



Detector Hall Configuration Overview

New baseline (Hybrid A') proposed

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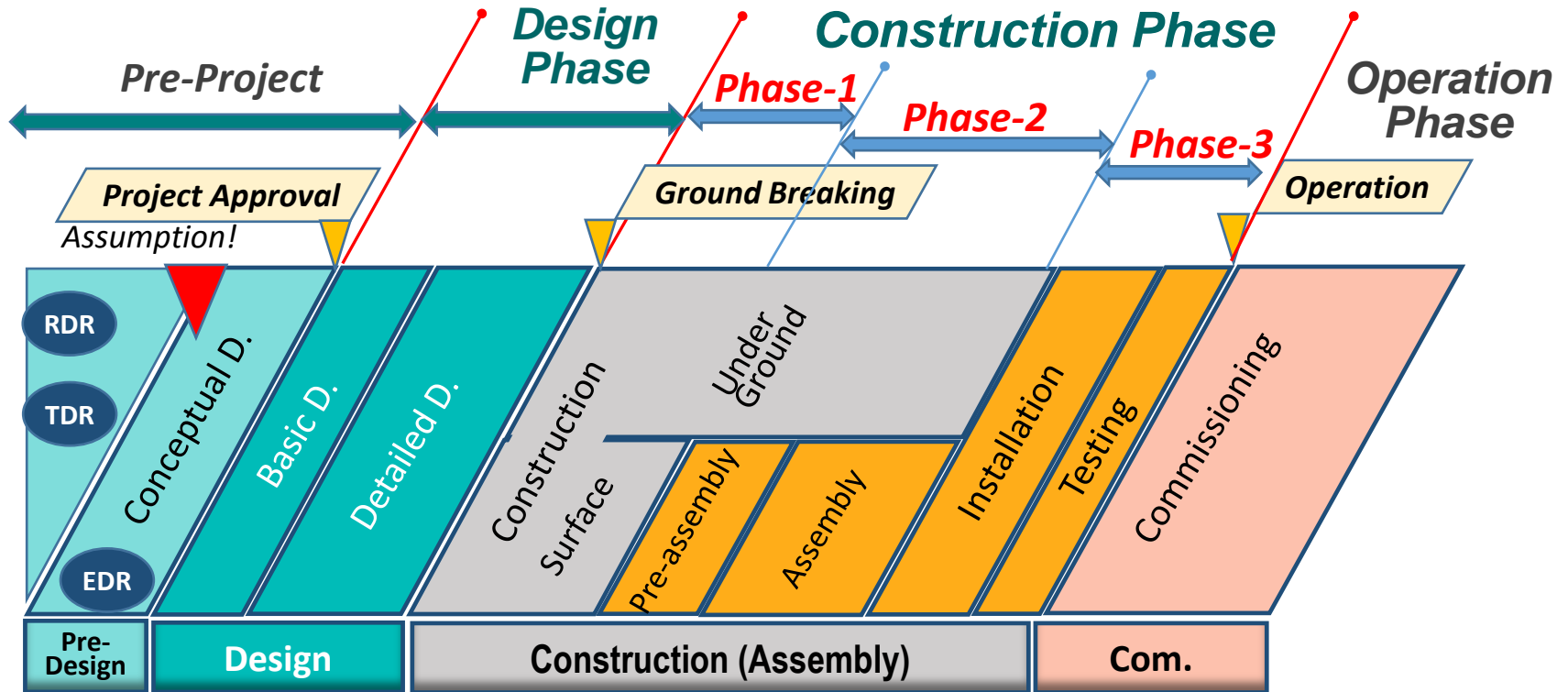


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Prospect of the DH Design & Construction at IR



