

Positron BDS tunnel

Toshiyuki OKUGI, KEK

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ILC-CRWG meeting, KEK

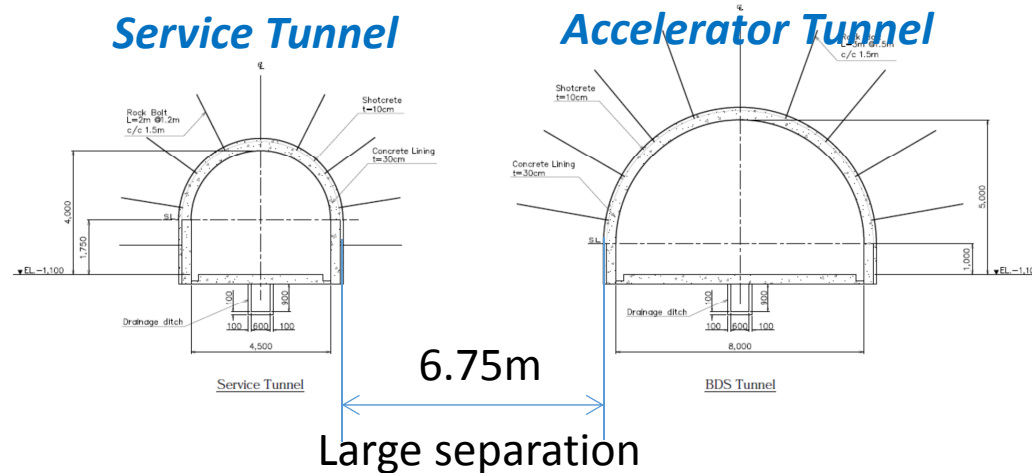
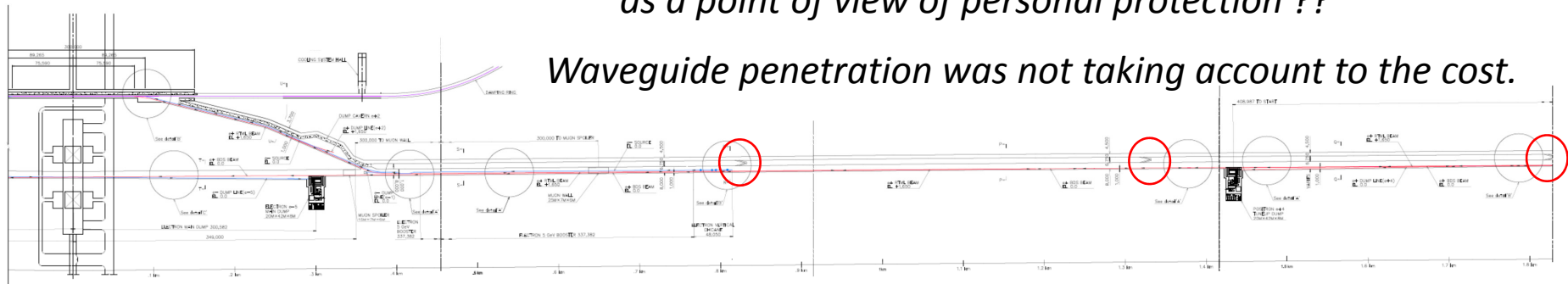
TDR positron BDS tunnel

Basic design of BDS tunnel is twin tunnel.

Access tunnel was every 500m in drawing (not counting to cost).

- Do we need more access tunnel
as a point of view of personal protection ??

Waveguide penetration was not taking account to the cost.

