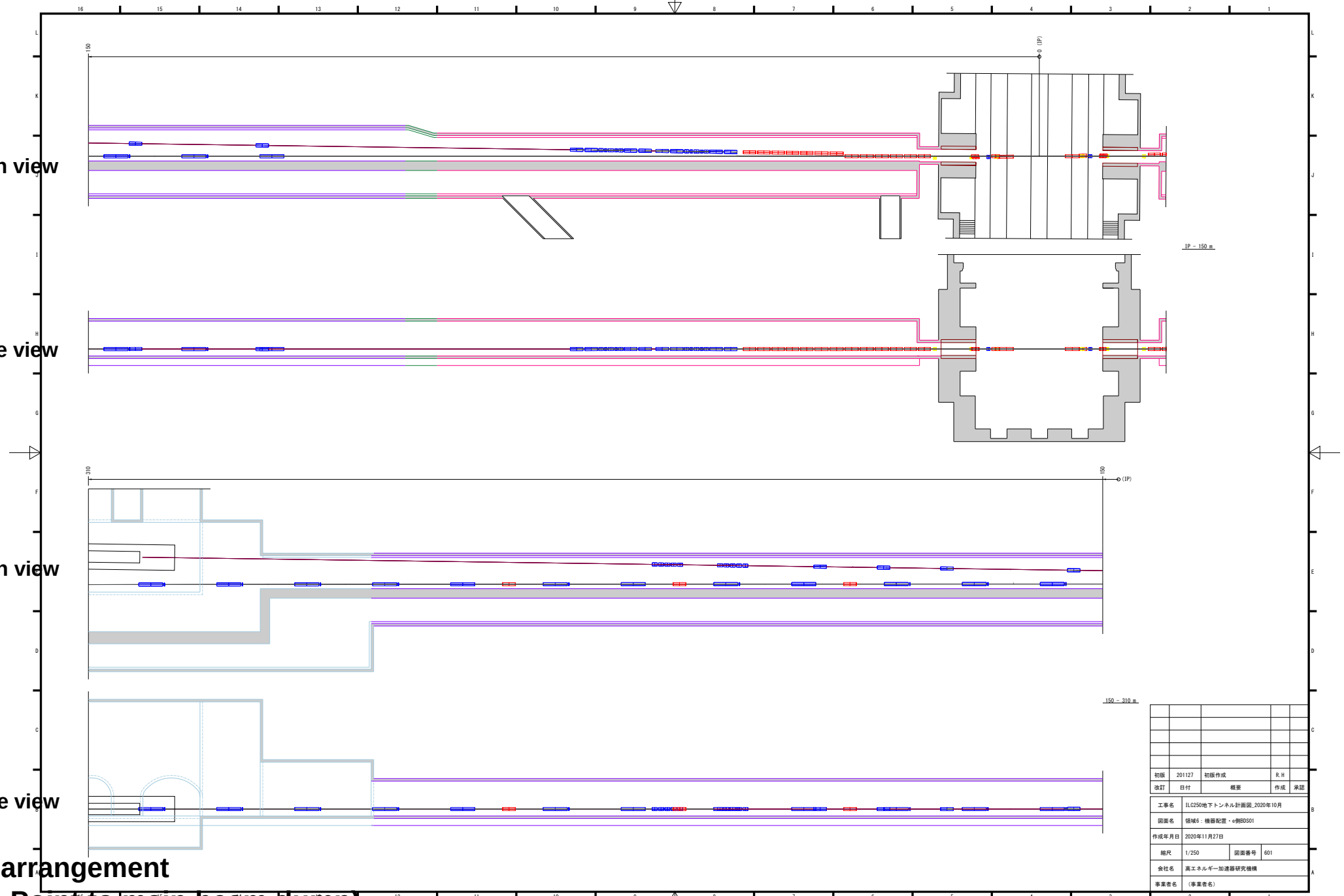
Central Region (3D View)



created 2D arrangement (Detector Hall Region)



created 2D arrangement
(Detector Hall cross section)



created 2D arrangement
(Interaction Point to main beam dump)

Check any interference, any issue during accelerator construction

Check was started on Nov. 2020, biweekly base, with optics group and CFS group.

Major concerns are listed.

1)Target room space, e+ capture device, e- beam dump for undulator-base-positron is not considered in tunnel layout and optics deck.

2)How to support the RTML beam line 1.65m above the BDS beam line is not yet considered.

3)How to connect tunnels with different widths and hights?

4)Chicanes of e- LTR interfere with e+ BDS.

5)tune-up dump line of e- LTR interfere with e+ BDS.

6)Polarized e- gun region may interfere with e+ RTML, 1.65m above.

7)Place of e- source and booster Linac are far away from access hall.
Gun laser need daily base maintenance, SC booster Linac is better to close to He supply at access hall.

8)Tunnel connection at turn-around seem better to use over-sized hall, not like just a tunnel-to-tunnel connection.

9)Tunnel shape of dump room might have not flat ceiling, but round ceiling.

10)There are spin rotator SC magnet at turn around region.
They require He supply. It should be noted.

11)There need precise estimation of magnet power supply space, electric substaion, cooling water and air-cooling device space for damping ring. More space may be required.

12)Current damping ring tunnel design require crossing of maintenance root with accelerator. Need to change the access hall location.

13)There need to check the space between Q and SX at arc section.

14)There need to consider the installation pass way of big main dump. Direct connection between BDS tunnel and detector hall circular tunnel might be a solution.

Concern examples (red squared items) are explained, in this report.

4)Chicane of e- LTR interfere with e+ BDS.

positron BDS-dump
positron RTML
positron BDS
electron DR-Injection
electron tune-up dump

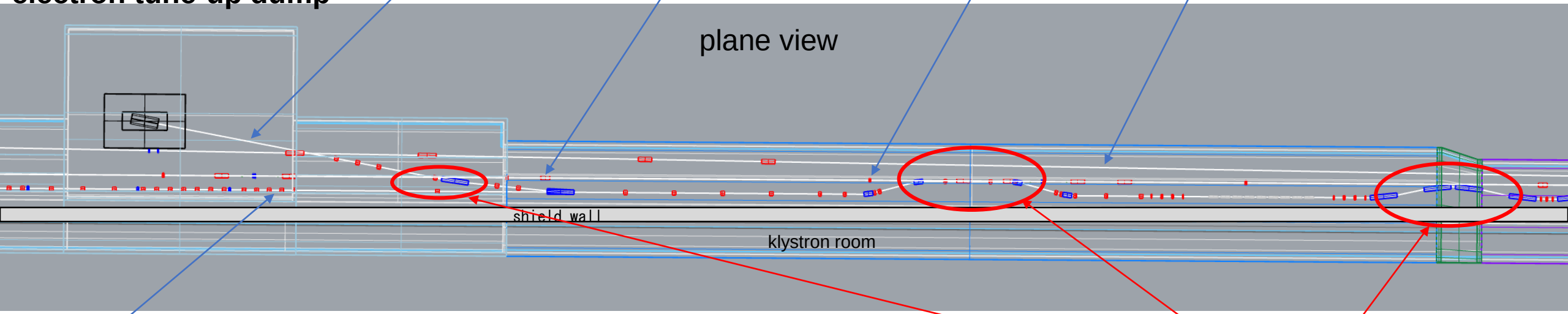
electron tune-up dump line

positron BDS

positron RTML(high position)

