March 22, 2012

1130 – 1145

ASIAN REGION DETECTOR HALL DESIGN

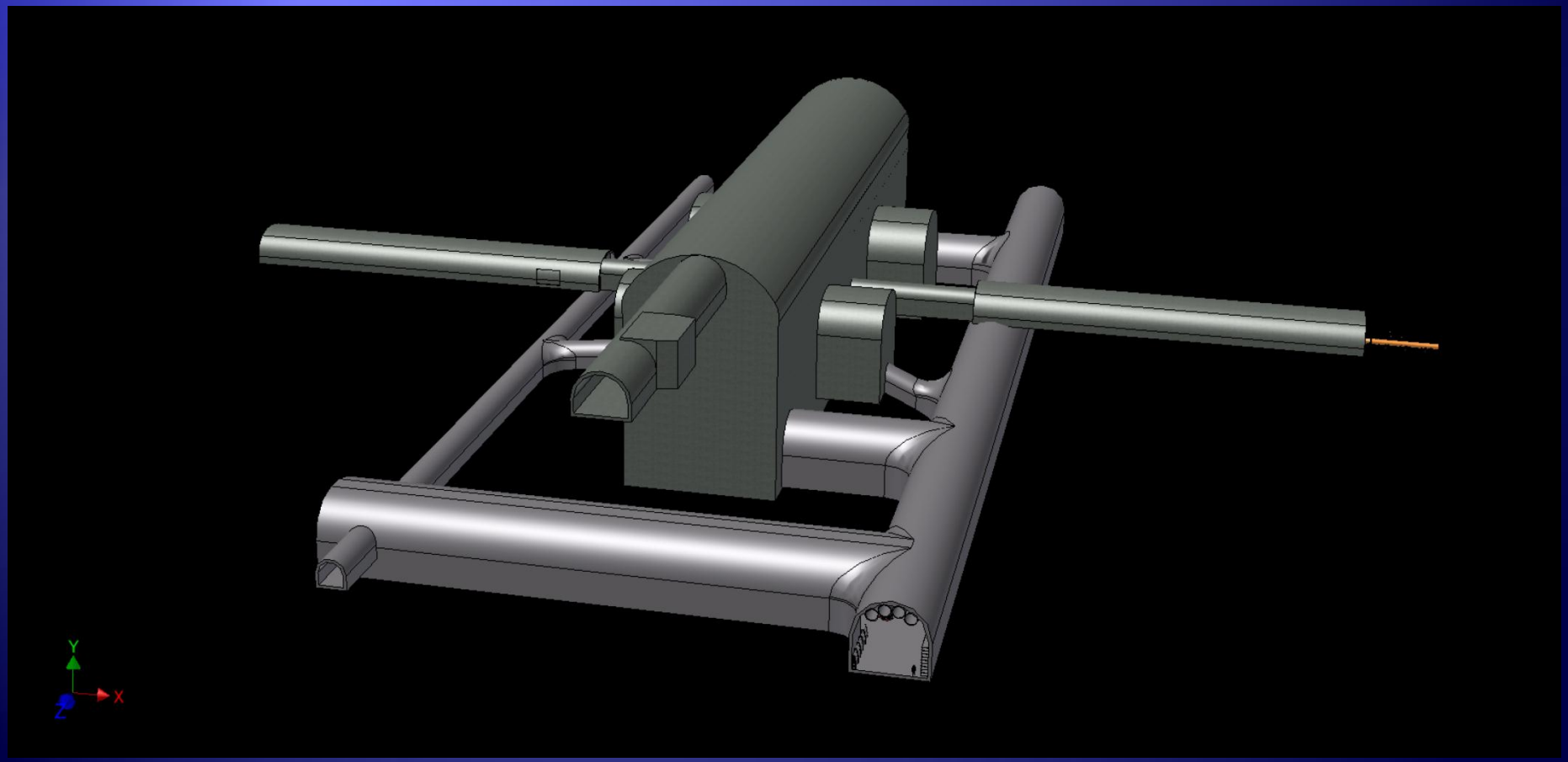
Outline

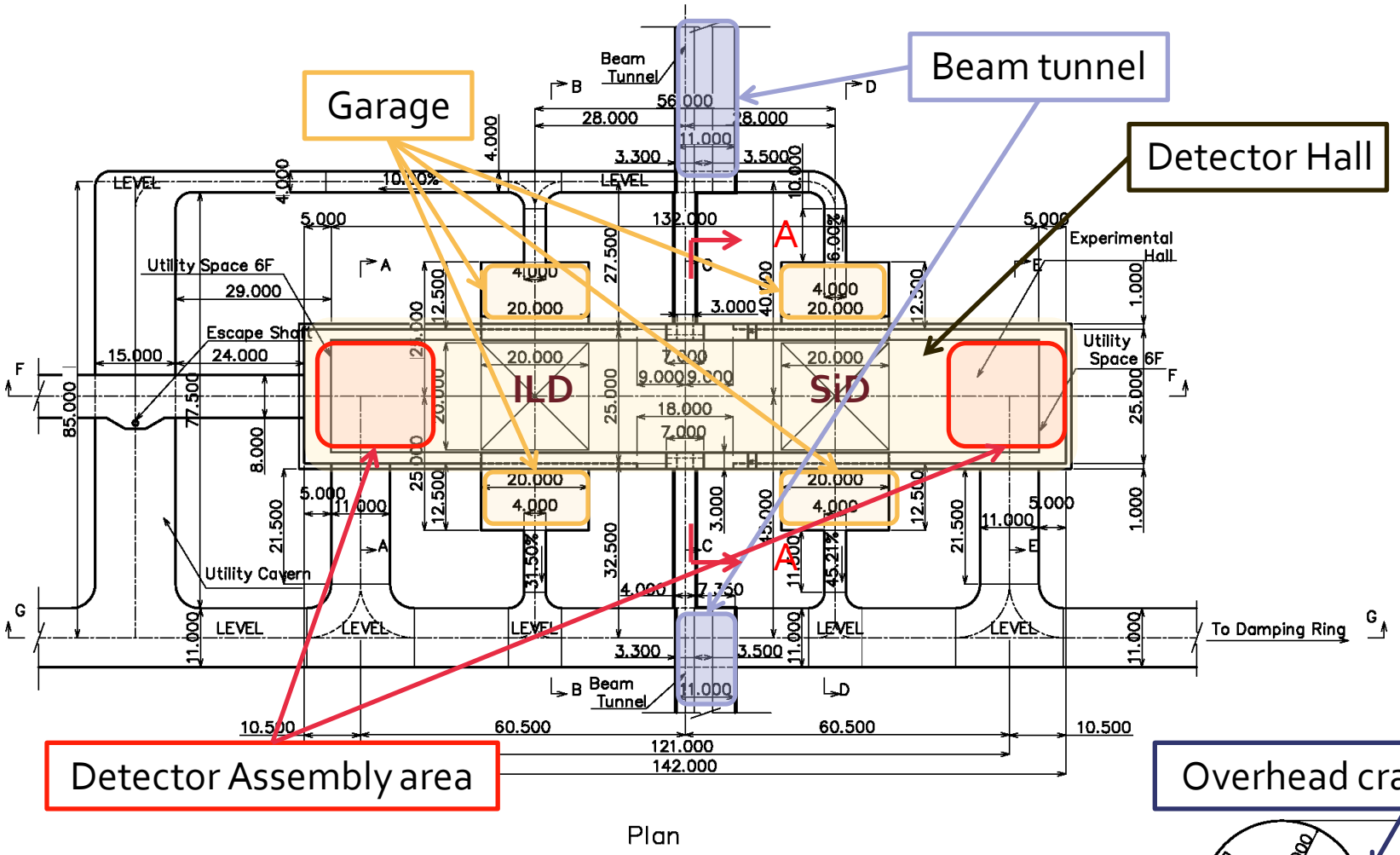
- Design Concept & Hall Layout
- Access Tunnel
- Top heading Tunnel
- Displacement of detector hall by push-pull operation