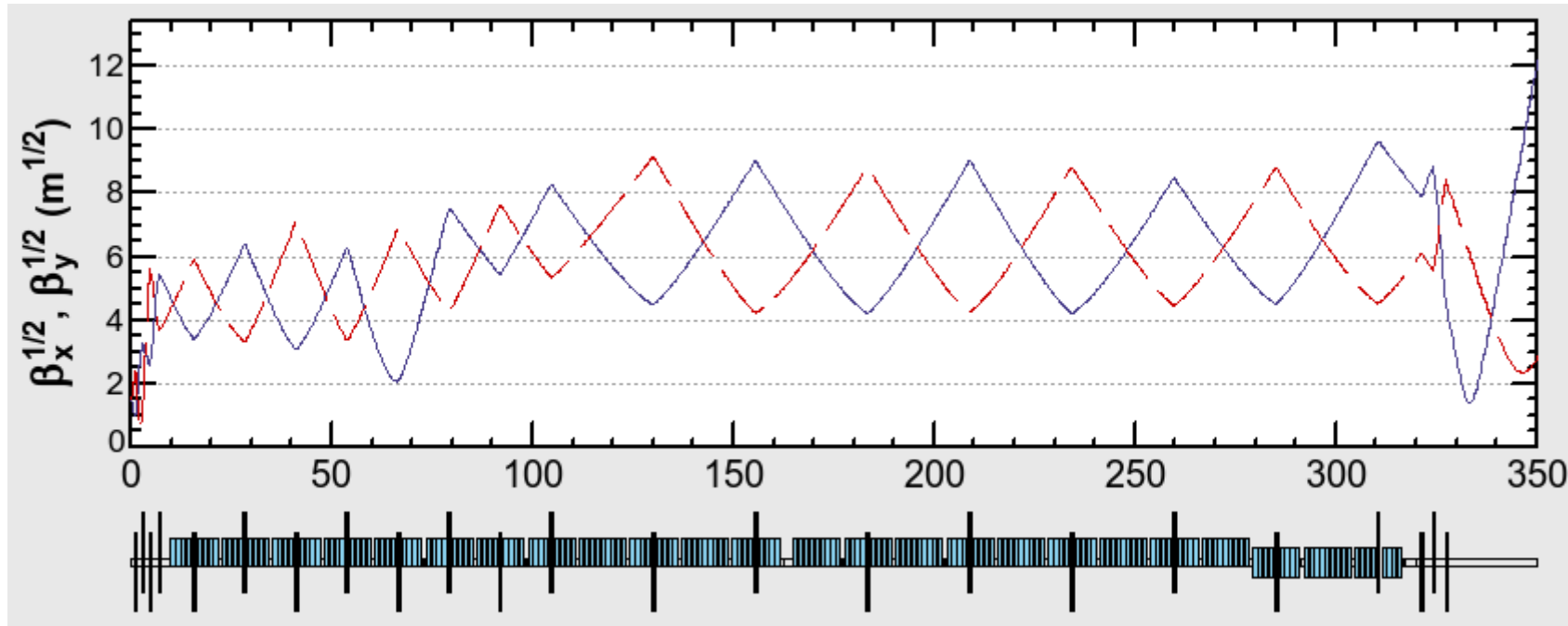


The cost of access tunnel and wave guide and cable penetrations are expensive.

Can we make the BDS tunnel Kamaboko tunnel as ML tunnel ?

Electron Source

We should take account the electricity, cooling water and **cold mass** for this section.



Electron Booster Linac

8 type A cryomodule (1 for backup)
16 type B cryomodule (2 for backup)

Operated with 27-28 MV/m

Electron gun

The electricity of electron gun and laser system

- **8 waveguide penetrations**
 - **The access tunnel every 250m (compatible to cable haul)**
- for TDR (Revised) evaluation**