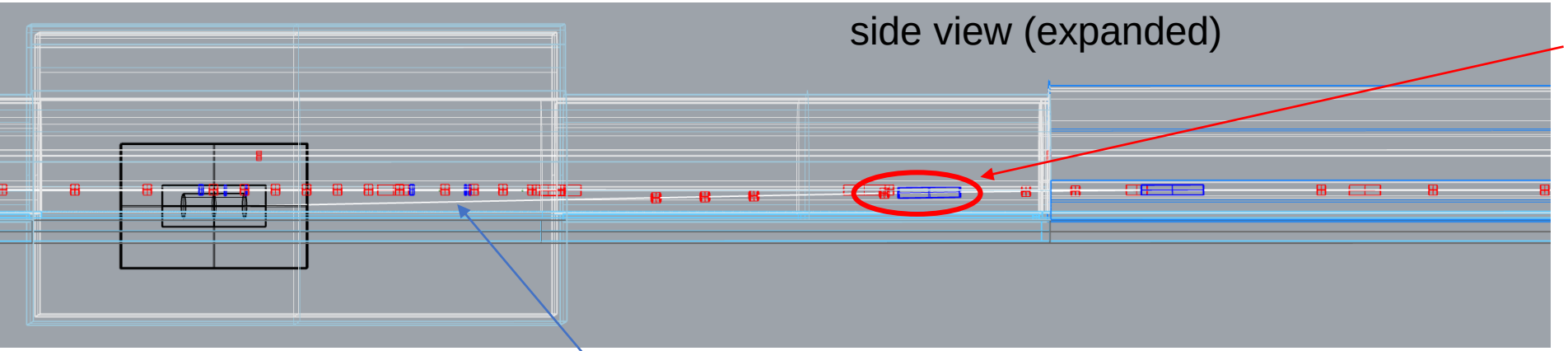
positron BDS-dump line

plane view



electron DR-Injection

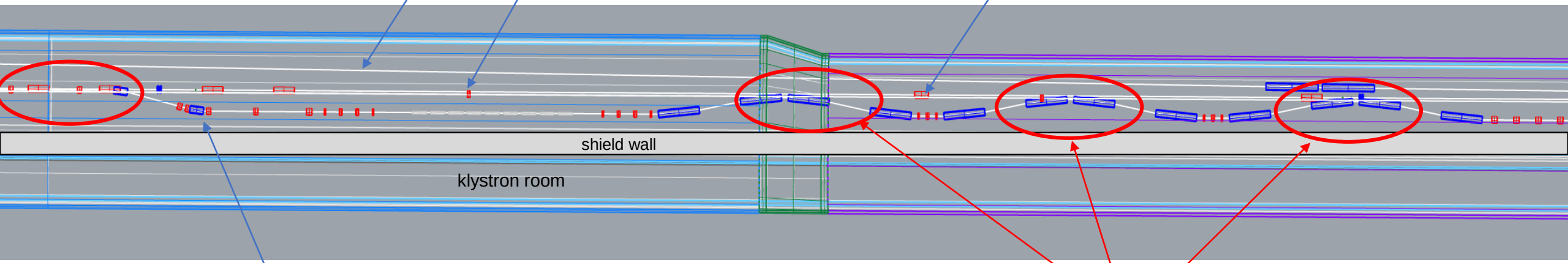
side view (expanded)



Beam lines interfere

tune-up dump line is going down to dump

positron BDS-dump
positron RTML
positron BDS
electron DR-Injection（chicane）



6)Polarized e- gun region may interfere with e+ RTML, 1.65m above.

7)Place of e- source and booster Linac are far away from access hall. Gun laser need daily base maintenance, SC booster Linac is better to close to He supply at access hall.

TDR electron source

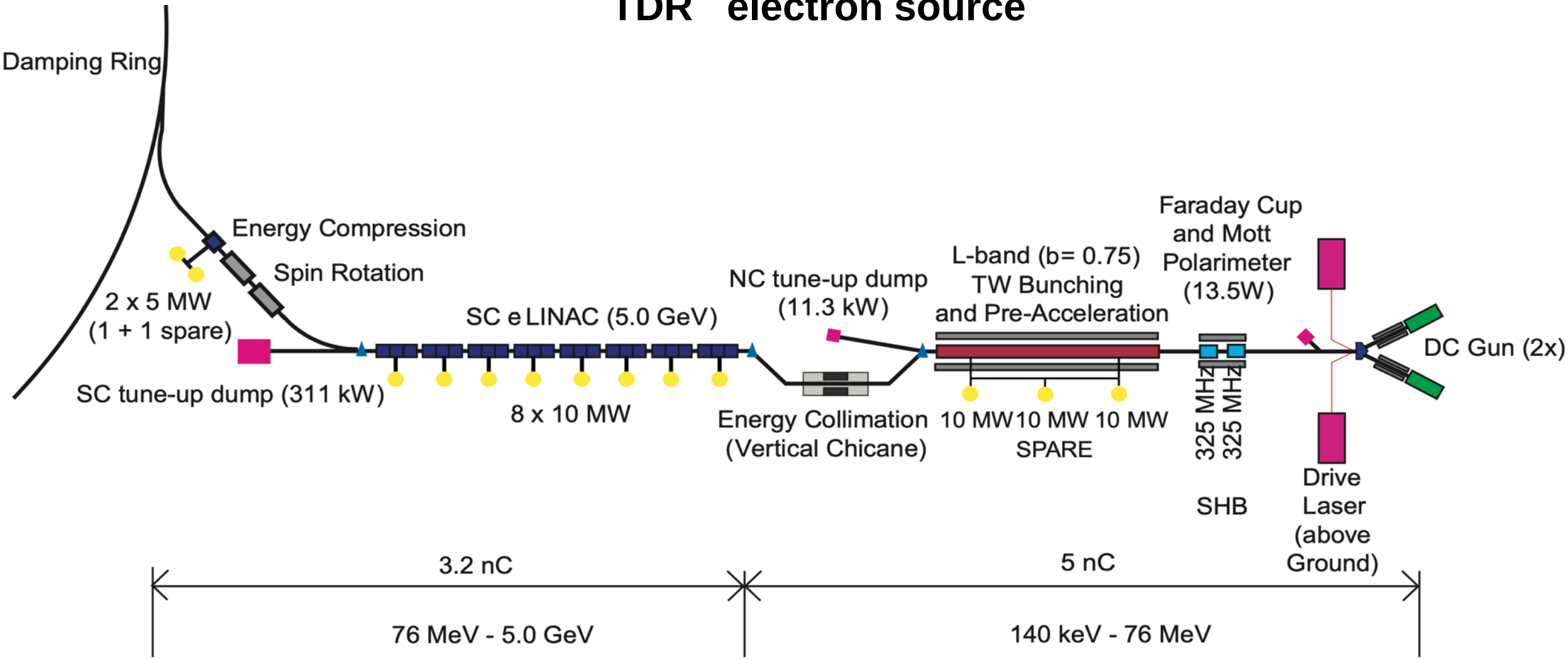
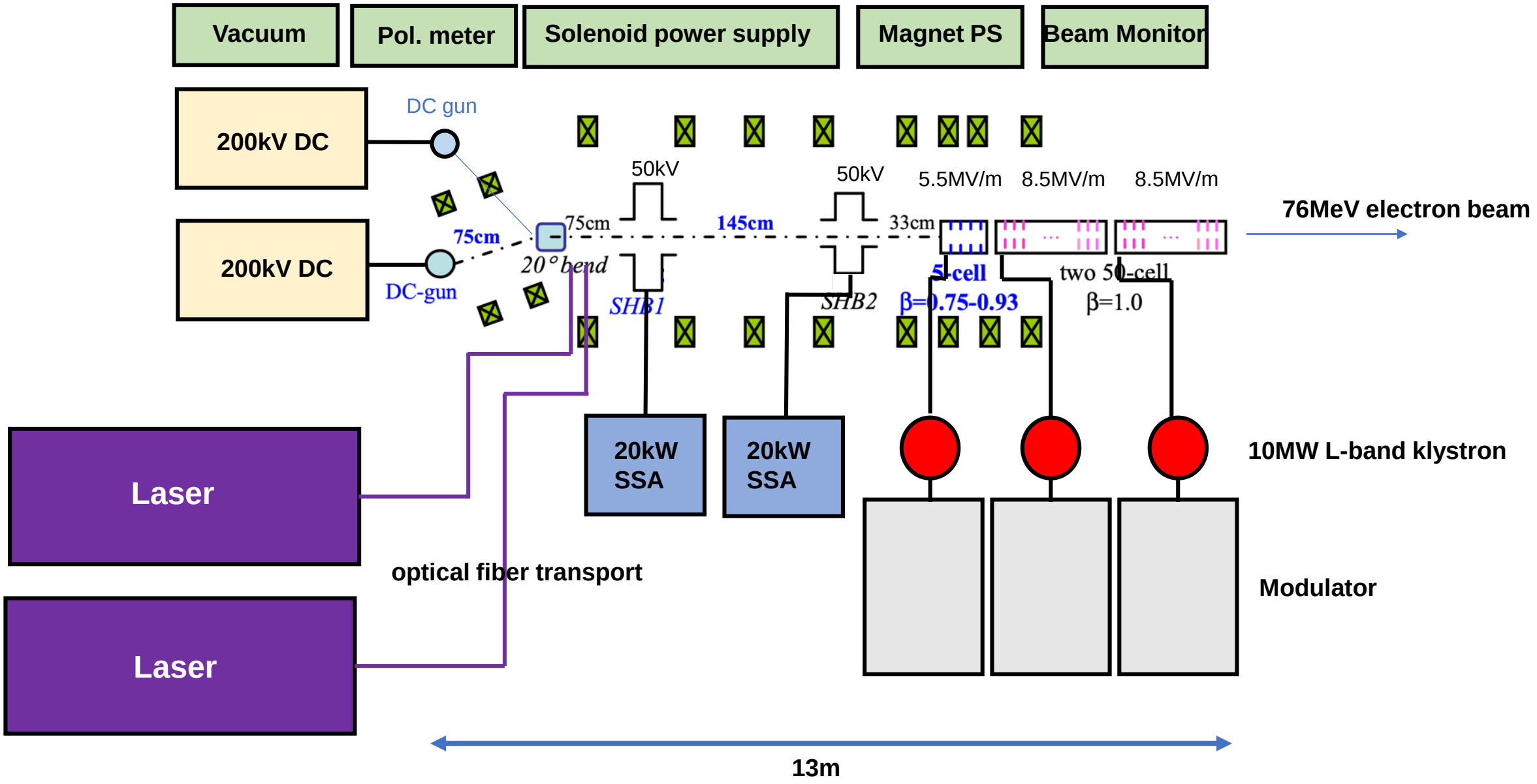


Figure 2.7. Schematic View of the Polarised Electron Source.

