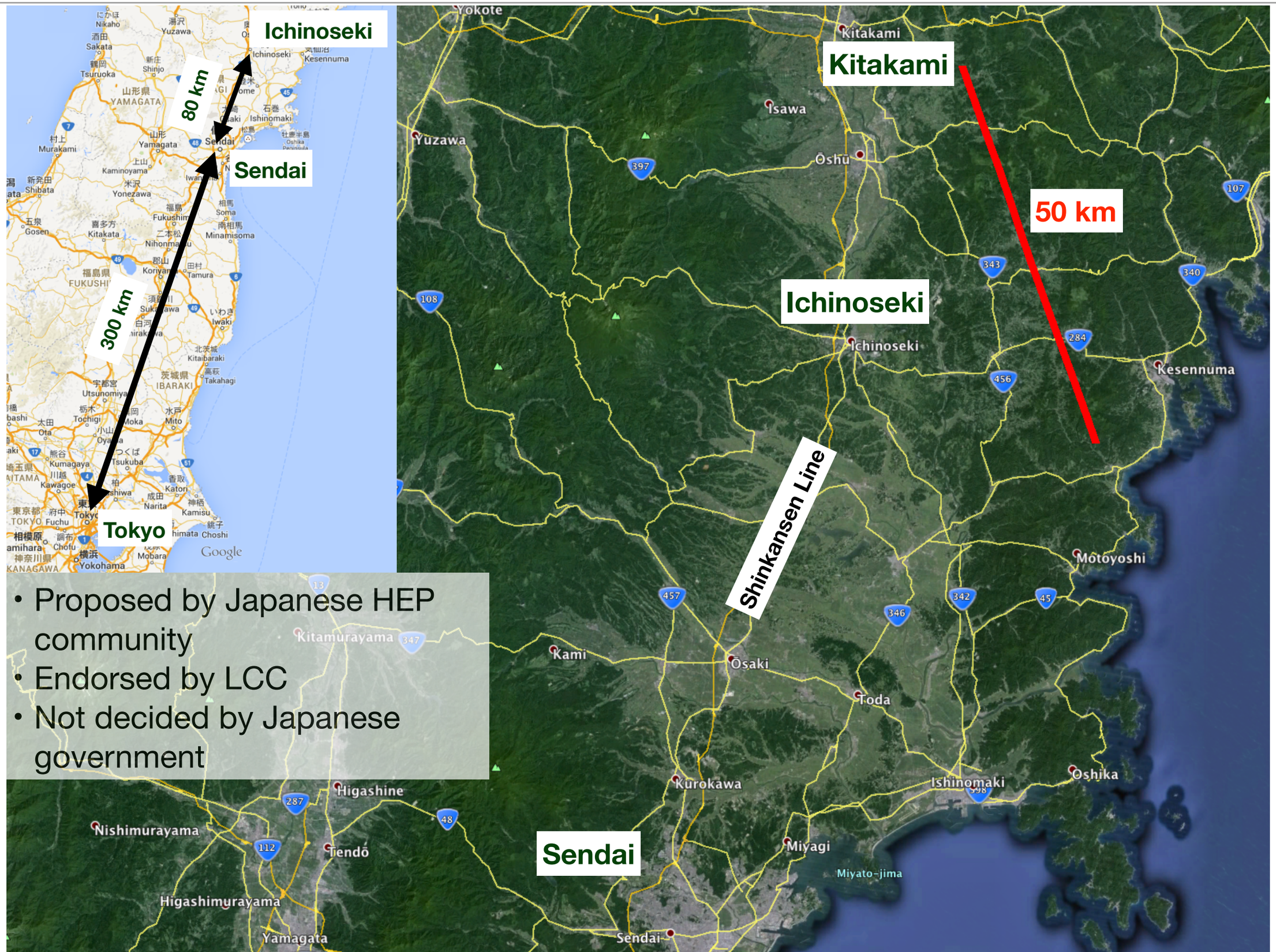
Site Specific Studies for ILD

Karsten Buesser

LCWS15
04.11.2015

Kitakami Site

Possible ILC Site at Kitakami



- Proposed by Japanese HEP community
- Endorsed by LCC
- Not decided by Japanese government

Vp

electrical resistivity

Vp@100m a.s.l.

electrical resistivity@100m a.s.l.

1,000Ωm

2.5km/s

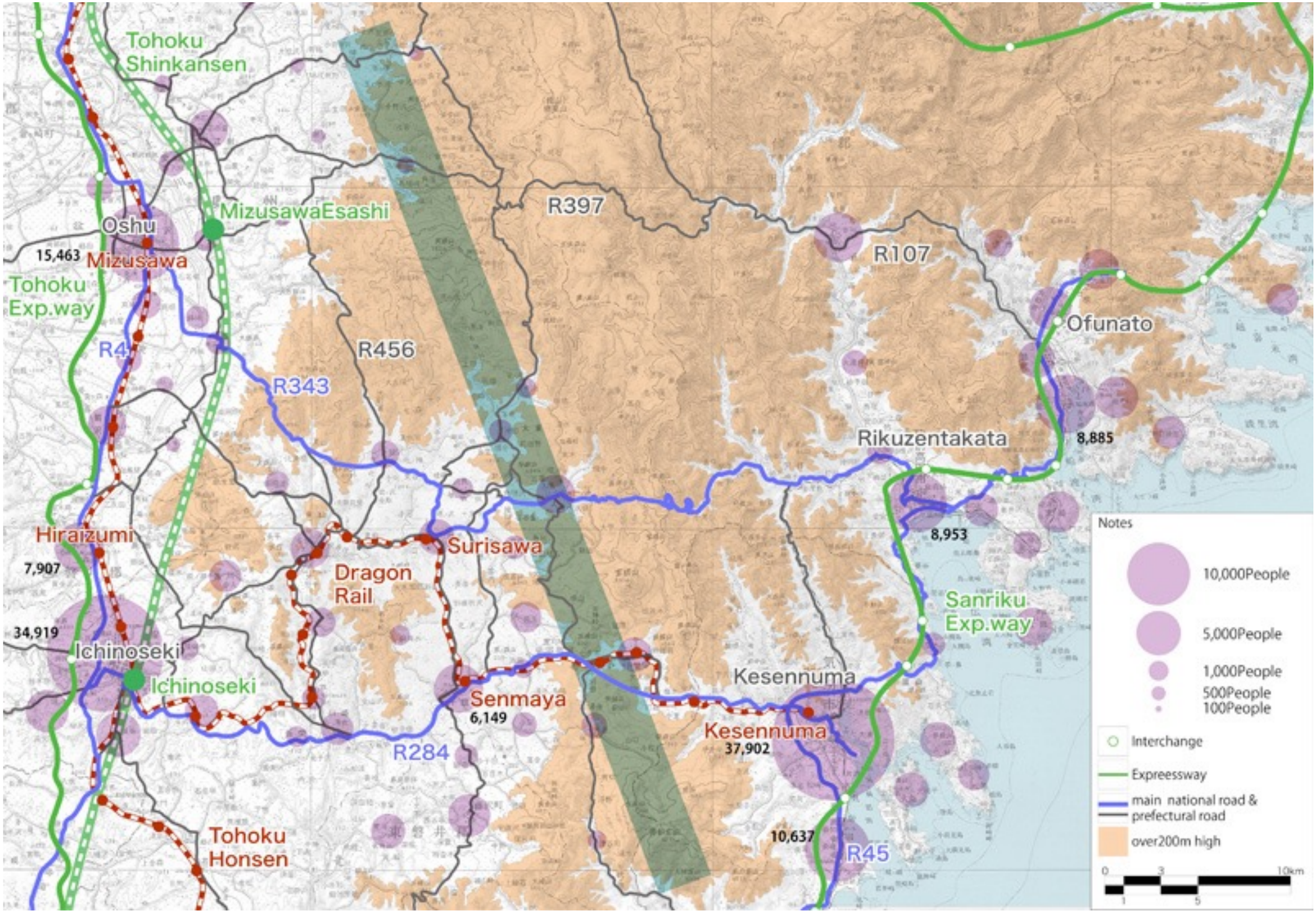
earth covering<50m , >150m

I bet on this site.

Slide from Tomo Sanuki

KITAKAMI Site: Transportation

Slide from Tokiko Onuki



General rule

total weight	trailer/ track	our package	daytime	night	Xpwy	paper work
25 ton	~10 ton	~15 ton	YES	YES	YES	0
44 ton	~20 ton	~24 ton	YES† / NO	YES	NO	1
80 ton	~30 ton	~50 ton	NO	YES	NO	10

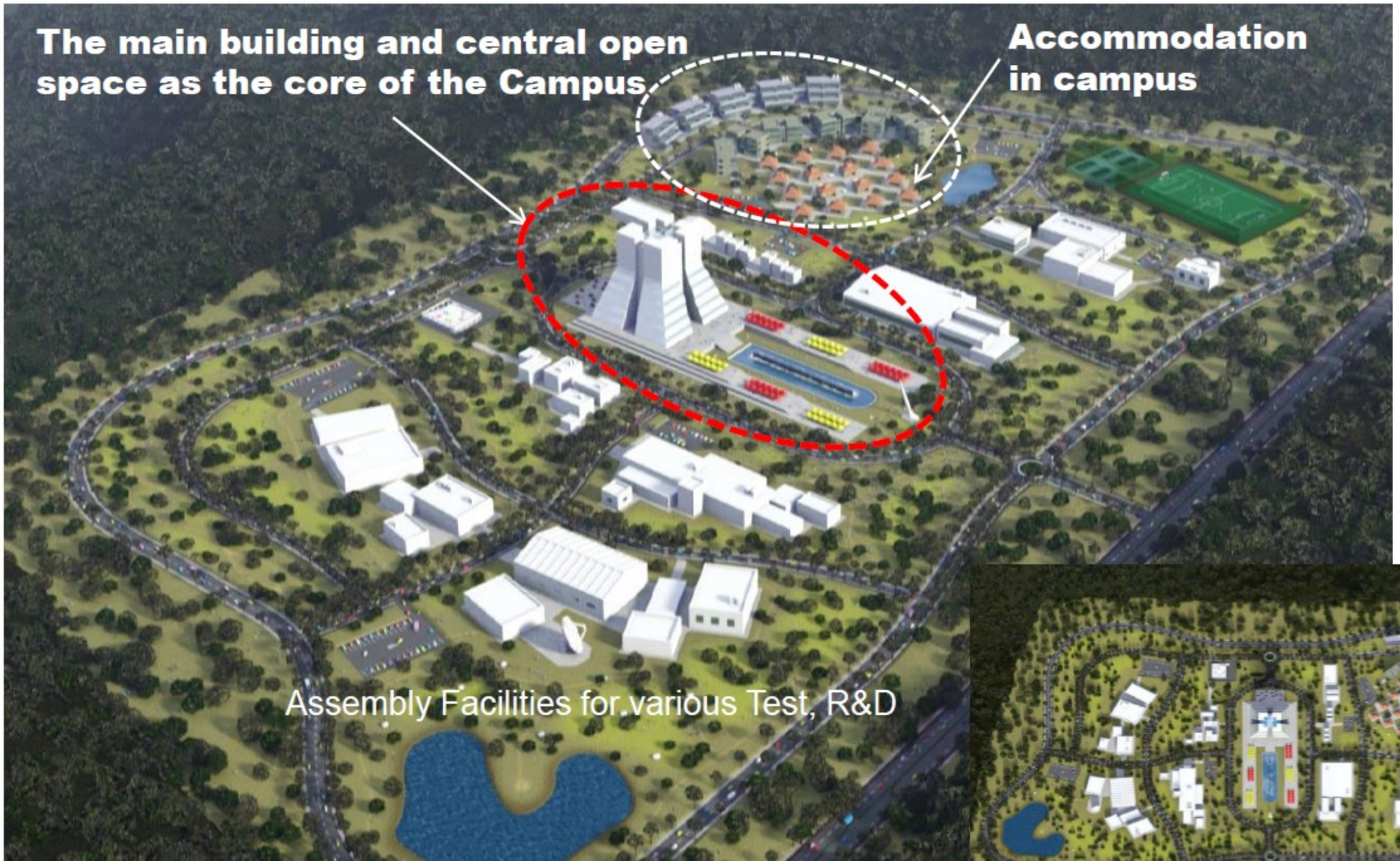
† Probably "YES", if our package fits into a standard container (W=2,438mm).

