

LCGT tunnel design

-f2f meeting-

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- **What's happened from the last f2f.**
- The tunnel design document prepared by the design company for the bid announcement for the tunnel construction was once completed in this April.
- The cost estimation based on the design was reported from the design company. The estimation shows much higher than our budget.
- LCGT road map group made a new plan for iLCGT, and iLCGT requires additional vacuum chambers for the test masses in the arm tunnels.
- The center experiment rooms design was revised for more convenience.
- Thus, we revised the tunnel design again.
 - Low cost, fit to iLCGT plan and more convenience.
 - 3km arm length was kept.
 - Two layer experiment rooms for the test mass suspension were kept.
- The bid announce was planned in this April originally. Unfortunately, it was postponed due to the earthquake at 3/11.
- The schedule for the bid and start of the construction have not been fixed yet.
- We still can not see when the tunnel will be completed.



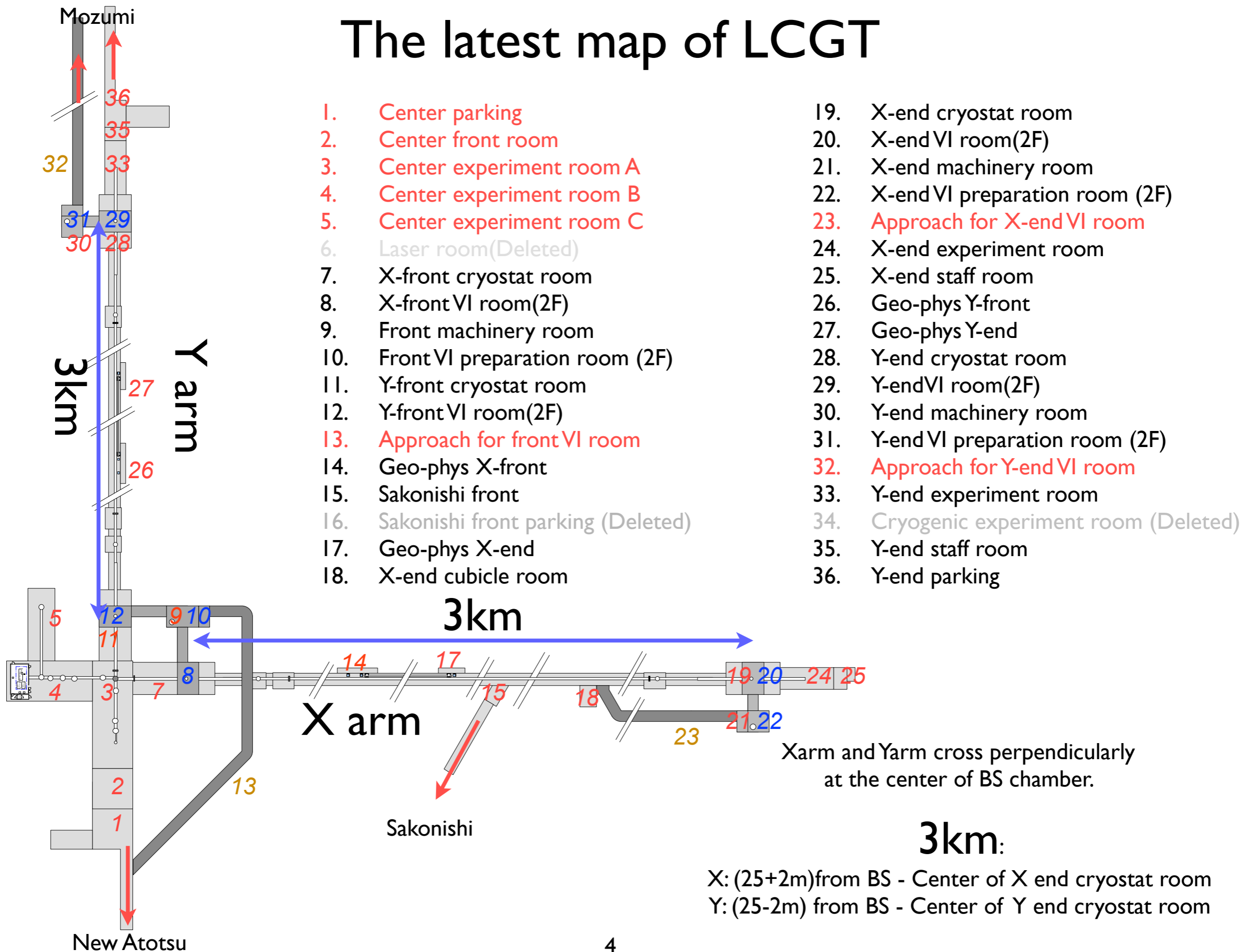
Location of Center (BS)

- latitude: 36.42°N , longitude: 137.30° .
- X arm direction: 300° , Y arm direction: 30° .
- Height from the sea level : about 372.000m.