Design Concept

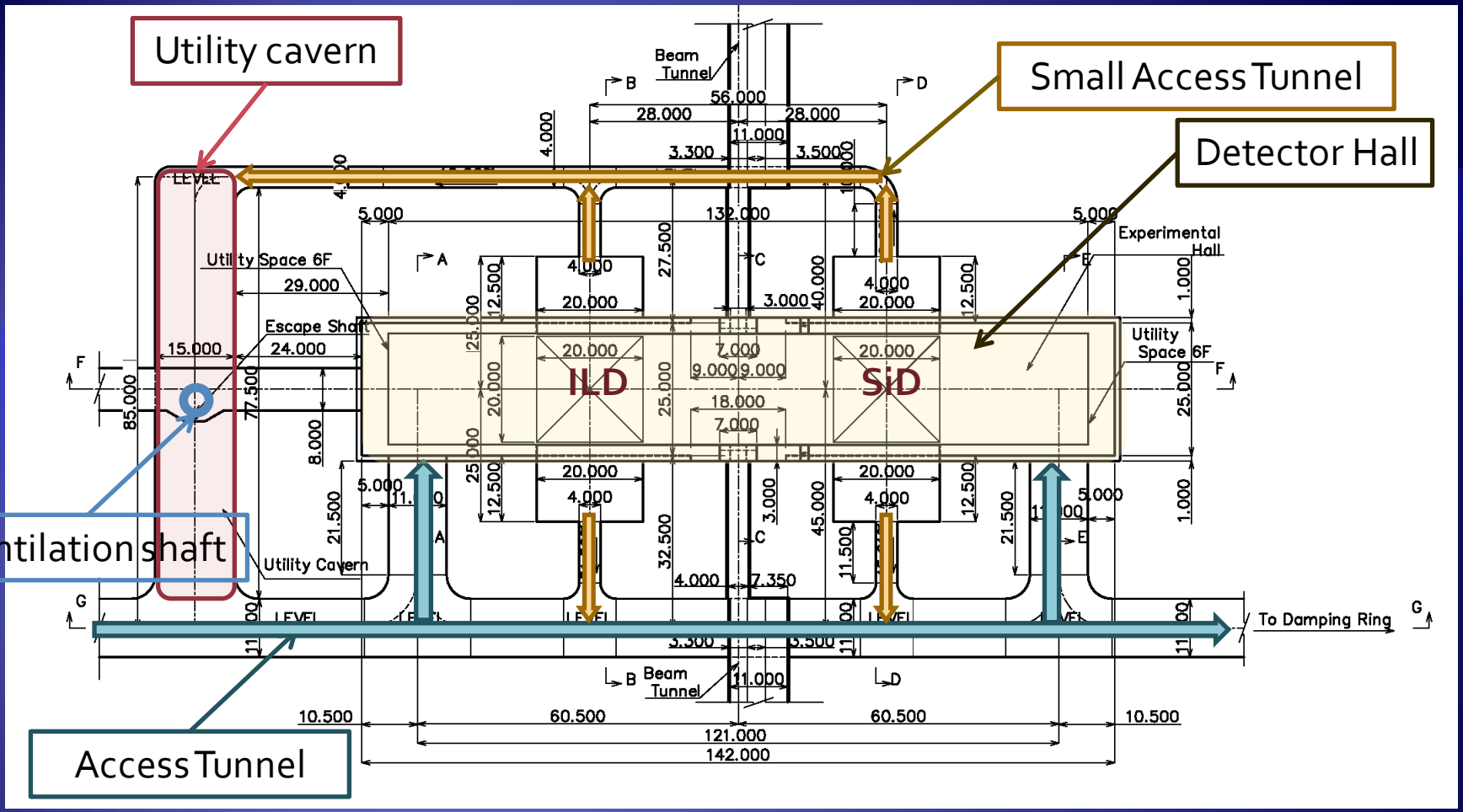
- Ensure the area is for detector assembly
- Garage space for ILD and SiD
- Sufficient tunnel section should be ensured for transportation of a part of detector
- Utility cavern for conventional facilities