Tunnel Cross-section of Positron BDS

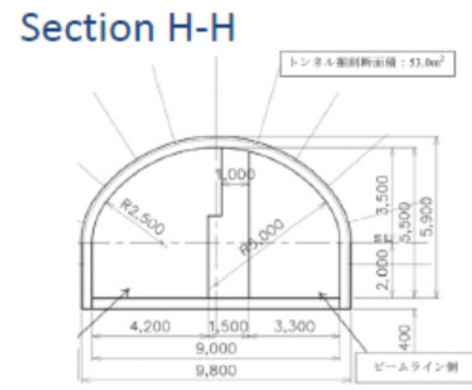
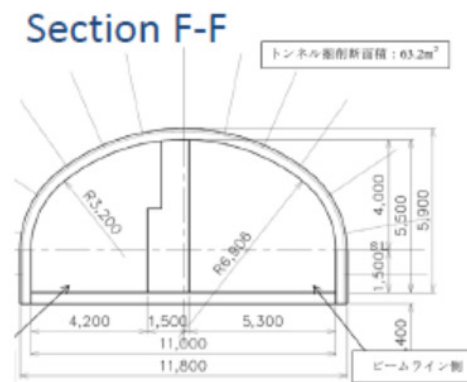
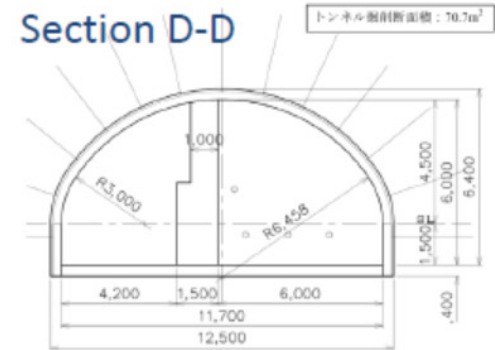
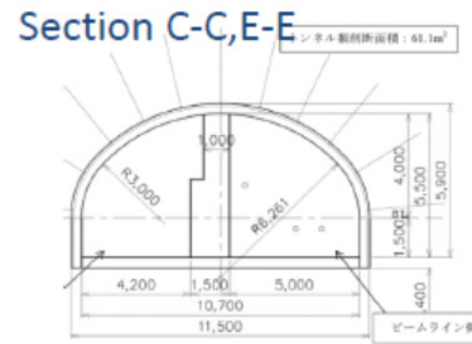
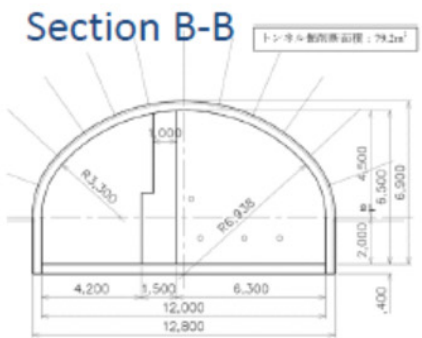
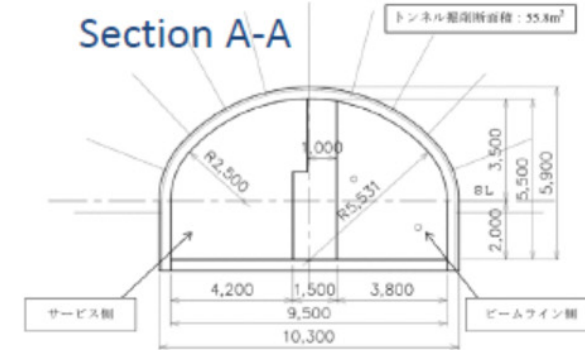
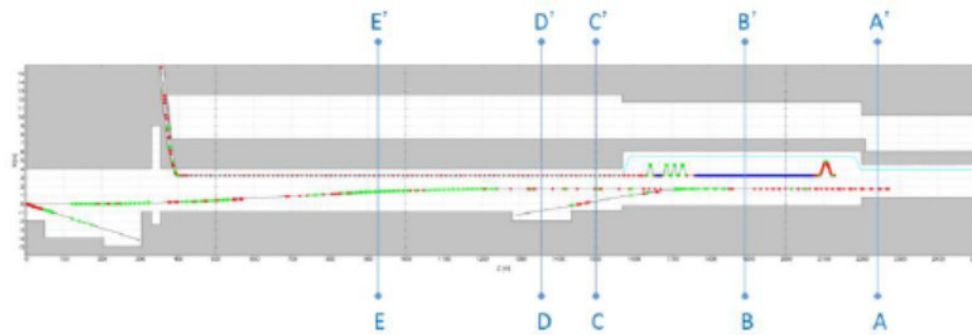


