CLIC Handling Engineering Update

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EN-HE

# Outline

- Surface transport & handling
- Shaft
- Underground handling
- Questions/ What is next?

Surface transport

- Surface transport in between the buildings carried out using the fleet of road transport vehicles (feasibility studies to be done).

- Surface transport within buildings carried out by:

  - Mobile cranes,

  - Overhead cranes,

  - Forklifts,

  - Industrial lift trucks,

  - Trucks and trailers,

  - Pallet trucks,

  - Etc.

* Any specific requirements to be determined.
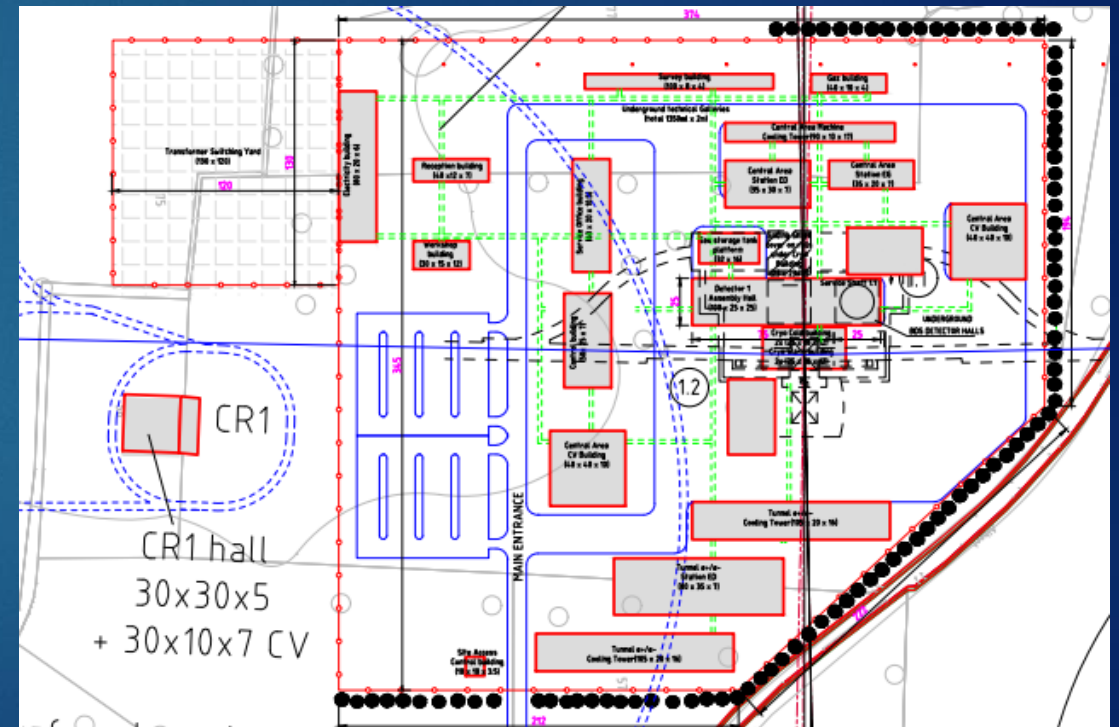
Surface handling – EOT cranes

Building Type: Crane load capacity (tonnes)

- ▶ Detector Assembly   2x80 (CMS approach) + strand jacks
- ▶ Colling Tower and Pump Station   3.2
- ▶ Colling and Ventilation   20
- ▶ Cryogenic Warm compressor   20
- ▶ Cryogenic Surface Cold Box   20
- ▶ Workshop   10
- ▶ Central Area Machine Cooling Towers   5
- ▶ Shaft Access   20
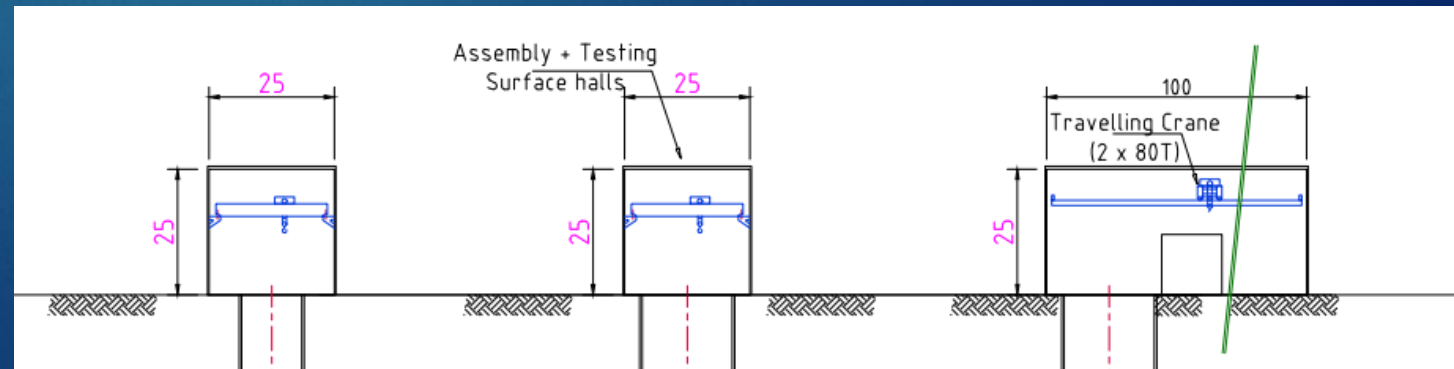
Surface handling - Questions