A Birds-eye View





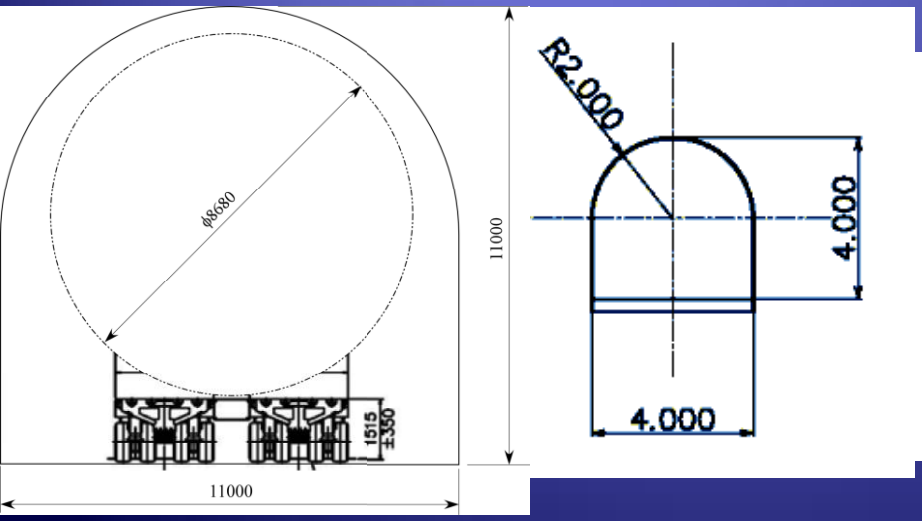
- Assembly area is located in front of the junction of access tunnels
- Beam tunnel is up to crossing point of access tunnel
- Garage for ILD and SiD is placed on the both side of cavern
- Capacity of overhead crane is 250 ton

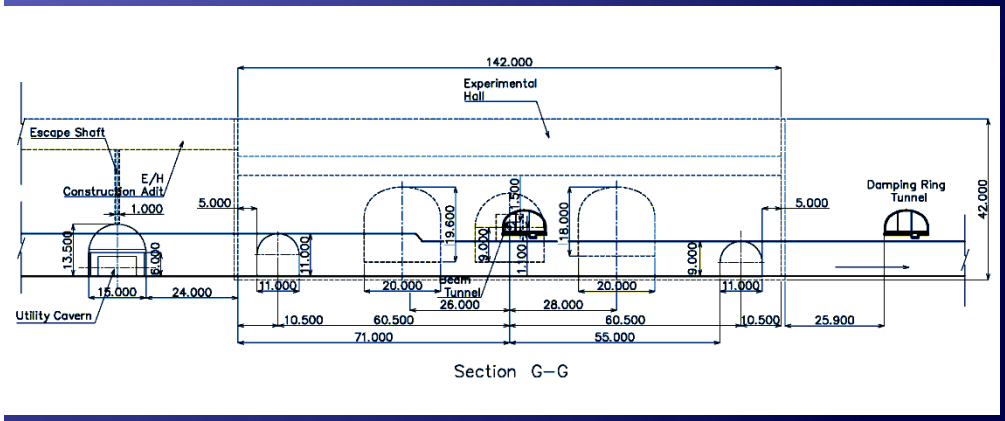


- With 11m width access tunnel for SiD and ILD installation
- Two access tunnels are connected on the same side of cavern
- Access tunnels are connected at the same floor level of cavern's bottom floor
- Utility cavern is placed for utility (electric facilities, parking, various rooms…)
- Small access tunnels are connected to the garages for the pass
- Ventilation shaft is placed at utility cavern

