IP-BDS area sub-tunnel proposal and progress of the 3D CAD models of ILC

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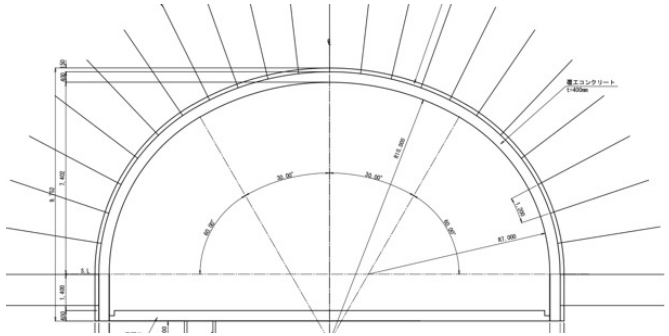
- We propose the BDS sub-tunnel especially for IP-dump area.
- It will be necessary to solve some concerns on this region and be effective for civil work, installation of accelerator and maintenance during the operation.
- The 3D CAD model reflecting recent optics update will also be presented.

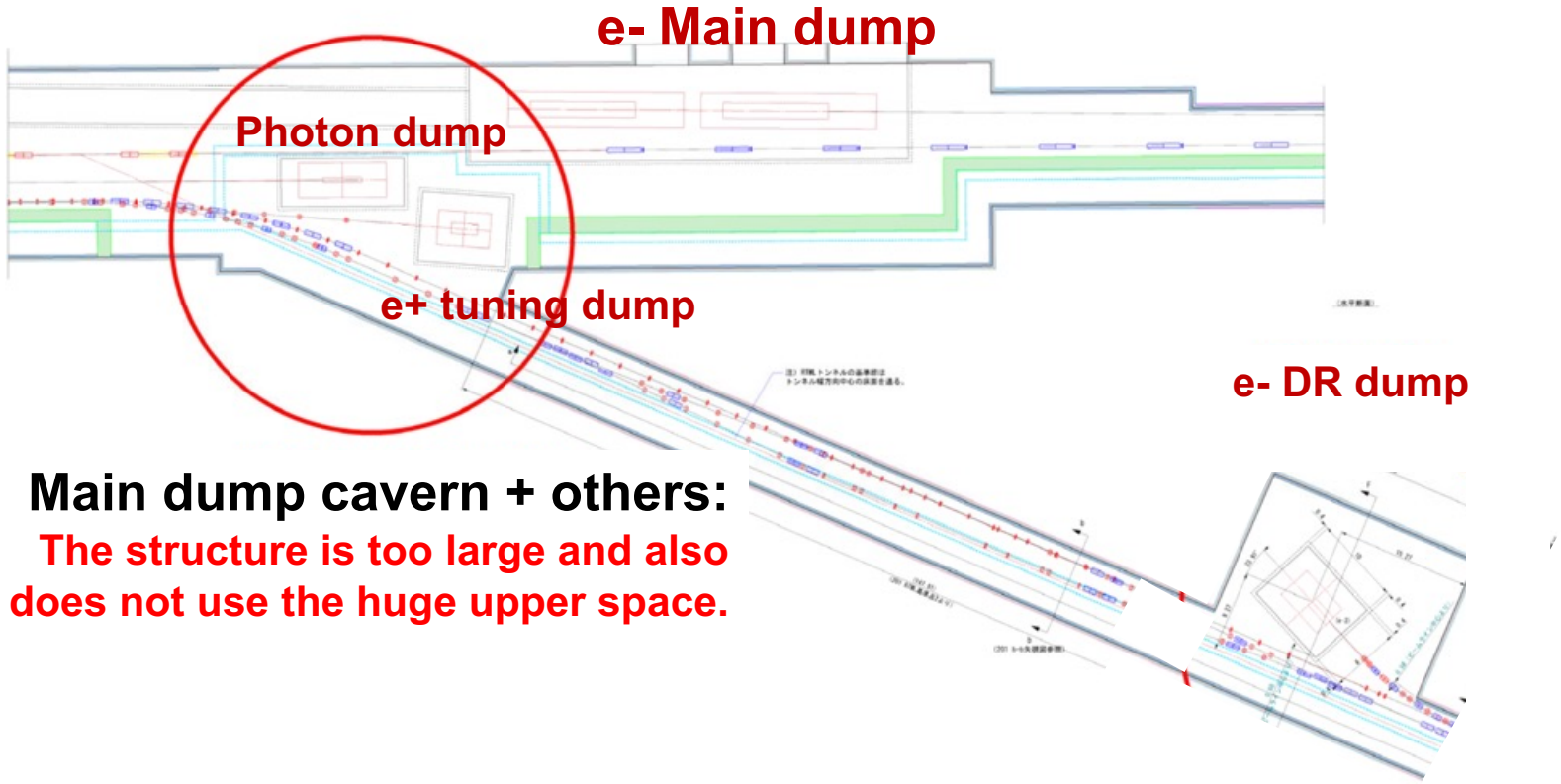
Move the DR a further 100 m away from the IP (1/2)

■ Previous design: Joint section of BDS and RTL/LTR

- Civil engineering concern about the proximity of the LTR/RTL tunnel to large, long cavern for main dump. Many cross-sectional changes should also be avoided.



Should have rounded shape for safe cavern structure.

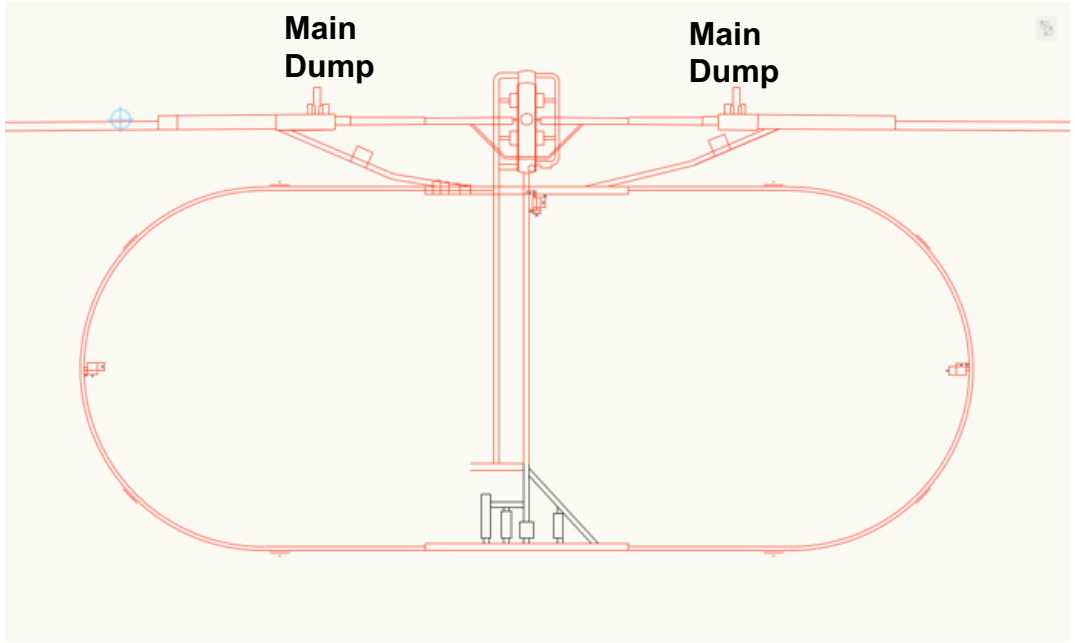


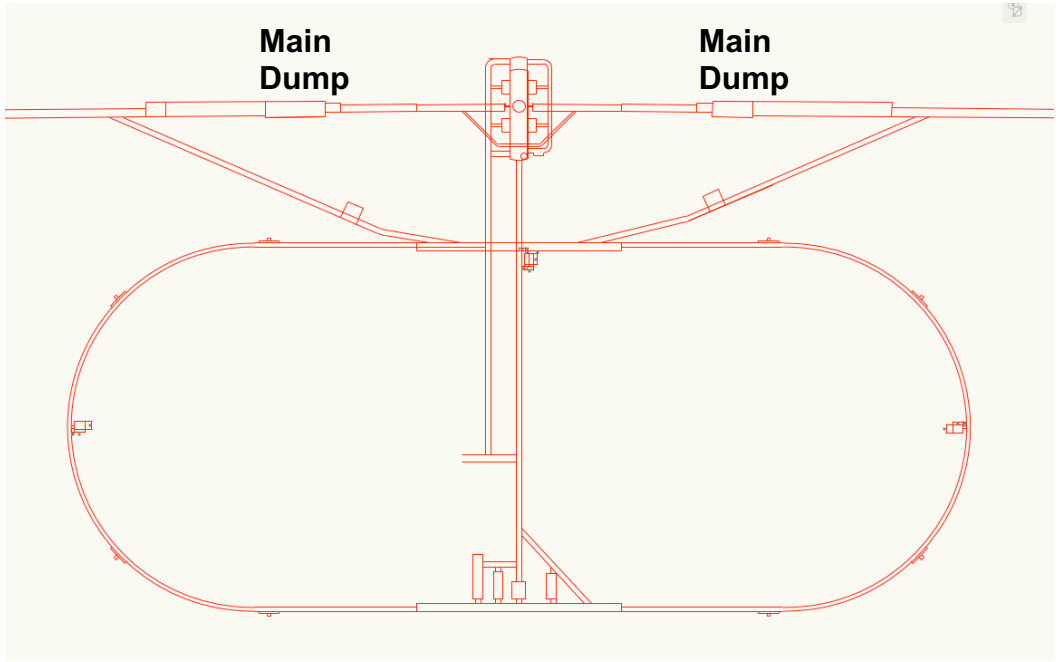
Main dump cavern + others:
The structure is too large and also does not use the huge upper space.

