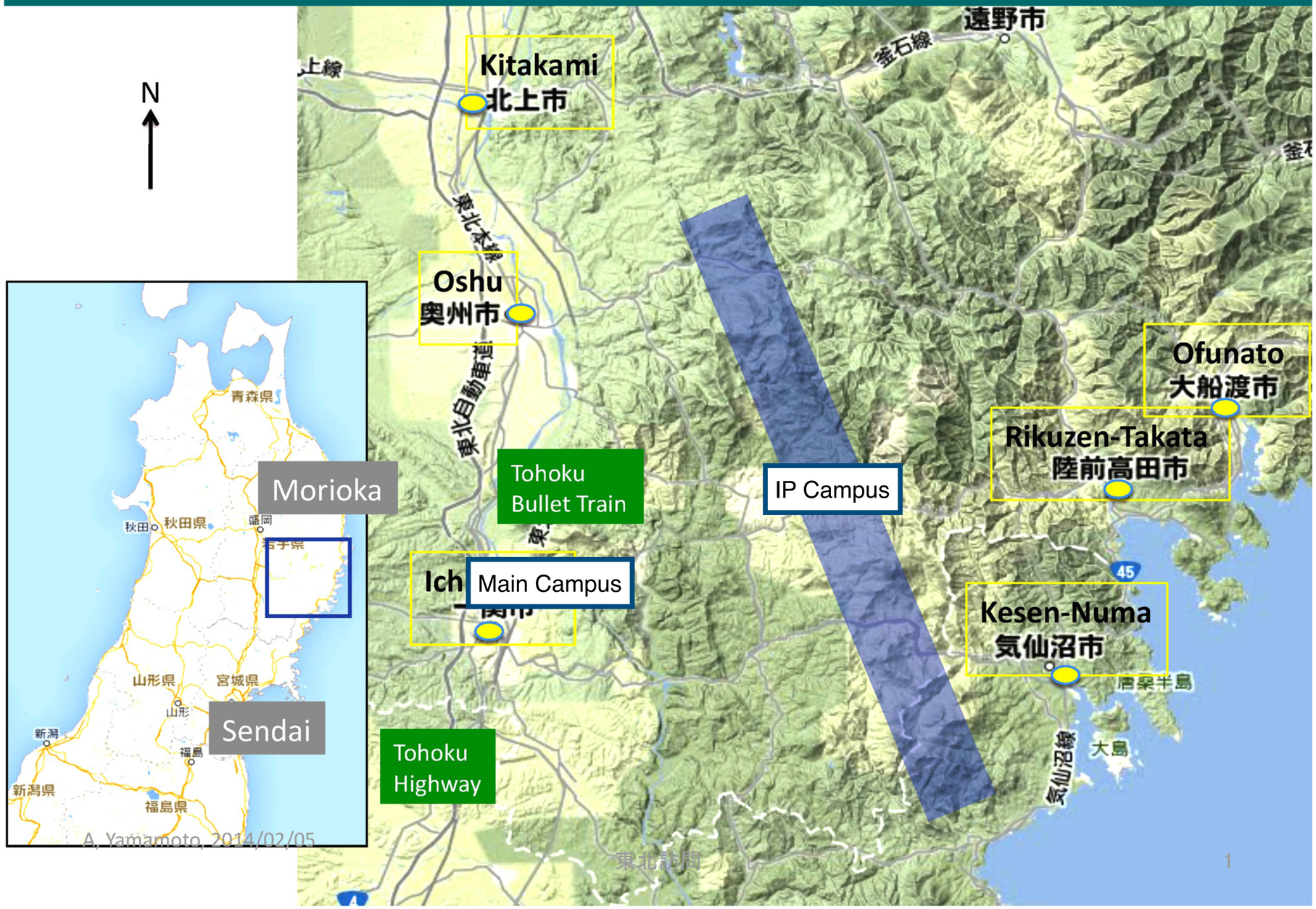
ILD Installation Timeline

a Reminder

Karsten Buesser

04.04.2023

ILC Candidate site in Kitakami, Tohoku

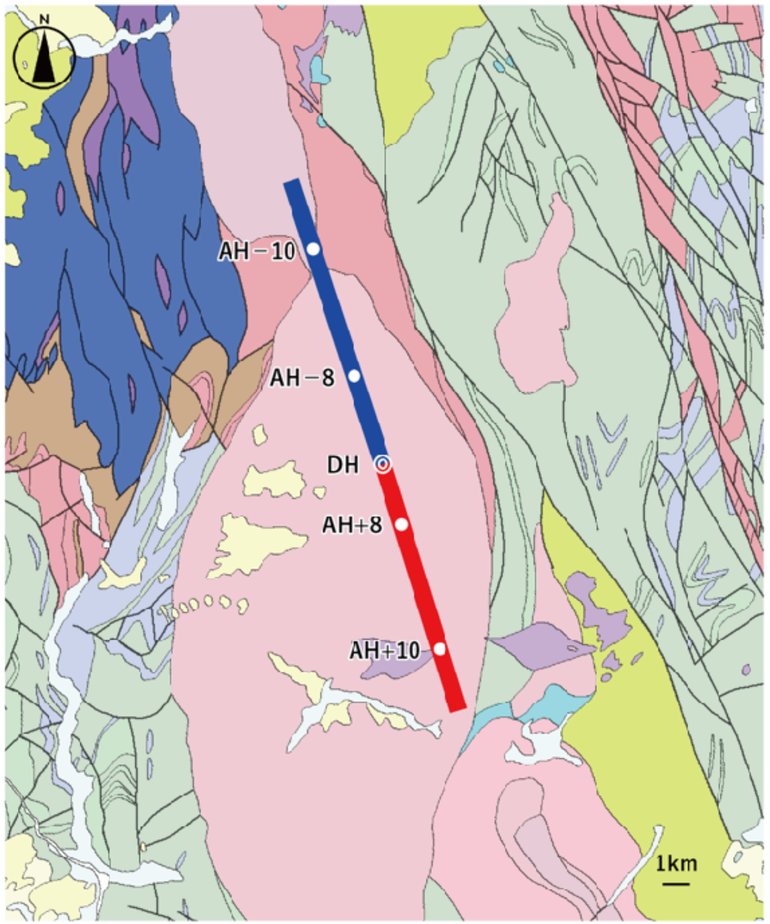


