Works for the CFS detailed design

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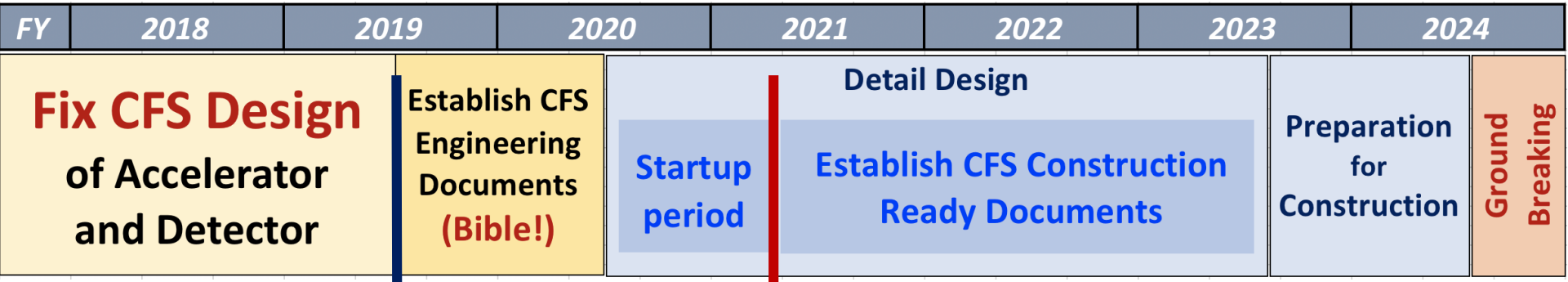
July 24, 2018, TCMB meeting

- We presented **the CFS timeline on "Pre- and Preparation Phase"** in ALCW2018, Fukuoka.

- It assumes followings.
  - **Positive signal by government in this year**
  - **It will initiate the process of funding in 2019 for preparation phase.**
  - **Then, 4-years preparation phase will start in 2020.**
  - **Ground Breaking in 2024**

- **4-years preparation phase (mid-2020 to mid-2024)**
  - It should be a **detailed design phase of CFS** to realize the ground breaking in 2024.
  - Establish the **construction ready documents** by CFS engineer consultants.
- **Pre-preparation phase**
  - **CFS Basic-Design documents** as the inputs for the detailed design should be finalized **by mid-2020.**
  - **For all the sections, summarize the drawings of the basic cross section, beam line and power supply arrangement and required specifications.**
  - **Requirements from accelerator and detector, should be prepared by mid-2019 for the Basic-design documentation.**

CFS timeline on "Pre- and Preparation Phase"



Our possible contribution

minor correction only

(A) Basic Design linked to CFS should be fixed.

- **Accelerator layout**
  - beamline
  - power supplies
- **Requirement of Utilities**
  - specification and route

(B) Selection of Positron Source Scheme

Note:
This timeline has been discussed and reached a consensus by the KEK LC-CFS members.

- M. Miyahara,
- H. Hayano,
- N. Terunuma,
- S. Michizono,
- K. Yokoya

Exception: Positron Source

- **Prepare designs for all possible schemes by (A)**
- **Scheme choice should be done by (B)?**

What do we need for CFS Basic Design?

- **Beamline layout**
  - **TDR DECK have to be updated to include followings.**
    - **tune-up beam dumps (need beamline and its requirement on CFS)**
    - **vertical dipoles to follow the geoid**
    - **updated photon dump (2km-long photon-line pushes the positron booster to the side)**
  - **DECK should be prepared for possible Positron schemes**
    - **Undulator** (mentioned above)
    - **e-driven schemes (replace or add the undulator)**
  - **K.Yokoya and K.Kubo will lead this work.**
  - **We wish to have layouts of these schemes in early 2019, to proceed the CFS designs.**

What do we need for CFS Basic Design?

- **Requirement for utilities**
  - Accelerator
    - update the requirements in TDR to ILC250
    - have the possibility for future upgrade.
  - Detector
    - Utility Hall (location, size, access)
    - asking the required power to ILD/SiD groups by Y.Sugimoto

What do we need for CFS Basic Design?