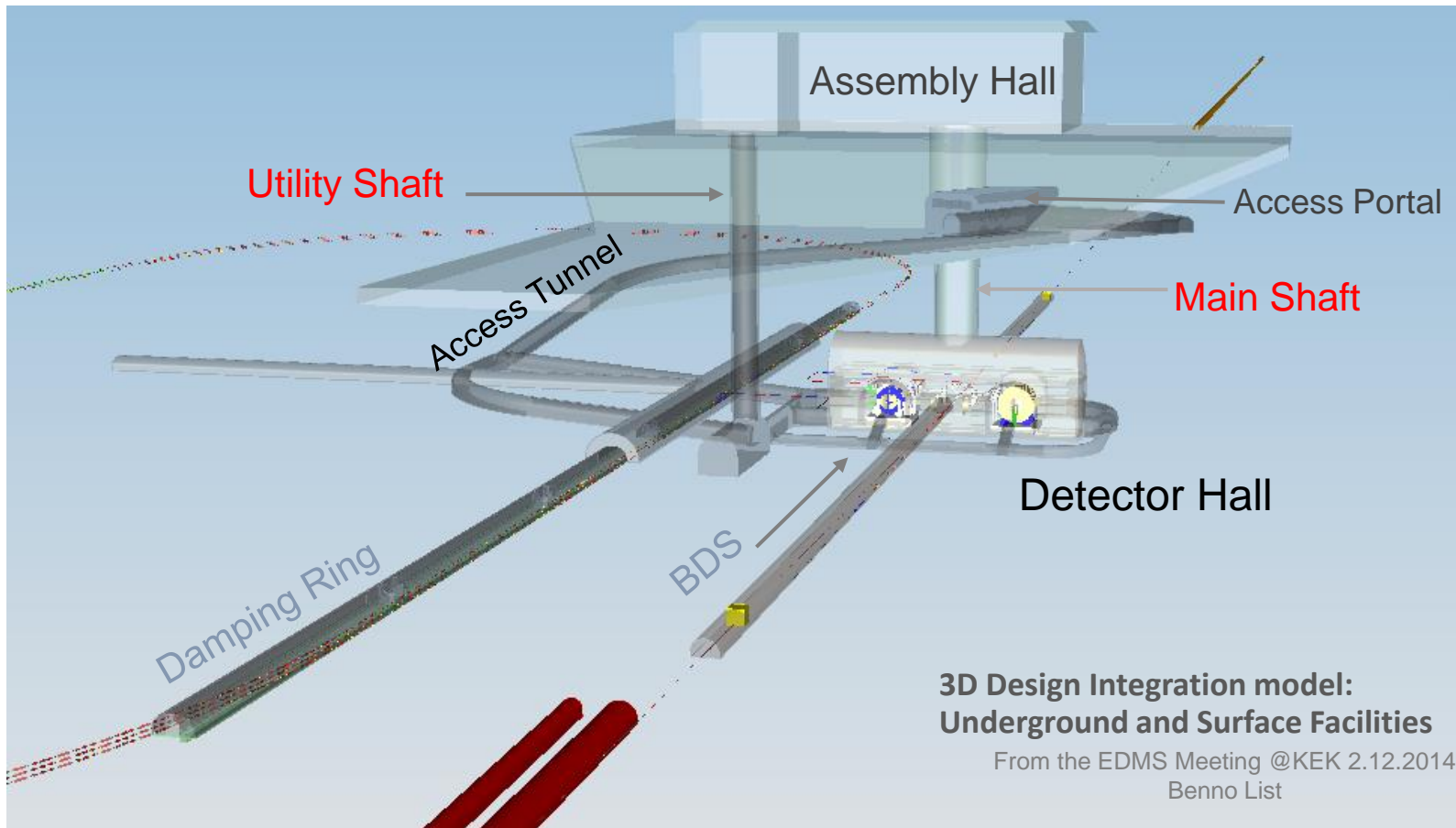
■ **IR Construction can be considered in three Phases**

Phase-1	<i>Construction phase of the Underground & Above ground facilities</i>
Phase-2	<i>Machine Assembly phase during the Underground construction</i>
Phase-3	<i>Installation & Testing phase after the Detector assembling completion</i>



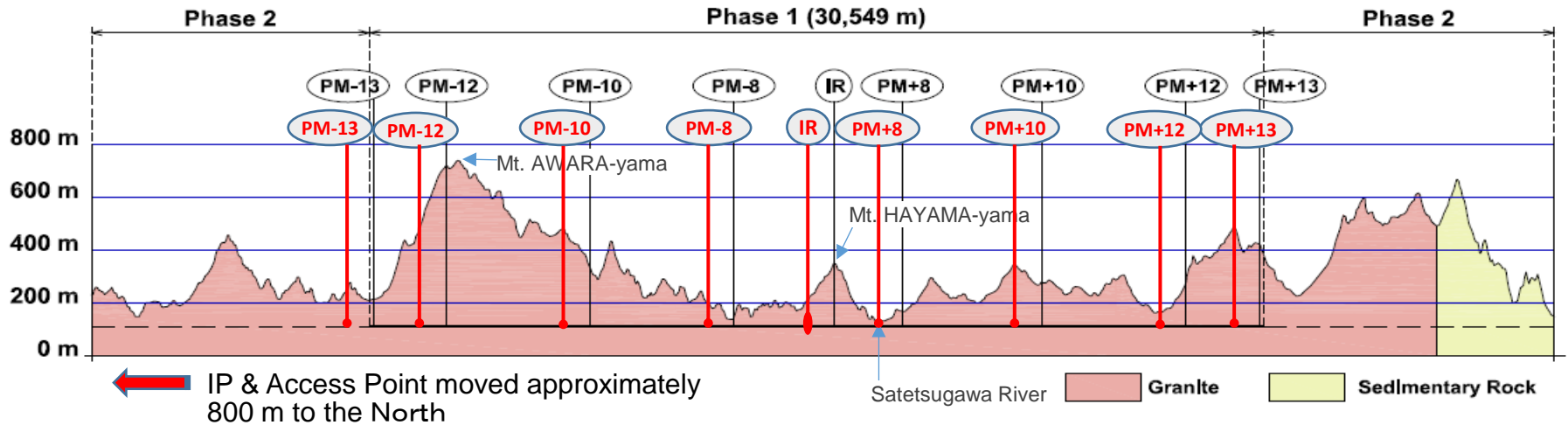
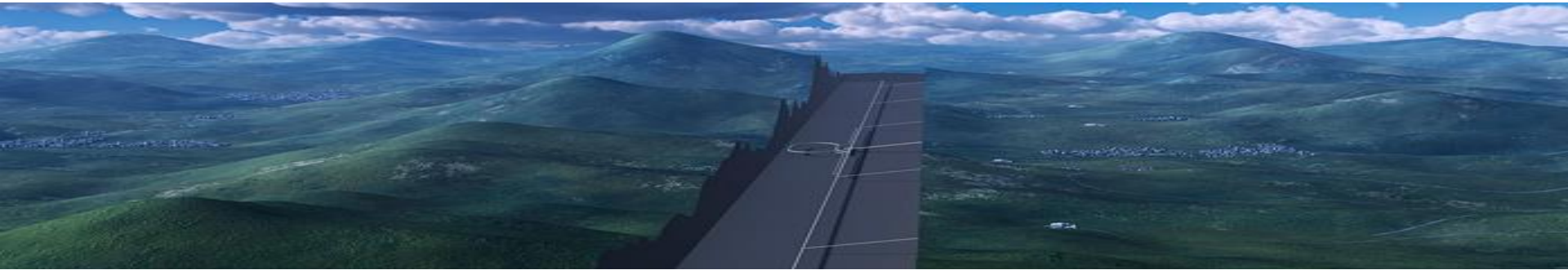
Overview of the DH scheme change