図 4.14 10-H断面

Assumed as 1.5m thickness shield & 4.2m width service tunnel

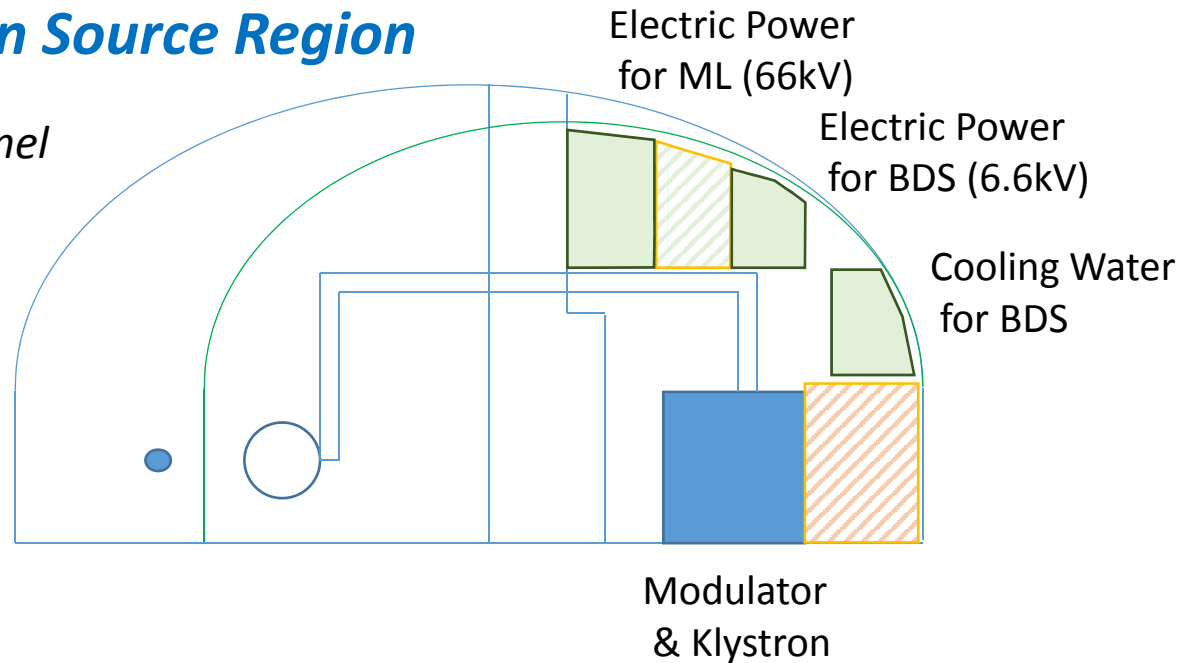
drawn by M. Miyahara & J-power Co., Ltd.

Kamaboko Tunnel for BDS section

BDS tunnel for Electron Source Region

The devices in service tunnel is same to ML

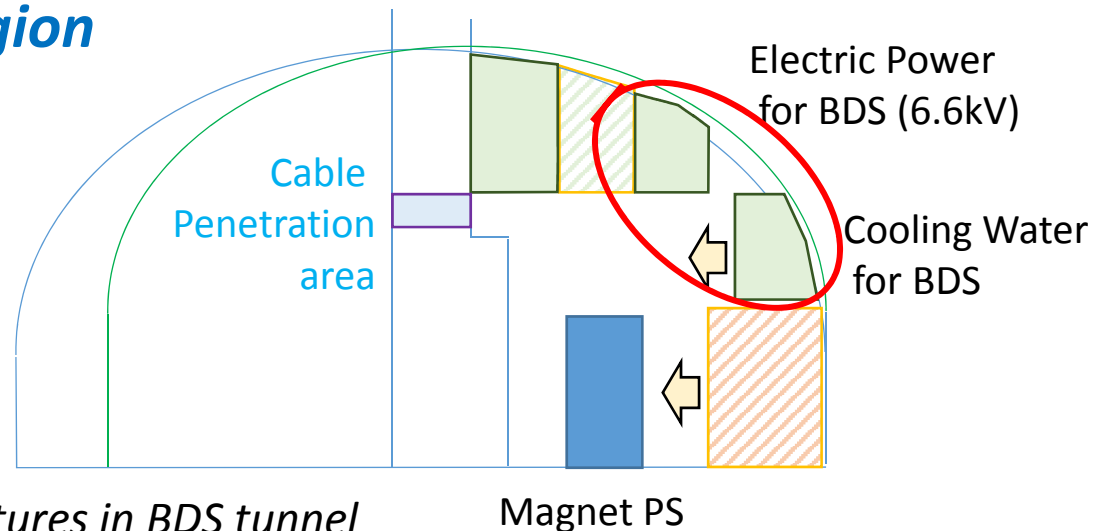
Same tunnel width is required to ML.