- **Radiation Safety for the heavily activated areas**
  - **Establish the CFS design**
    - **i.e., Beam Dumps, Positron Target, collimators**
    - capability to have a future improvement?
    - **Local control of activated air and water, if need**
  - **define the guideline to keep activation of rock and groundwater low**
  - **Design the decommissioning; remove the heavily activated materials**
  - **N.Terunuma and T.Sanami will lead the works.**

Shielding of Highly activated devices

- **using FLUKA simulation**
- **Beamline beside the shielding room**
  - **No workers when beam ON**
  - **Radiation doze by residual radioactives should be less than 20 uSv/h (rad. workers)**
- **Outside of the tunnel**
  - **Evaluate the activation of Soil, rock and ground water when beam ON**
  - Assumption: An activated water flows into the public area. Its activation should be lower than the authorized guideline.
  - **for exam; J-PARC guideline for soil and ground water**
    - **neutrons: 5 mSv/h, muons: 500 mSv/h**

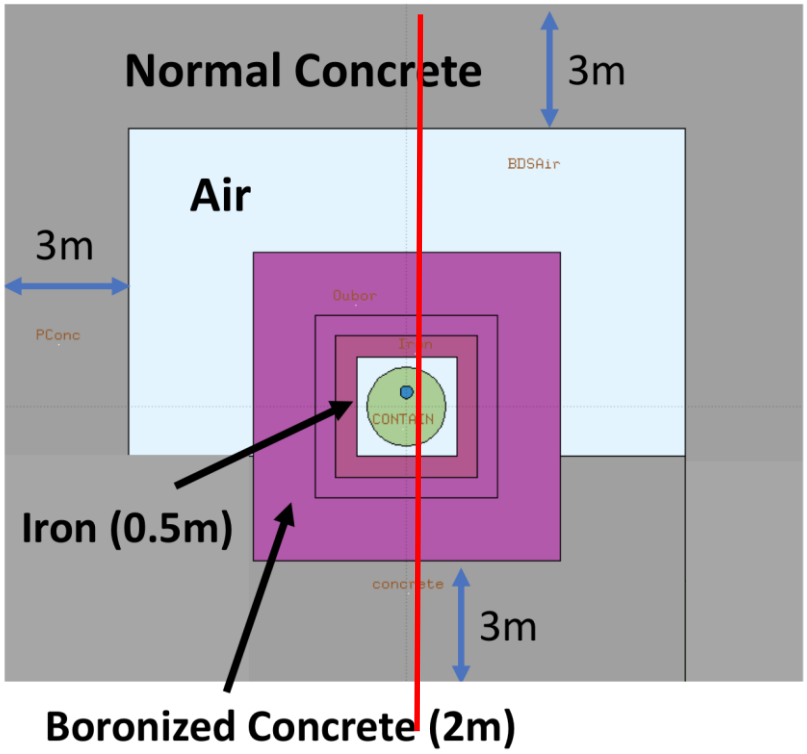
Examples

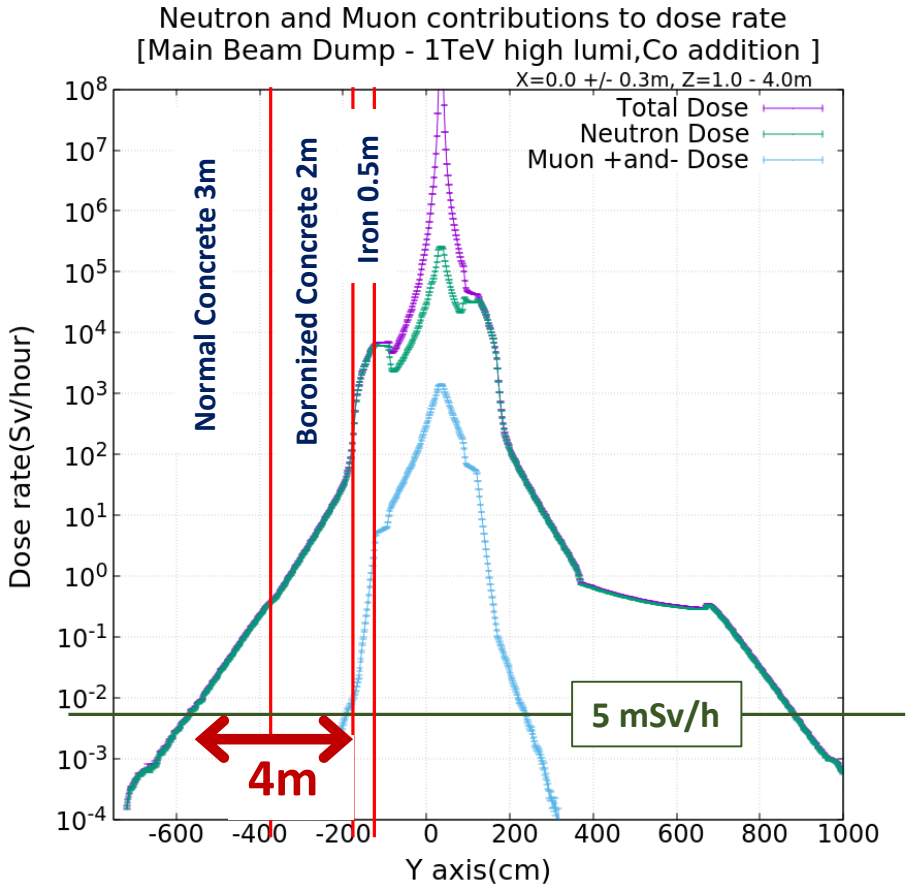
Radiation dose from Main Dump

- **Beam for simulation**
  - → **1 TeV, 14 MW**
- **Dump design with 20% margin**
  - → 17 MW

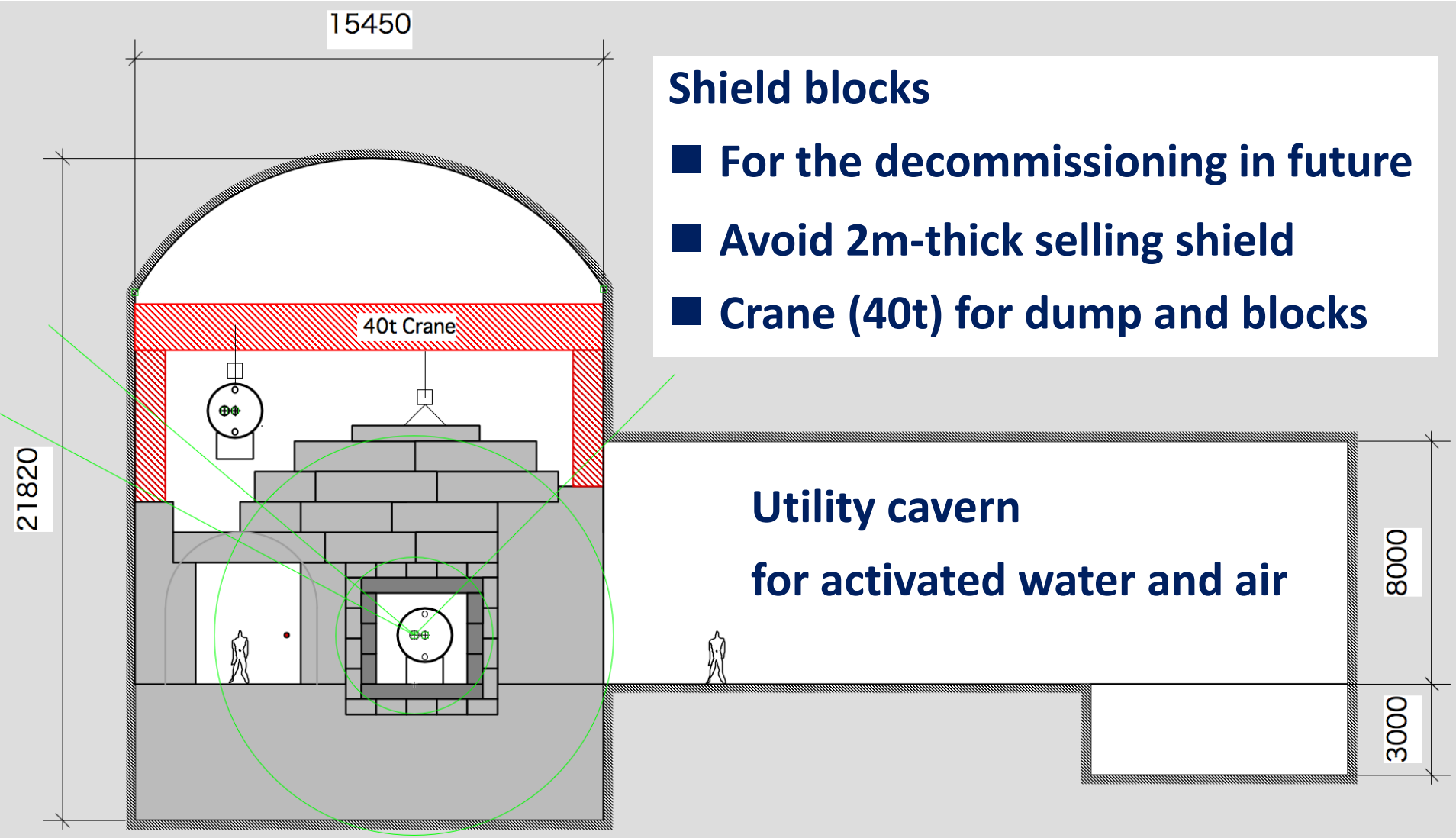
Iron Shield 0.5 m
and
(Boronized) Concrete 4 m