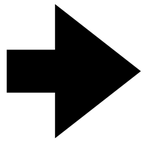
Local Planning: ILC Alignment

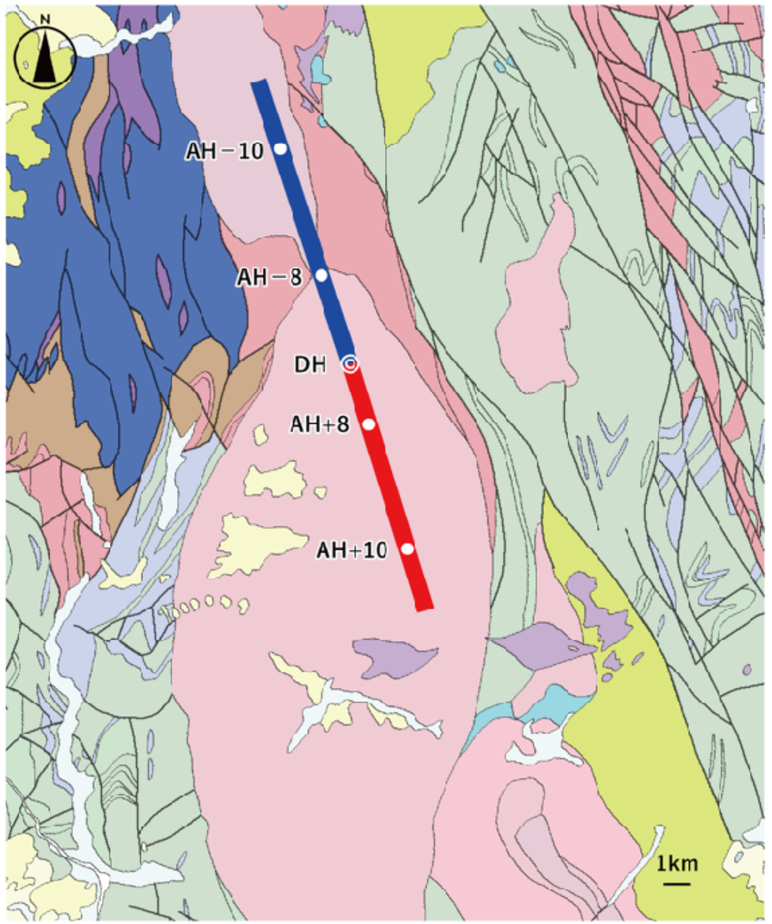
IP has just been moved north by a few km