- ~~2~~ ~~3~~ entrances for the experiment room.
- Center, Xend, Yend are inside more than 200m from the surface of the mountain.
- Tunnel floor is tilted by 1/300 for natural water drainage.
- Height of the Xend: 382.095m.
- Height of the Yend: 362.928m.

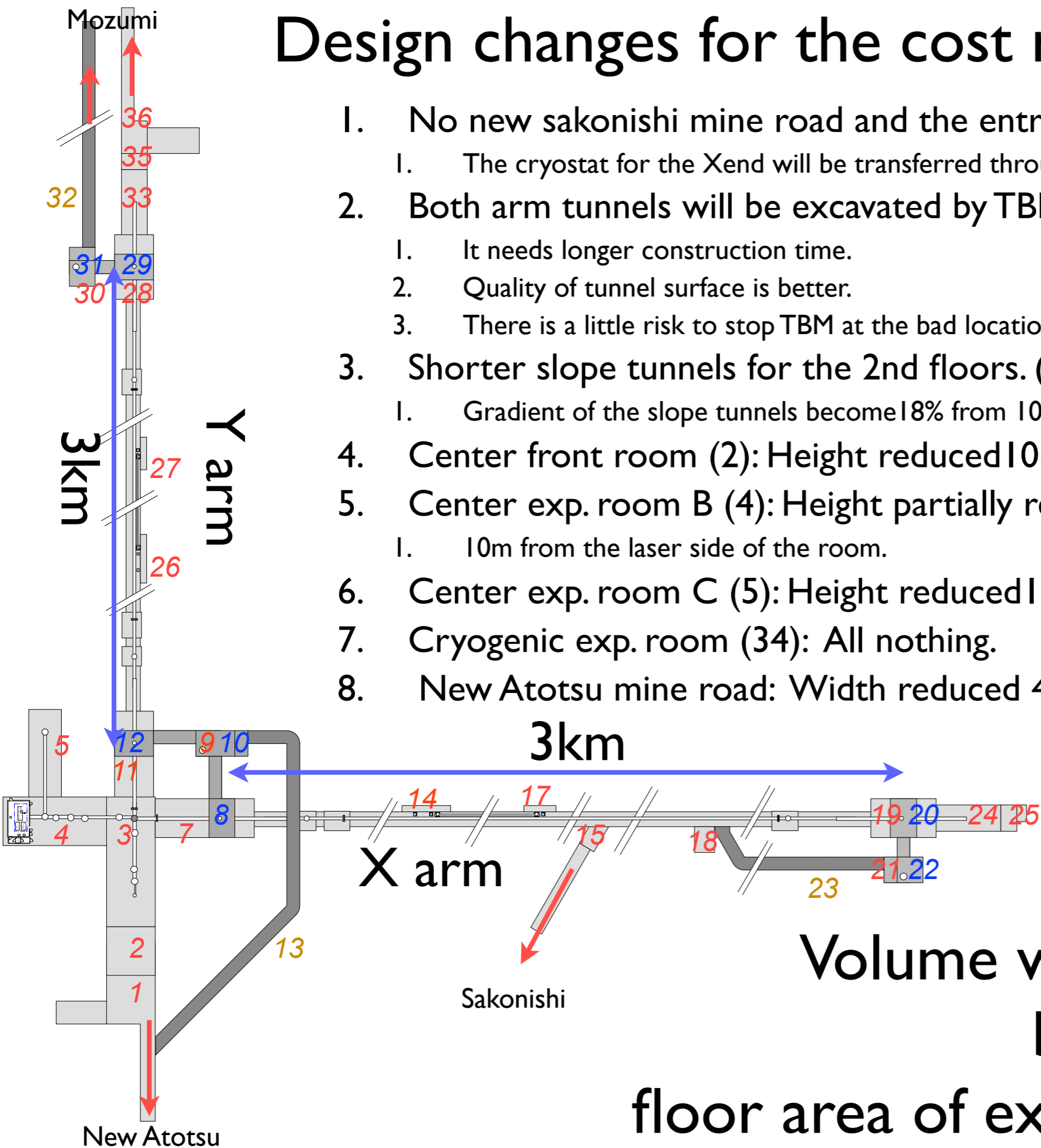


The latest map of LCGT



Design changes for the cost reduction.