Power supplies of 76MeV Injector



2588m

1994m

594m

IP

positron BDS region

e- Injector cryomodule place

306m

Move e- source to PM+8

-1630m

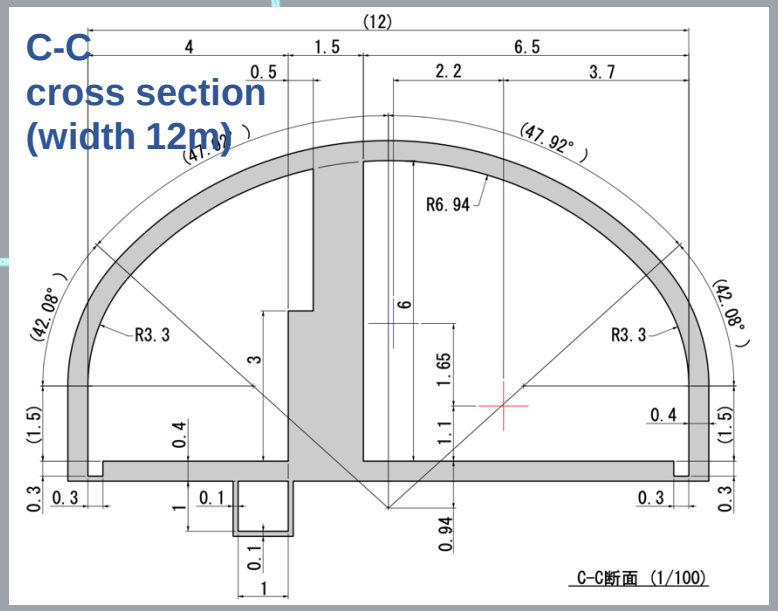
-1936m

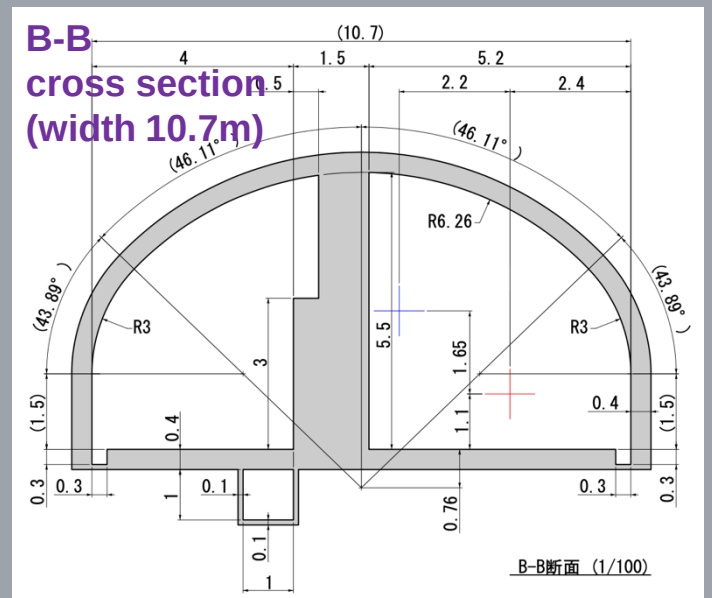
e-gun position

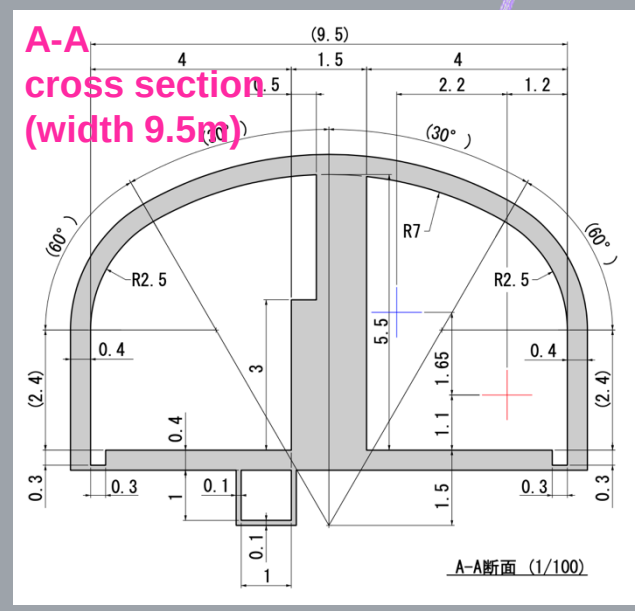
C-C cross section
(width 12m)

B-B
cross section
(width 10.7m)

A-A cross section
(width 9.5m)