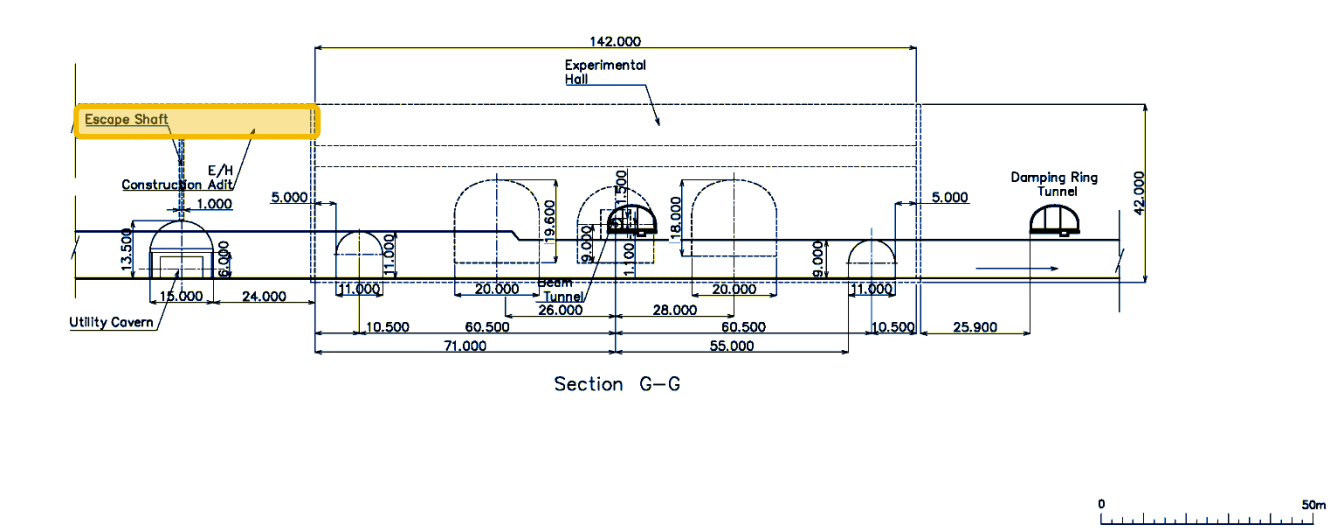
Access Tunnel

- The dimension of access tunnels are determined by the transporting maximum component size of detector
- Small Access Tunnel is used for personal passageway





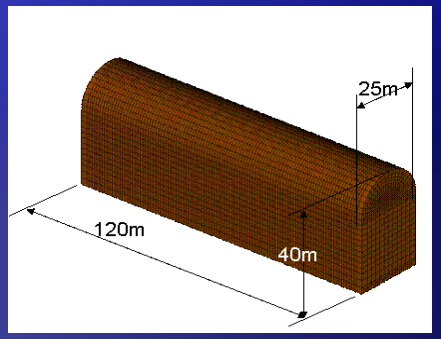
Top Heading Tunnel for The Hall

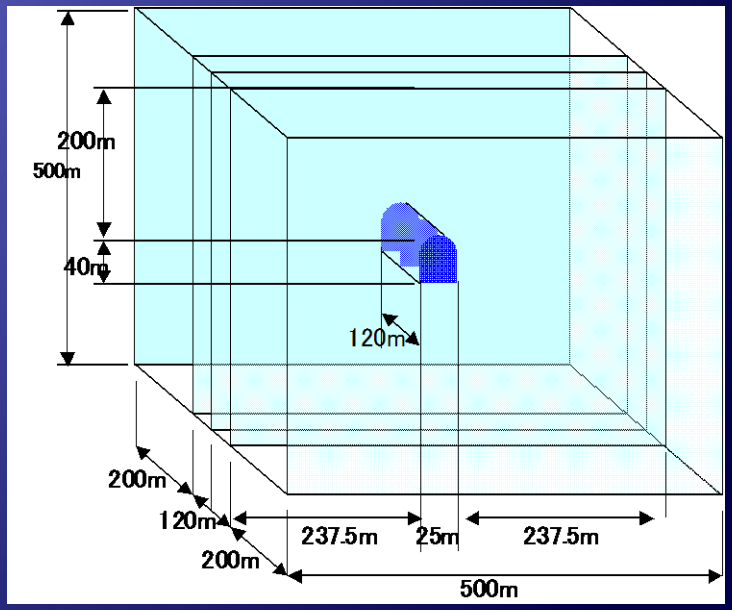


- The tunnel is utilized for initial excavation (arch excavation) during construction phase and for ventilation during operation phase