Slide from Tomo Sanuki

Slide from Masanobu Miyahara

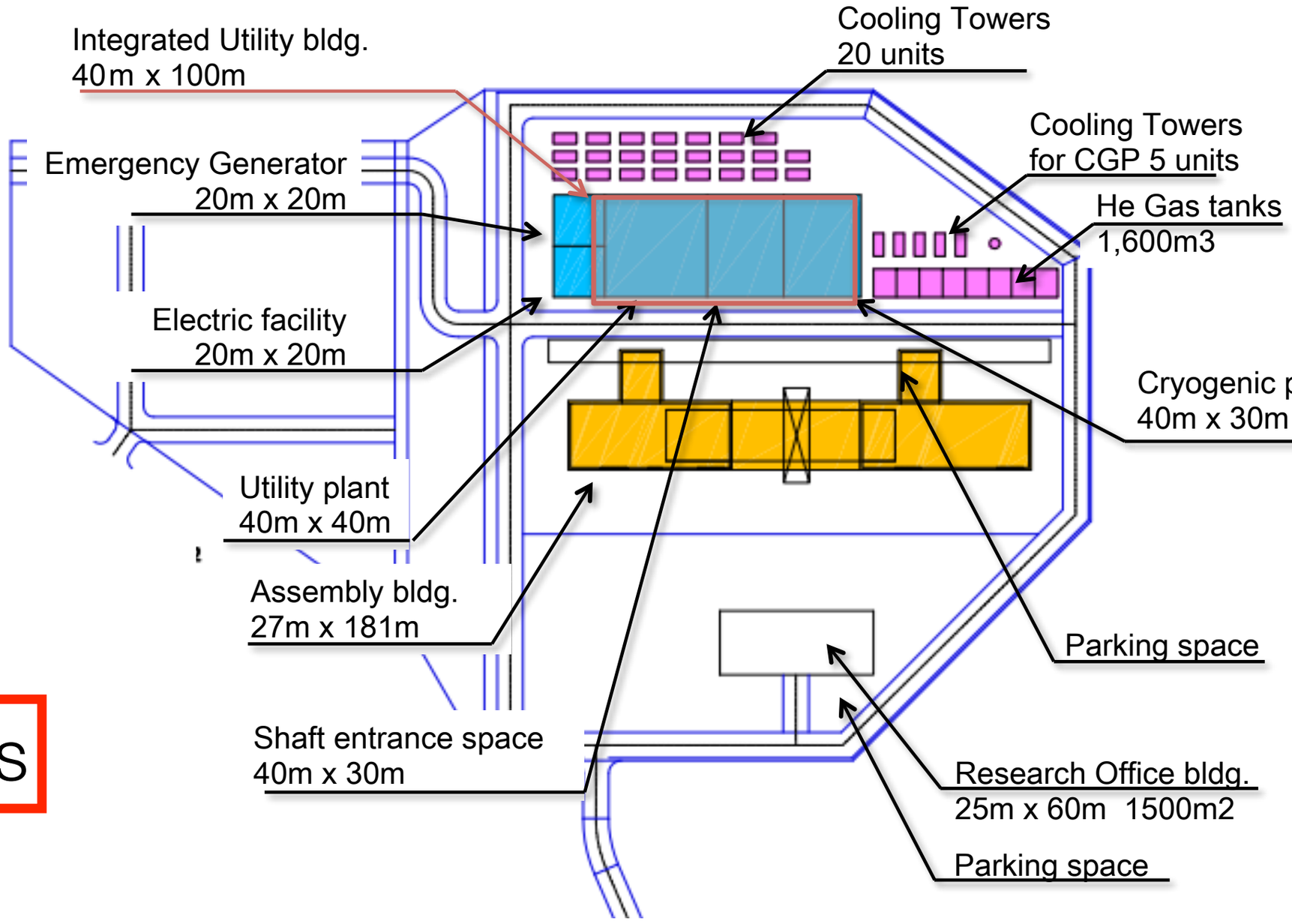
Central campus

Draft proposal plan for discussion



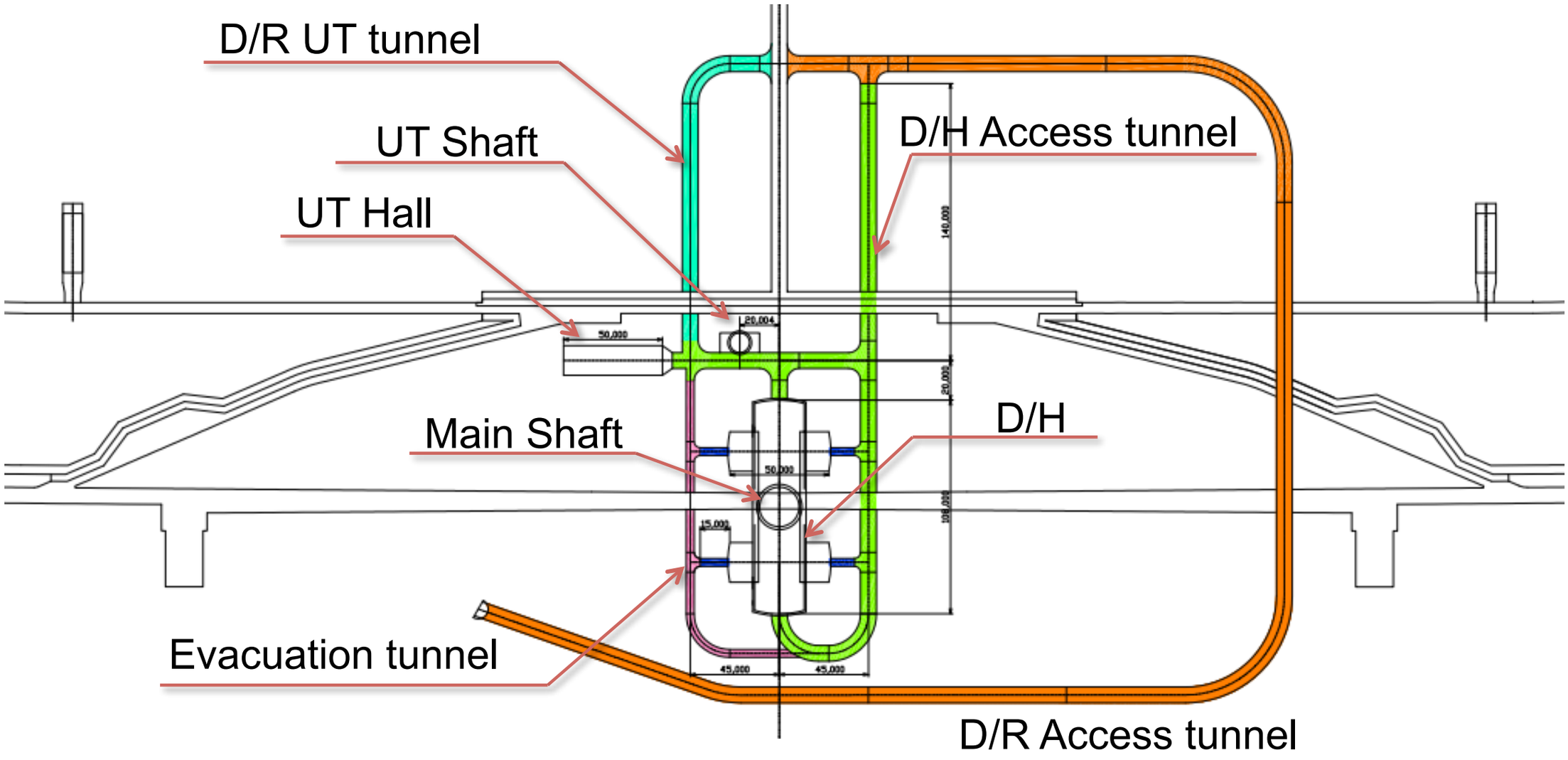
(M. Miyahara, AWLC14)

Surface ground Buildings and facilities



IP Campus

Underground Structure



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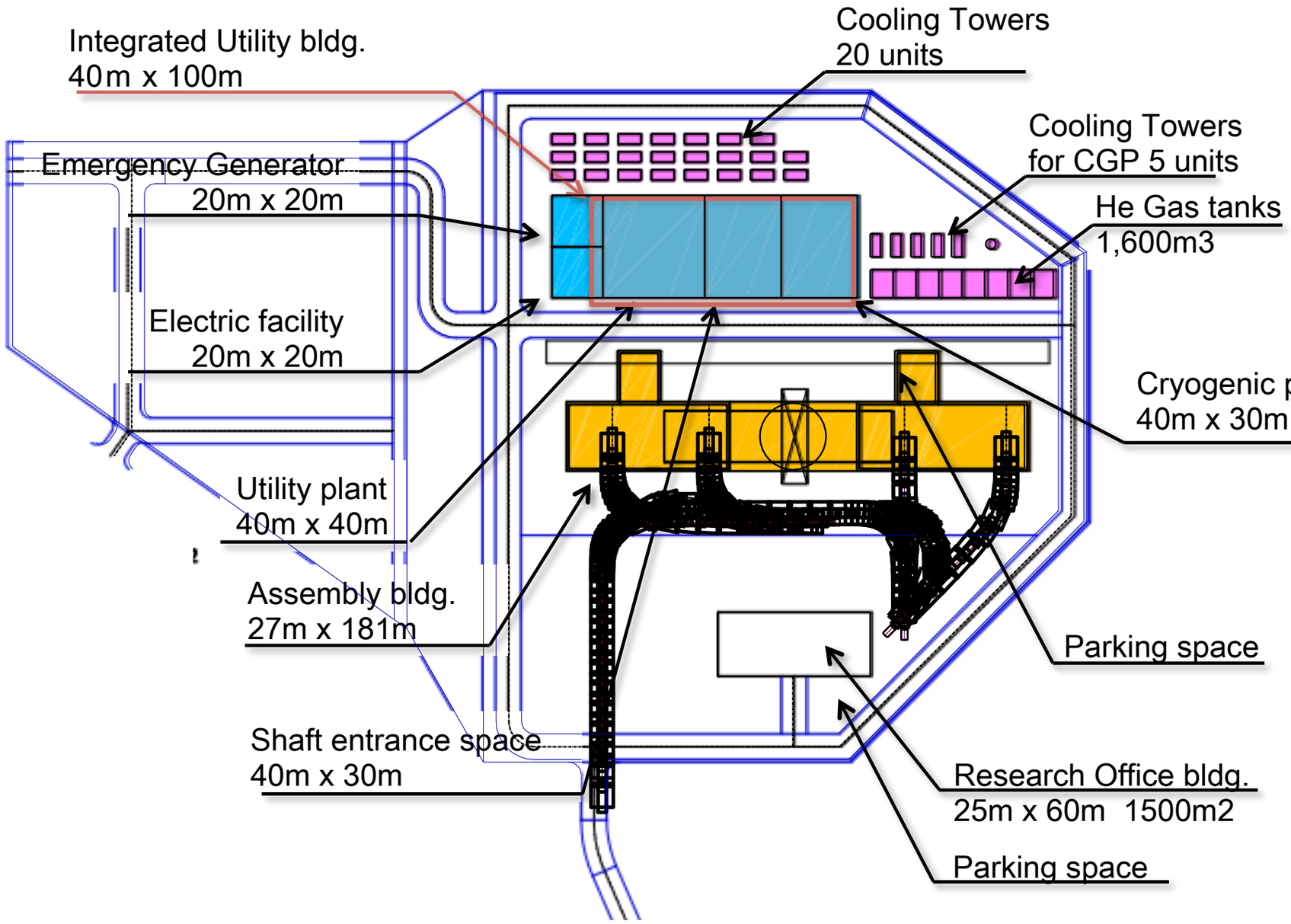
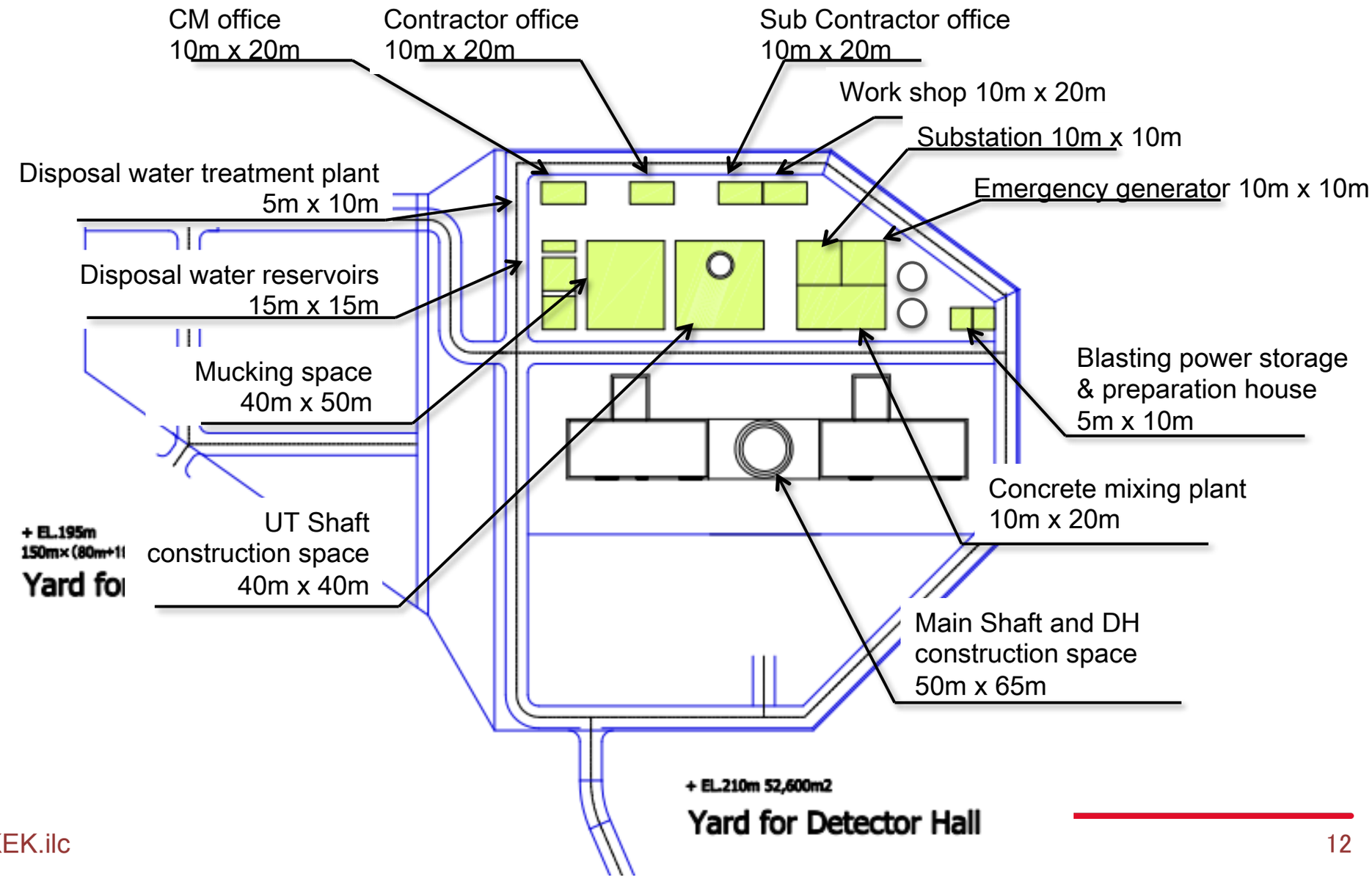