- optimisation of surface area arrangements

T. Sanuki, ILCX

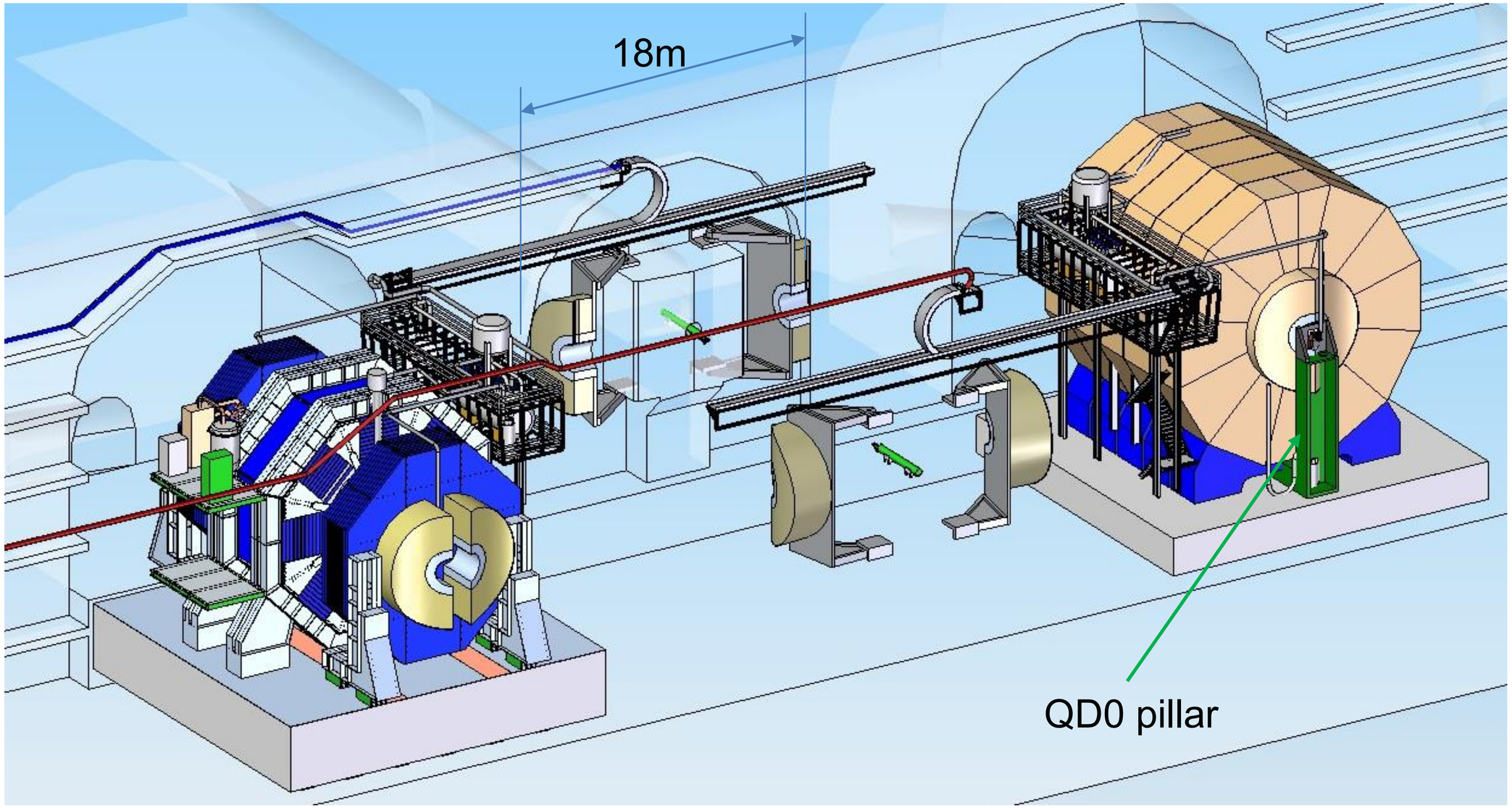






“Tohoku ILC Civil Engineering Plan”