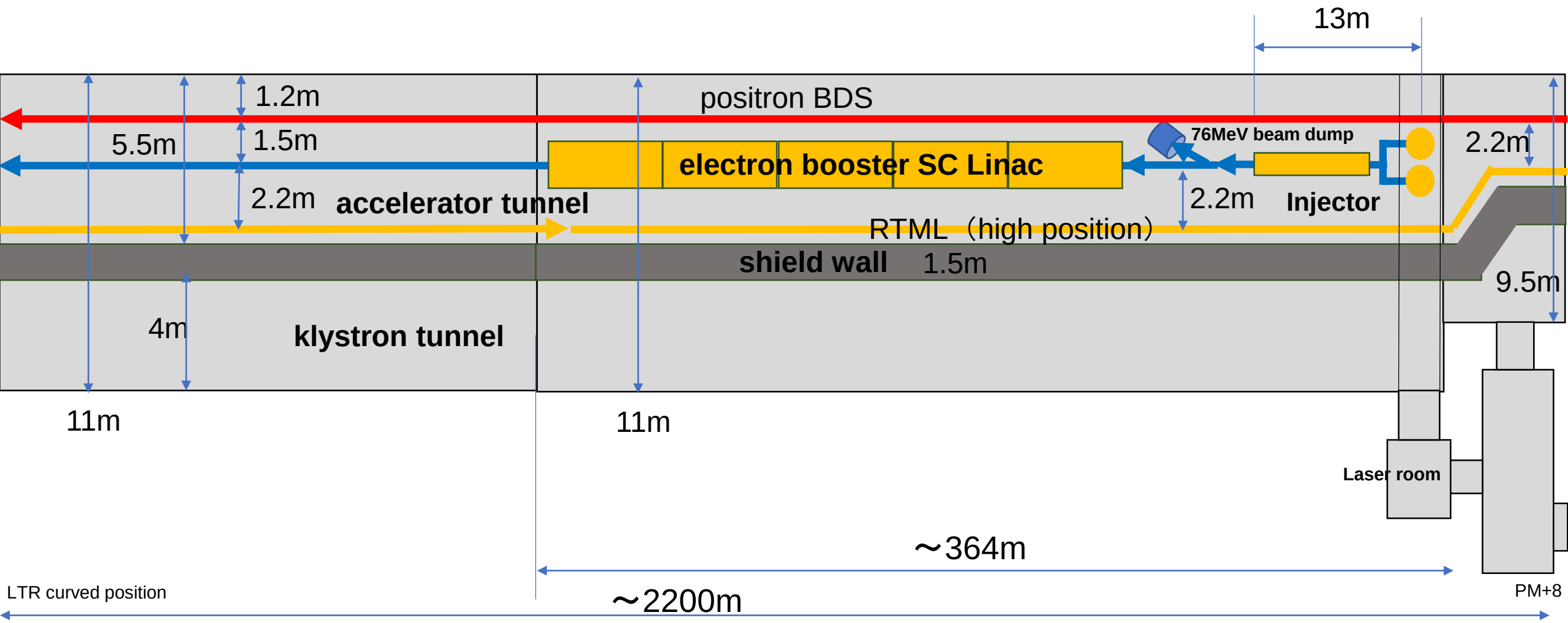




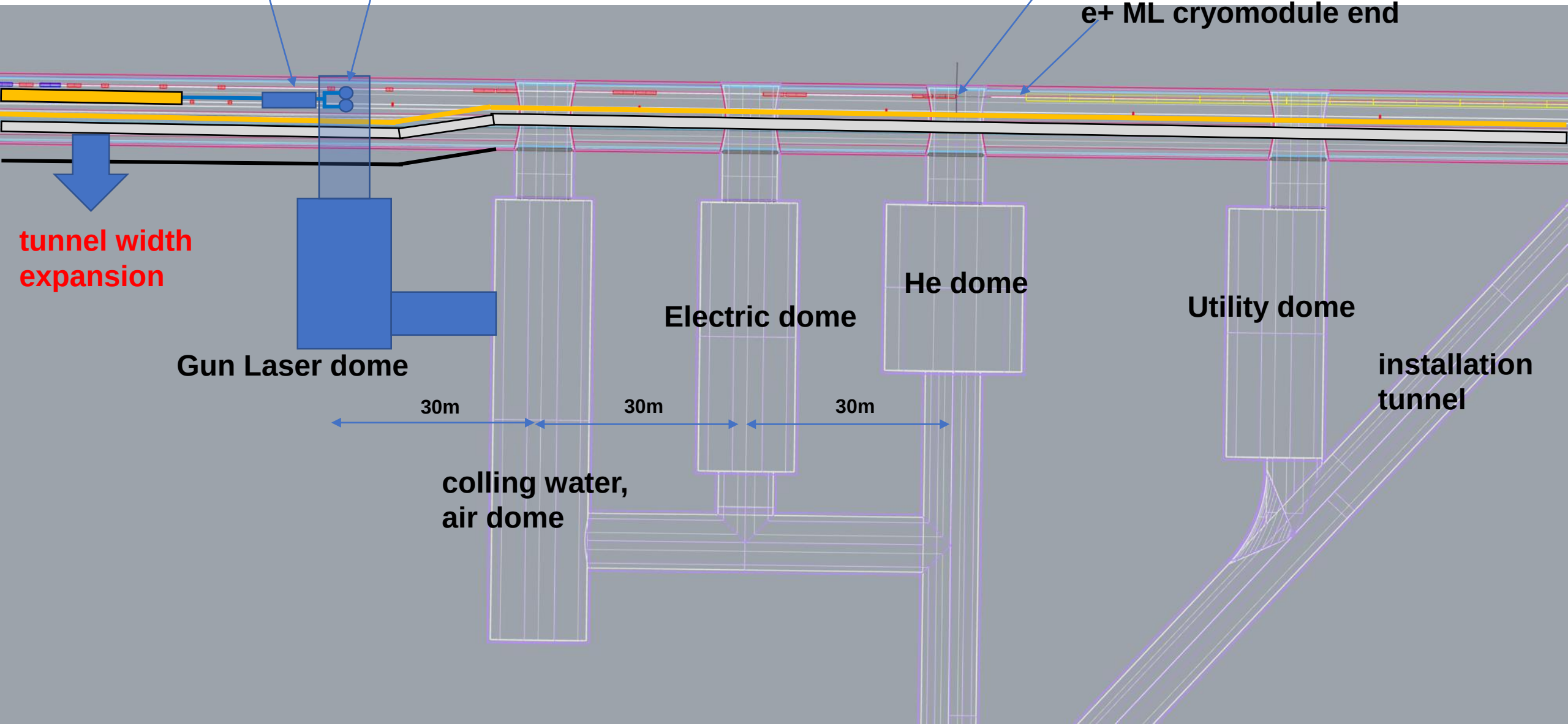


Location of e- source and booster Linac (yellow arrow)

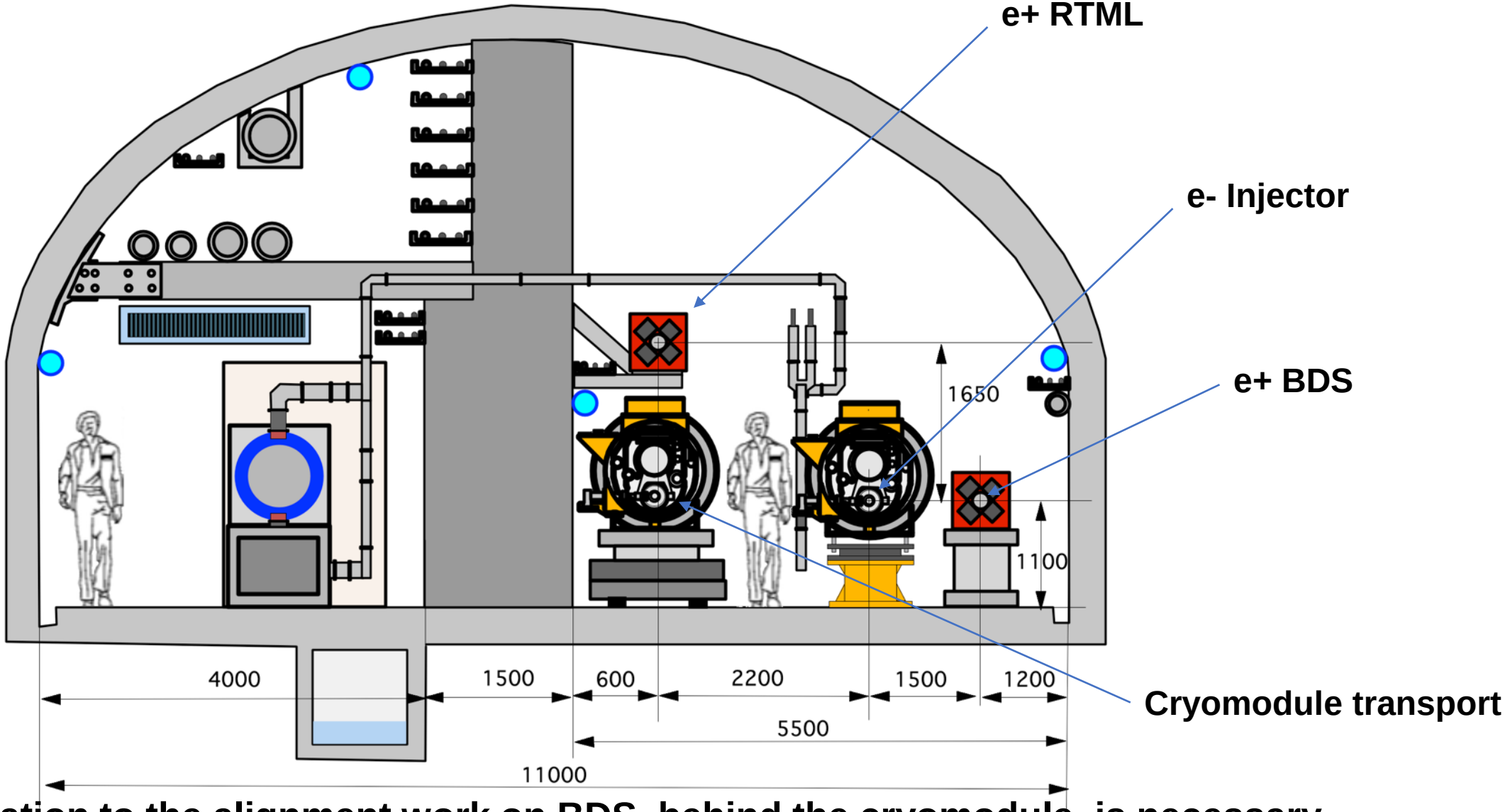
Moved e- source to PM+8 (plain view)



PM+8 region


e- Injector
e- Gun
Mark Point
e+ ML cryomodule end
tunnel width expansion
Gun Laser dome
Electric dome
He dome
Utility dome
installation tunnel
30m
30m
30m
colling water, air dome

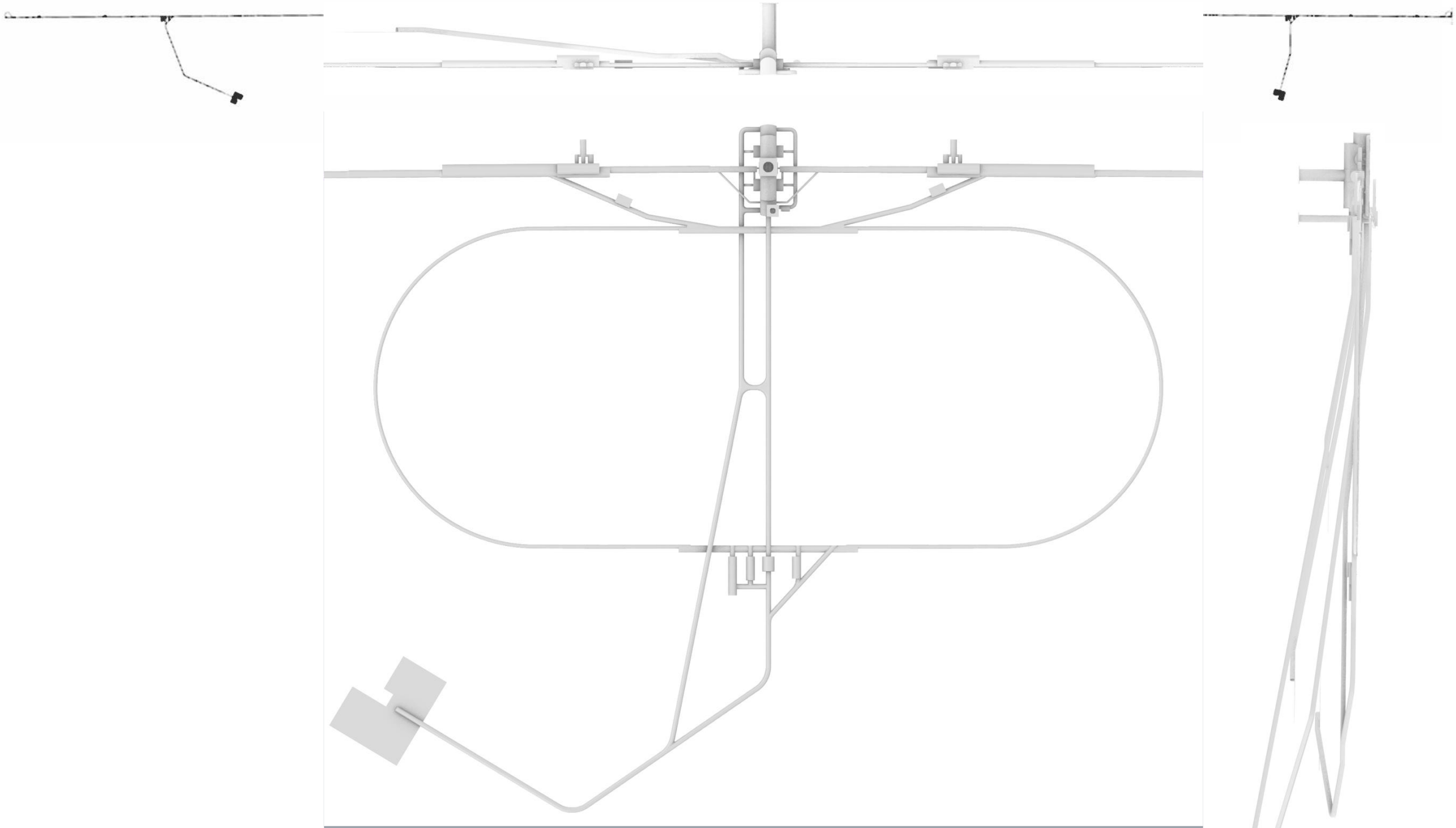
Cross section of 11m width tunnel for e- booster LINAC, e+BDS, e+RTML