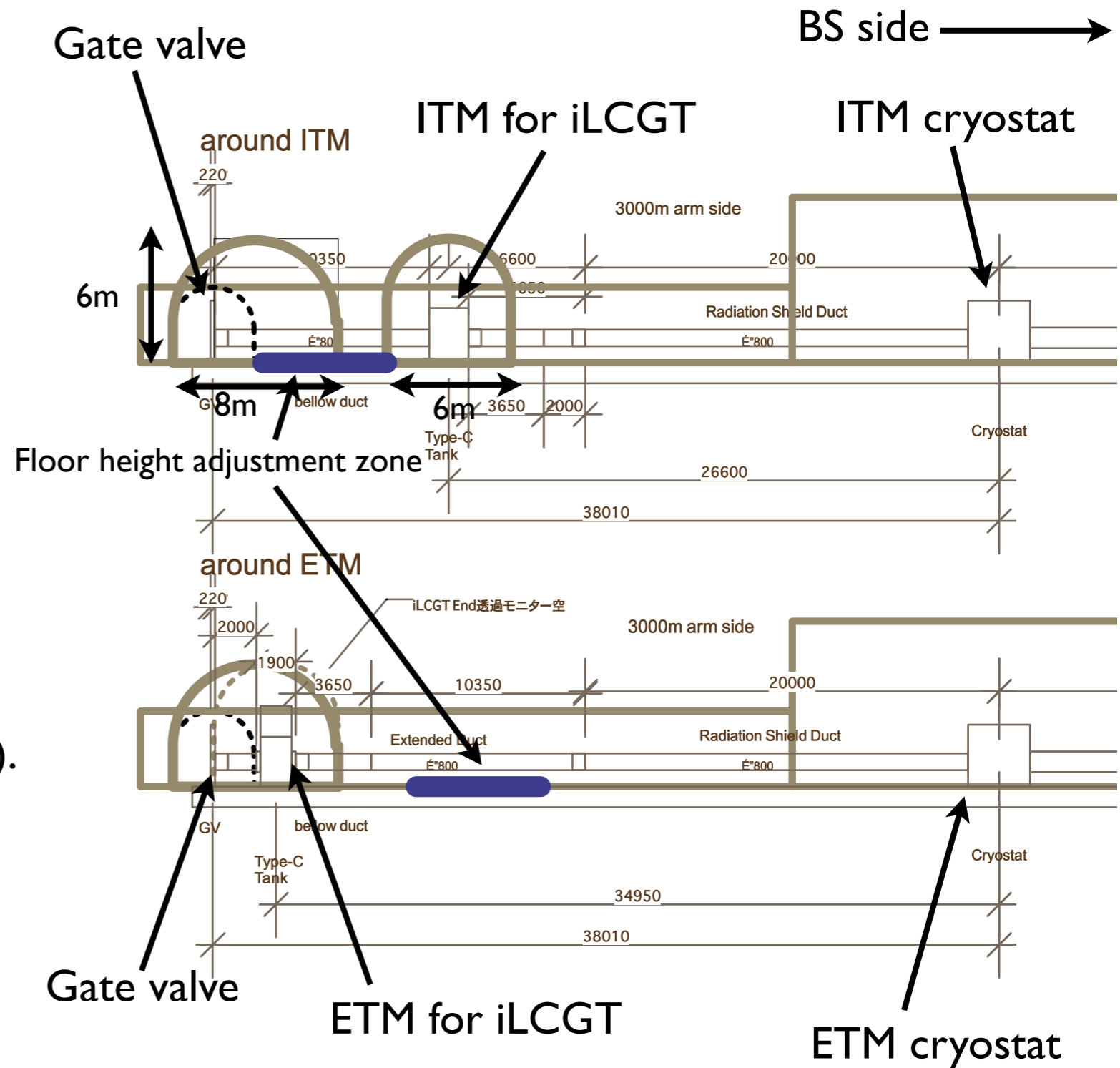
1. No new sakonishi mine road and the entrance.
 1. The cryostat for the Xend will be transferred through the Xarm tunnel.
2. Both arm tunnels will be excavated by TBM method.
 1. It needs longer construction time.
 2. Quality of tunnel surface is better.
 3. There is a little risk to stop TBM at the bad location near the Xend.
3. Shorter slope tunnels for the 2nd floors. (13, 23, 32)
 1. Gradient of the slope tunnels become 18% from 10%.
4. Center front room (2): Height reduced 10m → 7.5m.
5. Center exp. room B (4): Height partially reduced 10m → 7.5m.
 1. 10m from the laser side of the room.
6. Center exp. room C (5): Height reduced 10m → 6.0m.
7. Cryogenic exp. room (34): All nothing.
8. New Atotsu mine road: Width reduced 4.7m → 4.0m.



Volume was reduced
but
floor area of exp. room was kept.

Design changes for the iLCGT plan.

- All the test masses for iLCGT will be suspended by the Type C suspension installed in a small vacuum chamber that is different from the cryostat.
- 6 places in the arm tunnel will be expanded for the vacuum chambers and the gate valves.
- ITM for iLCGT: 6m×6m×6m(WDH).
- Gate valve and ETM: 8m×6m×6m(WDH).



Detail will be talked by Dr. Miyoki.

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End side

Design changes for convenience.