BDS tunnel for Other Region

We only put the magnet PS and electronics for monitors.

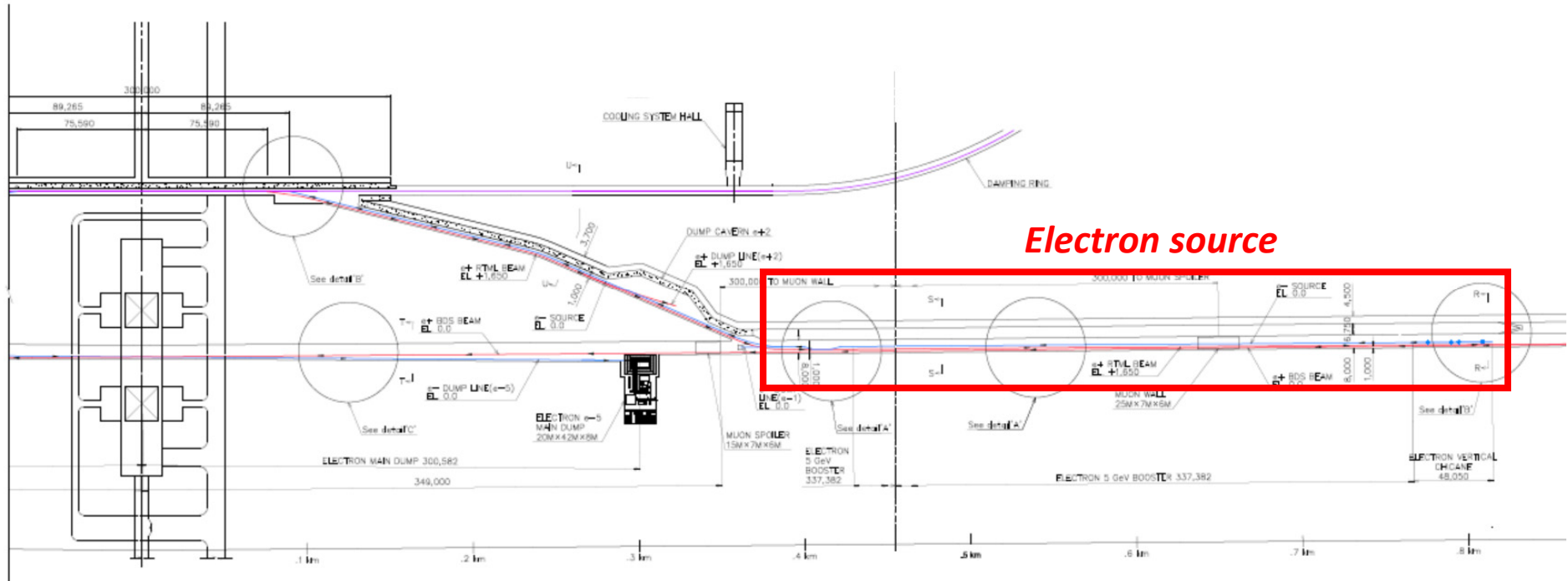
Possibility to shorten the service tunnel width.



Depends on the amount of infrastructures in BDS tunnel

Electron source (TDR design)

We have an electron source in positron BDS tunnel.