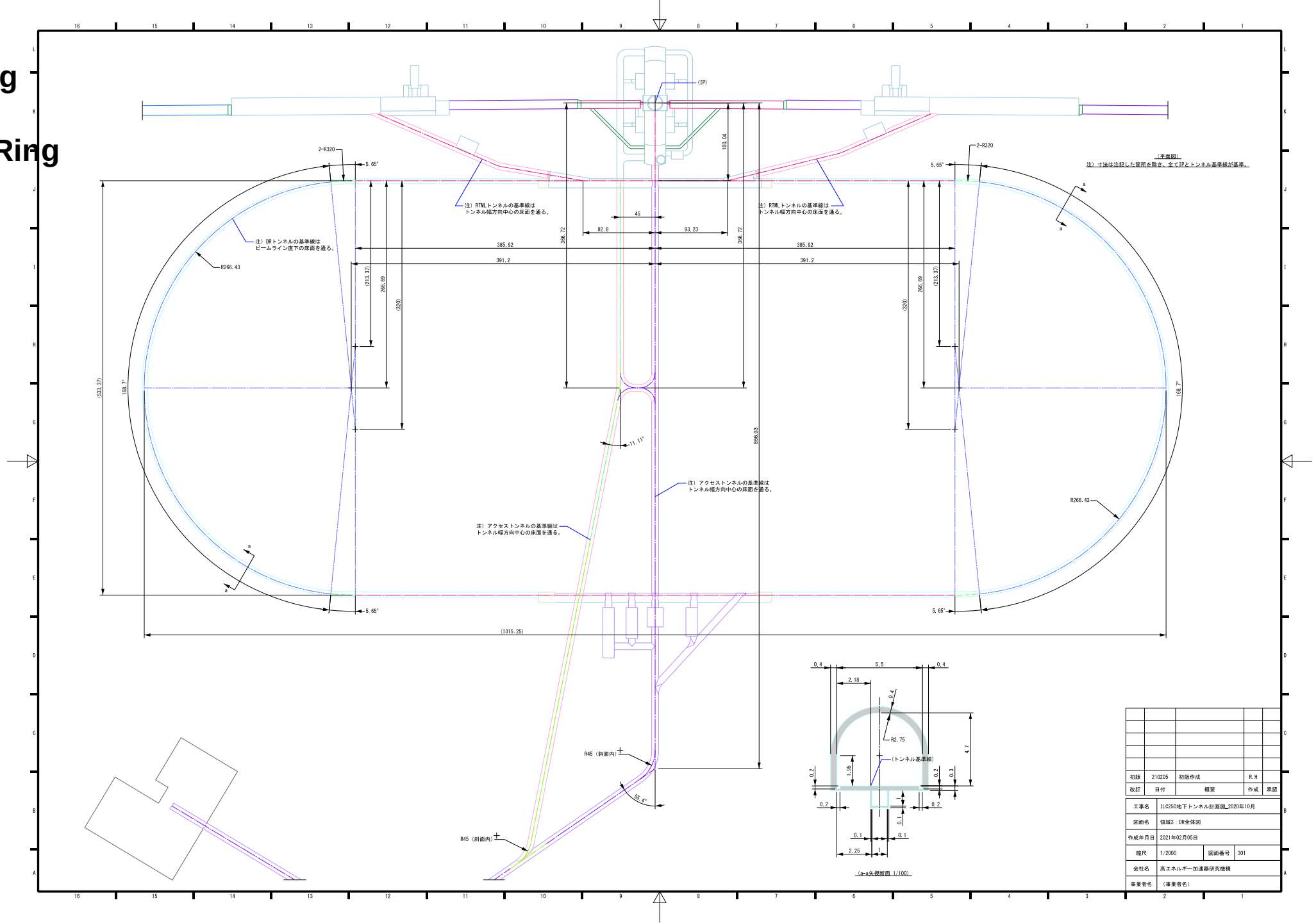
More consideration to the alignment work on BDS, behind the cryomodule, is necessary.

12)Current damping ring tunnel design require crossing of maintenance root with accelerator. Need to change the access hall location.