Q: Traveling crane full length of the *Klystron & Modulator Building*, is there a need for it?

A: Two possible solutions are:

- EOT crane:
  - Increased height of the building;
  - No constraints on floor live load;
  - Possibility to have more equipment in the building.
- Surface/road/ground vehicles:
  - Increased surface of the building (an access to all the equipment needed);
  - Constraints on the floor live load.

Depending on the amount of the equipment that will be installed in the building a need of the crane can be evaluated.
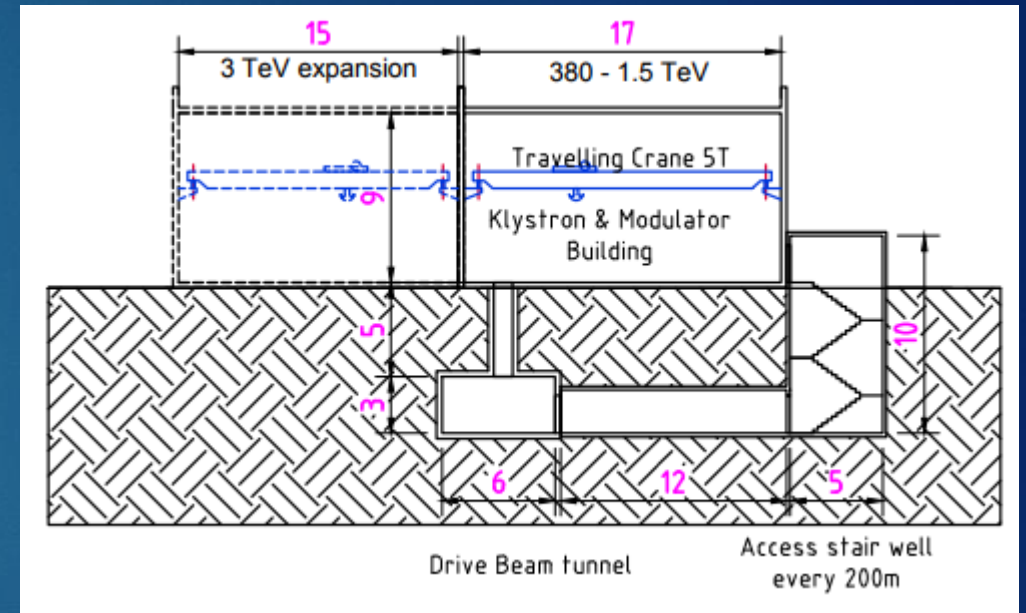
Transfer: Surface → Underground Shaft

▶ Access point: shafts (10 total, 3 during 380 GeV stage)