Geometry used for FLUKA Study





Main Dump Cavern



Shield blocks

- For the decommissioning in future
- Avoid 2m-thick selling shield
- Crane (40t) for dump and blocks

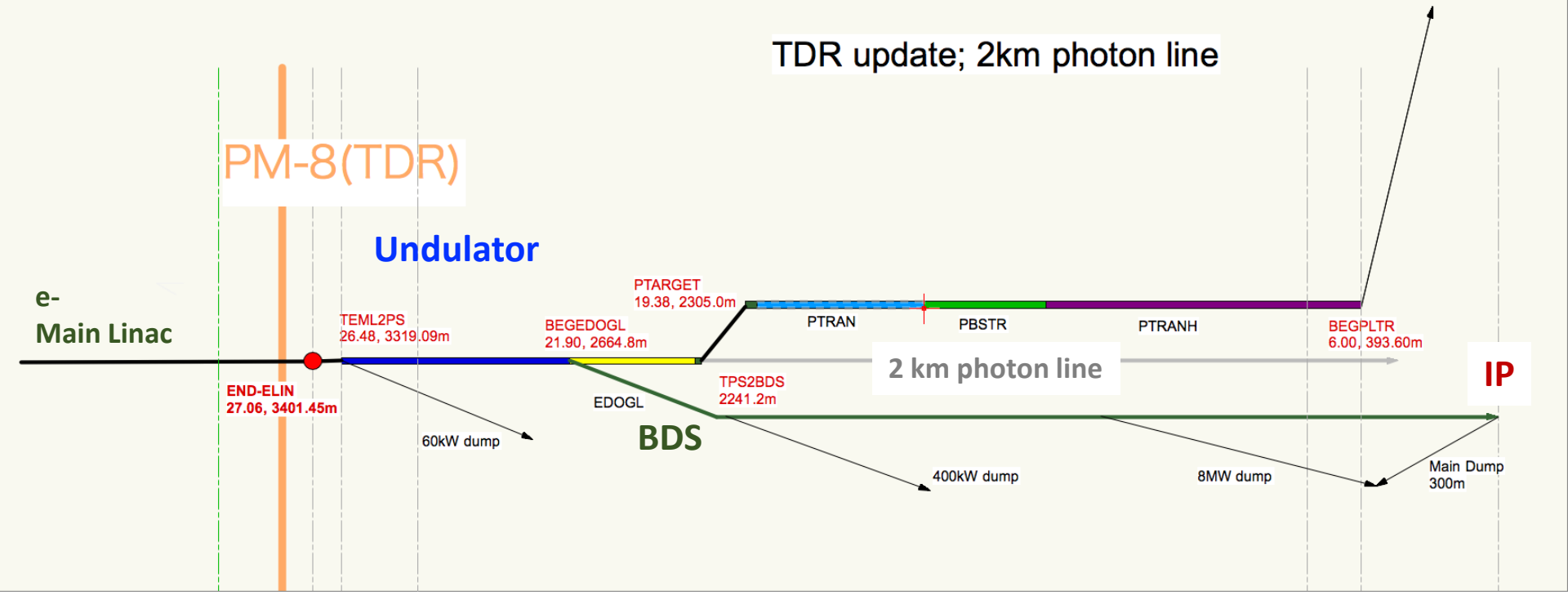