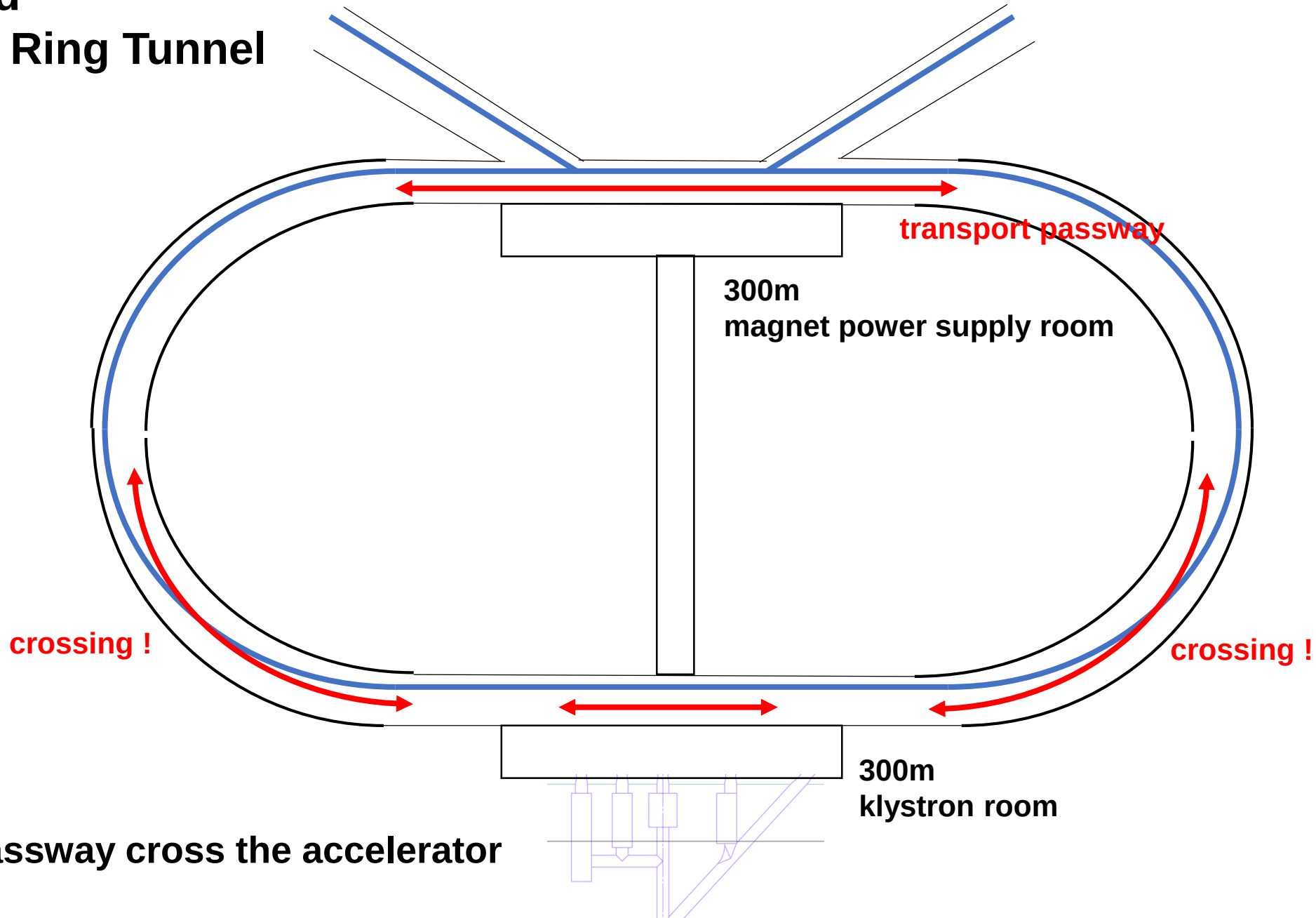
Damping Ring



2D drawing of Damping Ring

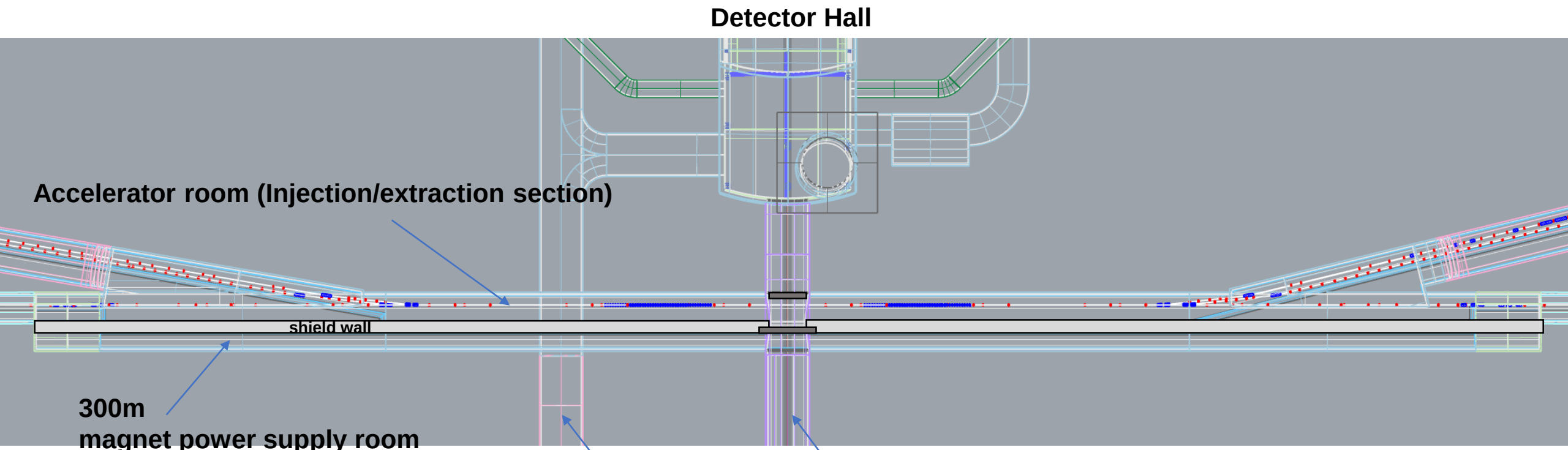


Simplified
Damping Ring Tunnel

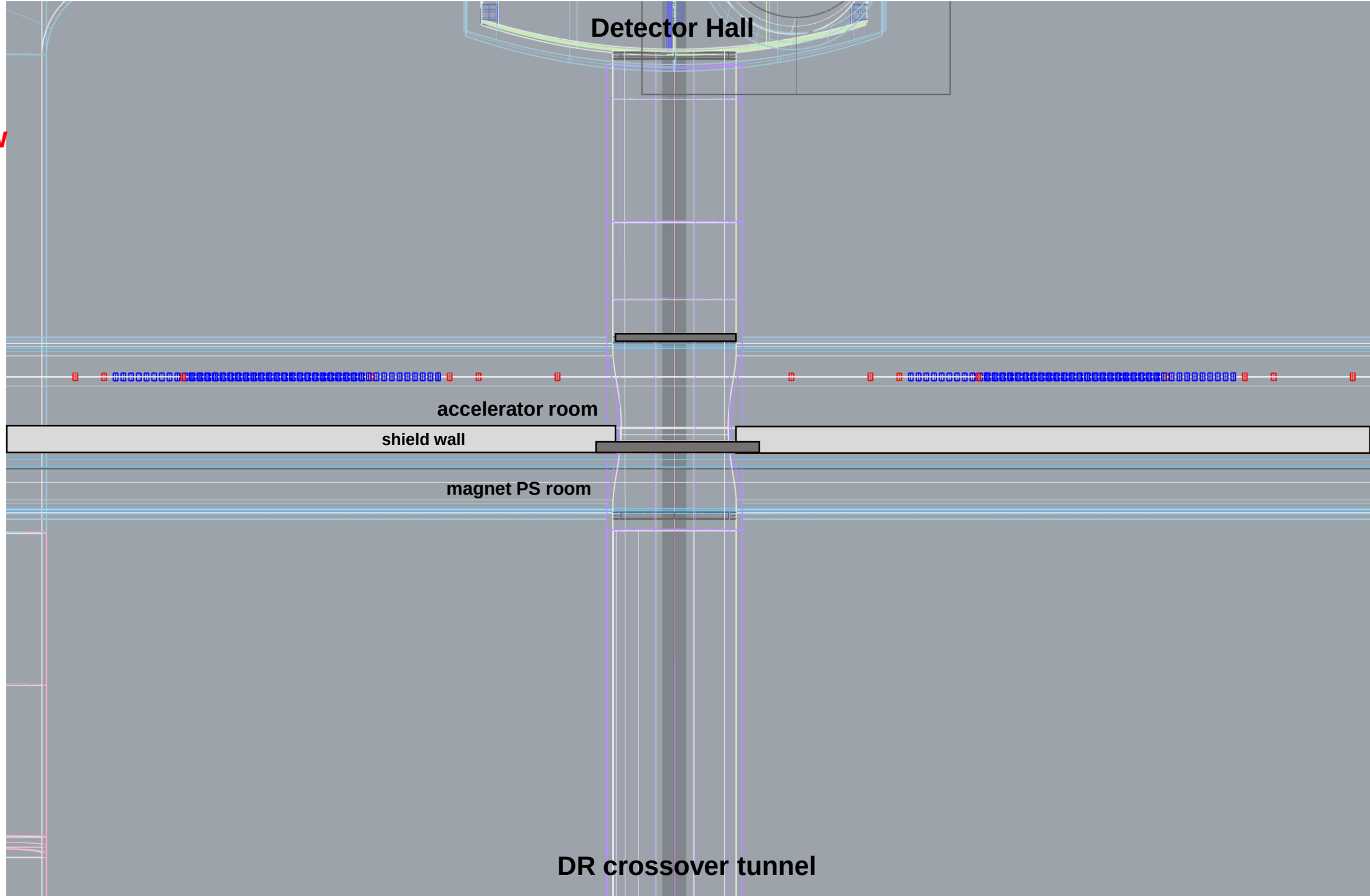


Transport passway cross the accelerator