Construction facilities Arrangements



Detector Infrastructures

Cryo Configuration (ILD,SID,QD0,QF1,CC,DR)

Hybrid A' (All pipes for Helium and cooling water.)

cooling tower for IR compressors including DR.
volume flow rate = 1500L/min per 1 comp.
total volume flow rate = 6000 L/min (4 comps)

sub buffer tanks for comp

main buffer tank

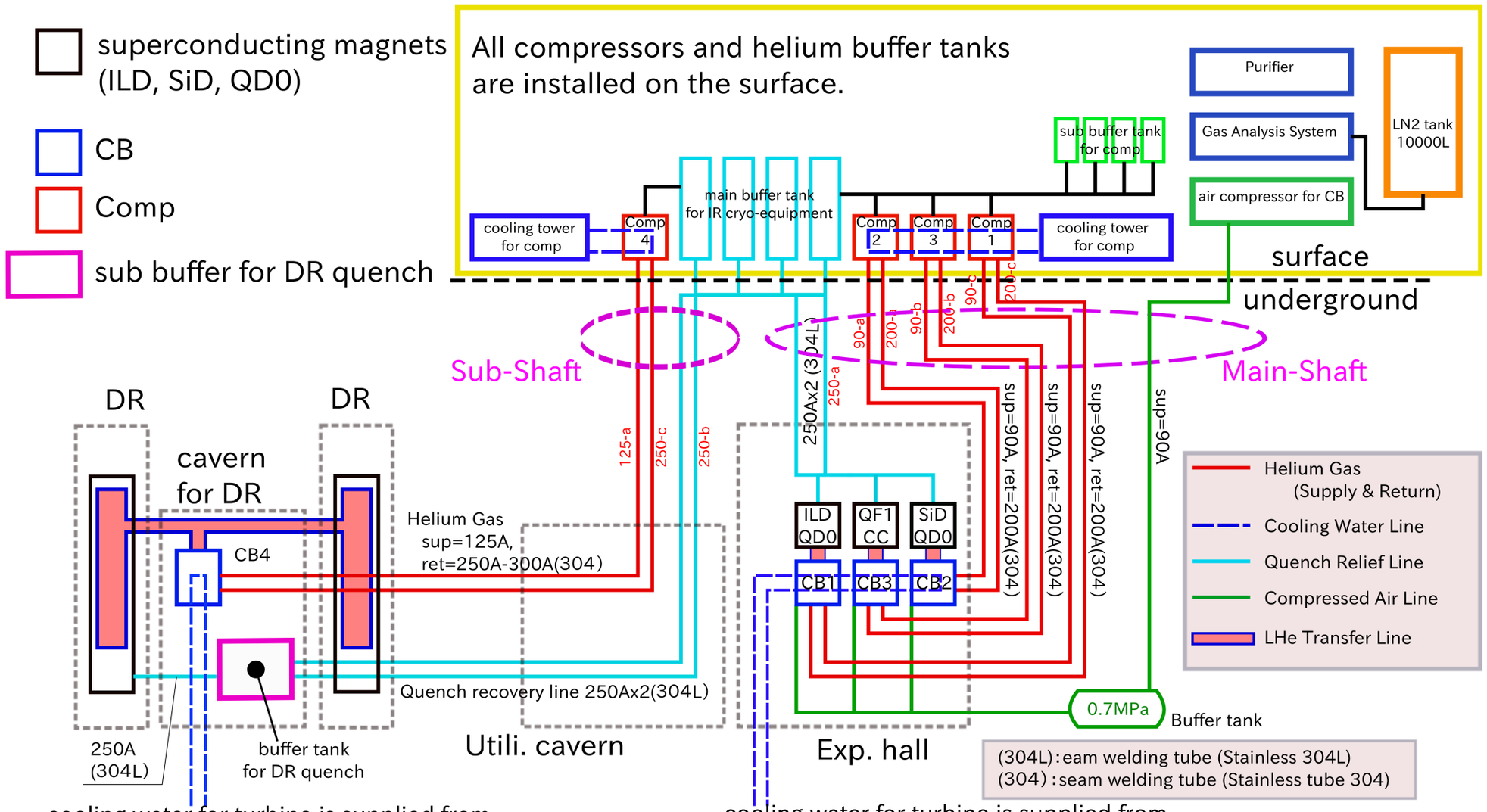
cooling towers

superconducting magnets (ILD, SiD, QD0)

CB

Comp

sub buffer for DR quench



cooling water for turbine is supplied from cooling water system located in the underground
100L/min per one CB.
Inlet temp = 31 deg.

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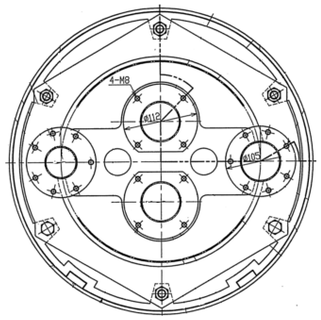
100L/min per one CB.
Inlet temp = 31 deg.

Slide from Takahiro Okamura

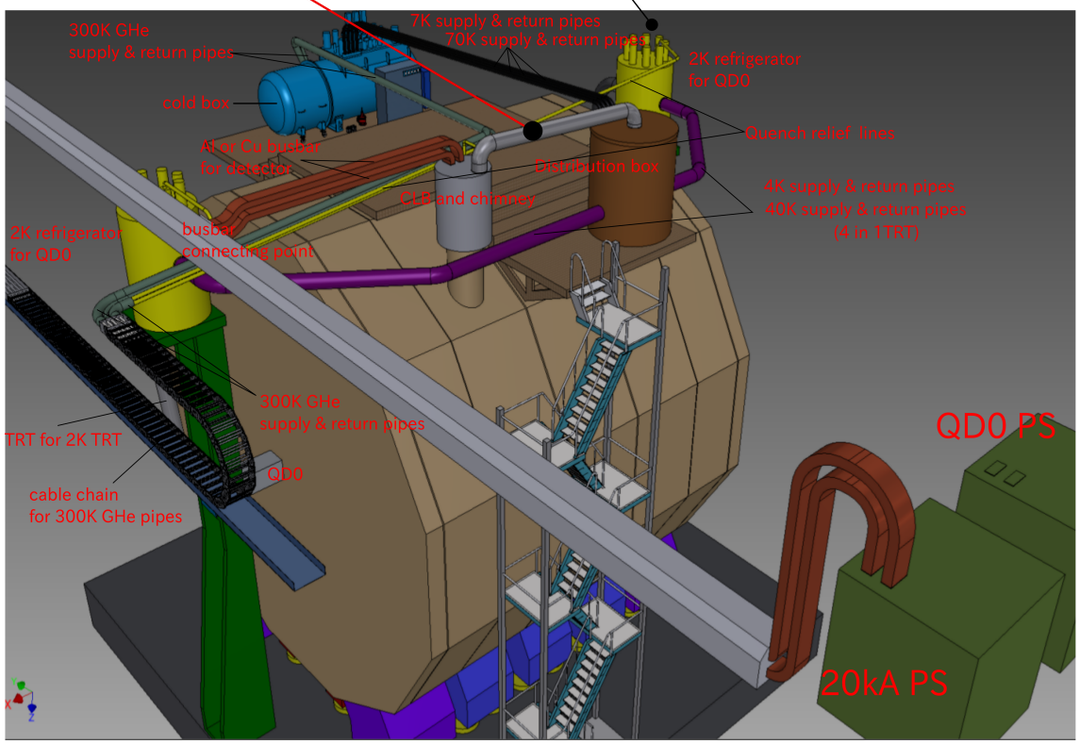
Layout example for ILD

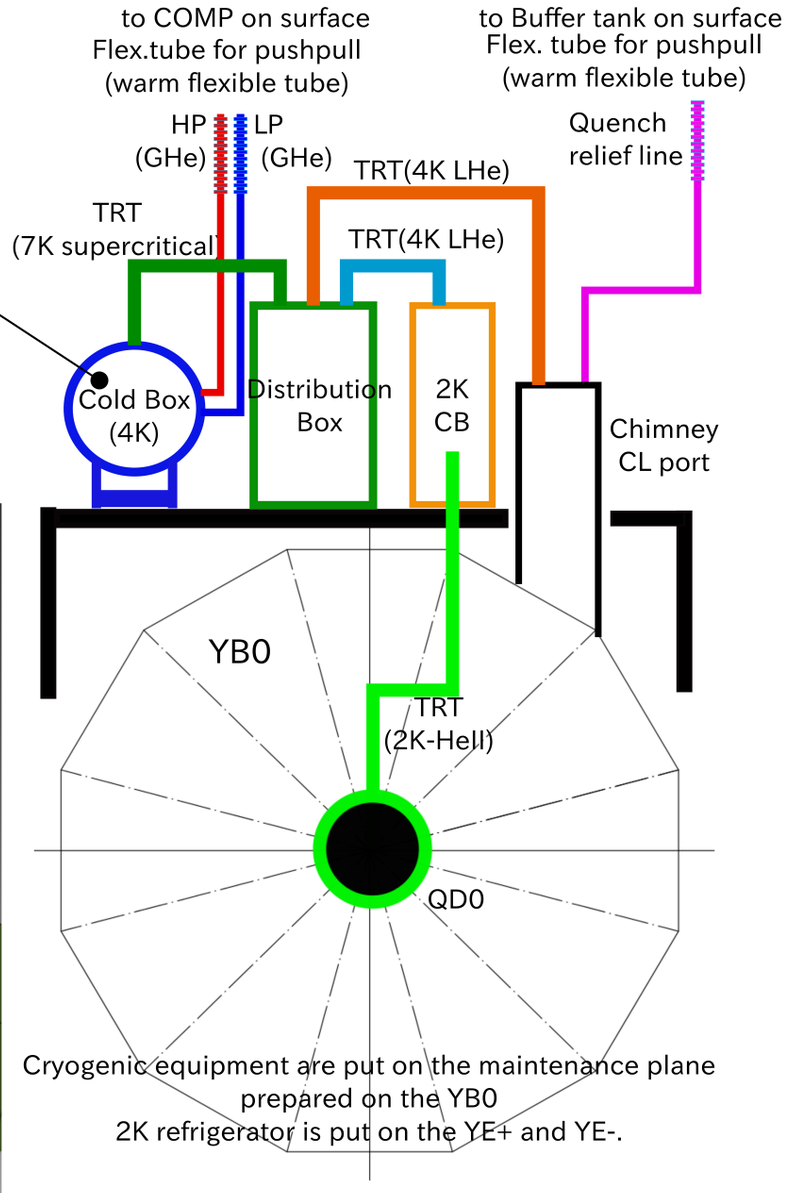
Cross section of TRT
(7K supercritical, 4K LHe)