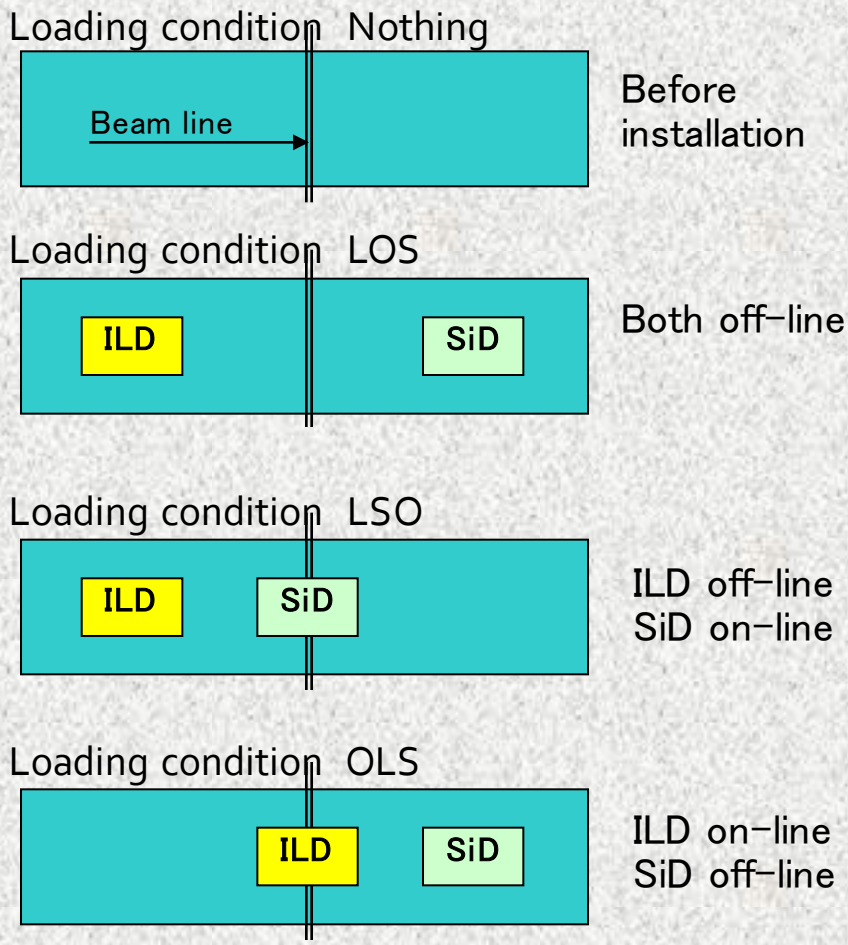
Displacement analysis by 3D FEM

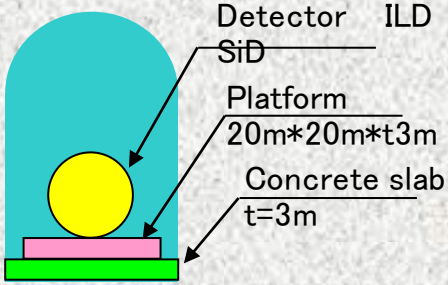
- Detector ILD and SiD are heavy
- Displacement surround detector hall should be confirmed during operation (push-pull)
- Analysis Condition
  - Method: 3D Elastic FEM analysis
  - Cavern shape: simplified shape (I-type cavern)
  - Model: H500m x W500m x L520m (cover 200m)
  - Rock properties: based on an investigation at candidate site
  - Rock support: not considered





Push-Pull

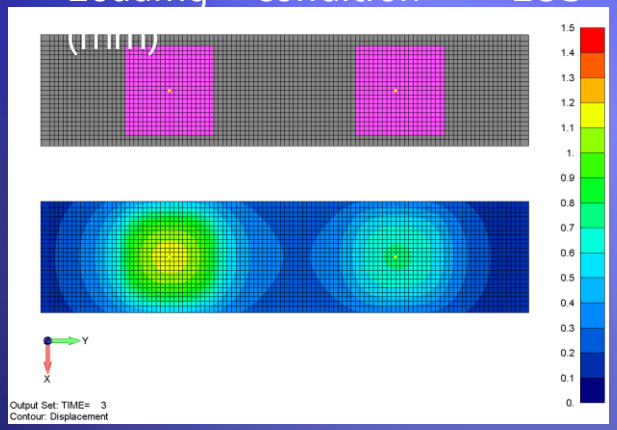




- ILD: 14,700 tons
- SiD: 8,600 tons
- Detector is sit on a platform (concrete, t=3m)
- Loaded on the platform as a uniformly-distributed load

Result of analysis (Base concrete slab deformation)

Loading condition LOS



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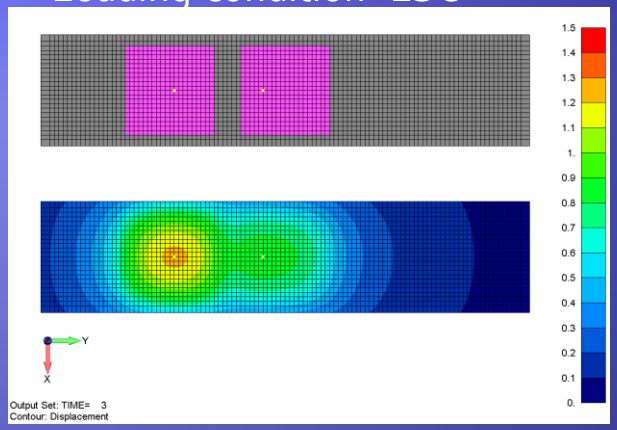