Push-pull



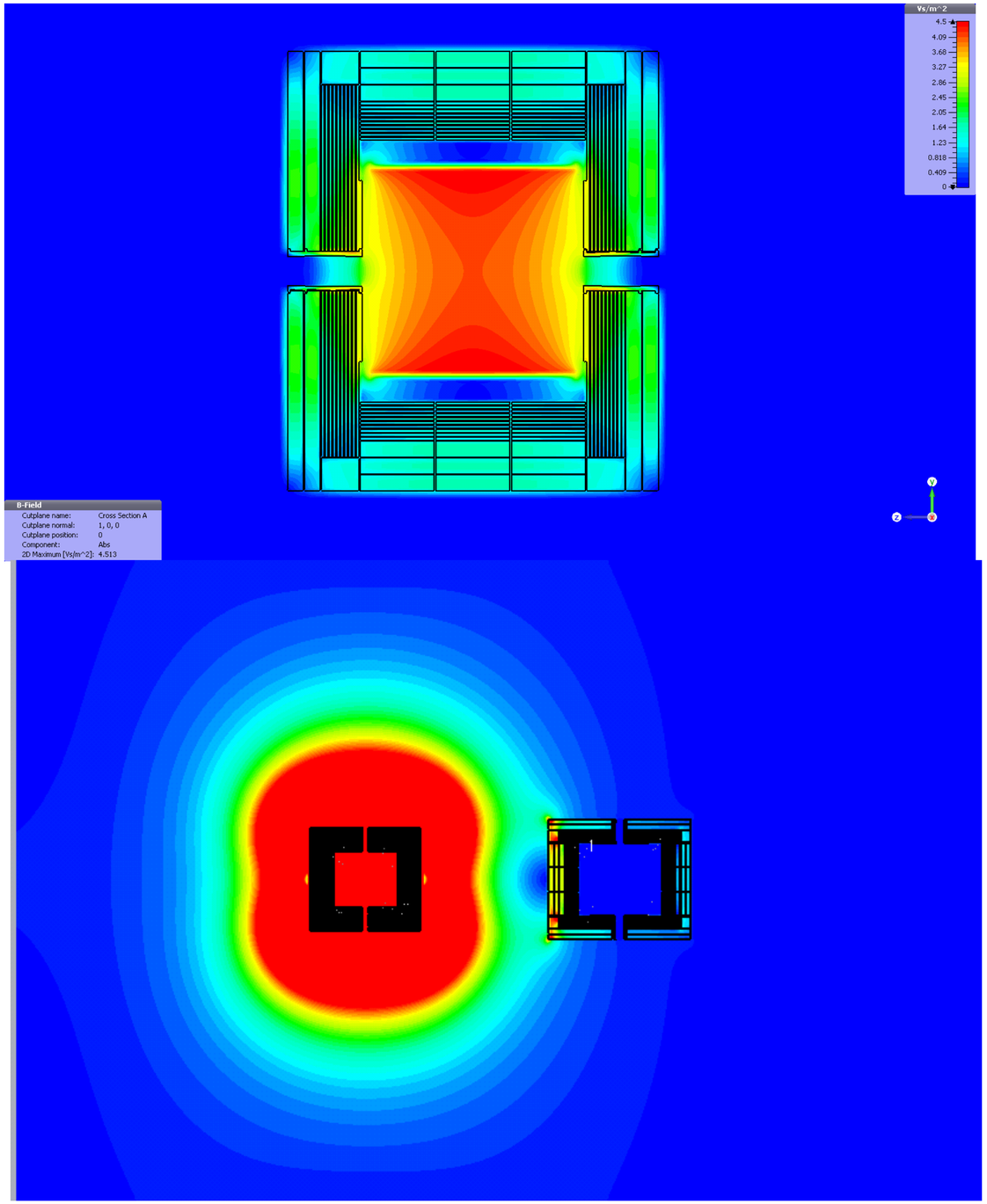
Magnetic Fields

Magnetic stray fields

- are of concern in an environment shared by two detectors
- „on-beam“ detector should be able to operate while maintenance work in „off-beam“ detector, 10m away, is required