2K refrigerator
(BNL)

4K cold box



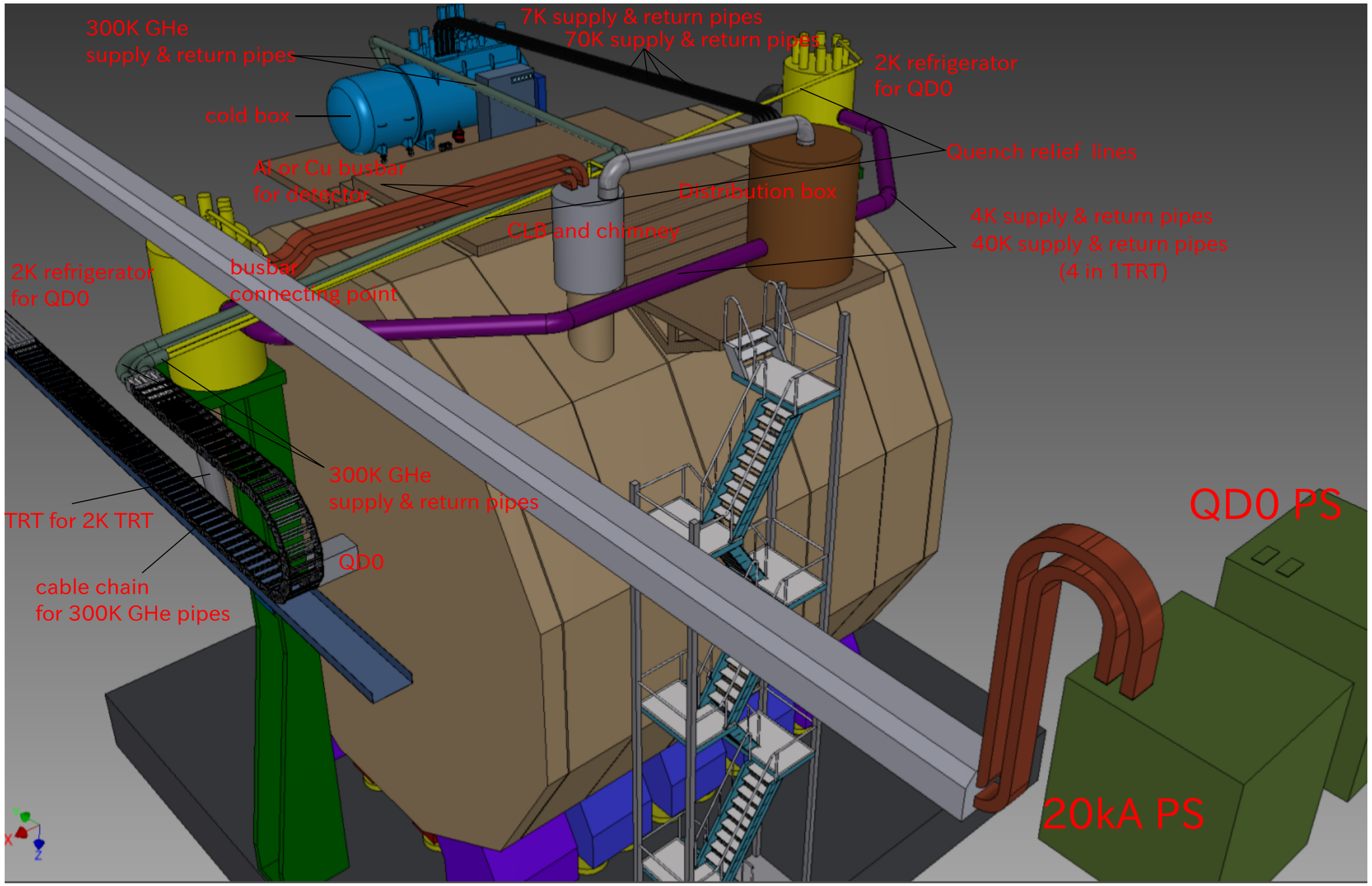


Cryogenic equipment are put on the maintenance plane
prepared on the YB0
2K refrigerator is put on the YE+ and YE-.

Side view of ILD

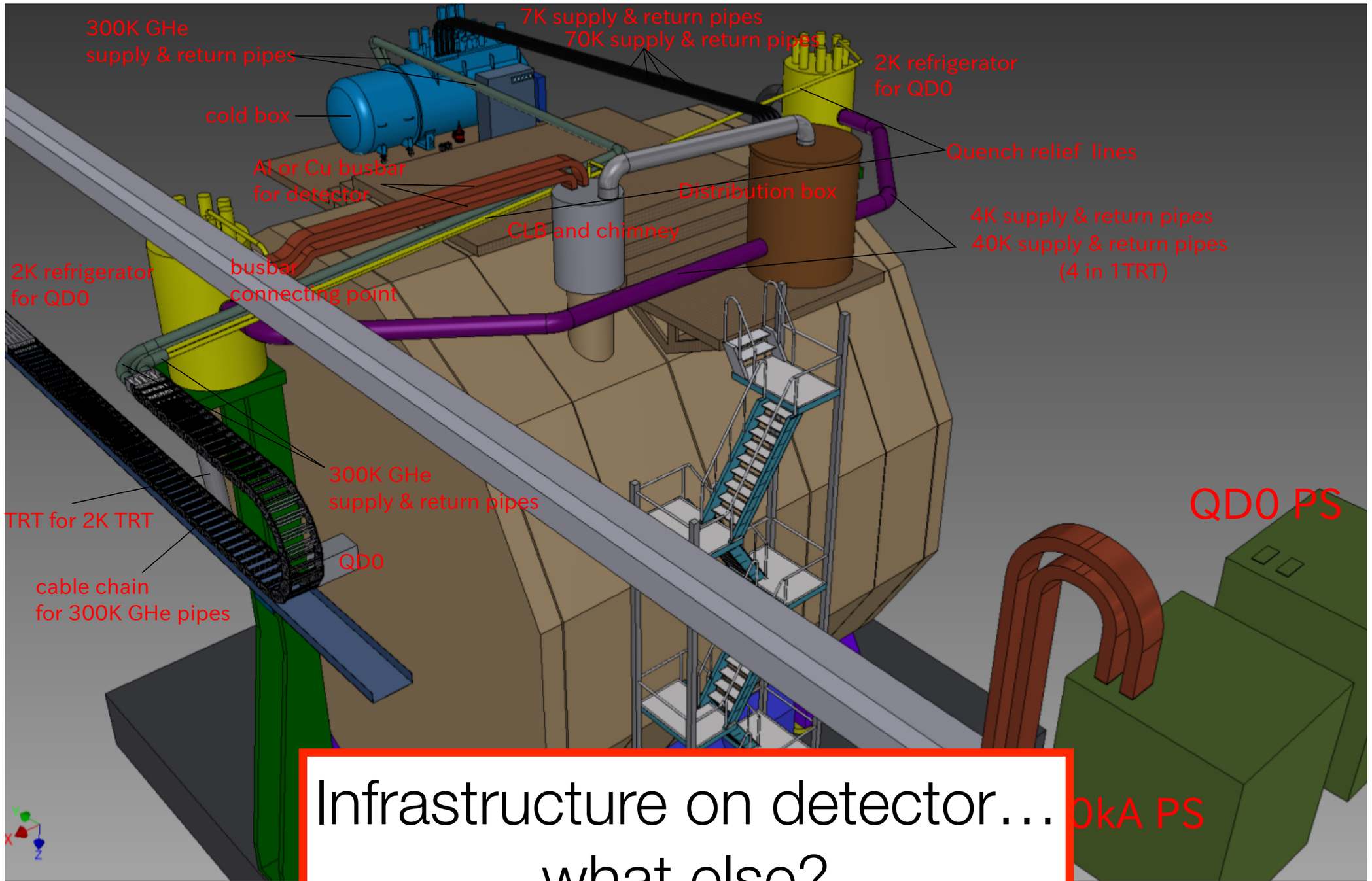
Most of the cryo-equipment should be located on the YB0 platform in order that ILD detector should be divided into 5 sectors as easy as possible.

Appendix (E) : 3D view



Slide from Takahiro Okamura

Appendix (E) : 3D view



Infrastructure on detector…
what else?

Slide from Takahiro Okamura

Subdetector Developments
(the big devices)

AHCAL Assembly

Kitakami Side

or anywhere in any detector

HELMHOLTZ ASSOCIATION

DESY

Slide from Karsten Gadow

AHCAL Assembly

solution: all needed AHCAL parts fit into here

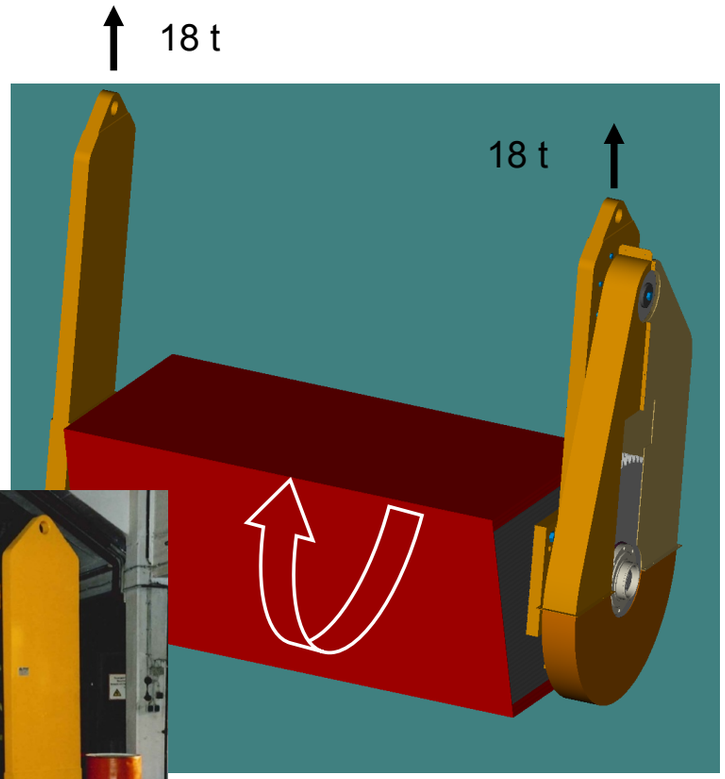
AUSSENMASSE		
Länge	mm	6058
	ft	19' 10 ½"
Breite	mm	2438
	ft	8'
Höhe	mm	2591
	ft	8' 6"

GEWICHT		
Tara	kg	2700
	pd	5950
Max. Zuladung	kg	27780
	pd	61250
Max. Bruttogewicht	kg	30480
	pd	67200

the container fits to standard transport systems as ships, railways, trucks and through tunnels…..