Move the DR a further 100 m away from the IP (2/2)

- It brings a better layout for the joint section of BDS and LTR/RTL
  - Separated from large cavern for the main dump
  - Beam dynamics and collision timing conditions are well satisfied.

K.Kubo in Beam Dynamics session.





Concerns for BDS/dump area – civil engineering

■ Large and long caverns around the main dump

We should avoid activation outside our equipment, *i.e.,* bedrock.

- **4 m-thick concrete shields** for the main dump
- **Iron shield 20 m-long** (e.g.,2mX2mX20m) behind the main dump for secondary muons. If the service corridor is maintained in a continuous position, a tunnel 21 m wide will be required to cover these shield blocks.

■ Wider BDS tunnel

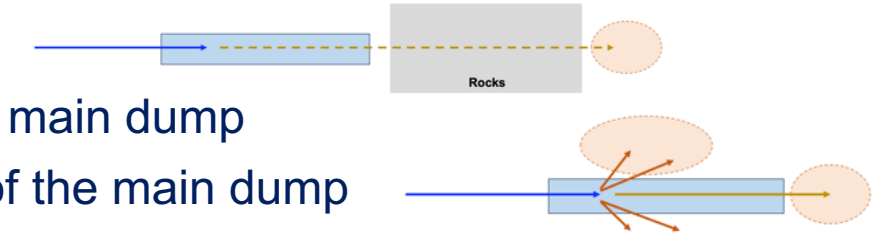
- **Maximum 17 m-wide tunnel** if include a service corridor separated by central shield wall. Tunnel height must be at least 10 m, but no upper space is used.

■ These will result prolong civil works

- Large volume of civil works, but access will mainly be via PM ± 8, 2.4 or 3.5 km away.

Concerns for BDS/dump area – installation and operation

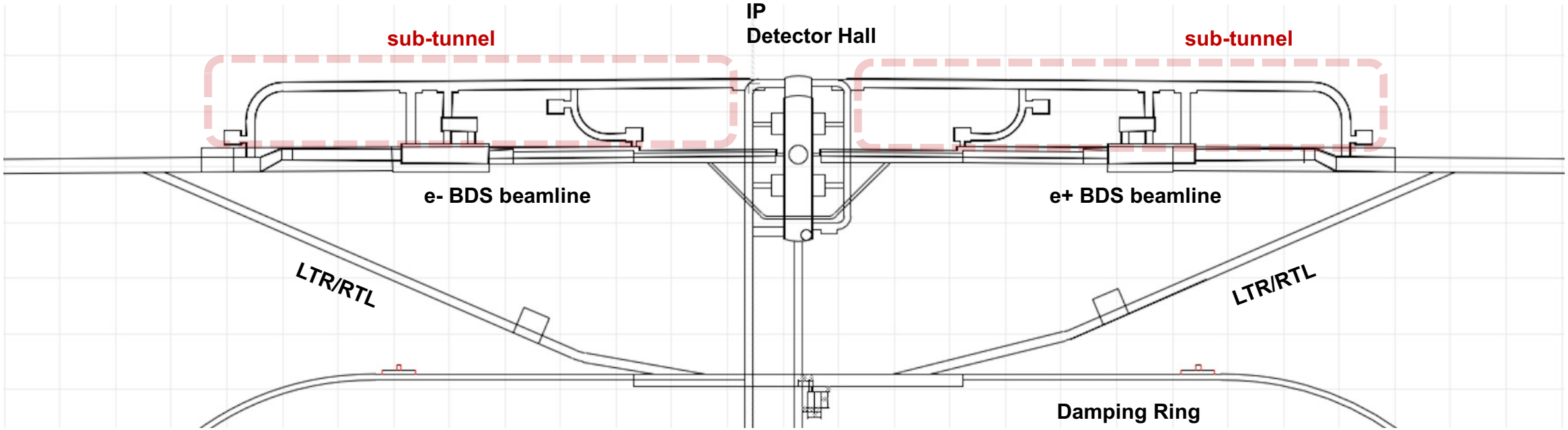
- **Longer installation period for BDS and Main dump**
  - **Only via PM±8**; 2.4 or 3.5 km away. (from IP, will conflict with detector works)
  - **BDS-IP would be after the construction of major part of main dump**
- **Need space and access to equipments**
  - **Utilities for main dump and BDS magnets** (No service corridor from IP to dump)
  - **Laser room for polarimetry** (at the halfway between IP and main dump)
  - **Newly proposed Beam dump experiments**
    - Search for exotic particles: 100 m shield behind the main dump
    - Secandary particle application: Neutron, side or rear of the main dump



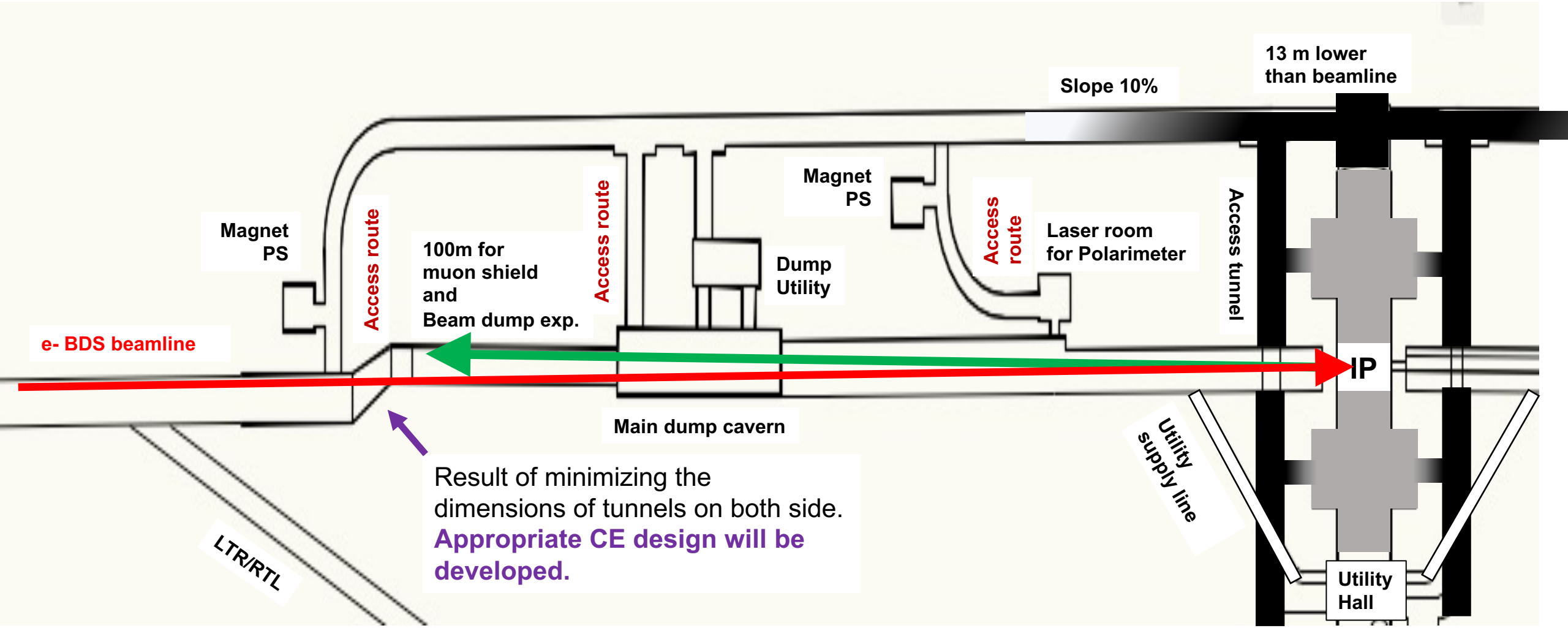
For these reasons, it is desirable to have access routes other than PM 8.