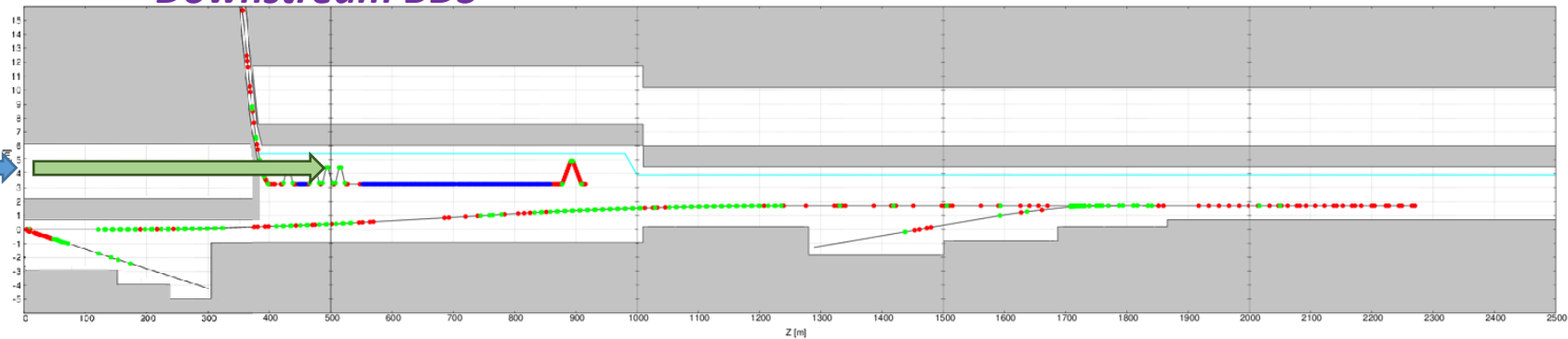
It is very important to design

- where to put the helium cold box and compressor.
- how to transport the 2K helium to cryomodule of electron source.

Where to put electron source ?? (1) - Cryomodule

We have 2 candidates of Kamaboko positron BDS tunnel.

Downstream BDS



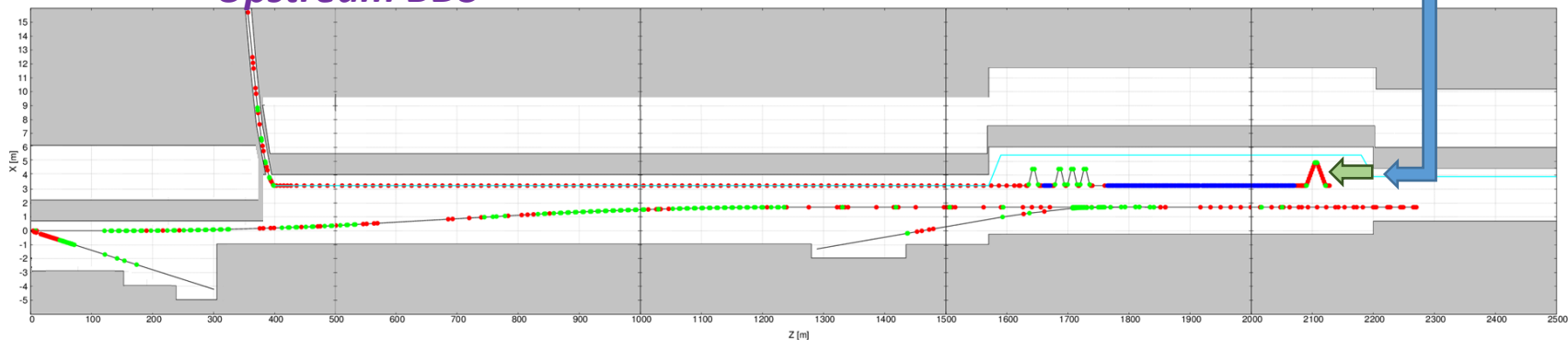
Detector Hall

Helium cold mass is put to detector hall,
and transport with about 500-600m helium transport line