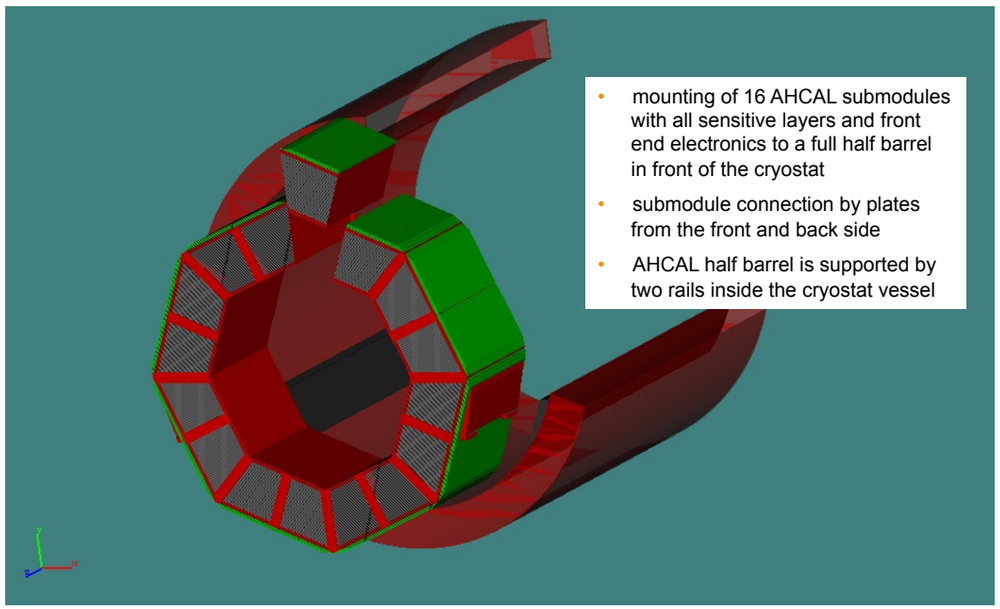
Slide from Karsten Gadow

AHCAL barrel integration tools



- lifting and turning tool for AHCAL barrel absorber submodules available
  - 2 x 18 t capacity
  - operation with 2 hooks (z angle adjustment)
  - precise motor controlled turning
  - design for adaptation for sub-modules with and without sensitive layers started
- mounting, support and insertion frame
  - insertion frame design ready
  - insertion frame support design depends on final yoke size and useable space
- push and pull tool available
  - must be modified to the rail distance and rail shap

AHCAL half barrel absorber installation
step 1



- mounting of 16 AHCAL submodules with all sensitive layers and front end electronics to a full half barrel in front of the cryostat
- submodule connection by plates from the front and back side
- AHCAL half barrel is supported by two rails inside the cryostat vessel

Slide from Karsten Gadow

AHCAL assembly in ILD
experimental site requirements

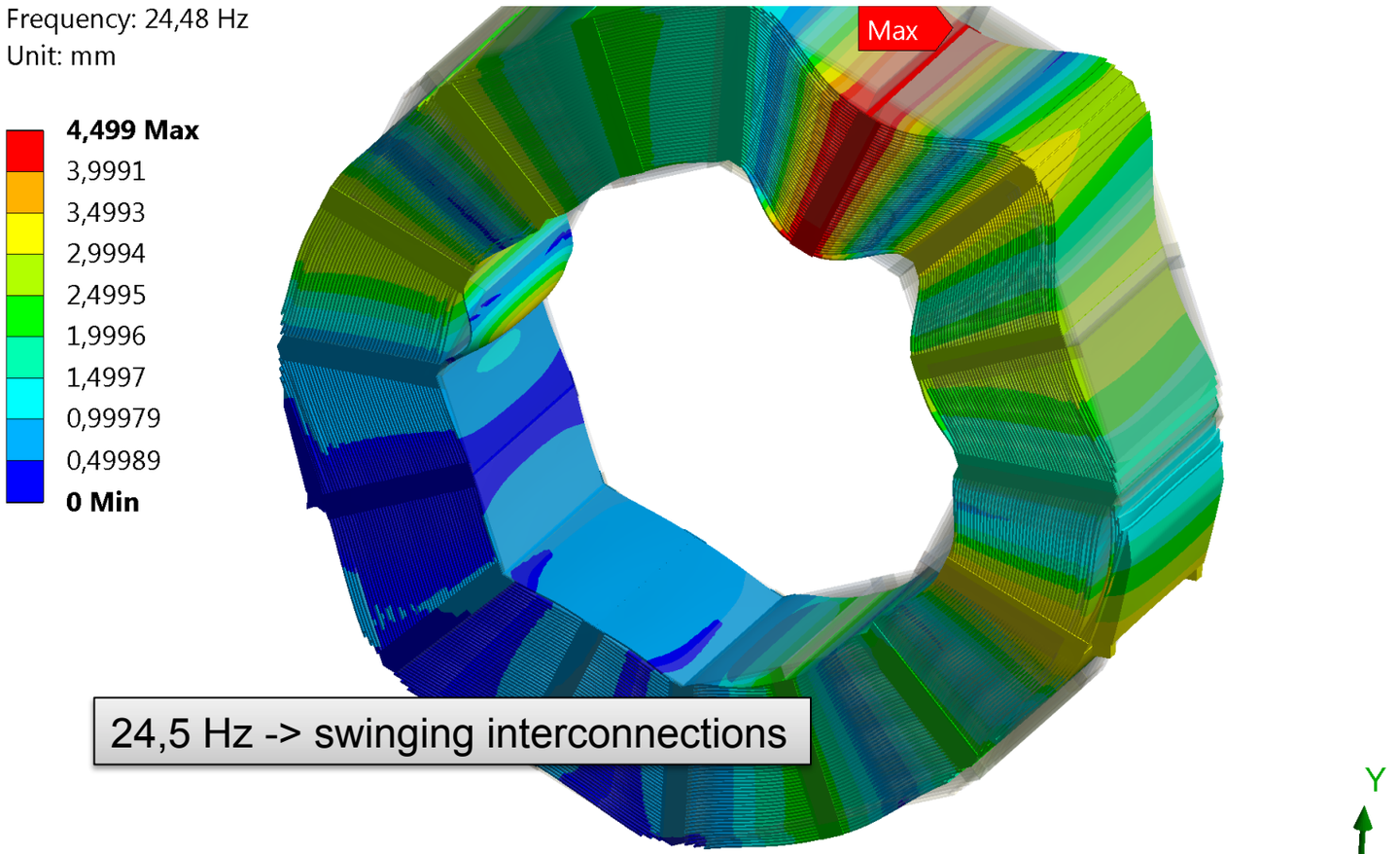
- experimental site must be reachable by standard trucks with 20“ containers and a payload of 20 t under convenient conditions (moderate slopes and curves)
- the AHCAL test hall must be passable with trucks like above
- the AHCAL test hall must be equipped with 2 x 20 t gantry cranes
- the two crane hooks must reach a distance of 2,5 m between each other and a height of 6 m over ground
- the operational area of the cranes for the AHCAL must be 10 m (crane bridge) x 20 m

  load area 4 x 8 m / AHCAL test area 6 x 8 m / AHCAL storage area 10 x 12 m
- the AHCAL test area must be air conditioned
- cooling water (16°C, 2 bar, 50 l/min) must be supplied to the AHCAL test area
- electrical power 4 x (3 phase x 400V / 50Hz, 32 A) must be supplied to the AHCAL test area
- workshop (5 m x 10 m with a height of 3,5 m) for sensitive layer repair directly at the AHCAL test area
- 4 offices with 20 m² directly at the AHCAL test area

Slide from Karsten Gadow

Seismic Studies: AHCAL

- AHCAL group has started dynamic simulations of structural behaviour with real earthquake data from Kitakami
- Need to understand seismic protection for complete ILD detector during assembly and operations



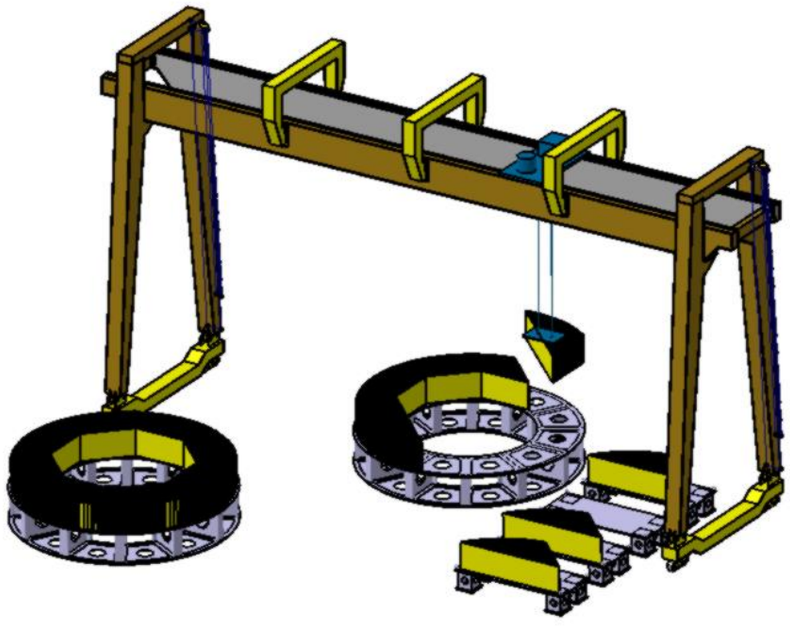
F. Sefkow

Barrel integration : scenario A

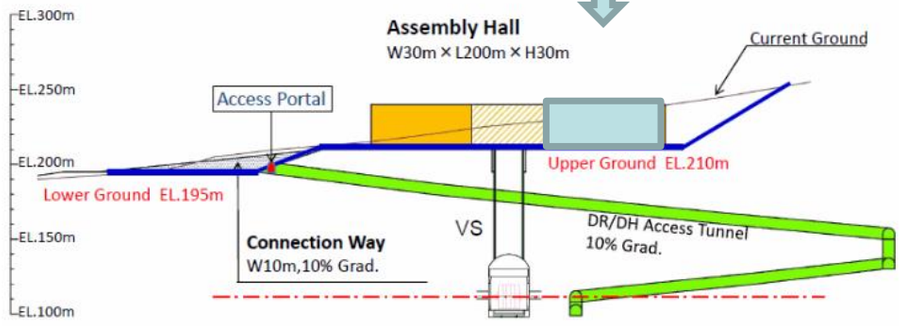
- Wheel Building in **Assembly Hall** : 8 modules x 5

Transport to Assembly Hall with normal truck - ILD area

- **Step 1** : Wheel structure transport (8 travels) & assembly
- **Step 2** : Modules transport 40 travels with 11 t
- **Step 3 :** Modules assembly on the wheel structure with 100 t crane
  - 8 modules in position on specific tool & screwing/welding