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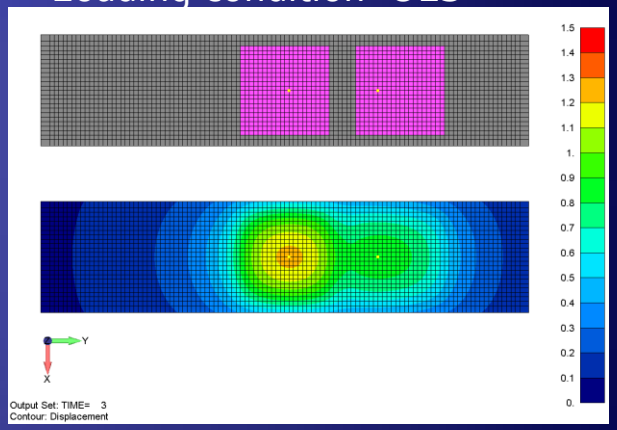

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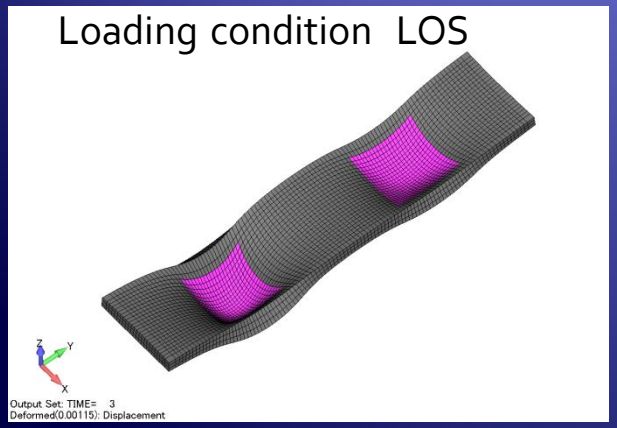

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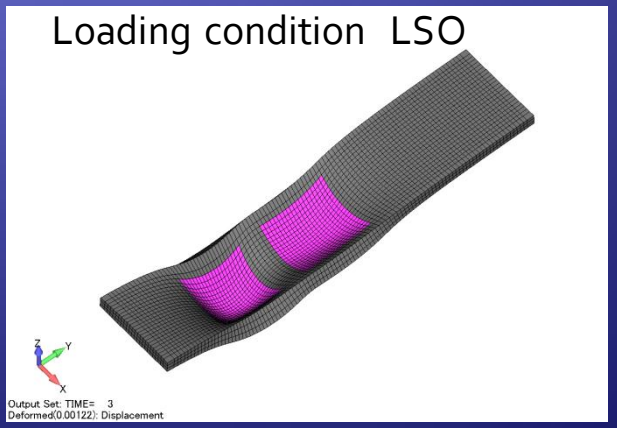