Limits drive thickness of iron yokes

- and this defines the radius of the central access shaft



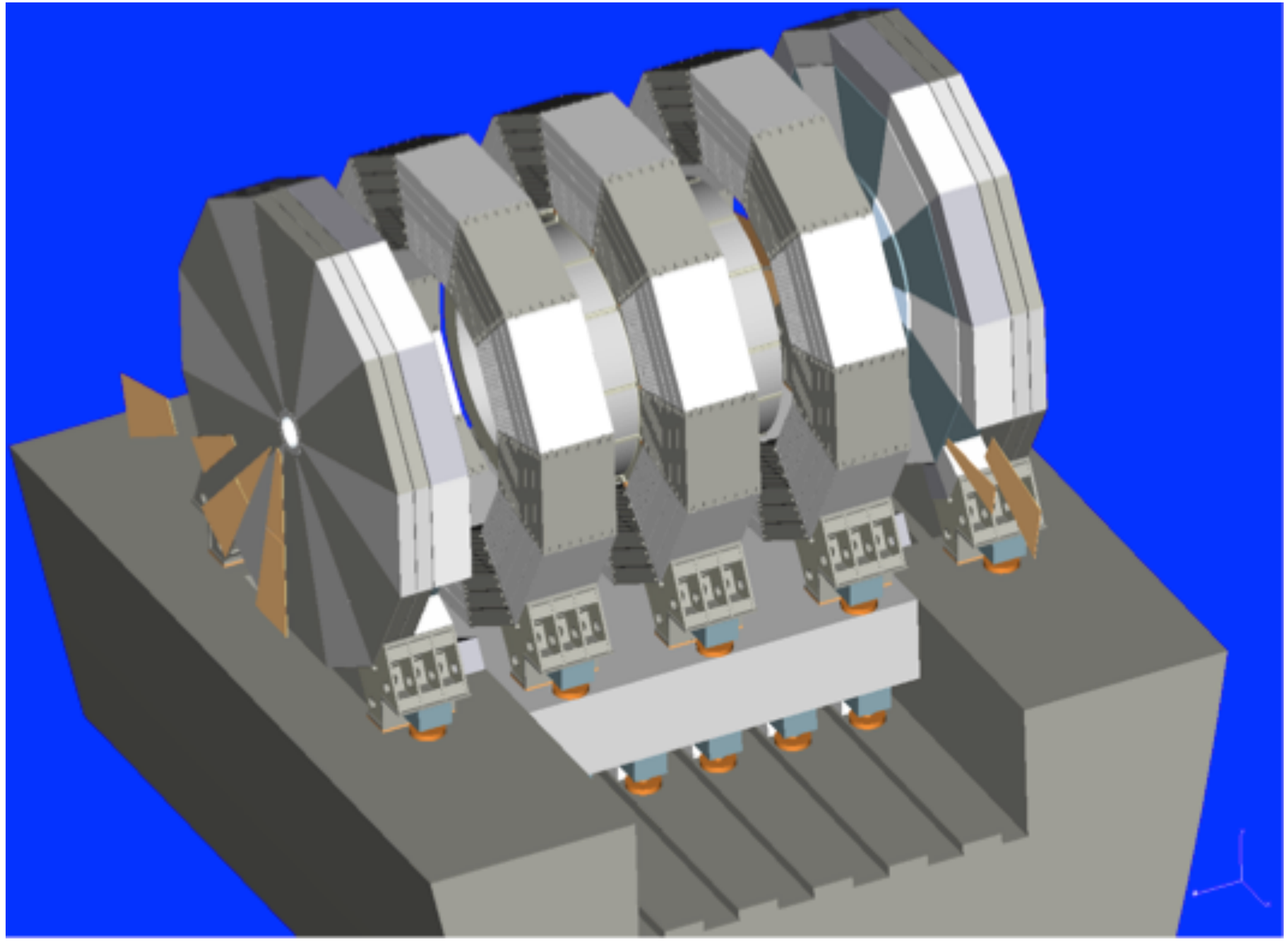
ILD Mechanical Structure

Main structure

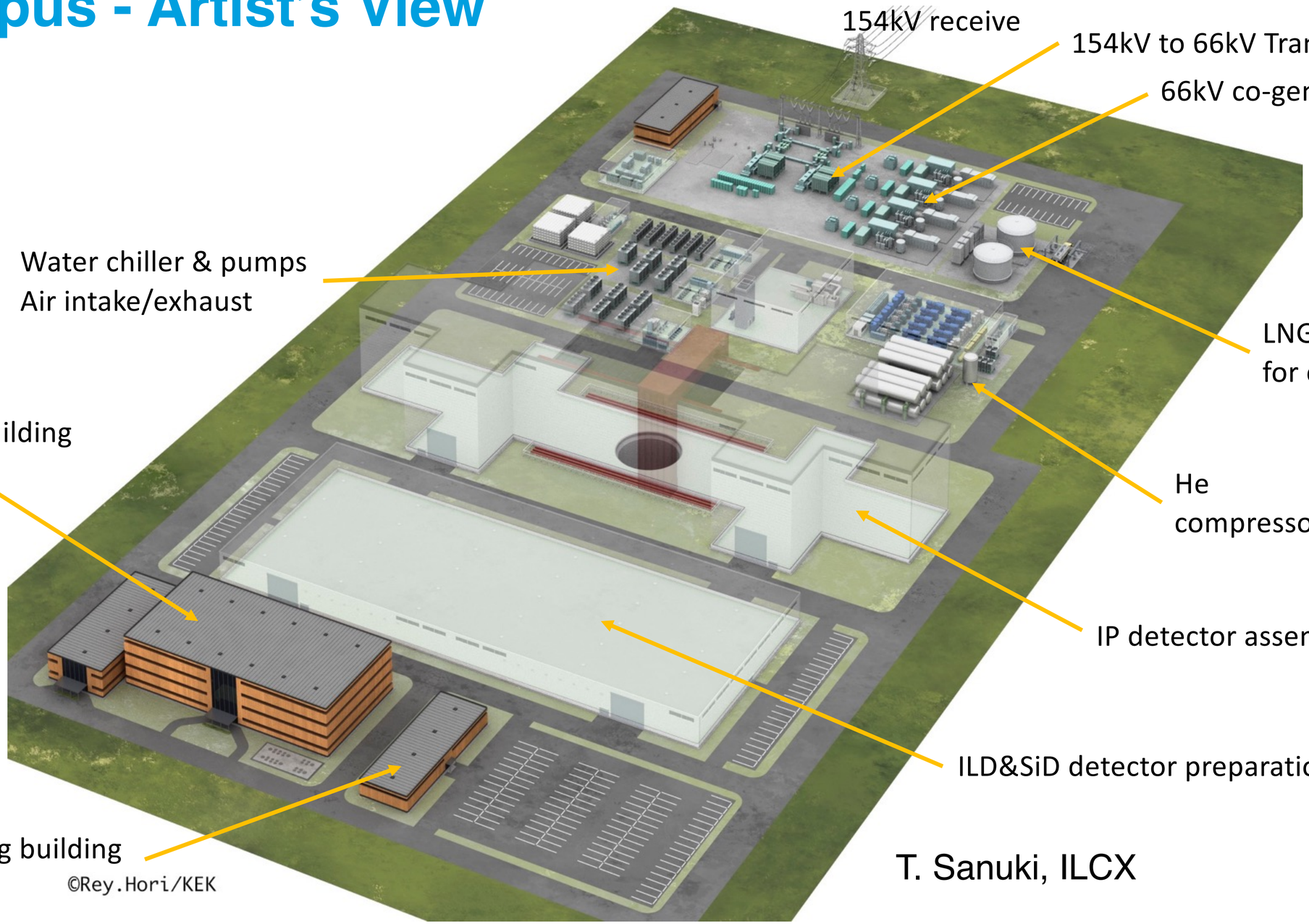
- 5 Yoke rings
- central ring carries solenoid and inner detectors
- 2 endcaps with endcap calorimeters