3D Model: New Baseline Proposal (Hybrid A')





New Baseline location in KITAKAMI Site



Longitudinal section of KITAKAMI Site



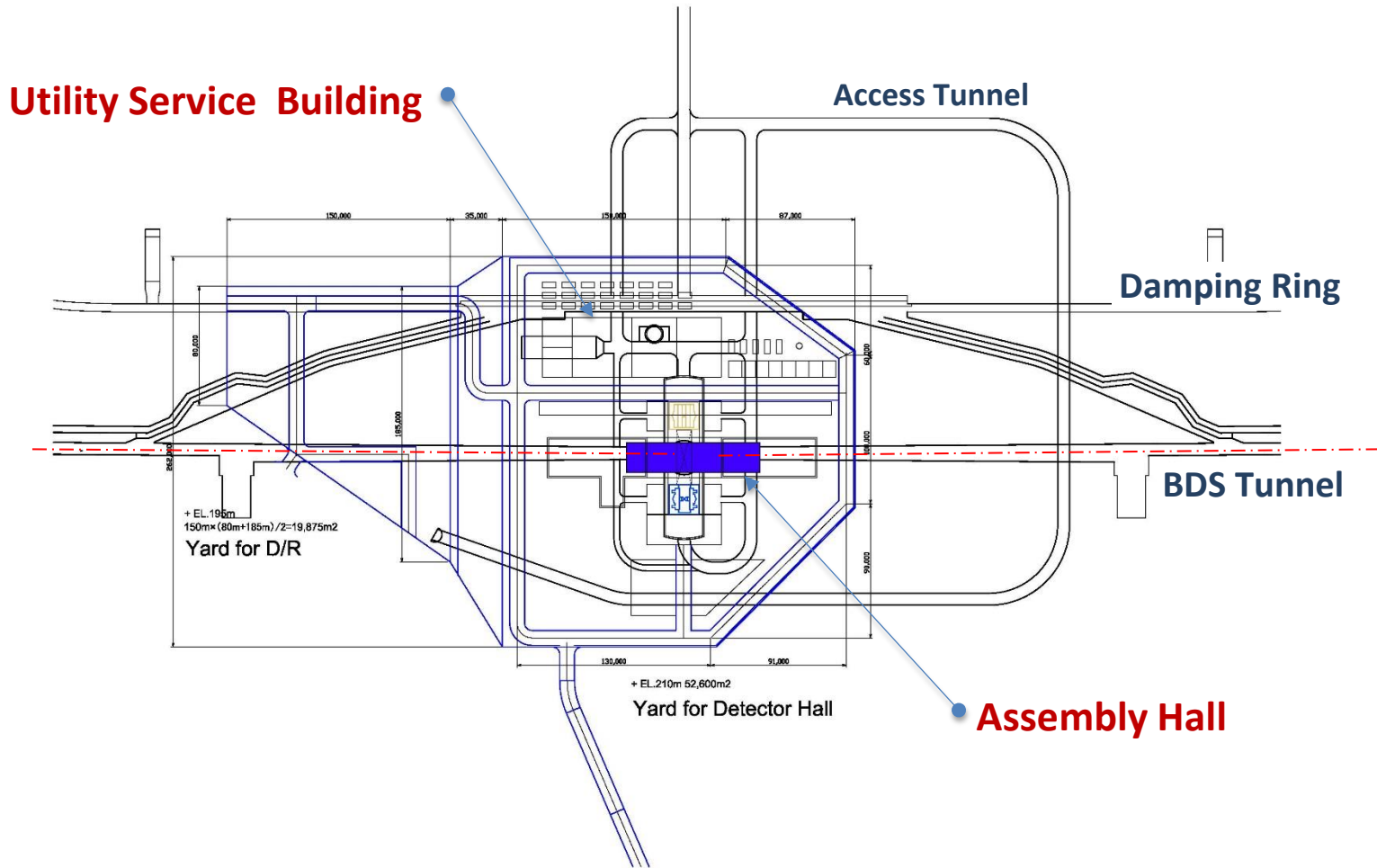
Value of the DH scheme change

Comparison study of the basic function

	TDR Baseline	New Baseline
Installation	Maximum Load: 400t - Through Access Tunnel - Special large trailer Assembly Period: short - 3Y (only in the underground)	Maximum Load: 4000t(Gantry) - Through Vertical Shaft - Gantry Crane Assembly Period: long - 5.5~6Y (including on the surface)
Accessibility	Electric Car or Walking (Access Tunnel)	Elevator or Walking (EV in the Utility Shaft , AT)
Disaster Prevention	Evacuation: through AT Exhaust(air, smoke, He): Through AT	Evacuation: through US & AT Exhaust(air, smoke, He): Through VS
Utility Service (Supply & Return)	Cooling Water, Air, Helium: - Through AT	Cooling Water, Air, Helium: - Through VS