Plan of sub-tunnel from IP to dump section

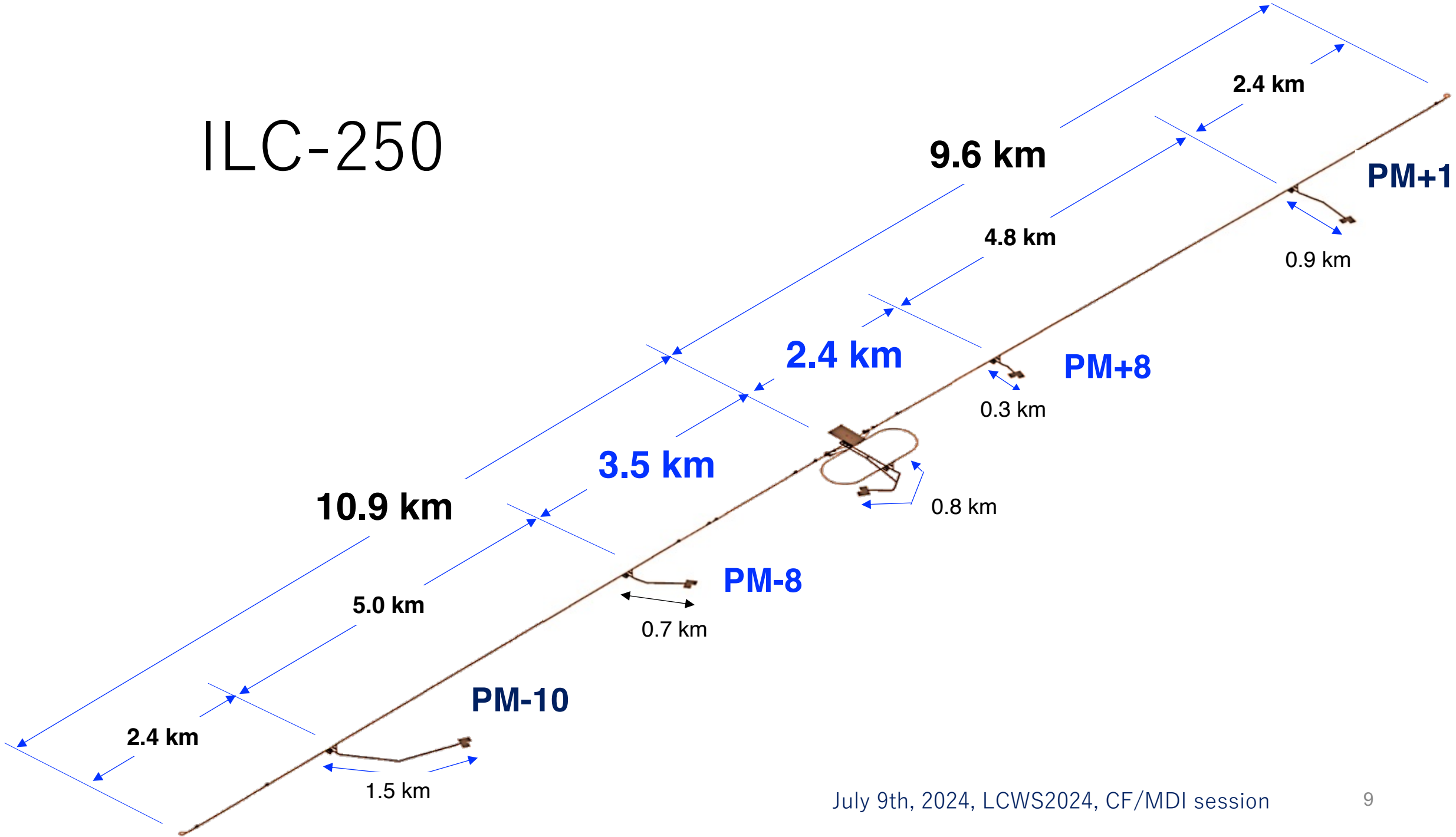
- **Extended from the access tunnel surrounding the DH.**
- **Parallel to the BDS tunnel with several connections to it.**
  - Serves as a delivery route other than PM 8s.
  - Equipment rooms can be located in the middle of connecting tunnels.



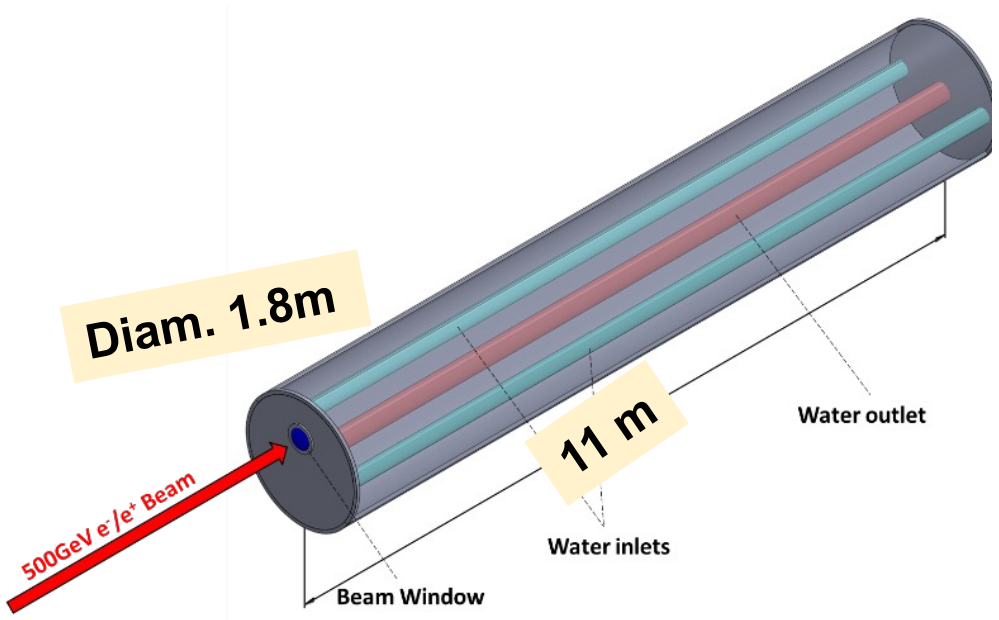
Plan of sub-tunnel from IP to dump section

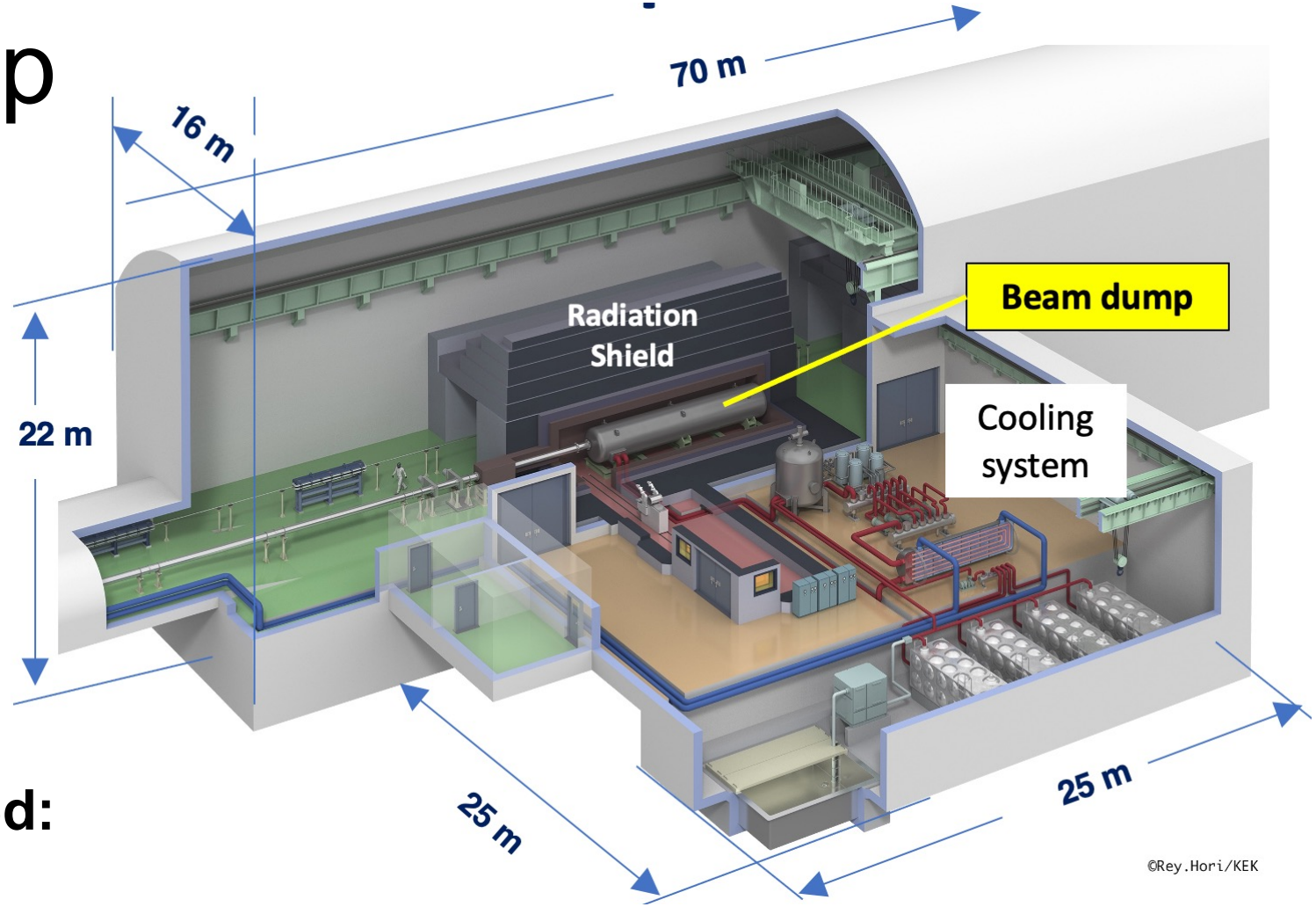


ILC-250


9.6 km
2.4 km
PM+10
4.8 km
0.9 km
2.4 km
PM+8
0.3 km
3.5 km
10.9 km
0.8 km
PM-8
5.0 km
0.7 km
PM-10
2.4 km
1.5 km