Road to



Longitudinal section

Slide from J.C. Ianigro

- Wheel assembly in Auxiliary building : s

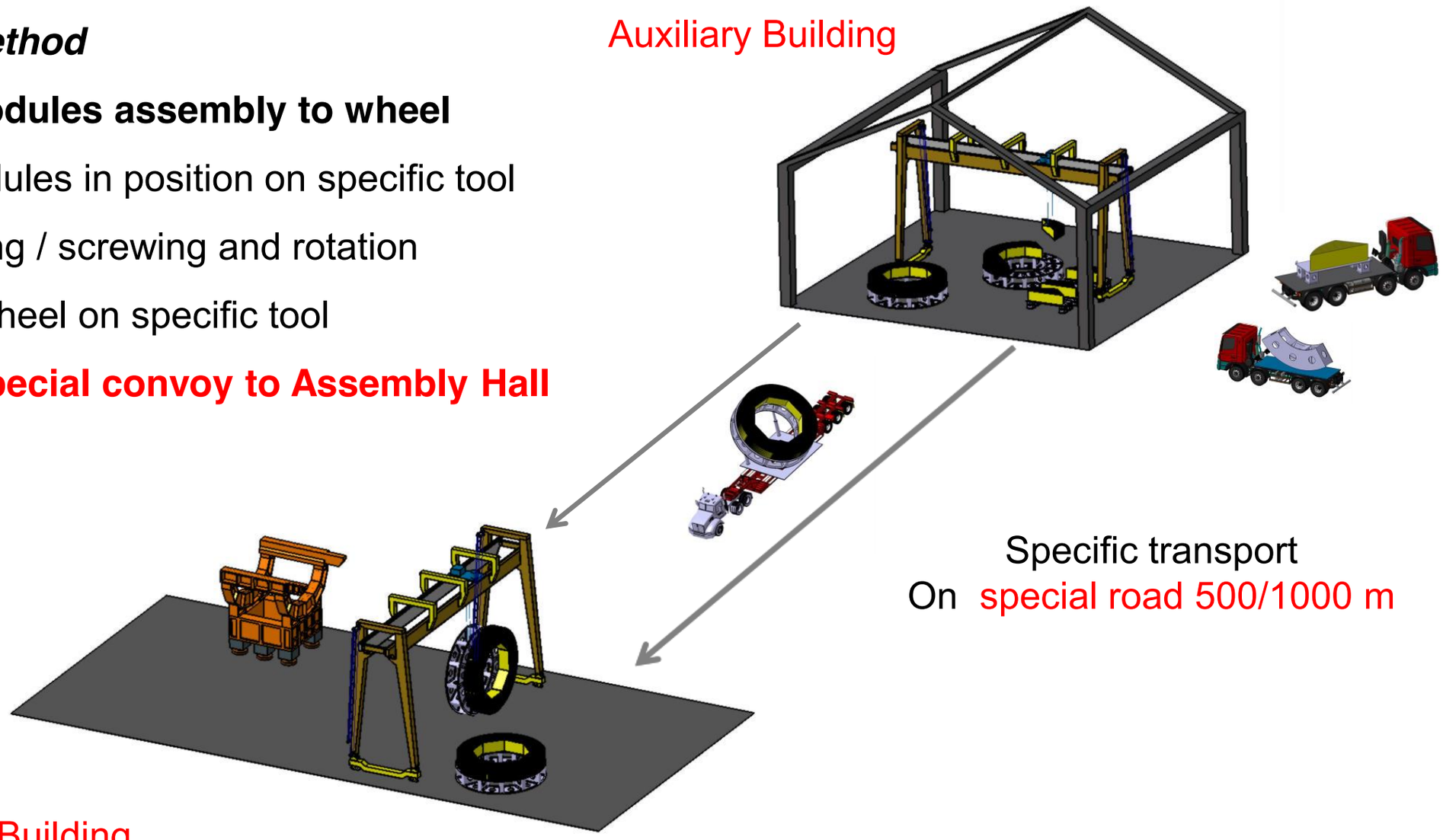
Building Method

•**Step 1 : Modules assembly to wheel**

- 8 modules in position on specific tool
- welding / screwing and rotation

• **Step 2 :** Wheel on specific tool

• **Step 3** : **Special convoy to Assembly Hall**



Slide from J.C. Ianigro

Barrel integration : scenario C

- Wheel assembly in Auxiliary building : 8 modules => 5 wheels

Building Method

•**Step 1 : Modules assembly to wheel**

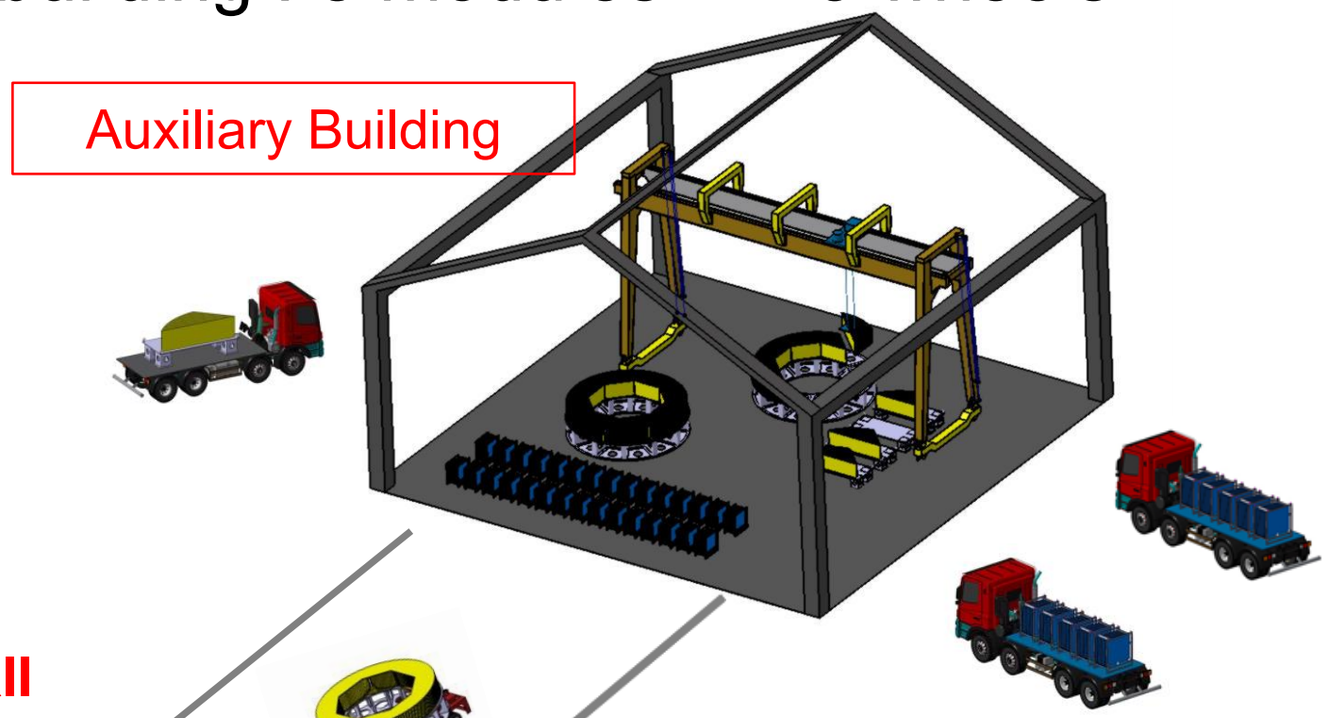
  • 8 modules in position on specific tool

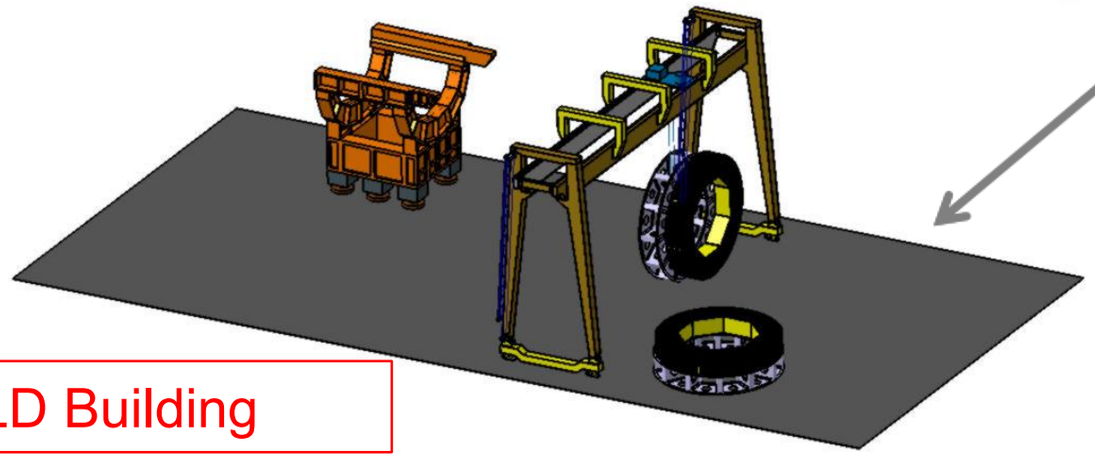
  • welding / screwing and rotation

• **Step 2 :** Wheel on specific tool

• **Step 3** : GRPC insertion and connected

• **Step 4** : **Special convoy to Assembly Hall with GRPC inside wheels – ready to be connected**