* Iinclined tunnels only when shafts are not feasible (geographical or environmental reasons).
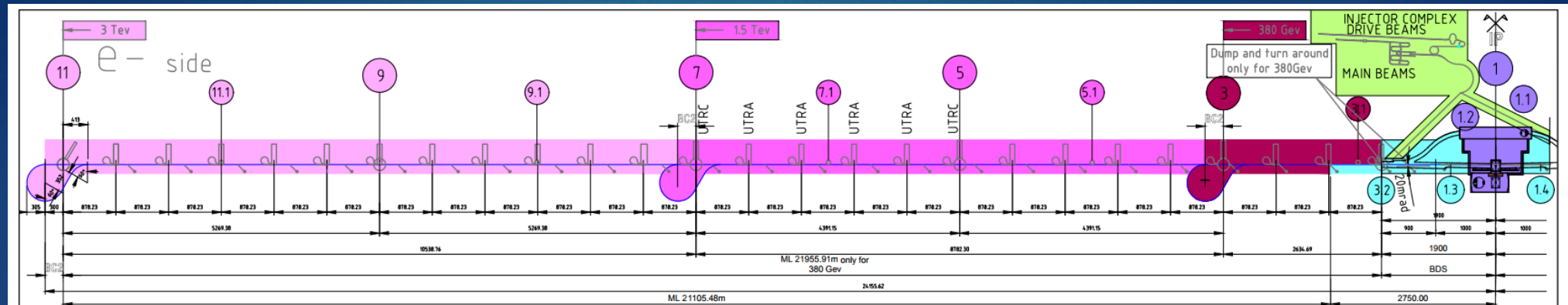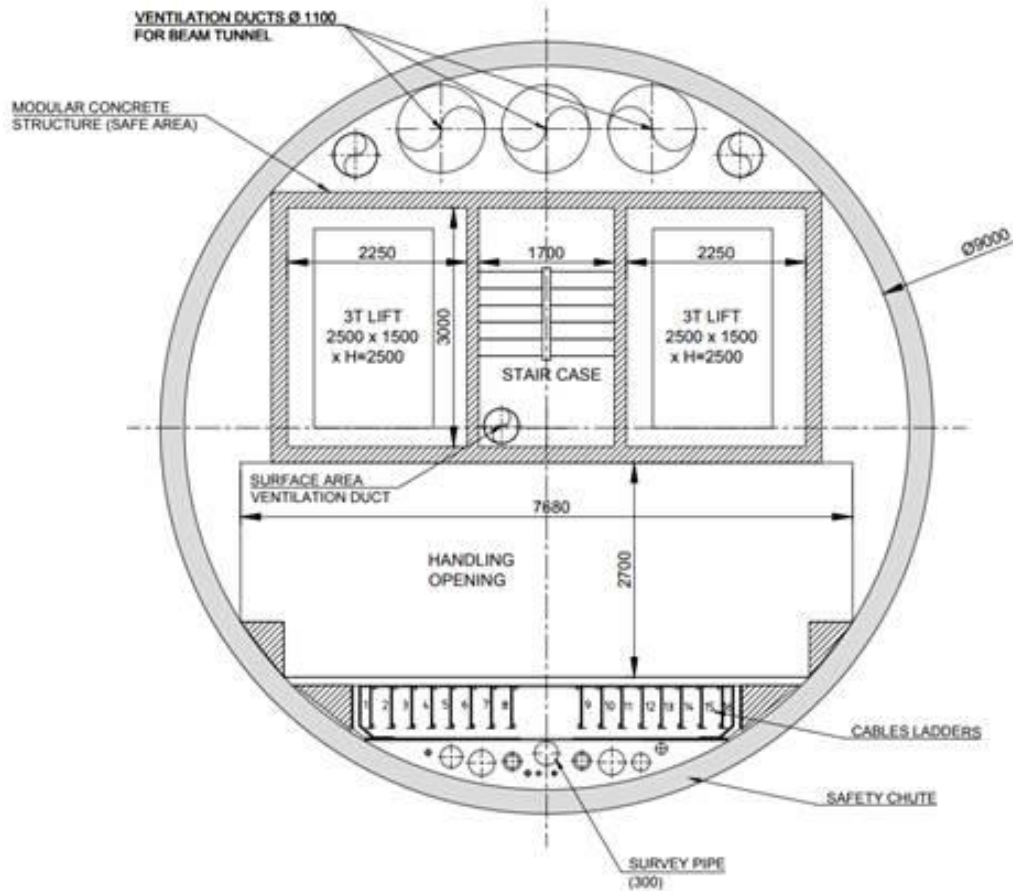

Shaft requirements:

▶ Evacuation

▶ Shaft maintenance (cables, pipes, etc.)

▶ Quick access for people and equipment

Transport means:

▶ Stairs

▶ Stairs/ tremie (crane maintenance platform)

▶ Lifts/ tremie

Transfer Surface – Underground Shaft

Q: Are the new dimensions of the handling opening (tremie) adequate?

A:
- The longest object is beam pipe (10m)
- The heaviest object is Dipole (5 t)
- Transport of the klystron modulator tank not verified (can it be turned? 2000mm x 1500mm x 1000mm – dimensions of the shaft and lift reached).