Utility cavern

for activated water and air

Positron source beamline: baseline

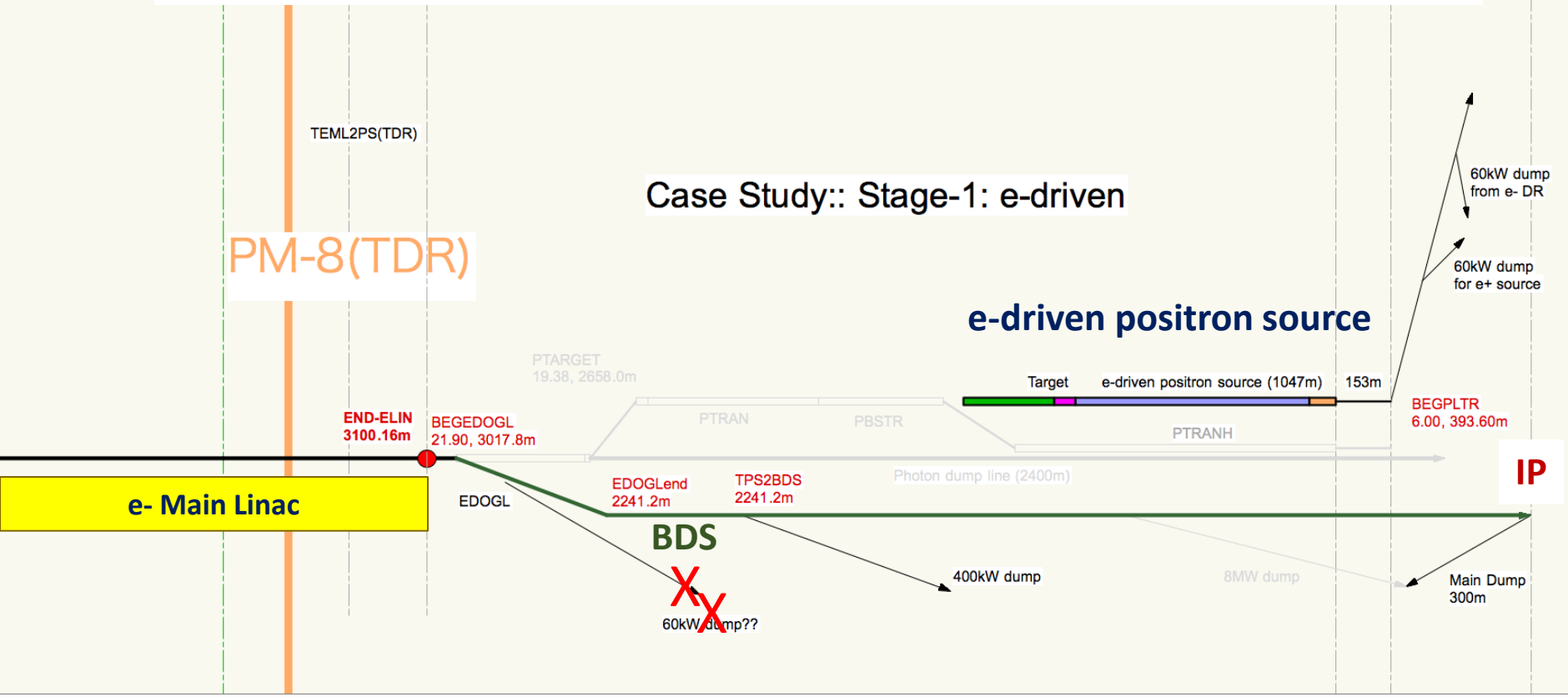
The beamline layout have to be updated with long photon line to the photon dump.