Main beam dump





Bigger items to be transported:

- Main dump: water tank
- Radiation shield; concrete blocks (10m or more in length)

This is a conceptual image just arrange the equipment, should be updated with recent layout of tunnels.

Revision of the 3D CAD model

- Revisions were made to reflect the optics work during July to December 2023.

① **Move DR further 100 m away from IP**

- make intersection tunnel design simple for the main dump and RTML
- adjust position of turn around to match the collision timing constraint
- other adjustment for bunch compressor dumps, etc.

② **Extension of Kamaboko-tunnel region for DR straight section**

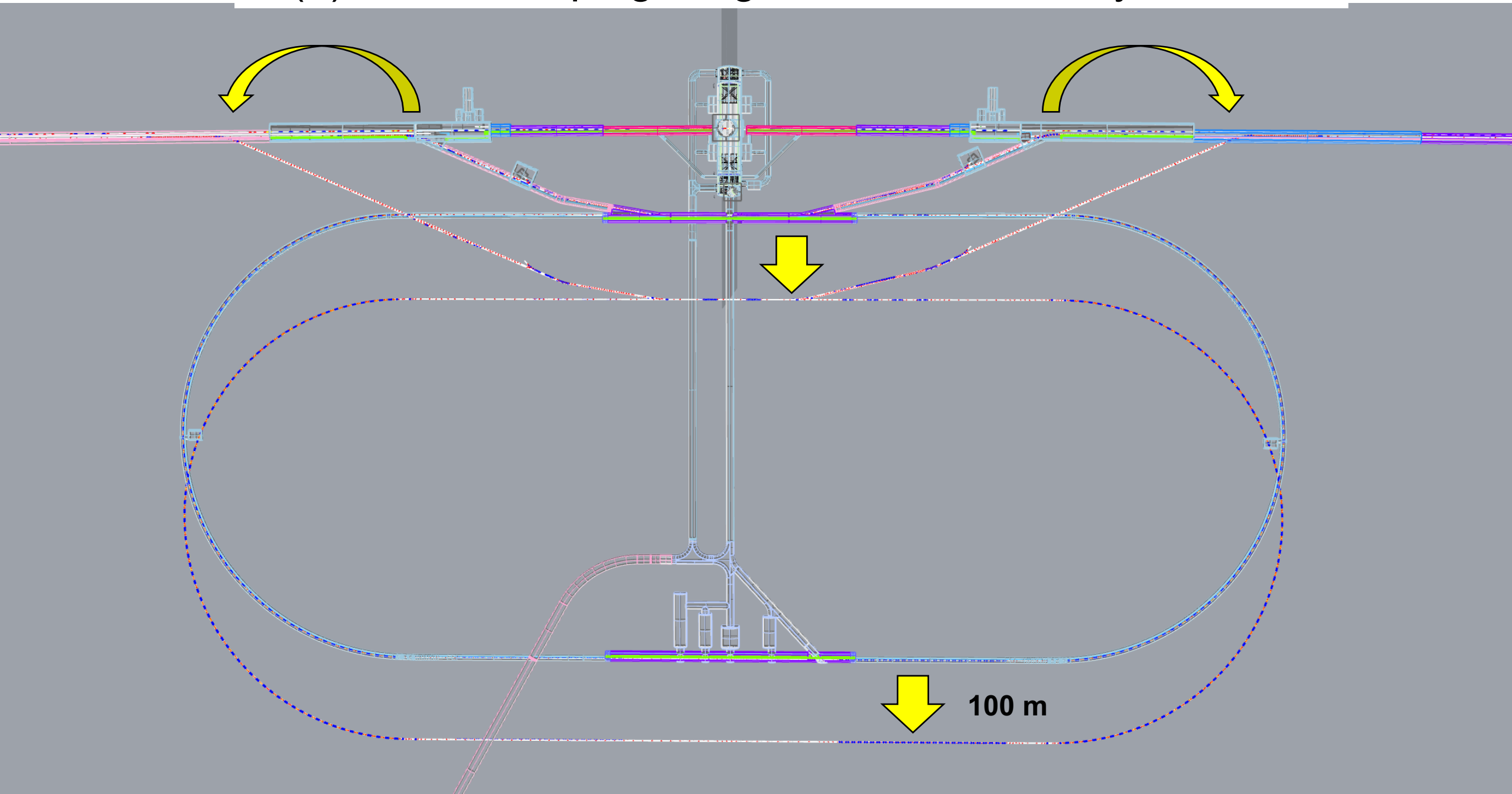
- need more space for magnet power supplies

③ **Update the utility halls for e-driven positron accelerator**

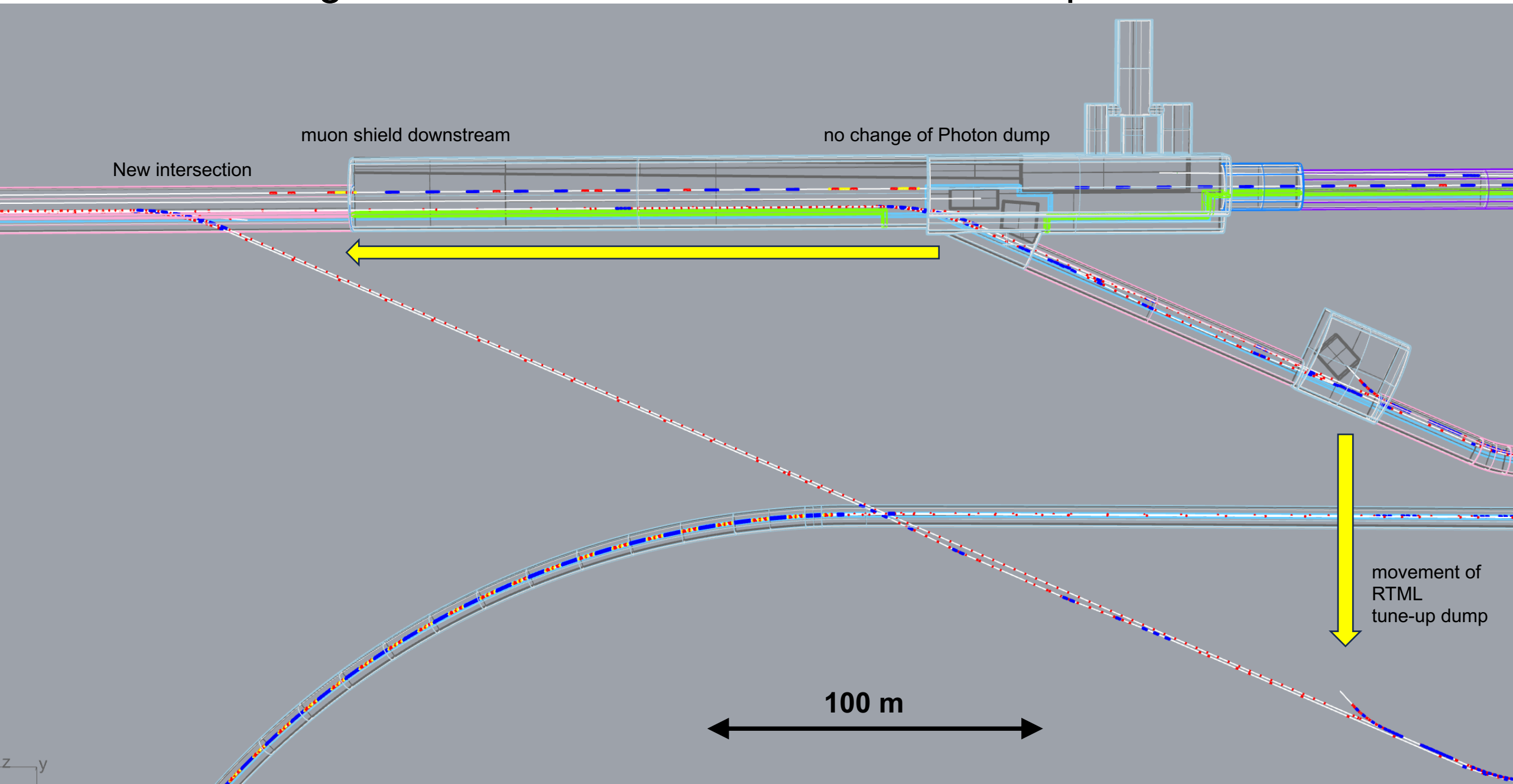
- based on the detail study of the cooling water system, change the size and number of utility halls to accommodate more equipment.