Q: Are the lift dimensions and capacities adequate?

A: standard 3t lift used in LHC (can be adapted)

Transfer Surface – Underground Shaft
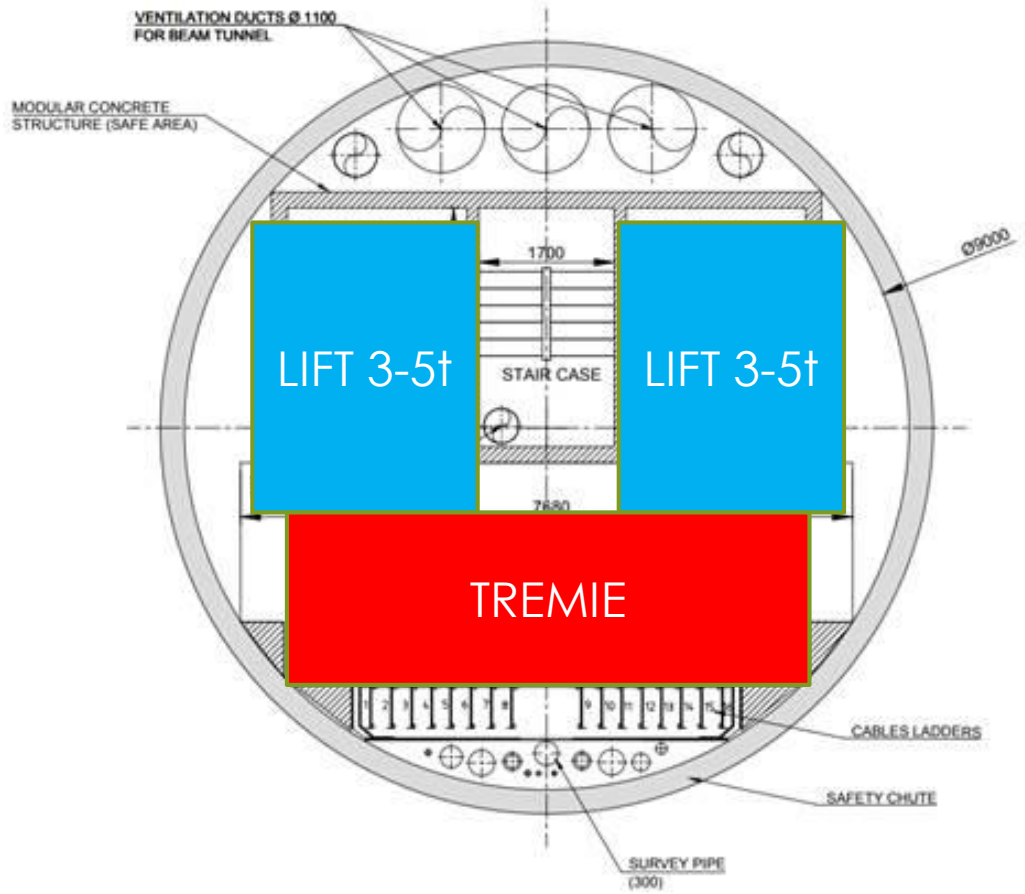
|		Quantity		Weight	Weight	Overall
		per sector	total	/unit (kg)	/total (kg)	dimension (mm)
Module		428	20549	~1500	8797330	2010x1550x1200
Module support		428	20549	few tens kg		
Main Beam Transfer line						
	MB TL Quadrupole	4	192	300	57600	2000x200x200
	beam pipe	85	4080	15	61200	10000x100x100
Drive Beam Transfer line						
DB Sectors						
	Transfer Line Quadrupole		768	300	230400	2000x300x300
	beam pipe	85	4080	30	122400	10000x200x200
Drive Beam Turn Around Loop		1	48			
	Quadrupole	39	1872	330	617760	360x360x600
	dipole	24	1152	5000	5760000	600x800x1500
	Sextupole	24	1152	25	28800	200x200x200