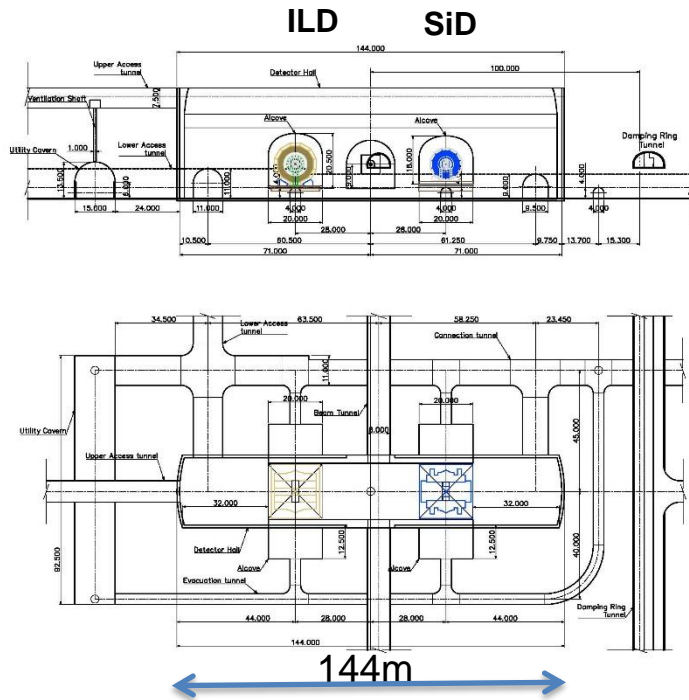


Underground & Above Ground Facilities





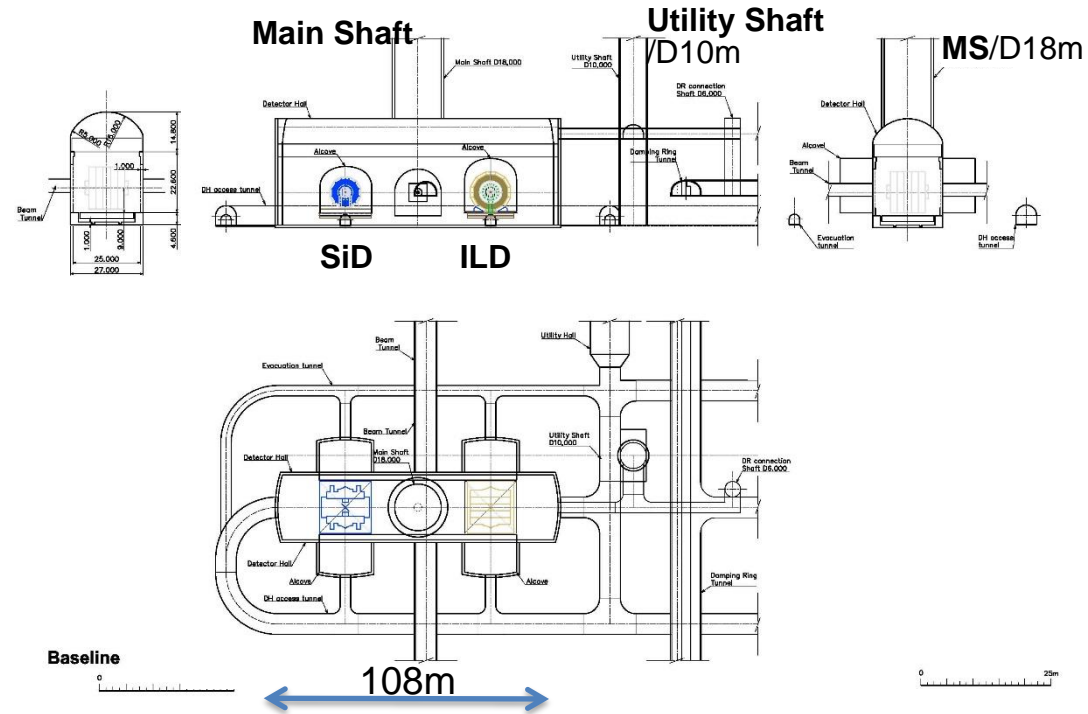
TDR Baseline



Remarks

- AT connection is perpendicular to DH at ILD side
- Assembling space is 33m outside of park position

New Baseline Proposed (Hybrid A')



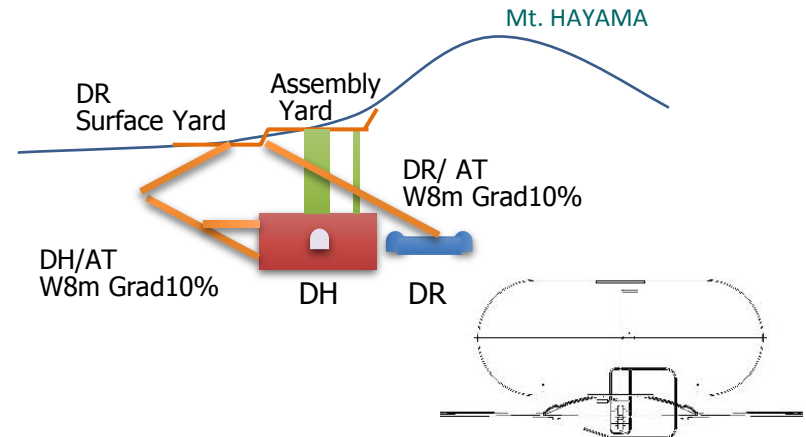
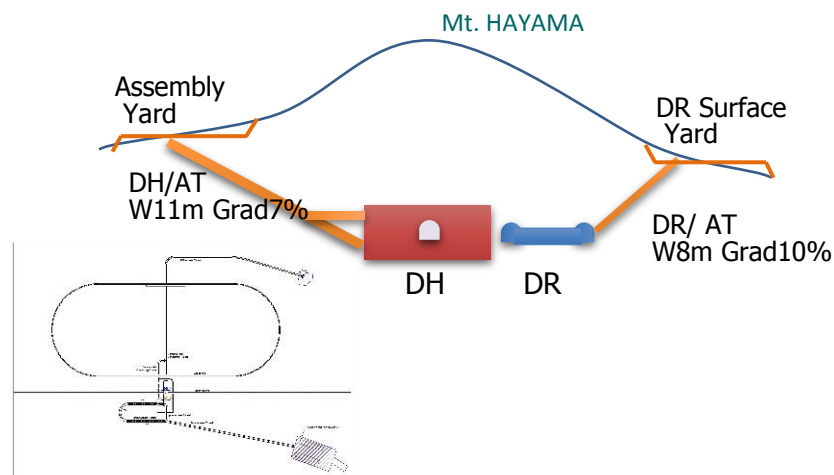
Remarks

- Connecting points of access tunnel are located at both end of Detector hall
- Because securing the separation distance from alcoves in the point of cavern stability.



Outline of Baseline & New Baseline

TDR Baseline	New Baseline Proposed
<ul style="list-style-type: none">Experimental hall (DH) is located below peak of Mt. HAYAMA.Transportation of the components: through the Horizontal tunnelAccelerator transportation(DR) : through the Horizontal tunnel(AT)	<ul style="list-style-type: none">Experimental hall (DH) is located in the north side foot of Mt. HAYAMA.Transportation of large components: through the Vertical shaft (D18.0m)Security of the flat land for Detector assembly above the IR





Assembly scheme & Transportation

TDR Baseline

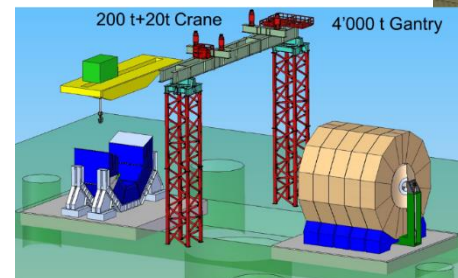
- Detector must be assembled in the DH underground after pre-assembled in the above ground facilities.
- These pieces are transported to DH by the **special large trailer**.
- Magnetic field measurement must be carried out in DH.

New Baseline Proposed

- Detector is assembled and tested mainly on the above ground.
- Heavy equipment is lowered to DH using temporary **gantry crane** (4000t).
- Magnetic field measurement can be carried out at the assembly hall on the above ground.