Location of photon dump should be defined with a maintenance scenario.



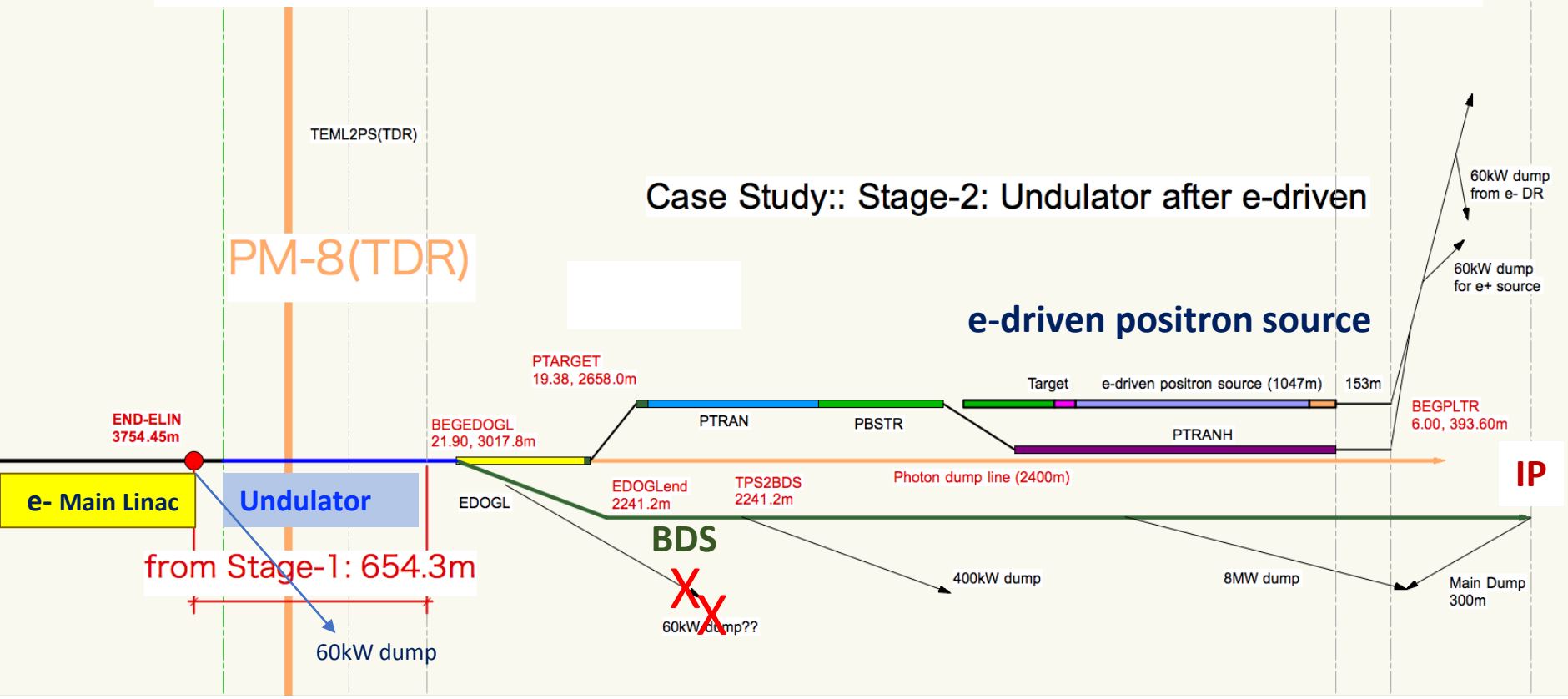
Positron source beamline: backup(1)

In the case of **starting with e-driven** and **change to undulator**,
but **if e-driven is heavily activated**, schematic layout will be as follows.