Designed for push-pull

- on platform for rapid beam-beam transition



IP Campus - Artist's View

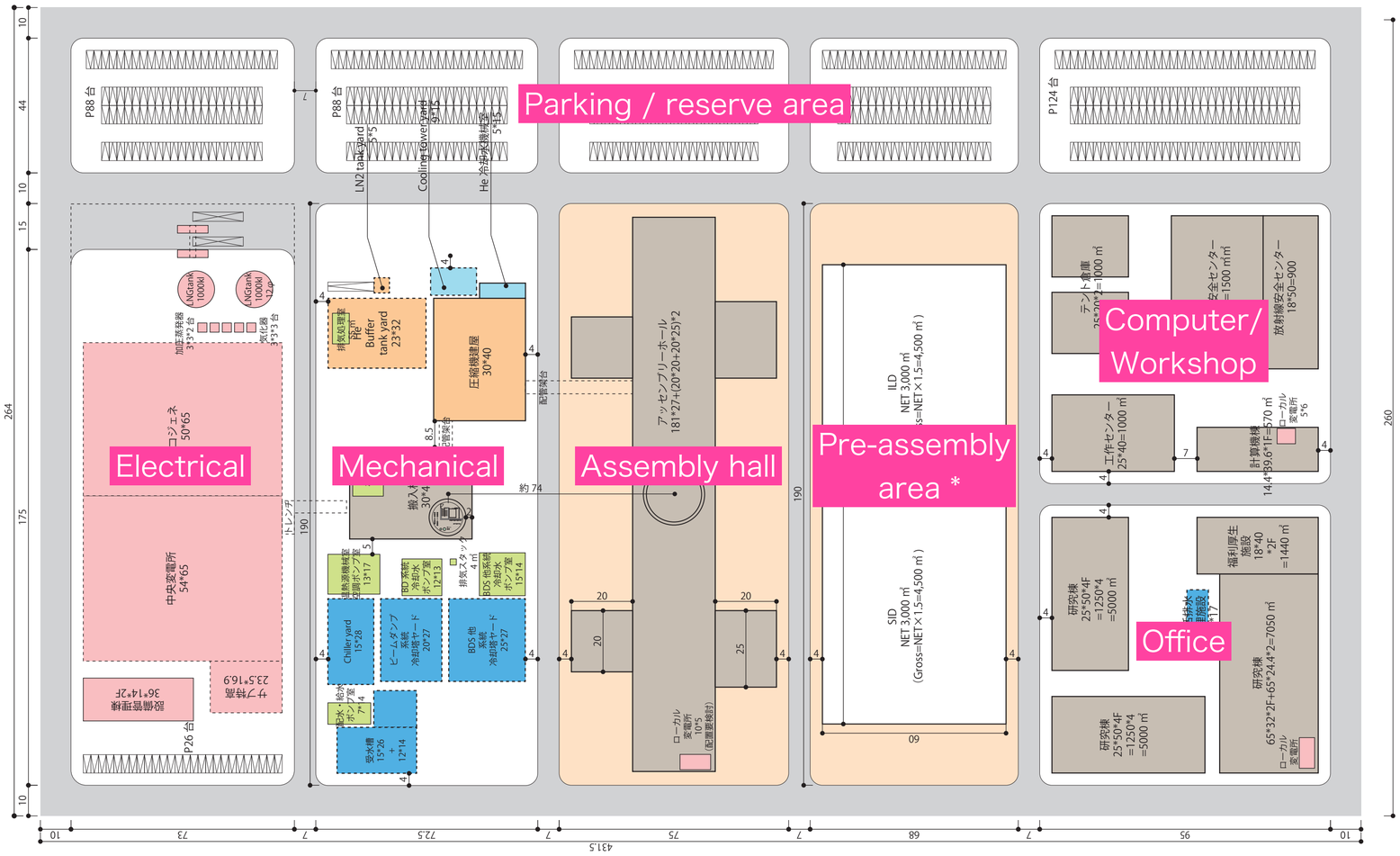


T. Sanuki, ILCX

IP campus
In virtual site

IP campus ~10ha

201116 東北大学 小貫



総敷地面積：
=113916≒**11.4ha**
Net 89,074 ㎡
通路等 24,842 ㎡
(Gross=NET×1.28)

電力関係敷地