ML compressor hall on GL
ML cold box cavern

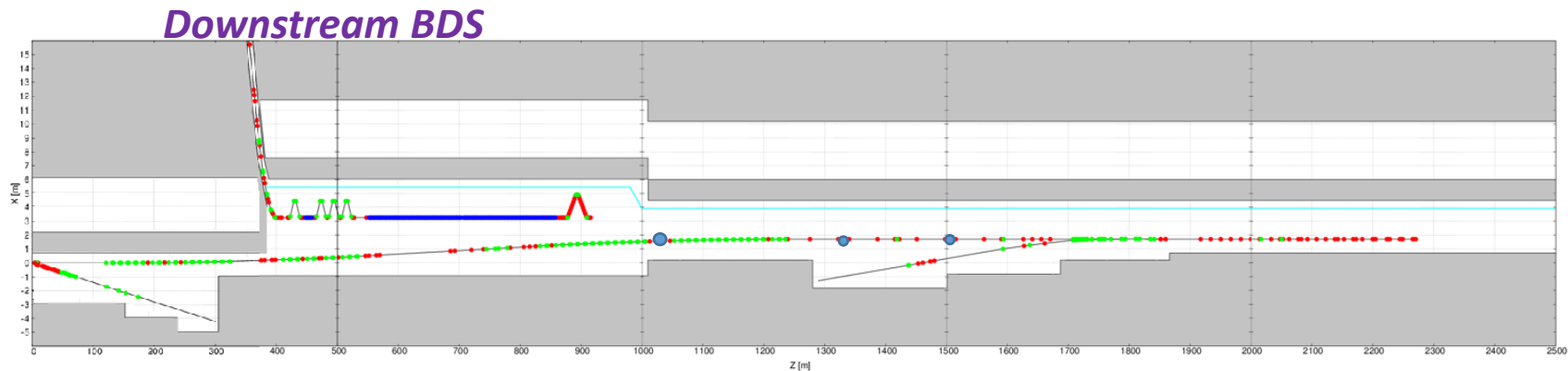
ML access tunnel

Upstream BDS



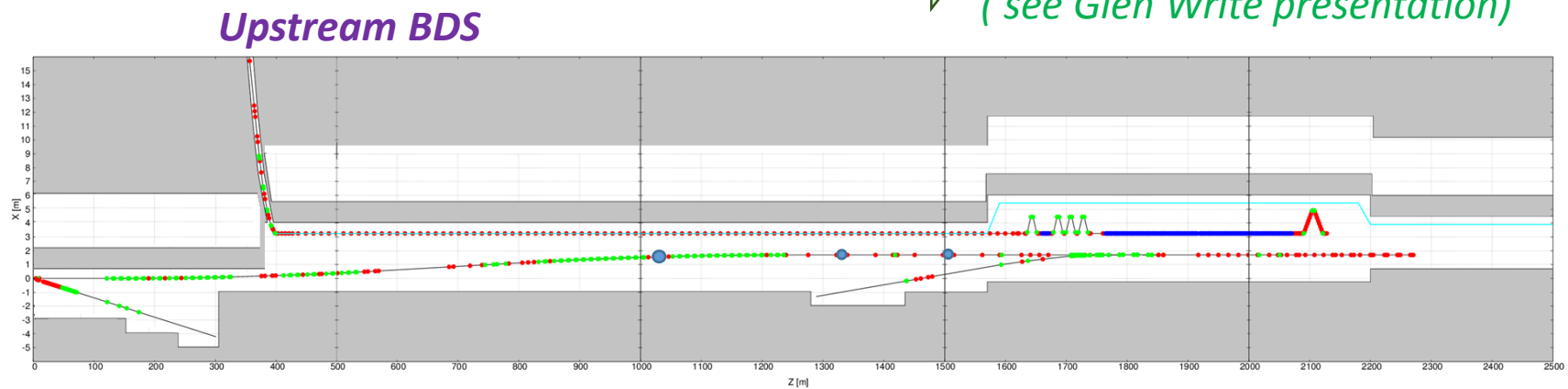
Helium cold mass is put to ML access tunnel as well as main linac,
and transport with less than 100m helium transport line

Where to put electron source ?? (2) - Background



*Electron source of cryomodule is located after BDS collimator.
Tunnel cross section after collimator is large.*