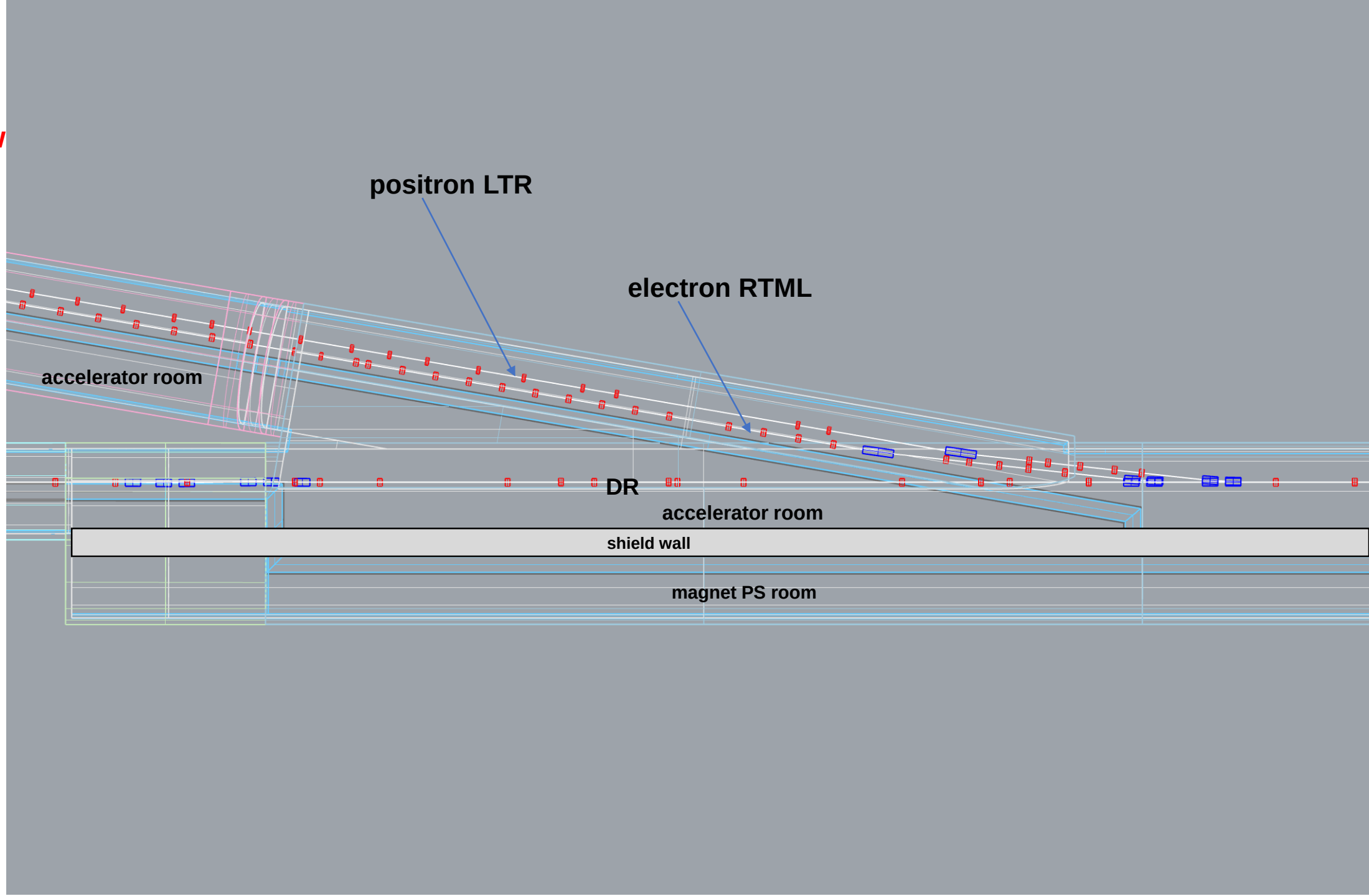
Damping Ring
East Straight



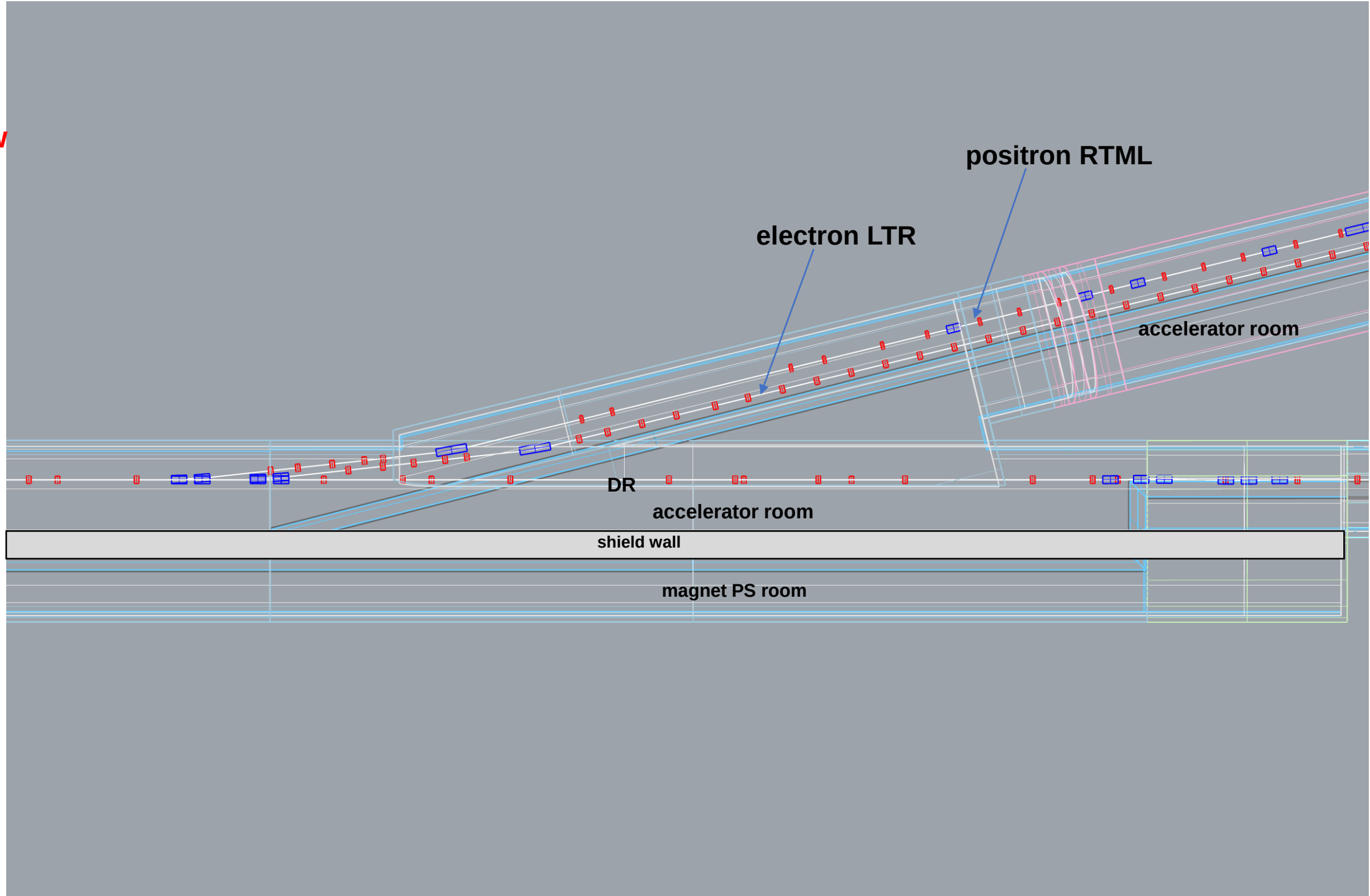
Damping Ring East Straight Center Expanded View



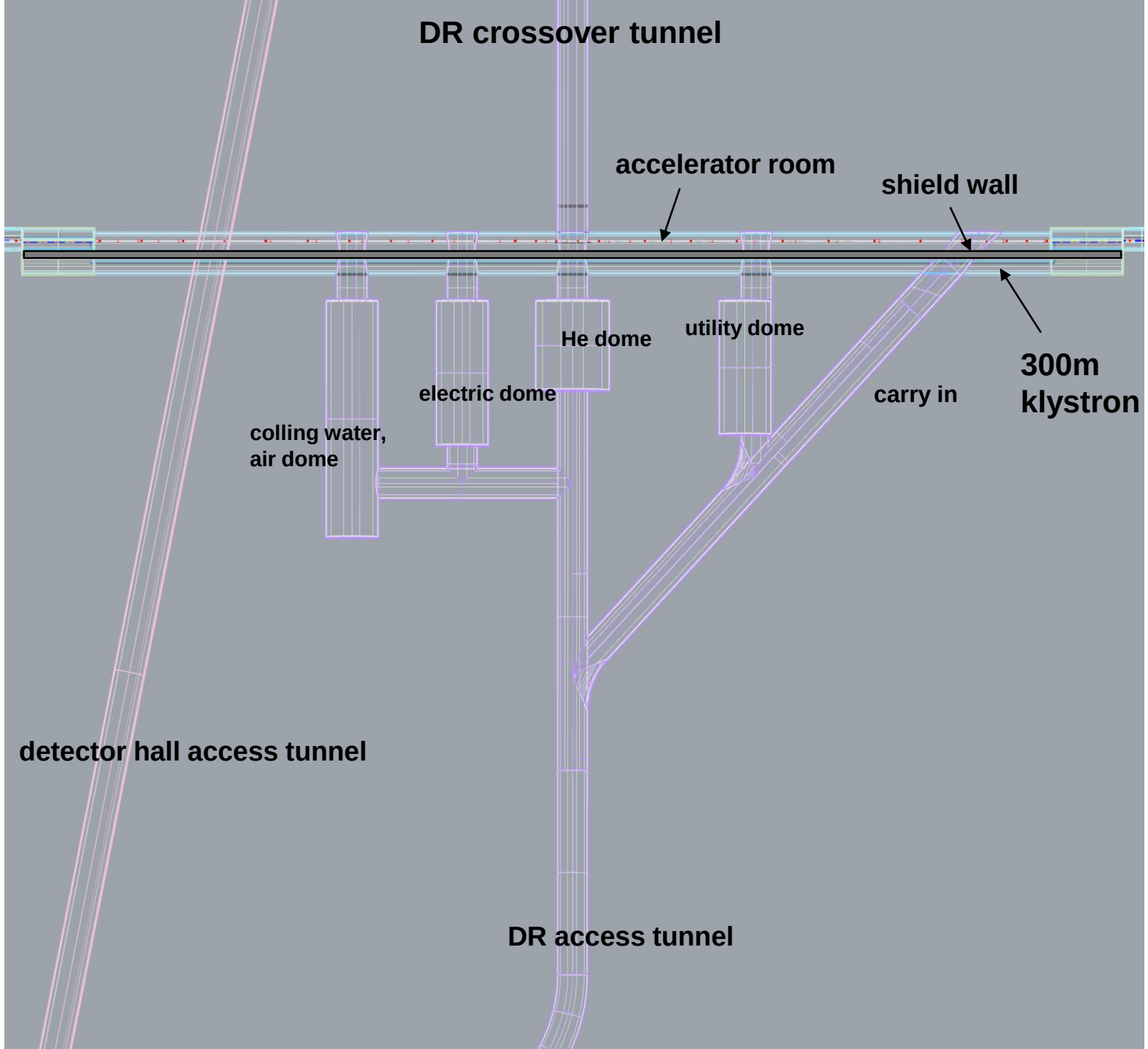
Damping Ring East Straight North Expanded View