- **BDS sub-tunnel plan will be applied soon.**

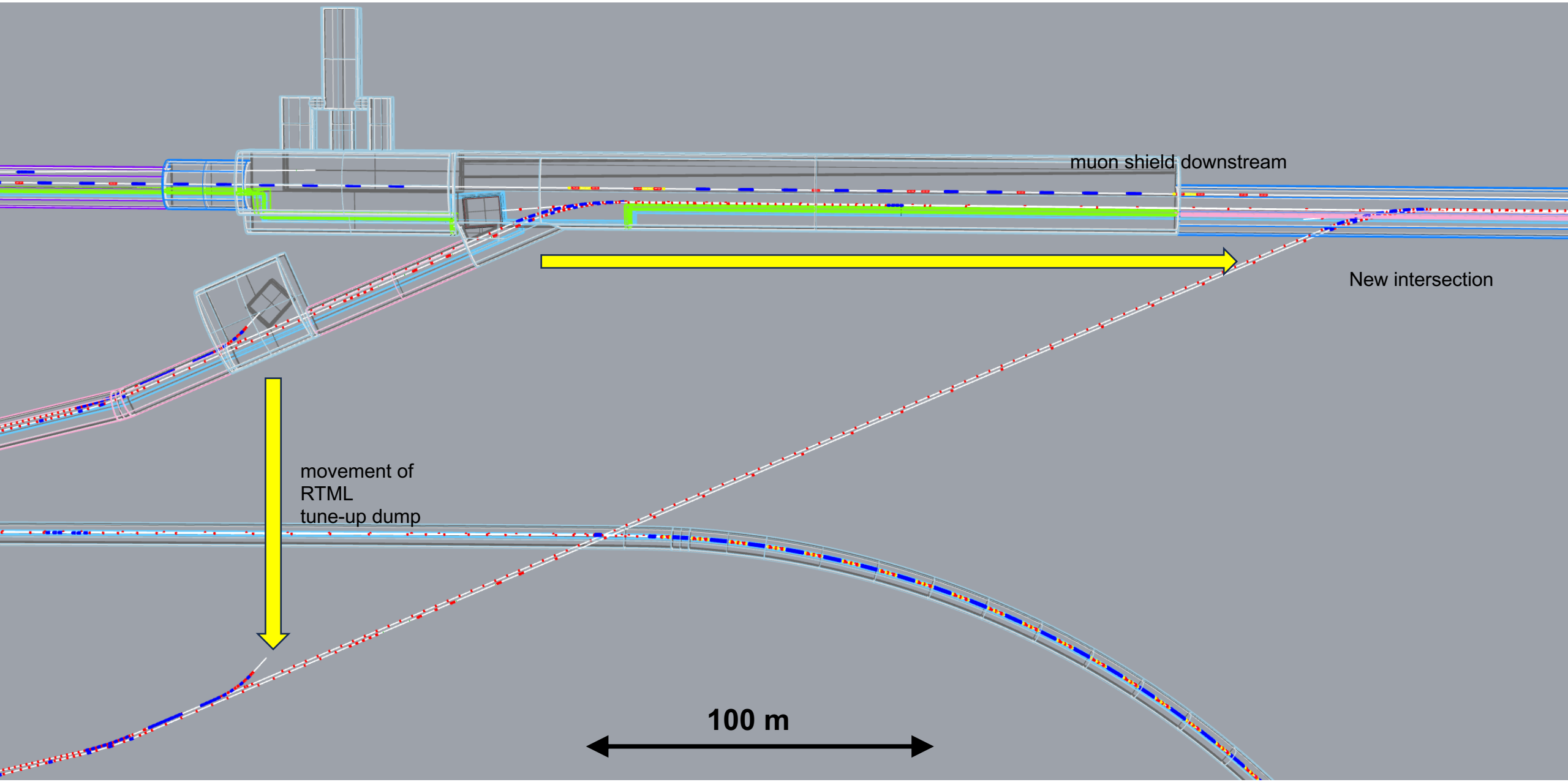
(1) Move Damping Ring further 100m away from IP