➡ *may be OK by using donuts spoiler
(see Glen Write presentation)*

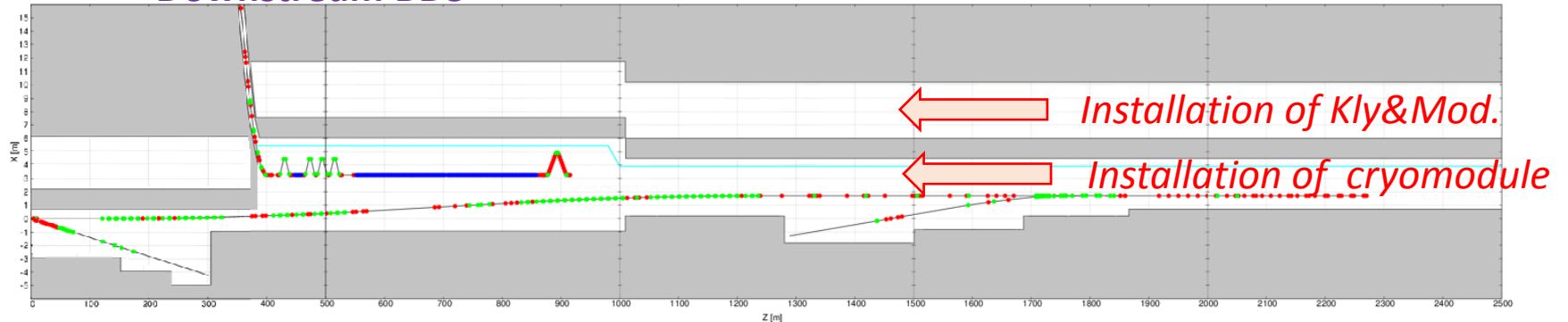


*Electron source of cryomodule is located before BDS collimator.
Tunnel cross section after collimator is smaller.*

Where to put electron source ?? (3) - Cost

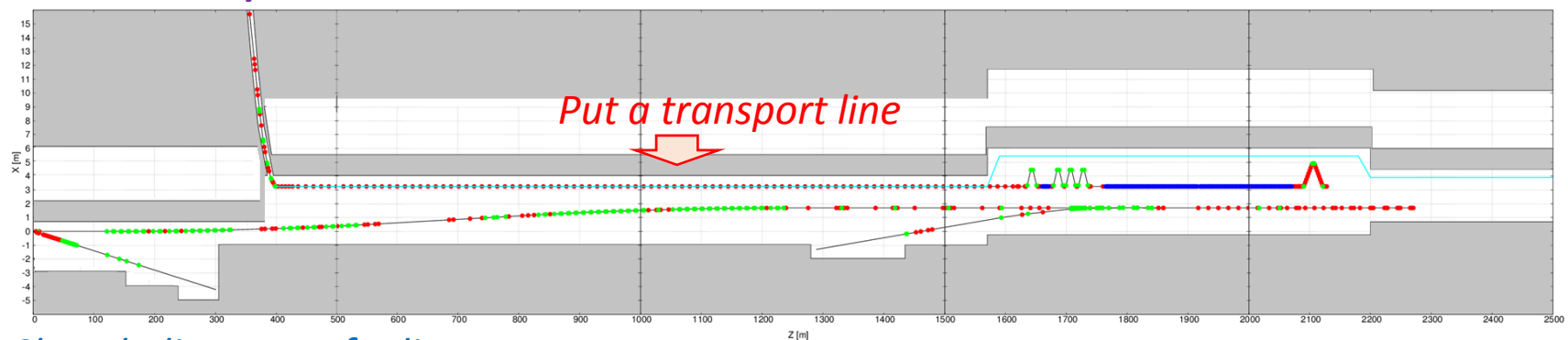
Tunnel cost by assuming 4.2m service tunnel for both schemes are almost same.

Downstream BDS



- Long helium transport line.
- No electron transport line.
- Difficult to reduce tunnel width for RF devices and cryomodule installation.

Upstream BDS



- Short helium transfer line.
- Need an electron beam transport line.
- Have a possibility to reduce the tunnel width for no SC devices after electron source.

Summary of positron BDS tunnel

BDS tunnel from ML to LTR

Twin tunnel => Kamaboko tunnel

- Easy to make penetration and access tunnel

BDS tunnel from LTR to Detector Hall

Single tunnel => Kamaboko tunnel

Make a access tunnel from detector hall to BDS service tunnel

- To make the path of electric power line etc.
- To make emergency exit through service tunnel
- To make a access path for small equipment
- To make LTR tunnel compact by putting LTR PSs to BDS tunnel

Move an electron source to upstream

- To be able to use ML compressor to cold box areas
- To make the Helium transfer line shorter.
- Have a possibility to make narrower BDS tunnel width

Demerit

- Need a electron source transfer line.

But, the cost of transfer line is comparable to Helium transfer line.

Electron gun

Access policy to laser room area for E-gun ?

- Should we access to the laser room in operation.
- If so, we should take care of the access path to the laser room.