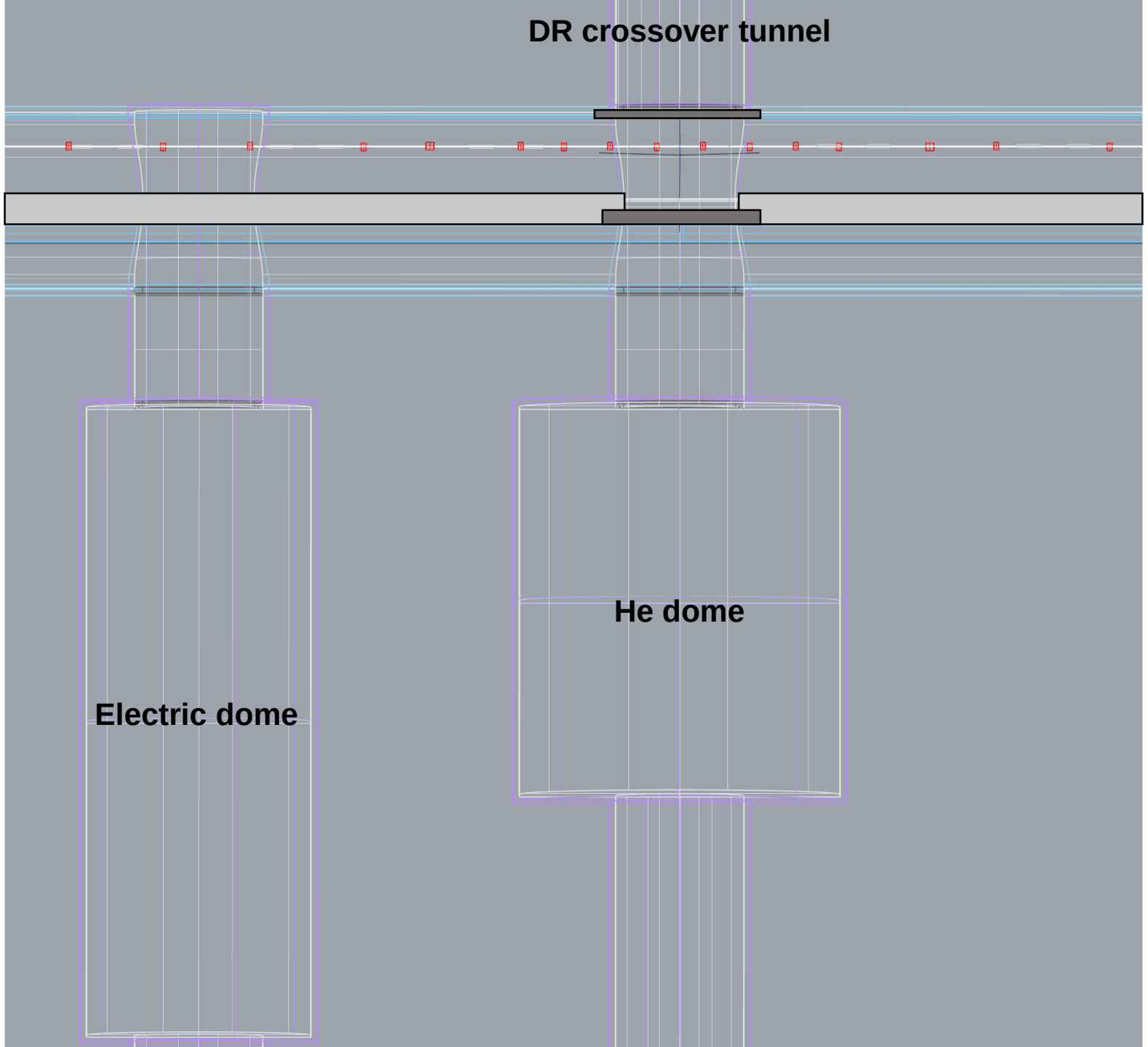
Damping Ring East Straight South Expanded View



Damping Ring West Straight

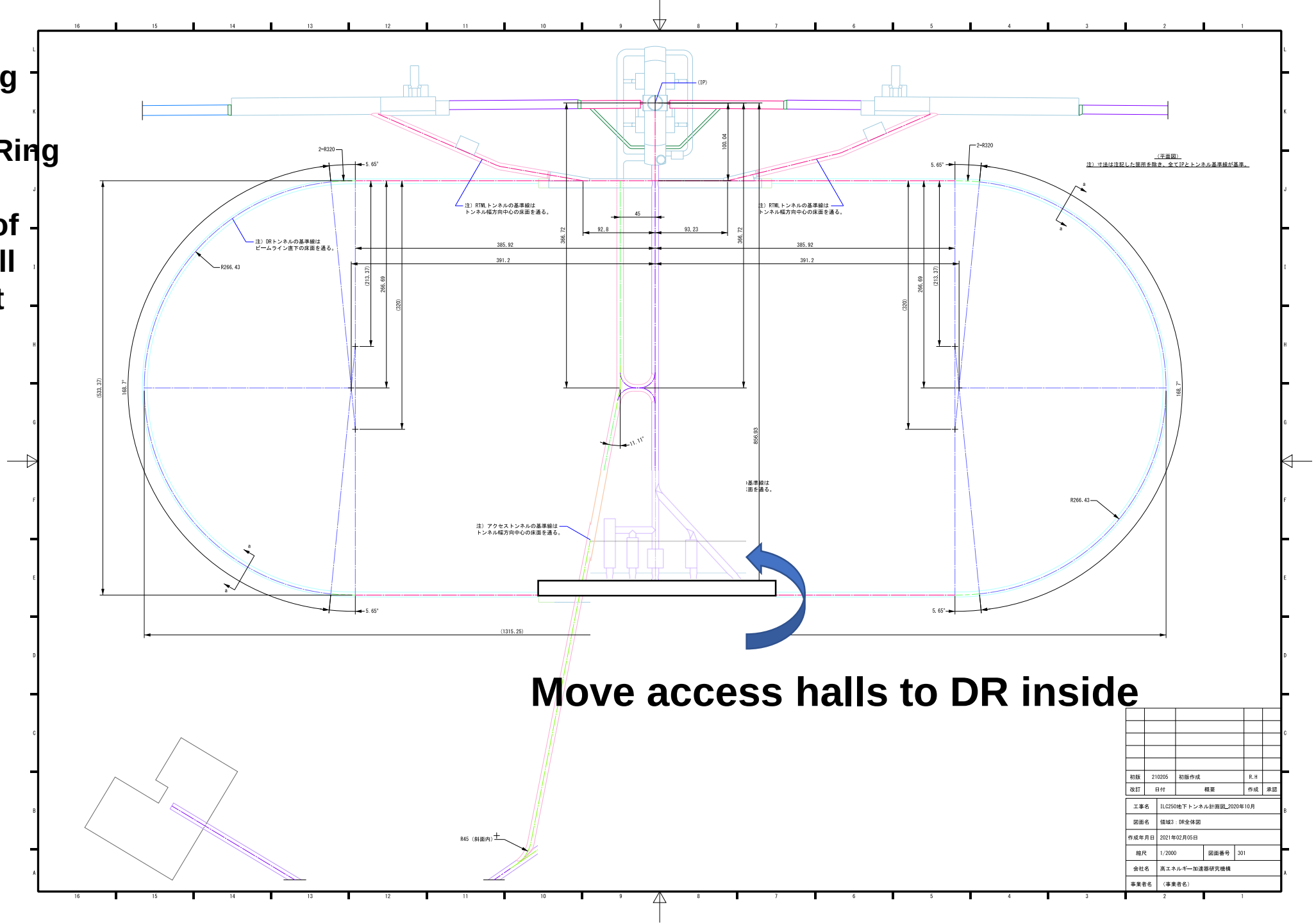


Damping Ring
West Straight
Expanded View



2D drawing of Damping Ring

proposal of access hall movement



Move access halls to DR inside

初版	210205	初版作成	R.H	
改訂	日付	概要	作成	承認

工事名	ILC250地下トンネル計画図_2020年10月
図面名	領域3：DR全体図
作成年月日	2021年02月05日
縮尺	1/2000
図面番号	301
会社名	高エネルギー加速器研究機構
事業者名	（事業者名）

Summary

1. The arrangement of accelerator components and tunnel wall housing were made by 3D-CAD base. And extracting 2D drawing from them for checking interference and tunnel shape.

2. First round of cheking was almost done. More than 14 issues were found, and explained in this report.

3. Feedback to optics deck and tunnel drawings is on-going.

End of slide