Change of intersection at e-BDS: Main dump and LTR/RTML

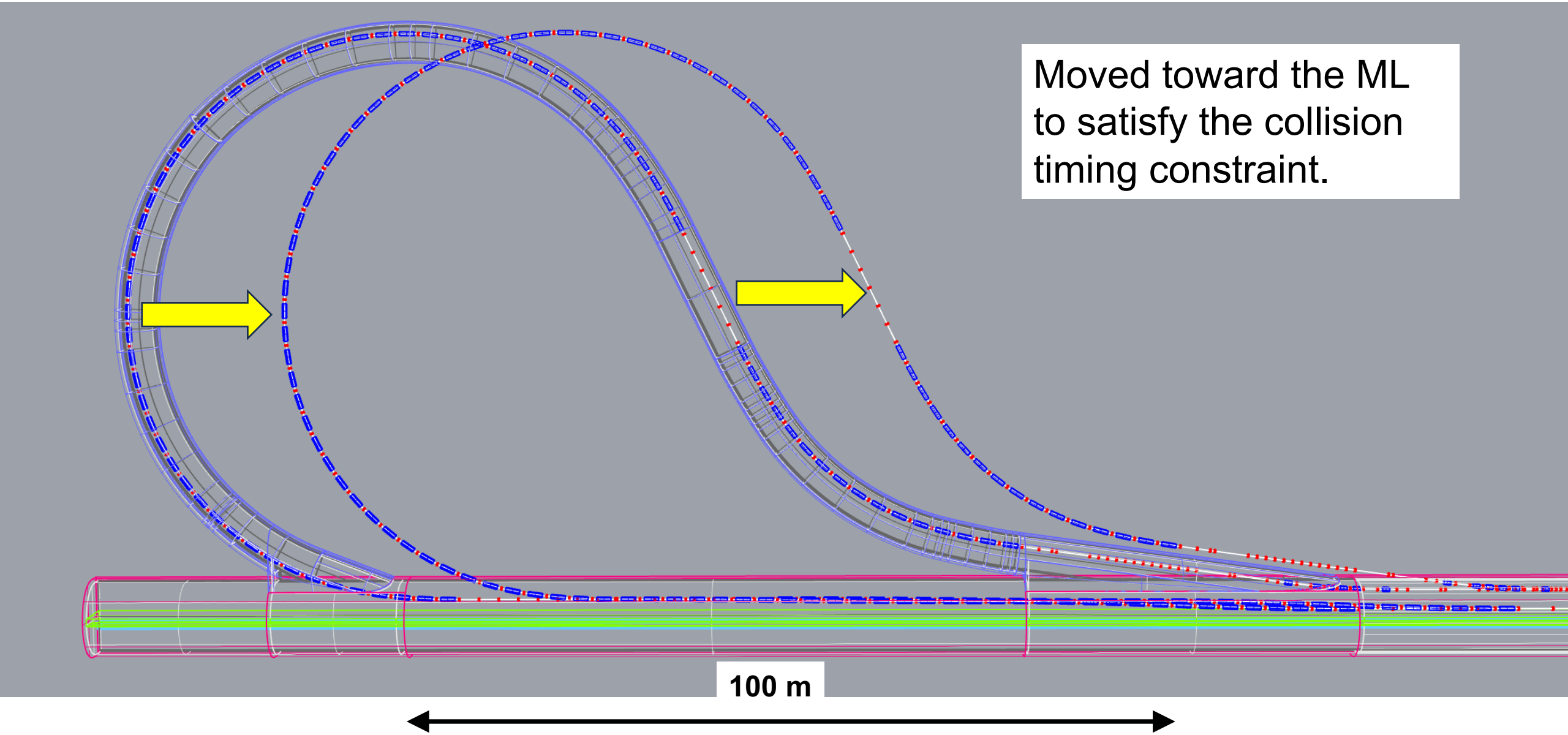


Change of intersection at p-BDS: Main dump and LTR/RTML

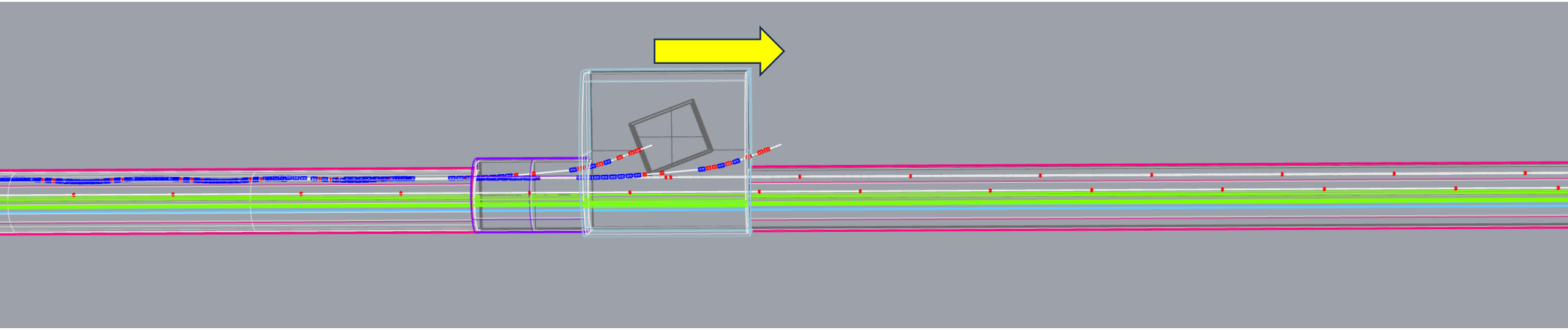


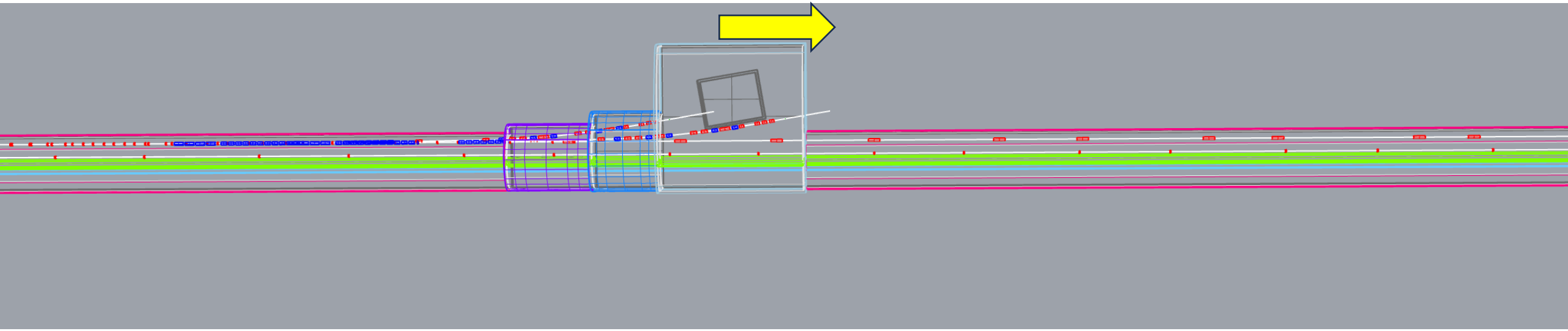
(1) Move Damping Ring further 100m away from IP