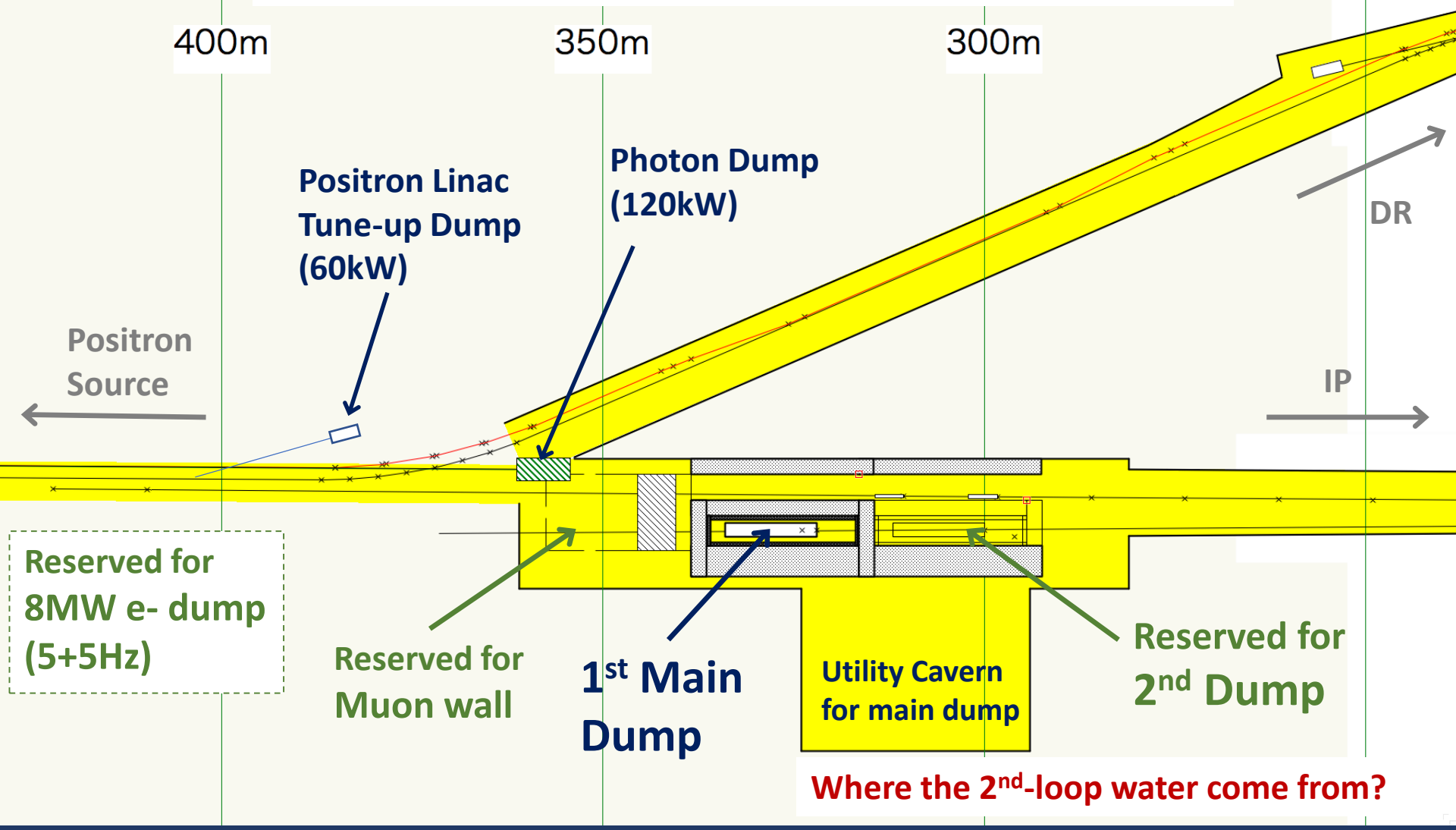
Positron source beamline: backup(2)

In the case of **starting with e-driven** and **change to undulator**,
but **if e-driven is heavily activated**, schematic layout will be as follows.