TO BE UPDATED

Underground transport
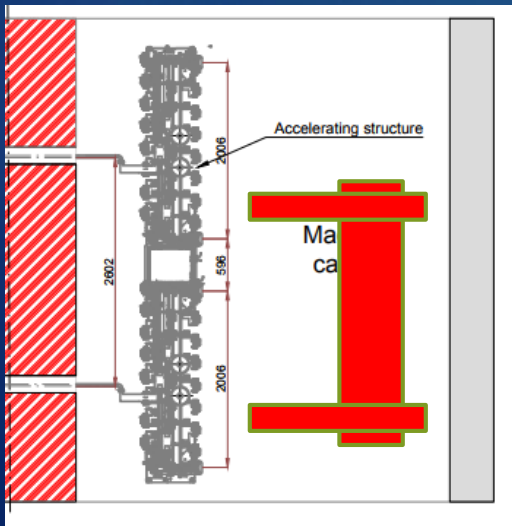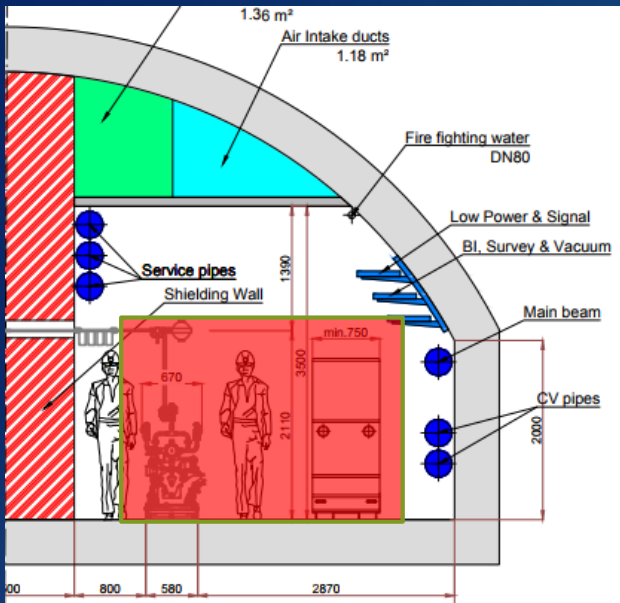
Machine Cavern:

▶ Transport of each accelerating structure on the Trailer-Crane vehicle;

▶ Space for the truck support needs to be defined and reserved (by EN-HE);

▶ Cable trays access and position to be discussed;

▶ Transport volume should not be less than 950mm.
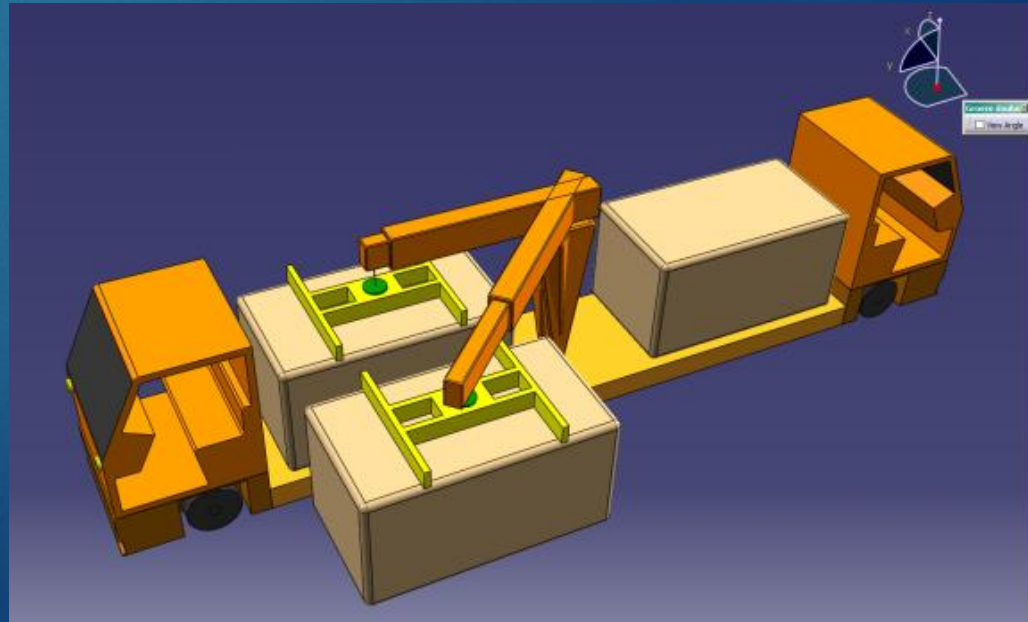
Underground transport

Klystron Cavern:

▶ Modulator tanks installed before other equipment. Is there maintenance foreseen?

▶ Transport volume width min 900mm (EURO Pallet width 800mm);

▶ Monorail above the Klystron solenoid for the maintenance;

▶ Min 500mm clearance below fixed part of the hoist.