Turn around

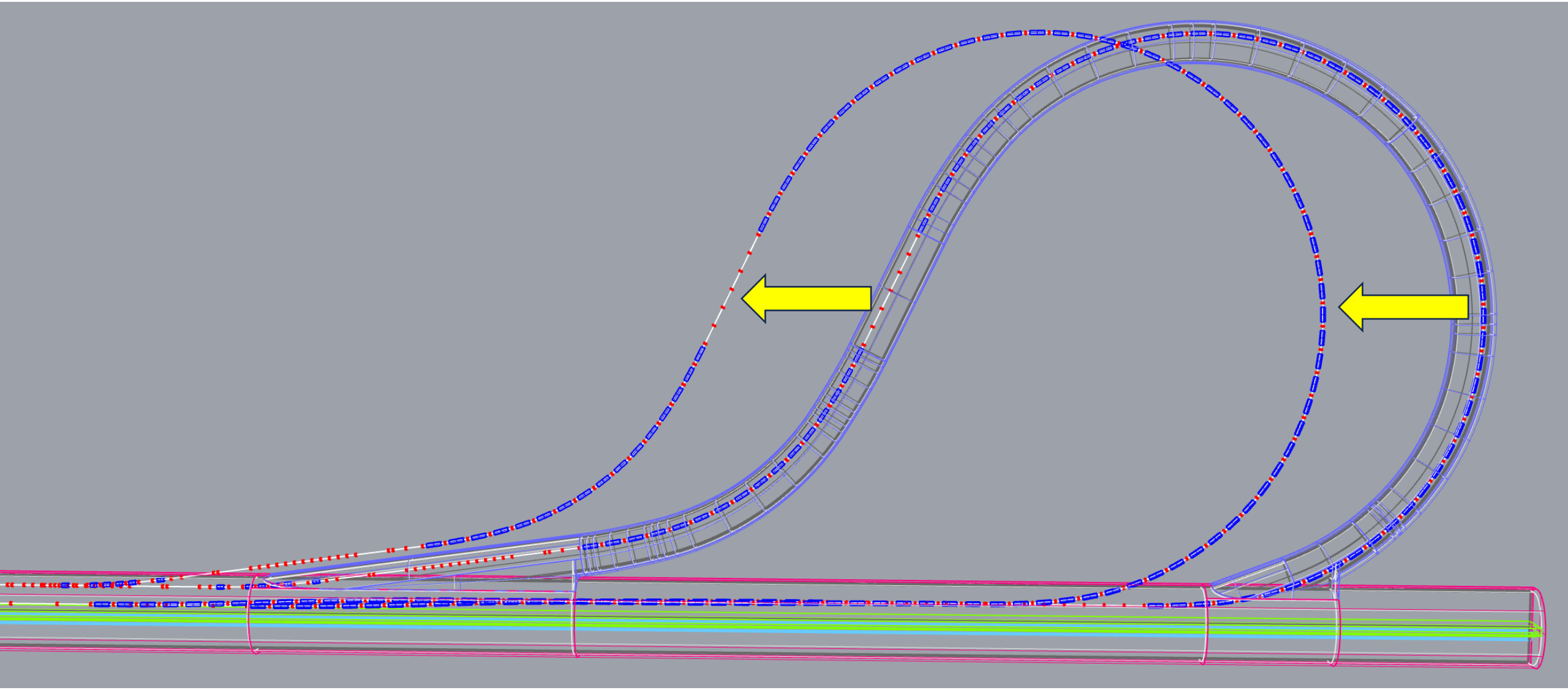


Change of bunch compressor dump halls at electron side



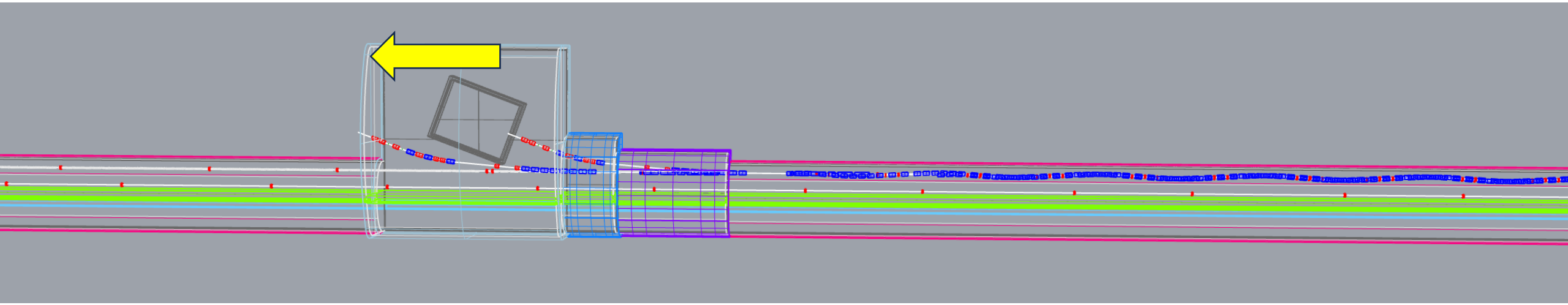


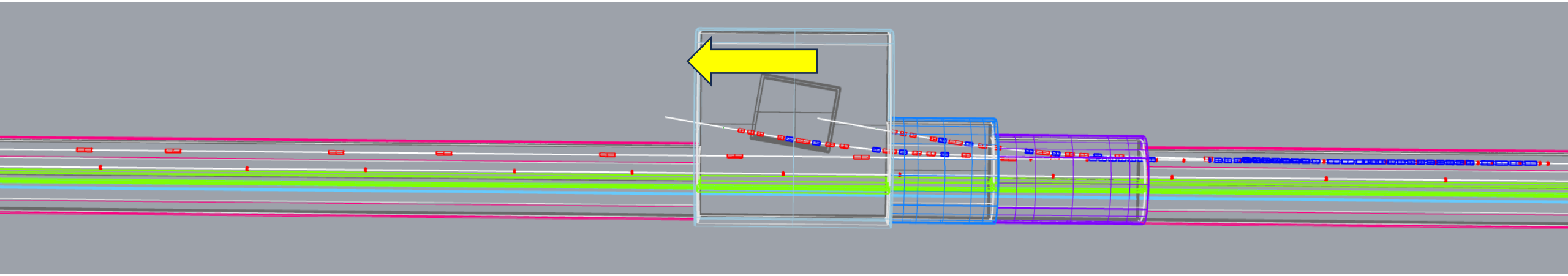
Change of turn around at positron side



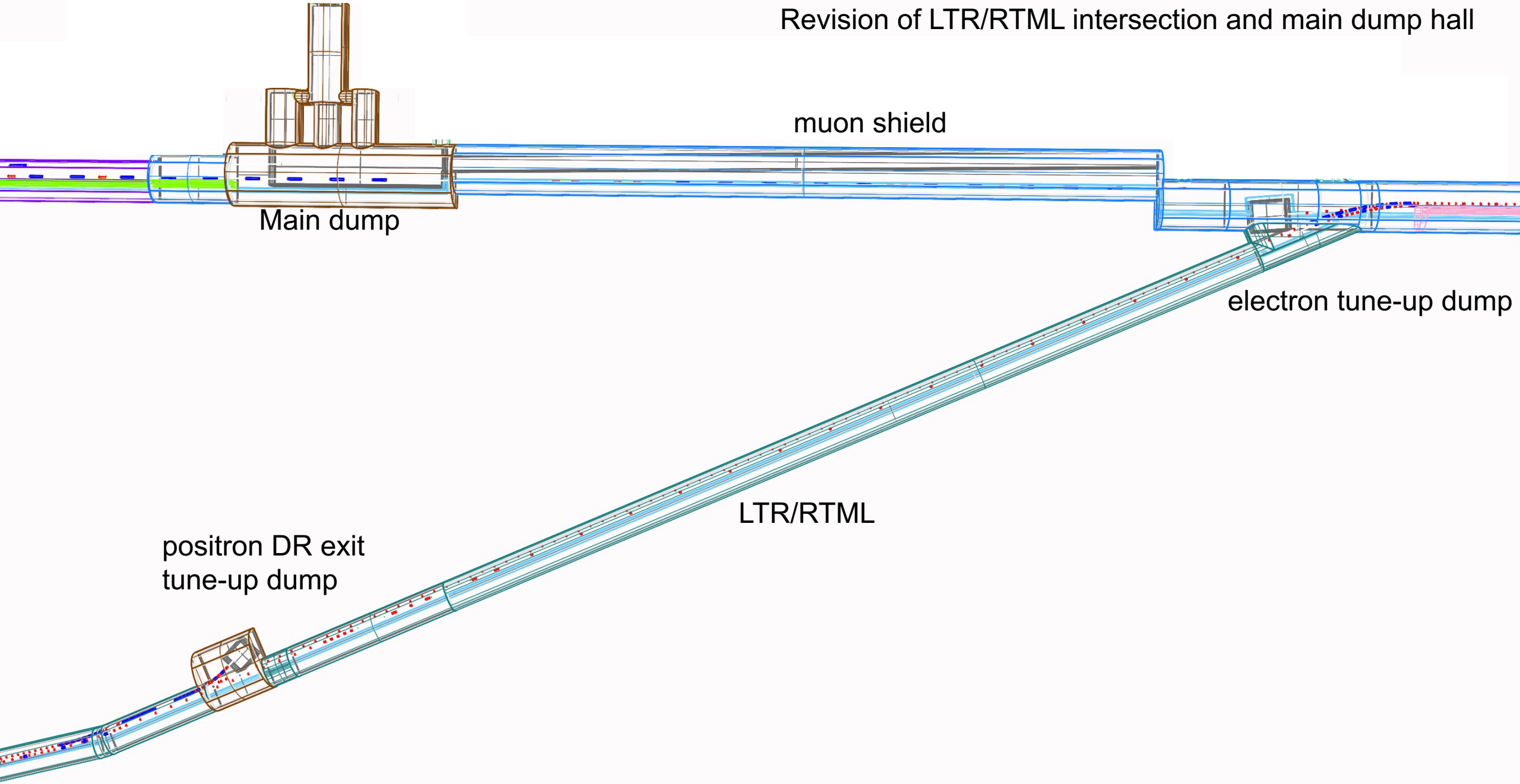
100 m

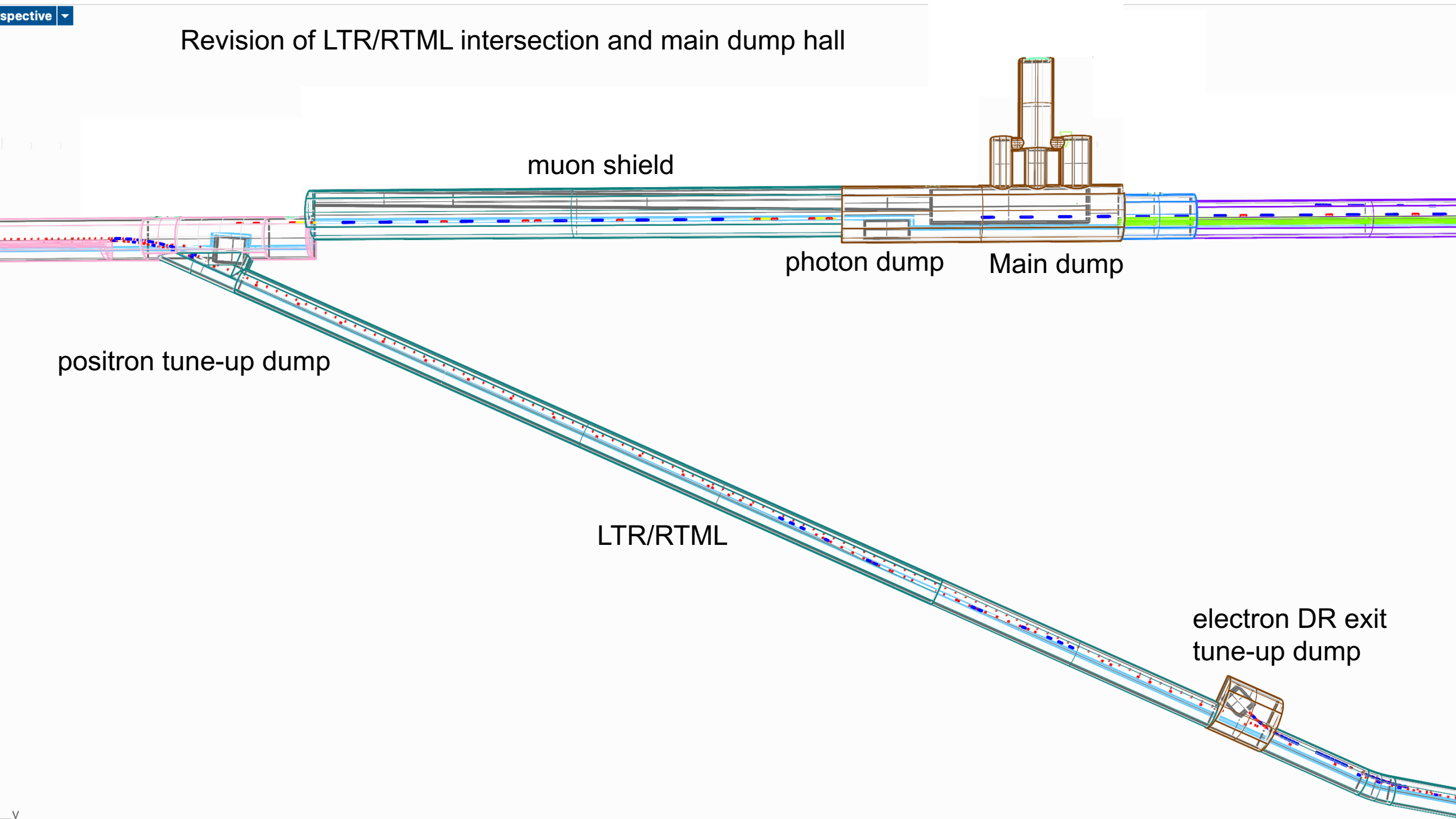
Change of bunch compressor dump halls at positron side