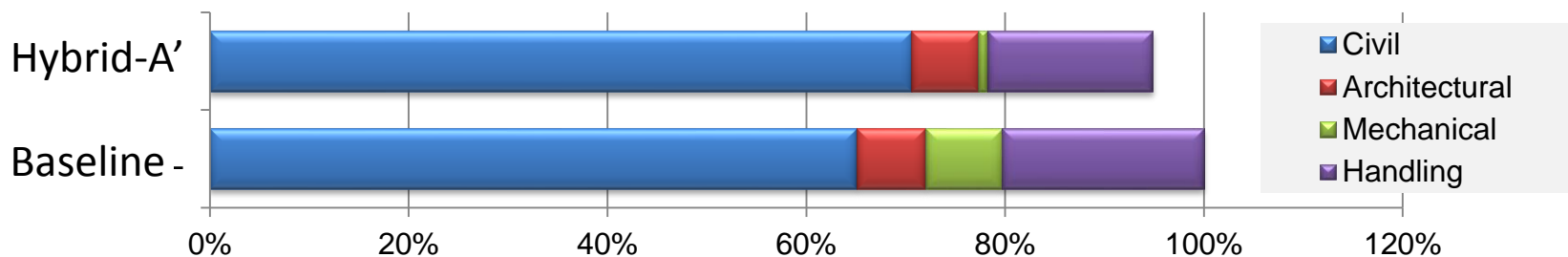
CMS like Assembly





Construction Cost Impact

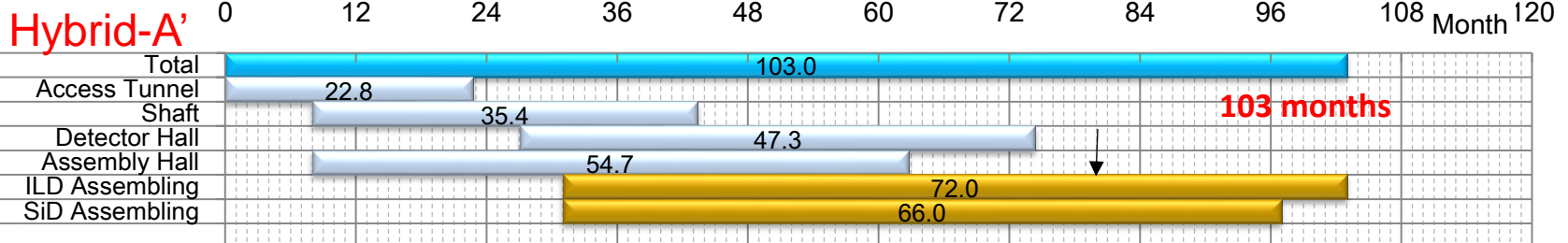
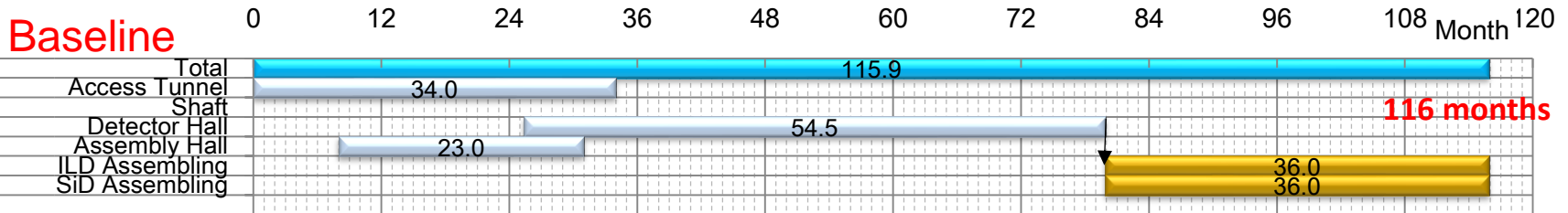
TDR Baseline	New Baseline Proposed
<ul style="list-style-type: none">Two access tunnels were assumed in the baseline for DR & DH.DH cavern volume is bigger in order to secure assembling work space.All piping and cabling from the surface are very large quantity for through the access tunnel.Permanent large crane equipment is necessary in DH for assembly work.	<ul style="list-style-type: none">DH construction costs are estimated to be reduced slightly than Baseline.Main factor of cost reduction<ul style="list-style-type: none">- Reduction of DH cavern volume (160,000m³→120,000m³)- Significant reduction in service length of mechanical facilities. (Cooling Water, Drainage, Ducting ,etc.)- Initial cost reduction of Handling Equipment.