=(175+15)×73
=**13,870 ㎡**

He 関係用敷地
+UT Shaft
+機械設備用敷地
=190×72.5
=**13,775 ㎡**

アッセンブリーホール用敷地
=190×75=**14,250 ㎡**

6iD/ILC 用敷地
=190×68=**12,920 ㎡**

研究棟用地
=91.5×95×2=**17,385 ㎡**

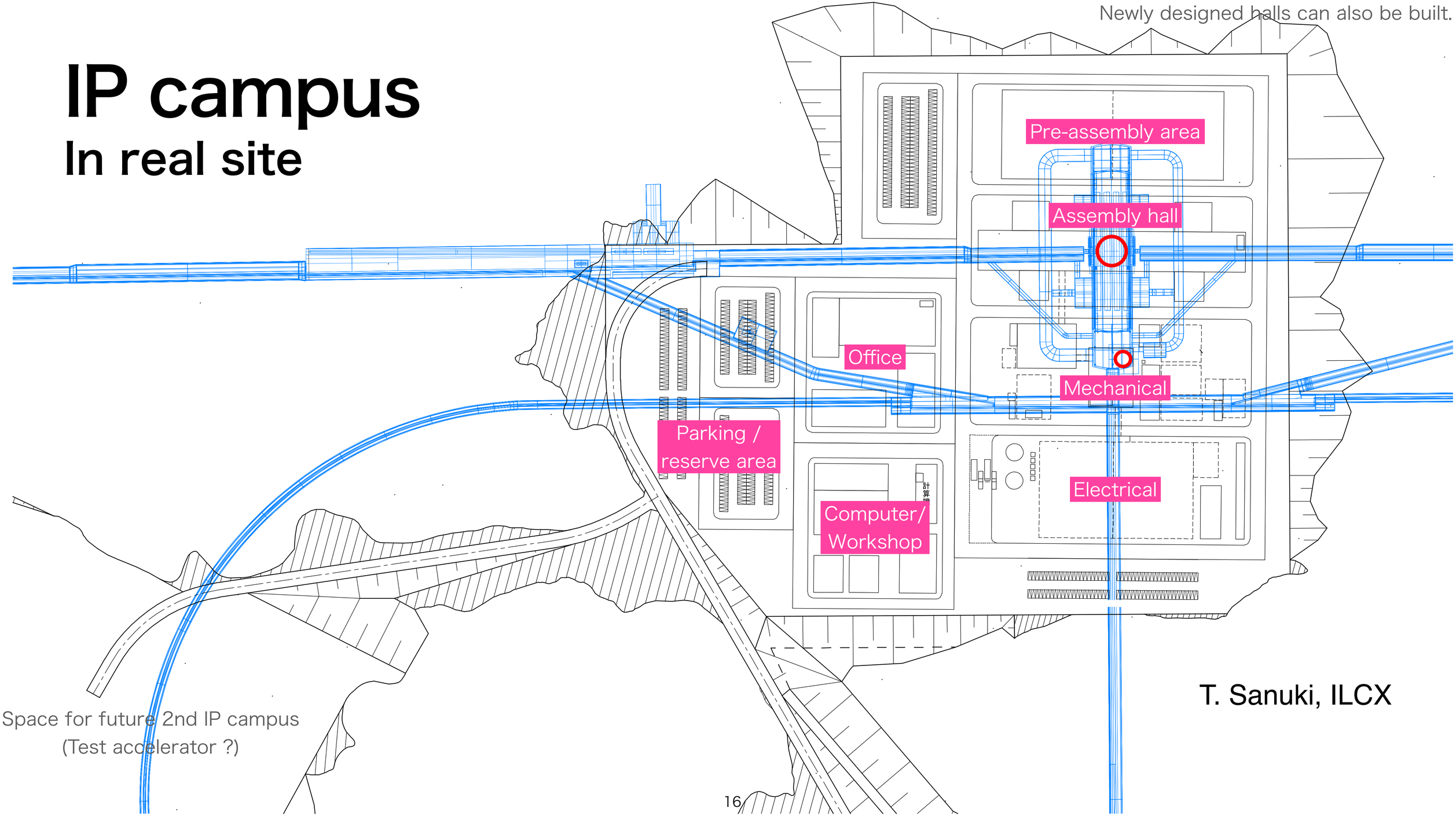
平置駐車場用地
=44×(73+72.5+75+68+95)
=**16,874 ㎡+α**
平置駐車場合計
=26+88+88+92+84+124
=**502 台**