Q:
- Operation frequency
- Support fixed above (false ceiling?)

Klystron cavern

Monorail with electric hoist
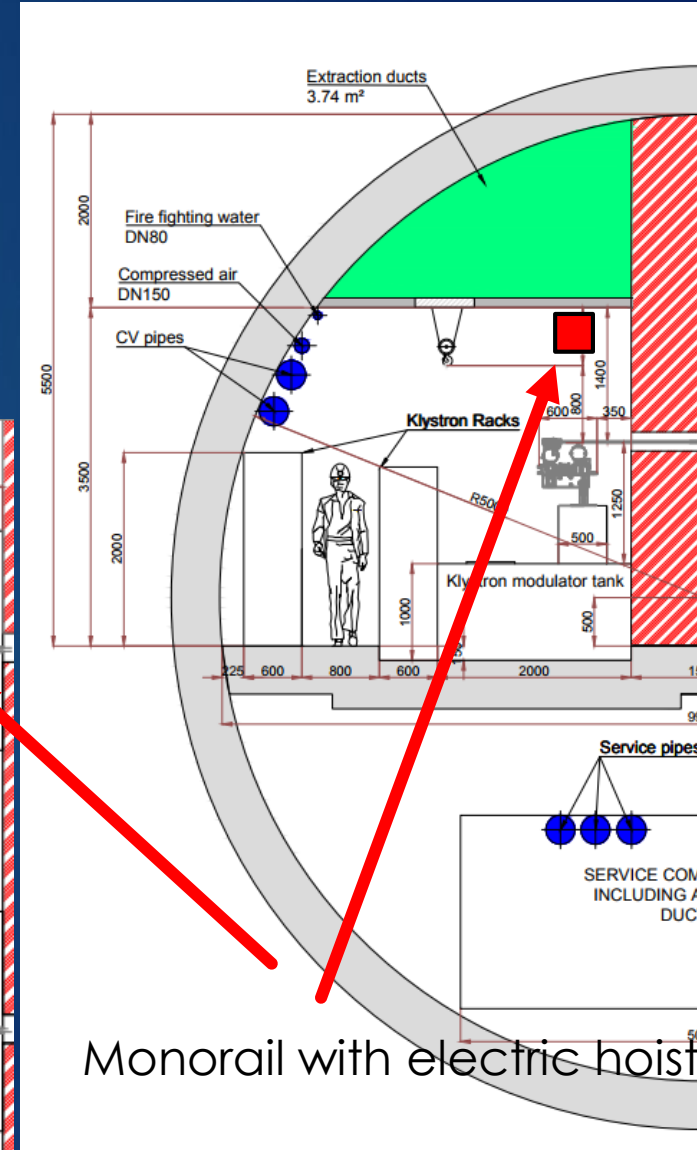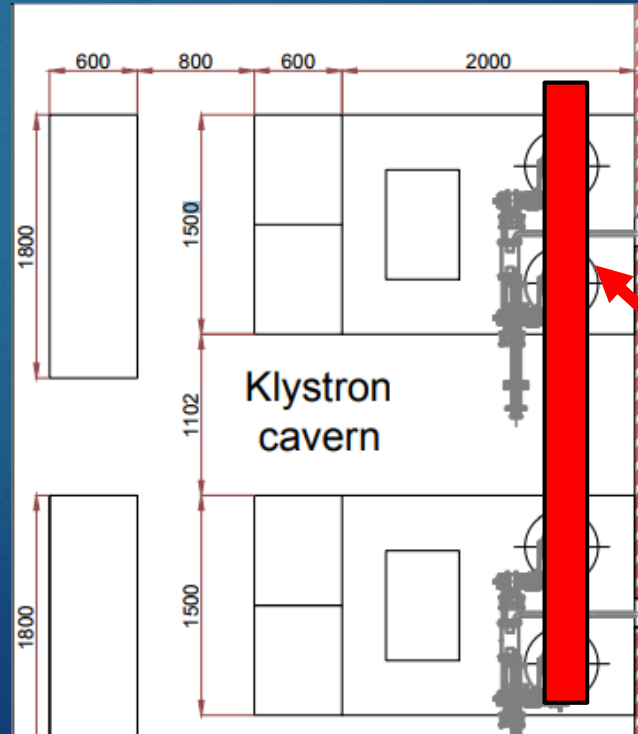
Questions/ What is next?

- Updated list of the equipment for each building/area with dimensions;

- Please think about the transport when designing (lifting points, CoG, installation) ☺ ;