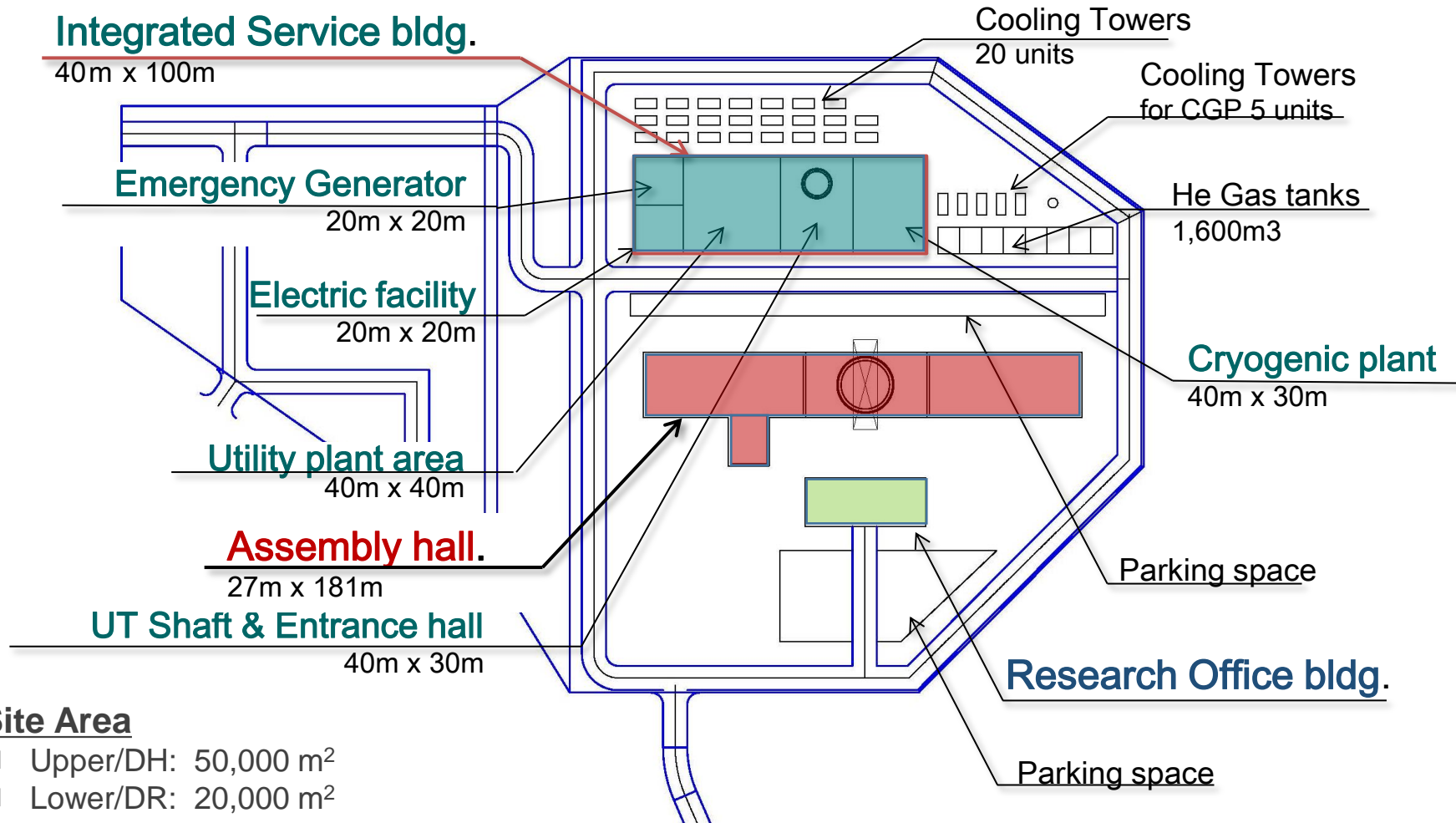
Schedule Impact

TDR Baseline	New Baseline Proposed
<ul style="list-style-type: none"> Total periods from construction start to assembling work completion is needed for 116 months. Excavation volume of DH cavern is big (W=25m, H=42m, L=142m) An assembly period after the DH cavern completion is so long 	<ul style="list-style-type: none"> Total period from construction start to install completion is 103 months. Excavation volume of DH cavern is smaller (W=25m, H=42m, L=108m) Most of assembly work are performed on the ground, assembly period at the underground is short.