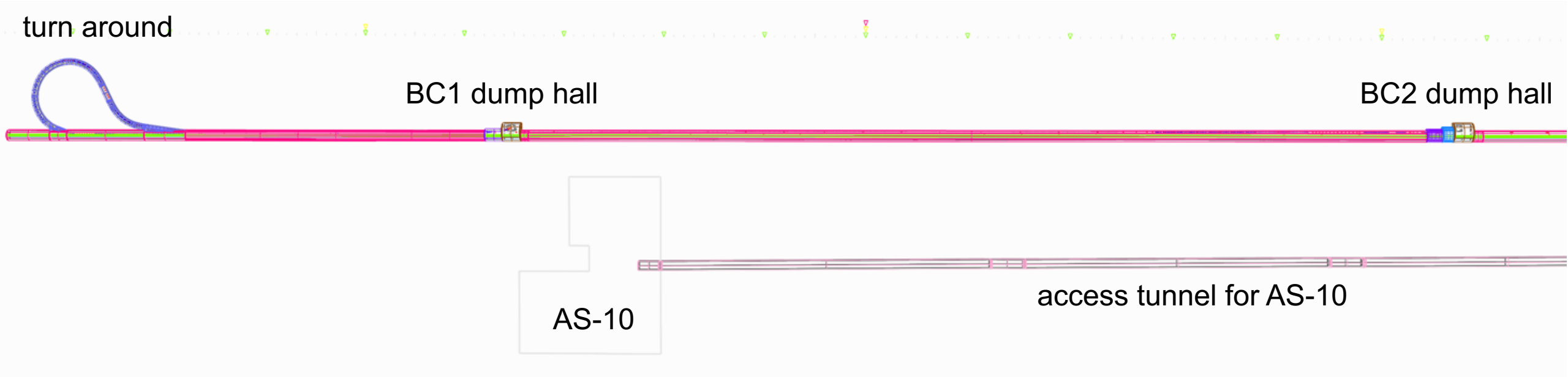


Revision of LTR/RTML intersection and main dump hall



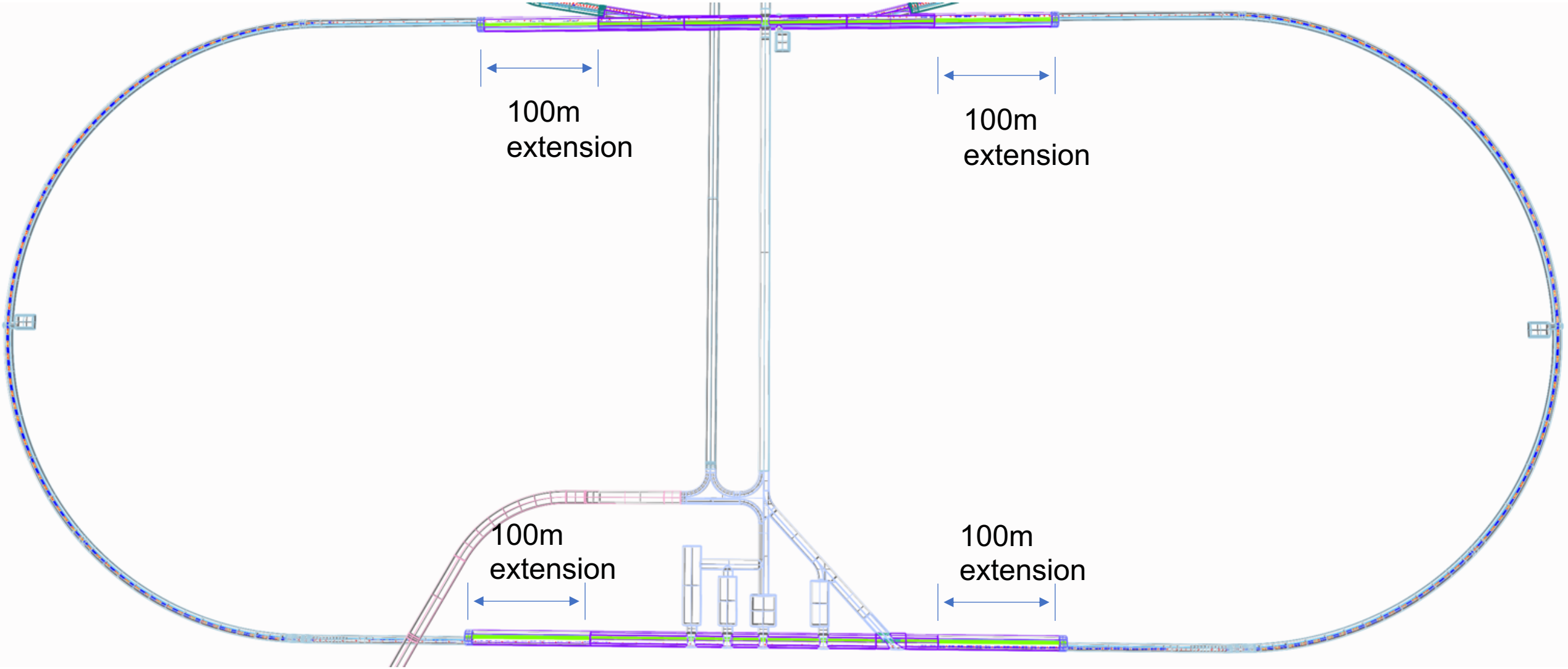

spective
Revision of LTR/RTML intersection and main dump hall
muon shield
photon dump
Main dump
positron tune-up dump
LTR/RTML
electron DR exit
tune-up dump

Revision of turn around, bunch compressor dump halls at electron side

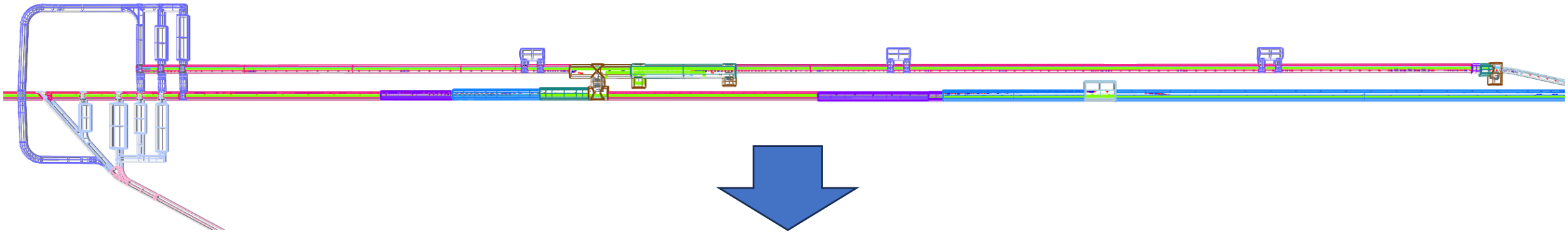


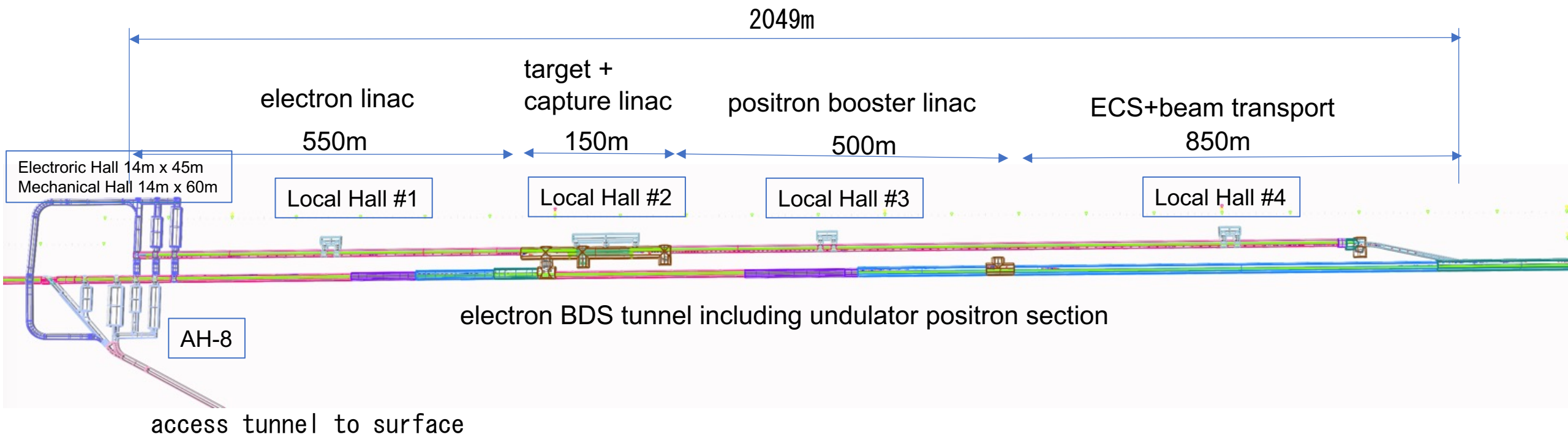
Revision of turn around, bunch compressor dump halls at positron side

(2) 200m extension of Kamaboko-tunnel region at Damping Ring streight section.



(3) Change size and numbers of local equipment halls in e-driven positron accelerator tunnel.





Summary

- We proposed the BDS sub-tunnel especially for IP-dump area to solve some concerns on this region.
- It will be effective for the civil work, installation of accelerator compornents.
- It also can be used for works during the operation.
- The 3D CAD model reflecting recent optics update are presented.

End of file