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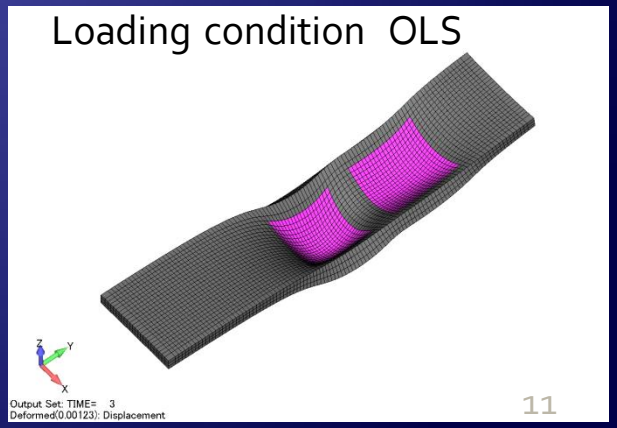
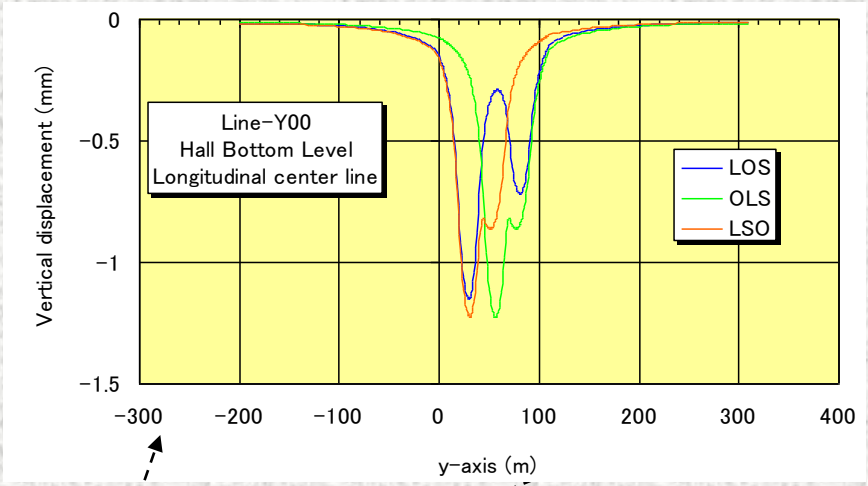
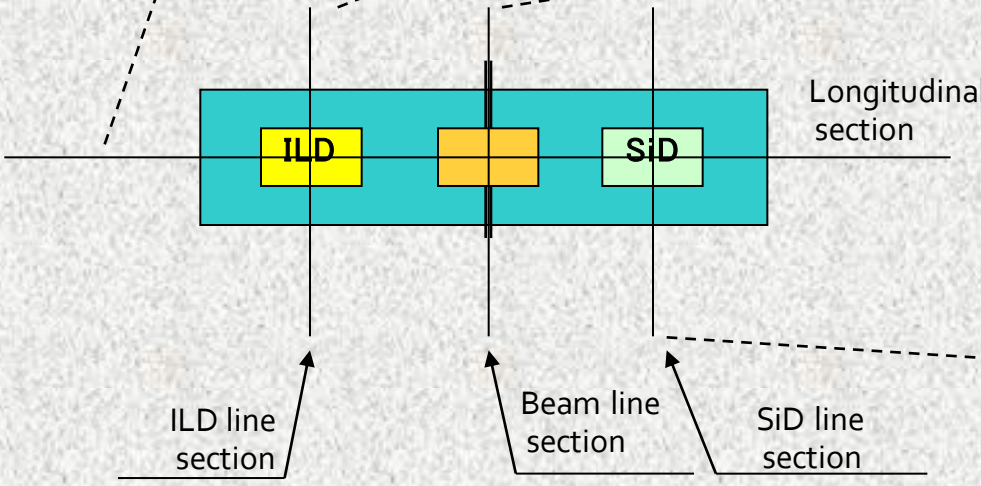
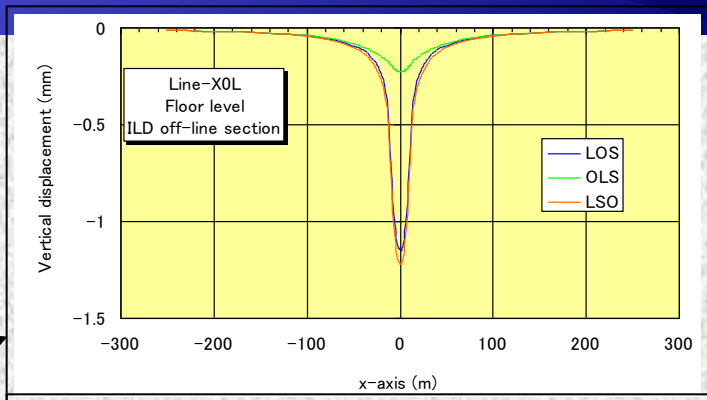
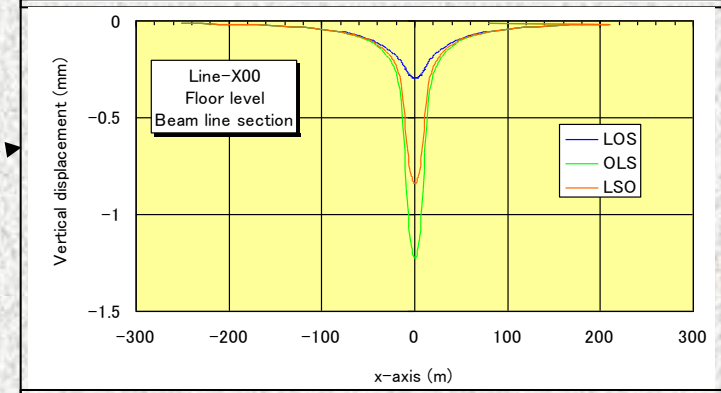


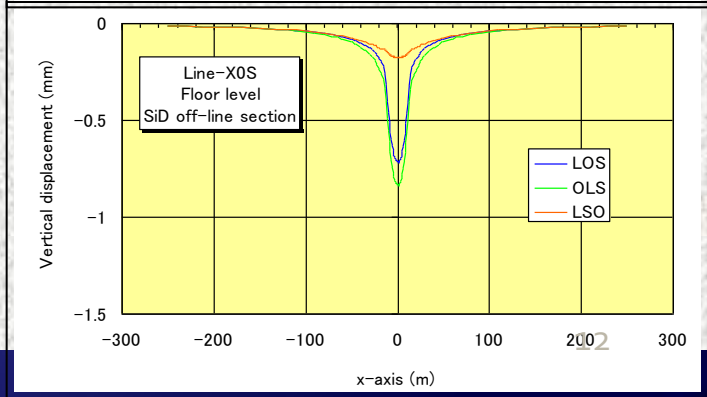
Displacement for each section (Floor Level)