Summary: Main Beam Dump and Around

Time for the CFS engineering design is limited.
Fix beamlines, location and size of systems!



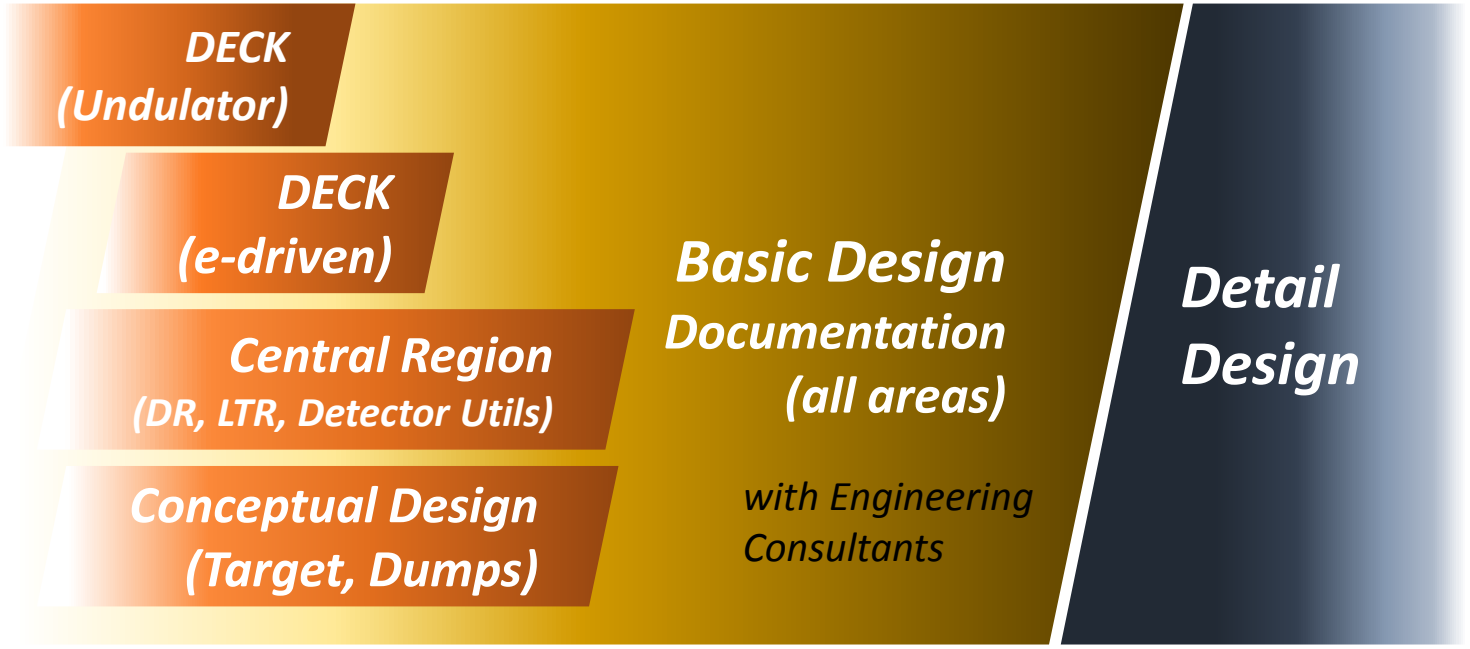
What we need to do for the basic design

- Ideal Schedule -

Pre-preparation Phase

Preparation Phase

mid-2018 **2019** mid-2019 **2020** mid-2020



We are here.

We need to have a design margin on CFS for the items under R&D, such as positron source, beam dump.