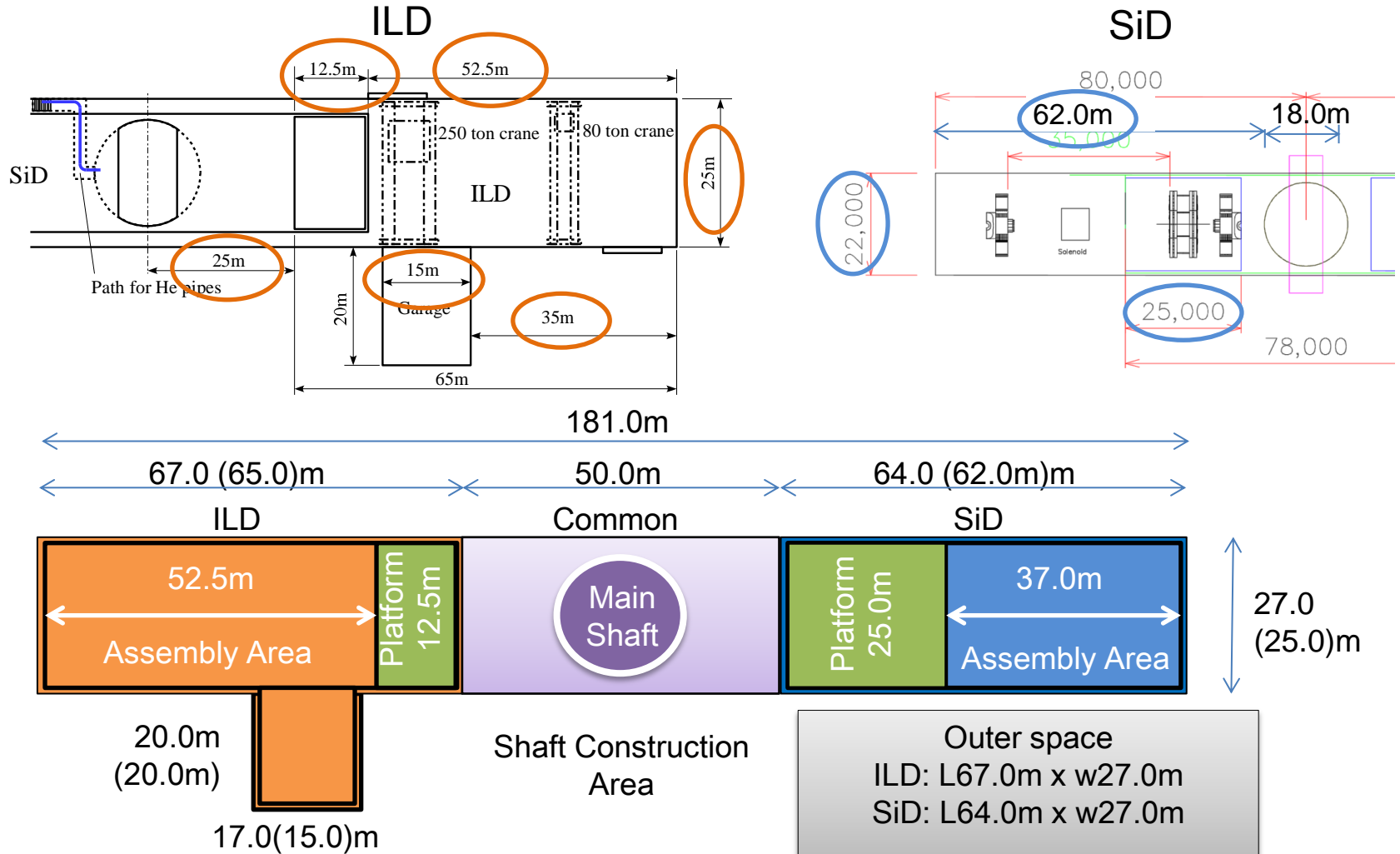


Facility Arrangement on the above ground in Operation Phase





Required Space of Assembly Hall





Ground facilities in Operation

Facilities	Condition
Assembly Hall	W27m × L181m × H31m A=4,900m ²
Research Office Bldg.	W50m × L20m × ? stories A=? m ² (Tentative DRAFT)
Integrated Utility Service Bldg.	W40m × L100m × H30m H15m A=4,000 m ²
	Cryogenic plant area. W40m × L30m × H15m A=1,200 m ²
	Utility plant area. W40m × L40m × H7m A=1,600 m ²
	Electric facility area. W20m × L40m × H7m A=800 m ² including Emergency Generator and Fuel tanks
	UT shaft entrance and control W40m × L30m × H7m A=1,200 m ²
Cooling Tower	For Cryogenic: 5 units. (15m x 12m, A=180 m ²)
	For other facilities: 20 units. (50m x 12m, A=600 m ²)
Cryogenic plant tanks	He gas tank 1,600 m ³
	Ni liquid tank 10,000 L
He Buffer Tanks	10,000 L : <Require more detailed technical study>



Other Surface Facilities at IR

Consideration of the Social Service Facilities

- In case of the central campus will be located in the distance



Should we consider whether the following surface facilities are necessary?

Category	Facility	Scale	Remarks
Research Life Support	Cafeteria	?	Canteen, Coffee lounge
	Convenience shop	?	Foods & Drink, etc.
	Medical office?	?	Health center? Nurse's room?
Accommodation	Short-term stay?	?	Need or not?
Information	Visitor Center?	?	Visitor lounge, Site tour?
Others	?	?	

- ❑ Study of the **necessary facilities** and calculation of **optimal size** are needed.



DH Scheme change

- The total construction period can be reduced about 1y.
- Accessibility to the underground is good and attractive.
- The construction cost is also perspective cheaper than the baseline.

Above Ground facilities

- The basic plan of the Assembly hall can be almost agreed.
- Utility facilities will need more detailed study in near future.
- More study about the necessary facility at IR is required.

Future Prospect and Problems

- Basic planning is important activity toward the design stage.
- Geological Survey is an important issue for the decision of DH location and structure.