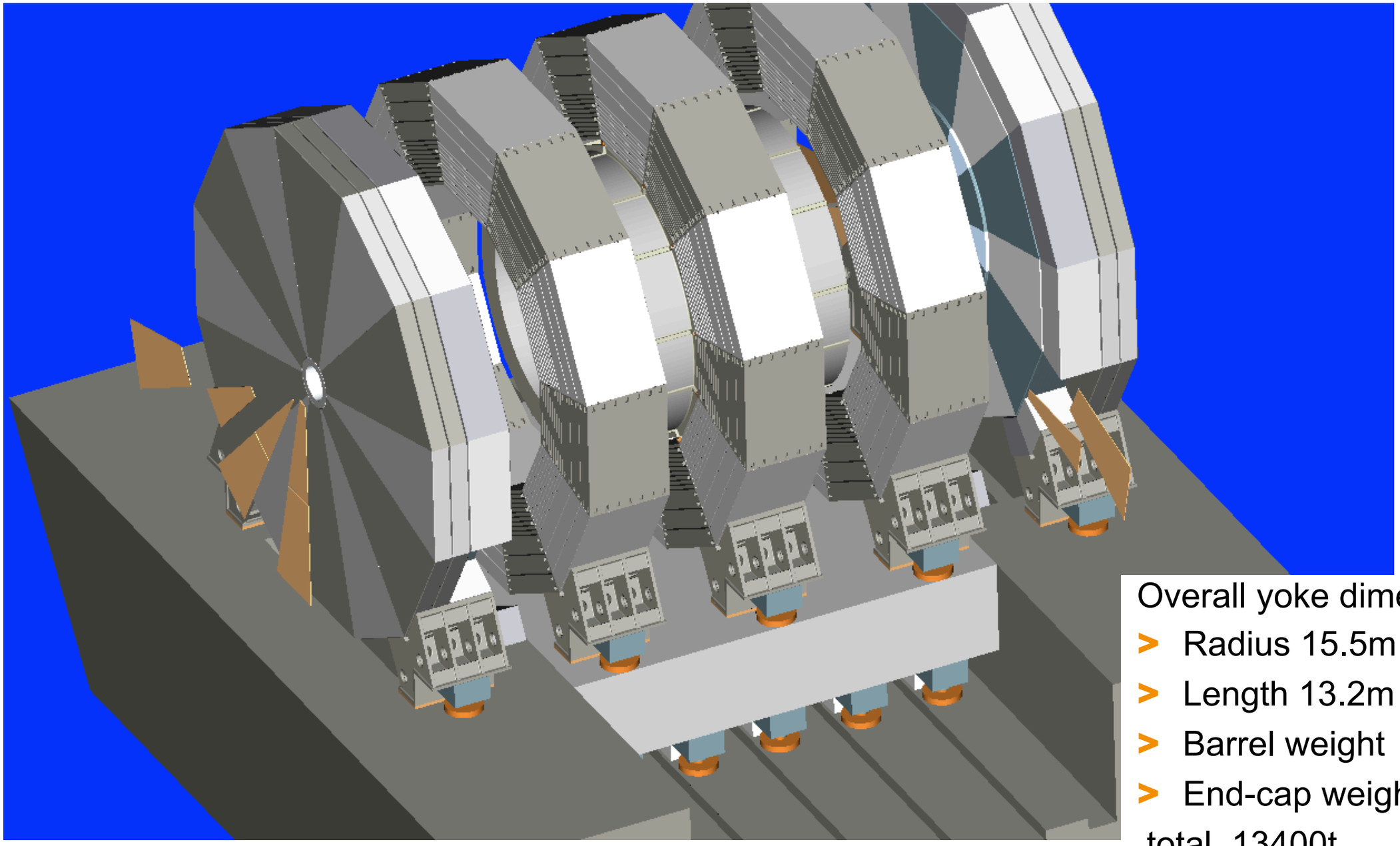


Specific Damper transport
On special road 500/1000 m

Slide from J.C. Ianigro

Heaviest Problem: Iron Yoke

Present Design



Overall yoke dimensions

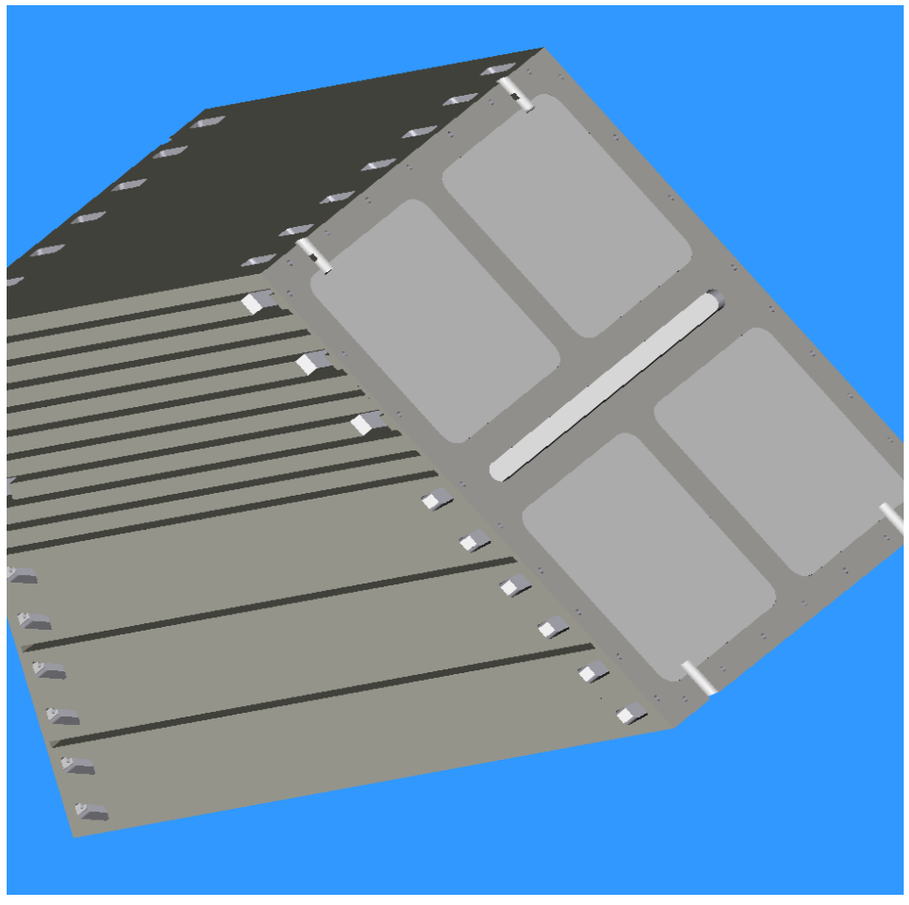
- Radius 15.5m
- Length 13.2m
- Barrel weight 6900t
- End-cap weight 6500t

total 13400t

Slide from Uwe Schneekloth

Yoke Assembly

- Yoke segments (<~210t) cannot be transported in one piece
- Look into possibilities to weld or bolt these segments in or close by of the assembly hall
- Requirements under study:
  - additional assembly space
  - crane capacity in this space
  - storage space
  - time and person power
- Need to discuss this with possible local vendors



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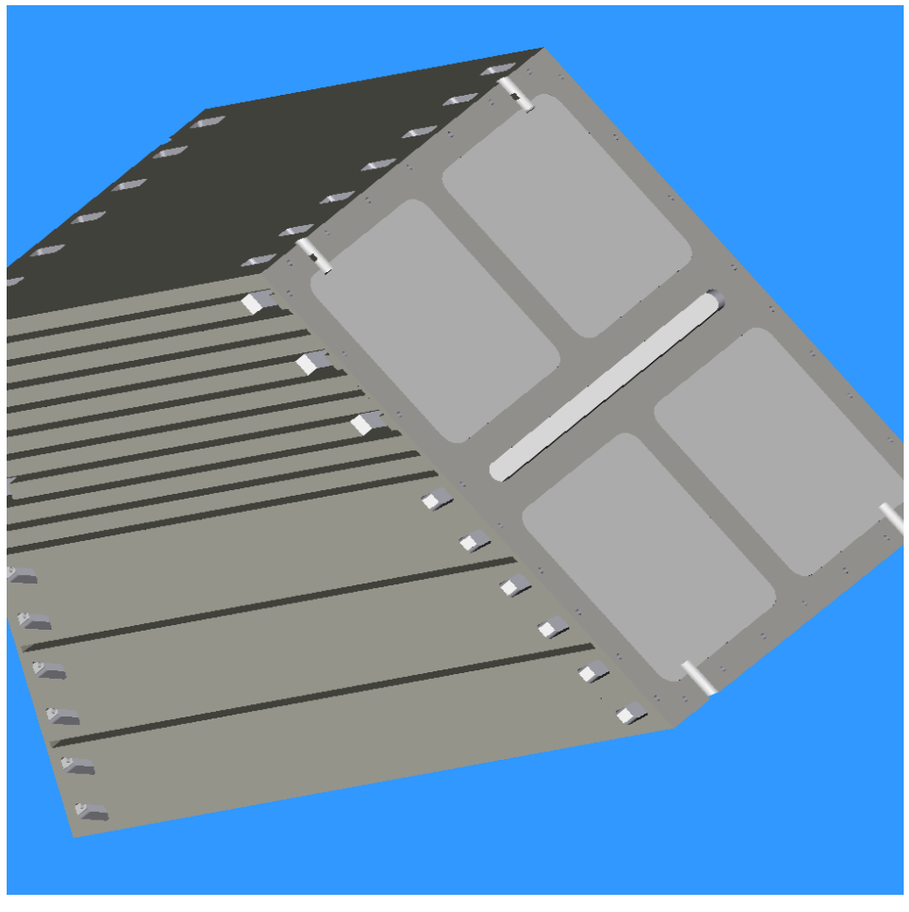
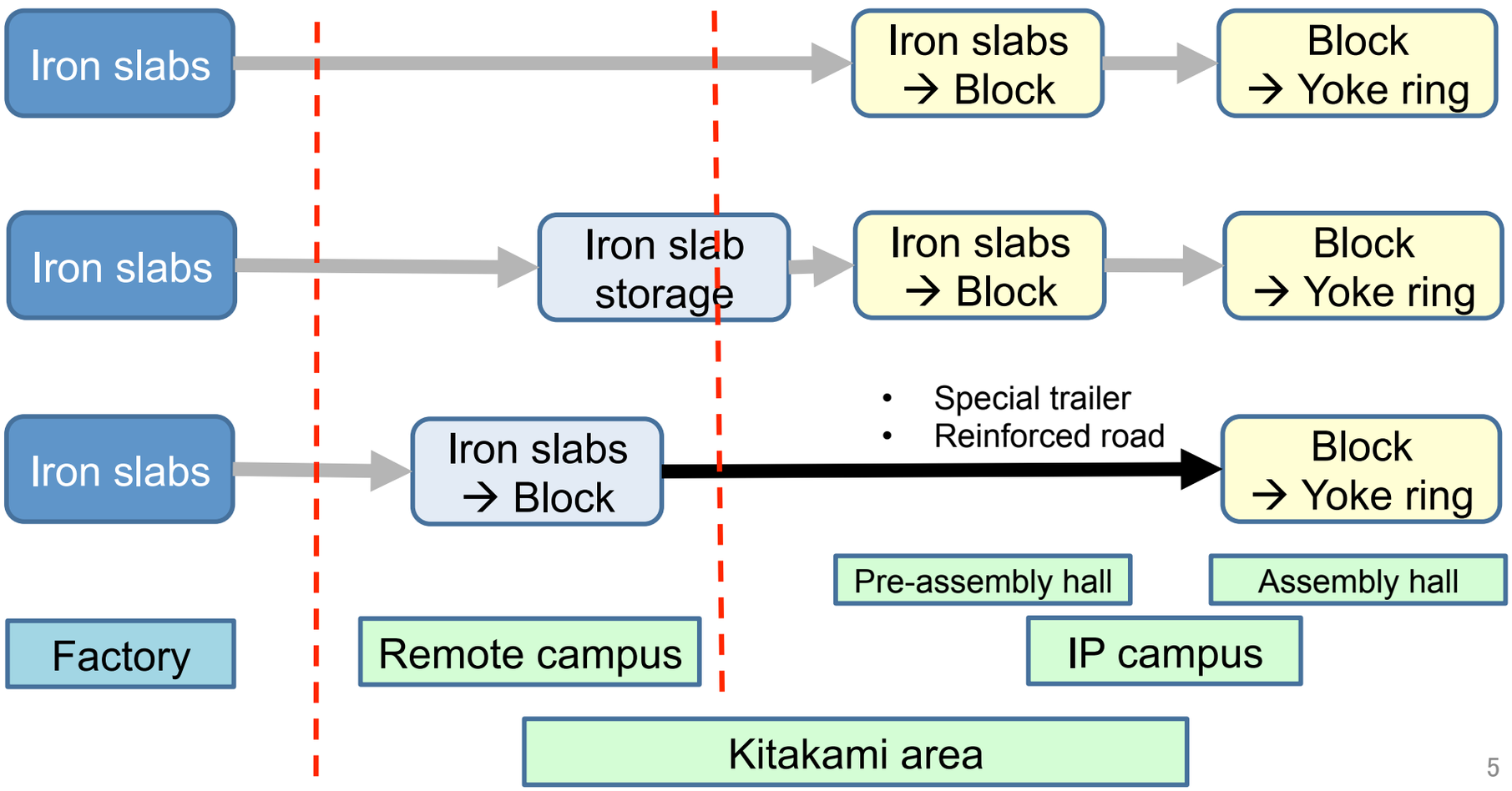