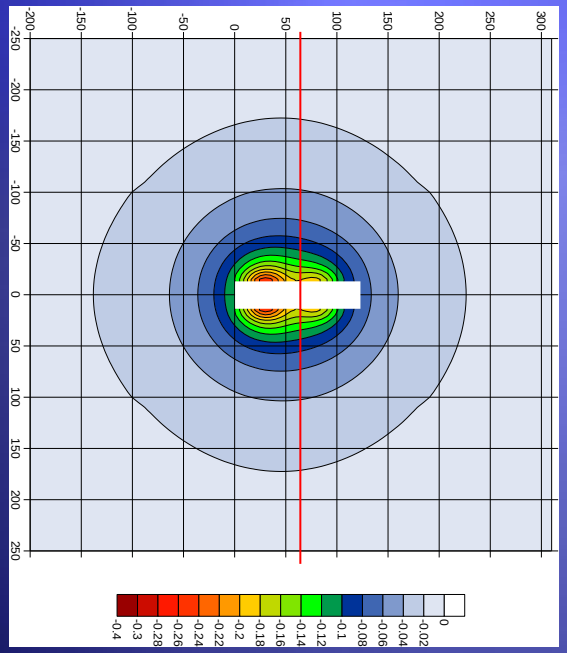








Displacement (Beam line elevation)



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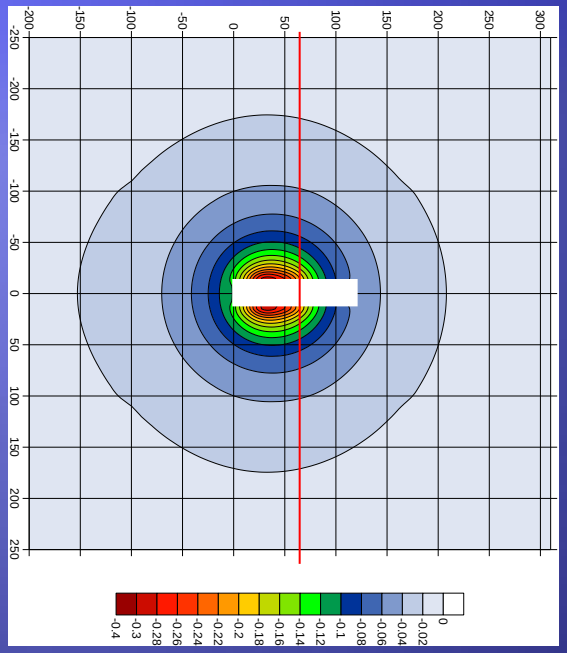

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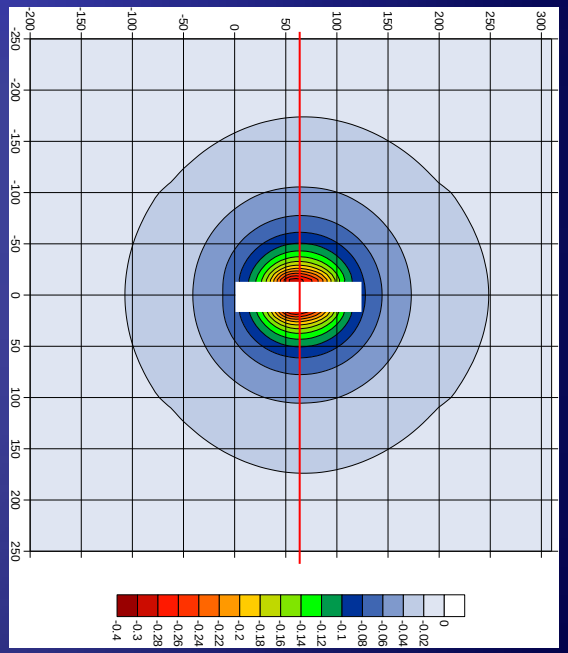

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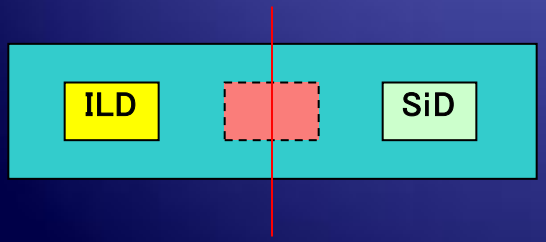

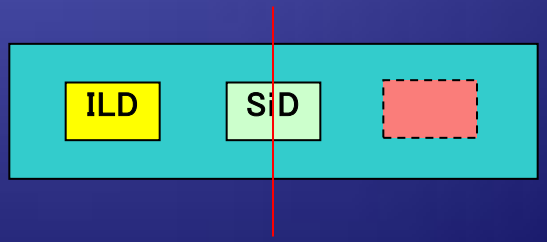

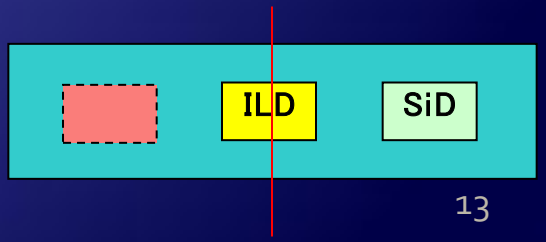

Summary

- Assembly space is ensured
- Detector garages are placed
- Utility cavern is constructed separately
- Sloped access tunnel has a enough size to transport detector parts
- Top heading tunnel is constructed for excavation and ventilation
- The maximum displacement at the floor level is under 1.3mm
- The maximum displacement at the beam tunnel elevation is under 0.4mm