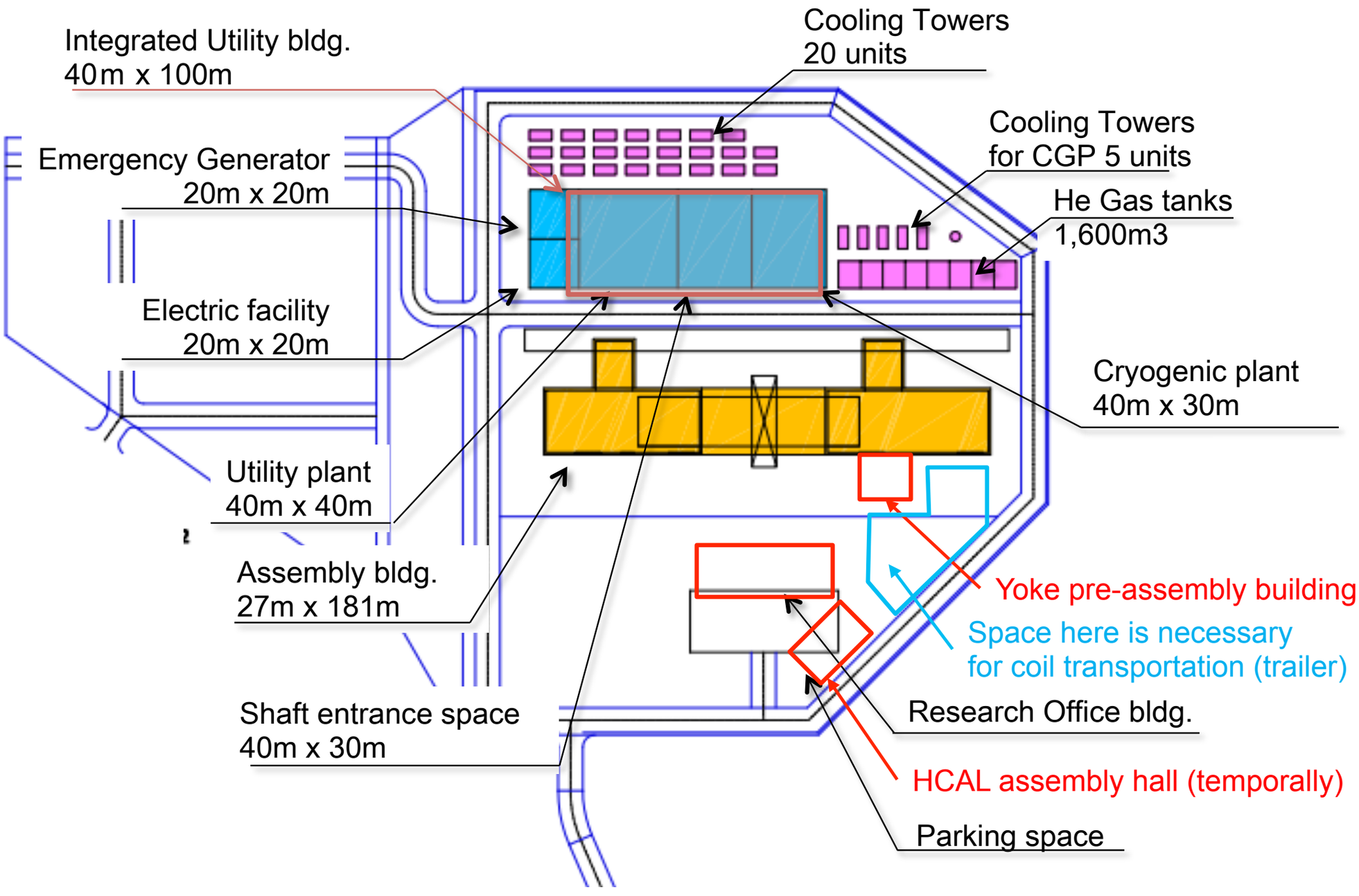
Update see talk by Uwe Schneekloth

Assembly scenario

- There are three options



IP campus with 600m^2 HCAL-AH



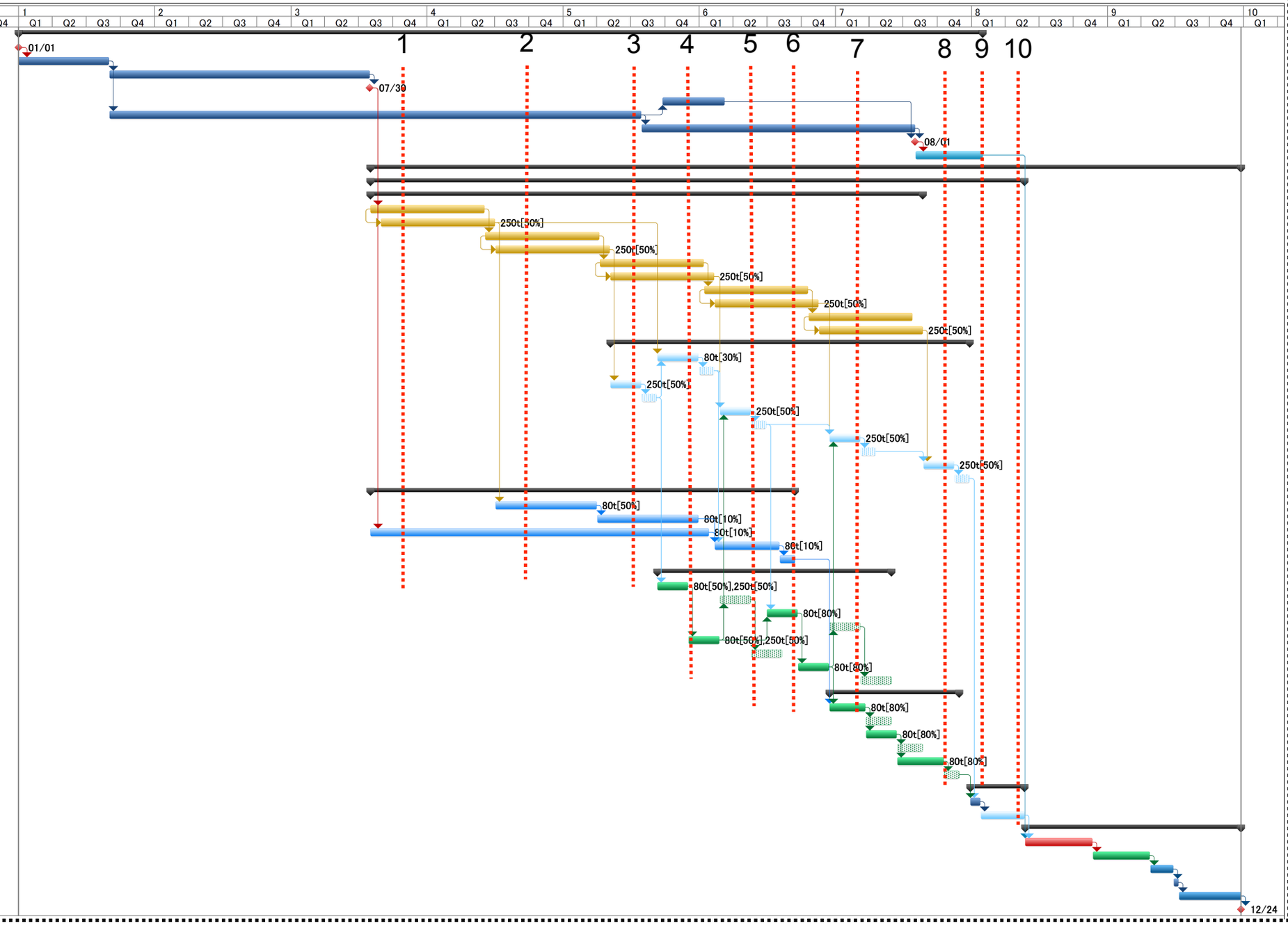
Slide from Yasuhiro Sugimoto

ILD Assembly Plan

ILD Assembly Plan

- One central plan - coordinated with sub detectors

ID	タスク名
1	**Conventional Facilities**
2	Start of civil construction
3	Land development/common preparation
4	Assembly hall – Phase 1
5	AH ready for detector construction
6	AH – Phase 2
7	Detector hall/tunnel
8	Underground utilities
9	DH ready for detector lowering
10	SiD lowering
11	**ILD assembly in flat site**
12	**Surface assembly**
13	**Yoke assembly**
14	YB0 modules
15	YB0 ring
16	YE+ modules
17	YE+ ring
18	YE− modules
19	YE− ring
20	YB+ modules
21	YB+ ring
22	YB− modules
23	YB− ring
24	**Muon detector**
25	Muon detector YB0 install
26	Muon detector YB0 cabling
27	Muon detector YE+ install
28	Muon detector YE+ cabling
29	Muon detector YE− install
30	Muon detector YE− cabling
31	Muon detector YB+ install
32	Muon detector YB+ cabling
33	Muon detector YB− install
34	Muon detector YB− cabling
35	**Solenoid**
36	Outer Vacuum Tank construction
37	Inner Vacuum Tank construction
38	Coil construction
39	Coil/IVT/cryo installation
40	Coil test
41	**Endcap Calorimeters**
42	HCAL endcap+ install
43	HCAL endcap+ cabling
44	HCAL endcap− install
45	HCAL endcap− cabling
46	ECAL endcap+ install
47	ECAL endcap+ cabling
48	ECAL endcap− install
49	ECAL endcap− cabling
50	**Barrel Calorimeters**
51	HCAL barrel+ install
52	HCAL barrel+ cabling
53	HCAL barrel− install
54	HCAL barrel− cabling
55	ECAL barrel install
56	ECAL barrel cabling
57	**Magnet commissioning**
58	Close yoke
59	Field Mapping
60	**Underground assembly**
61	Lowering big parts
62	TPC/Inner detectors
63	QD0/piller
64	Close detector
65	Detector commissioning
66	Ready for commissioning with beam

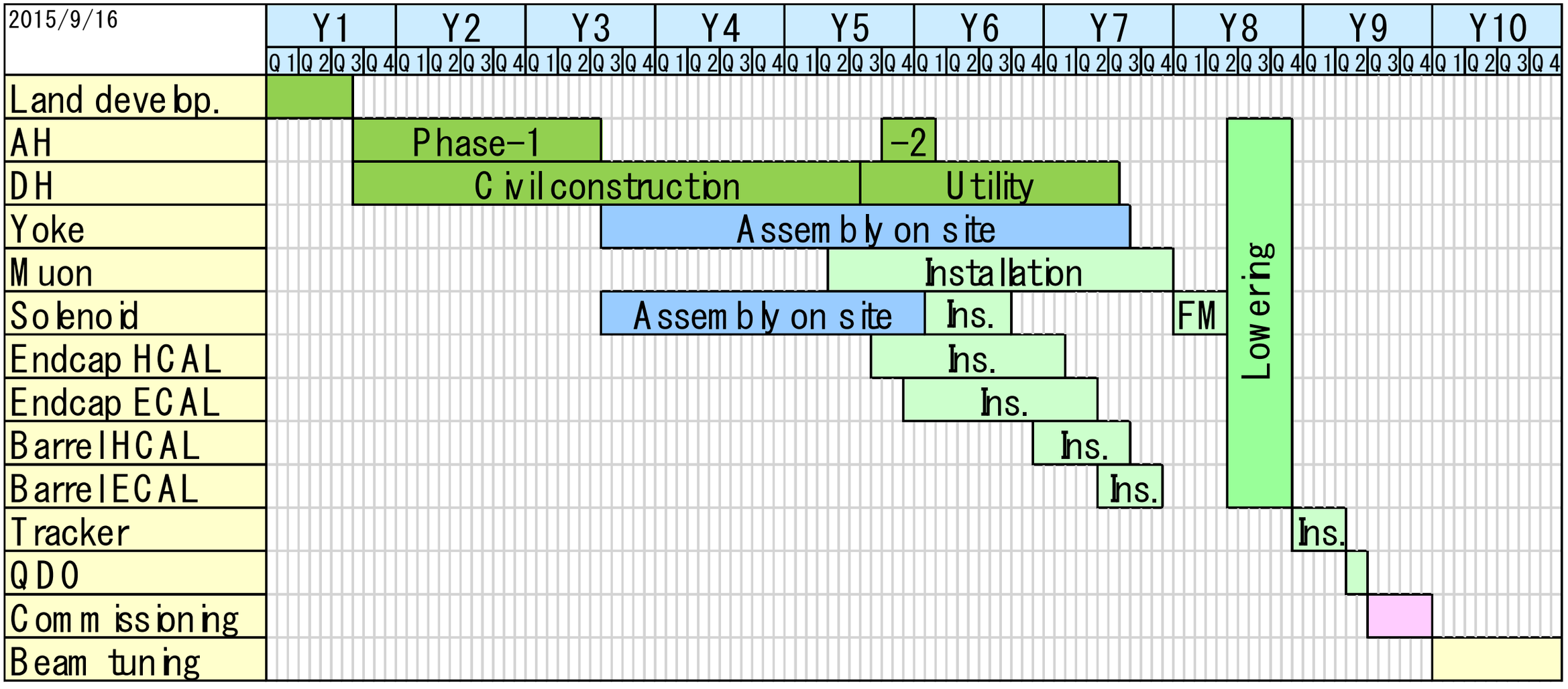


21

Slide from Yasuhiro Sugimoto

Simplified table

- Definition of T0 here is the beginning of the land development = Ground Breaking (consistent with CFS group)



Slide from Yasuhiro Sugimoto

Assembly procedure

- Summary of tasks at each step

	Step-1	Step-2	Step-3	Step-4	Step-5	Step-6	Step-7	Step-8
YB0	Yoke	OVT		Muon	Coil/IVT	Coil/IVT	CAL	CAL
YE+		Yoke	Muon	CAL	CAL			
YE-			Yoke	Yoke	Muon	CAL	CAL	
YB+					Yoke	Yoke	Muon	
YB-							Yoke	Muon

YB0: Central barrel yoke
YB+: Barrel yoke on + side
YB-: Barrel ypke on – side
YE+: Endcap yoke on + side
YE-: Endcap yole on – side
OVT: Outer Vacuum Tank
IVT: Inner Vacuum Tank

Slide from Yasuhiro Sugimoto

Risks

Container Ship „MOL Comfort“

- Container vessel „MOL Comfort“, 8110 TEU, Mitsui O.S.K. Lines
- Line service LP1: Japan - Hong Kong - Singapore - Jeddah - Rotterdam - Hamburg - Southampton - Le Havre and back to Japan

„MOL Comfort“ 17.6.2013

- Indian Ocean between Singapore and Jeddah

„MOL Comfort“ Rear Part

- Salvage operation failed, sunk on June 27th.

„MOL Comfort“ Rear Part

- Salvage operation failed, sunk on June 27th.

„MOL Comfort“ Front Part

- Salvage operation failed, caught fire, sunk on July 11th

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„MOL Comfort“ Front Part

- Salvage operation failed, caught fire, sunk on July 11th

A Toshiba klystron for the XFEL was on board of this ship….

Summary

- The planning for the layout and infrastructure at the Kitakami site is advancing
- Now is the time to provide input from detectors for this process
  - Area and space requirements
  - Infrastructure: power, cooling, computing, etc.
  - Special environments: clean rooms, etc.
- Need to understand the dependencies on local conditions, e.g. transportation limits, on detector assembly and maintenance philosophy
- ILD is working on common installation timeline including planning status of all subdetector collaborations
- Should synchronise the work that is going on the accelerator and the detector sides of the game
- Proposed dates for a follow-up workshop on detector infrastructures:
  - March 15-16 2016 at KEK