同一平面上敷地
(他はレベル違いも可)

※LNG 用タンクローリー転回のため、外周道路は W10m

Newly designed halls can also be built.

IP campus
In real site



Space for future 2nd IP campus
(Test accelerator ?)

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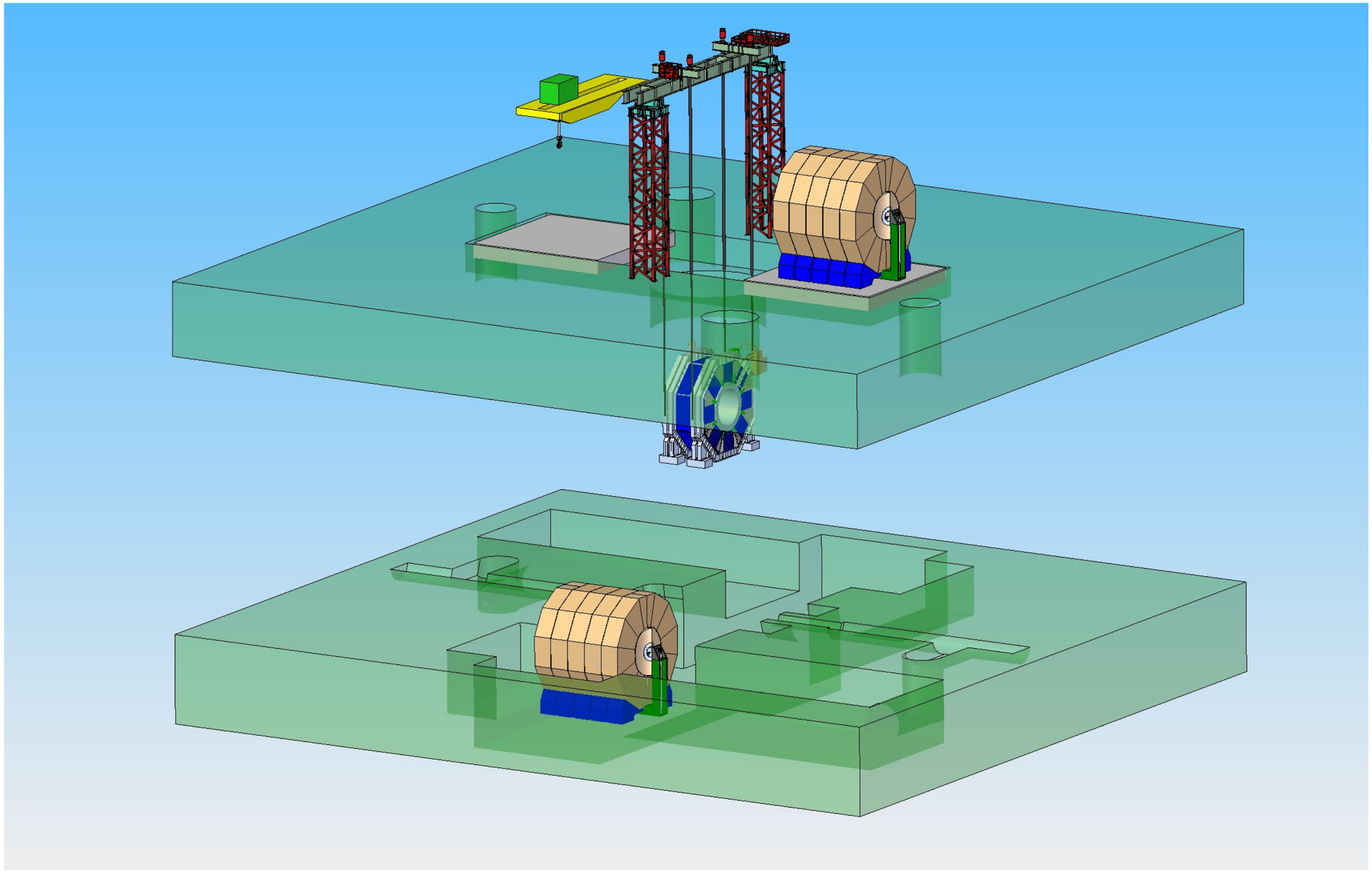
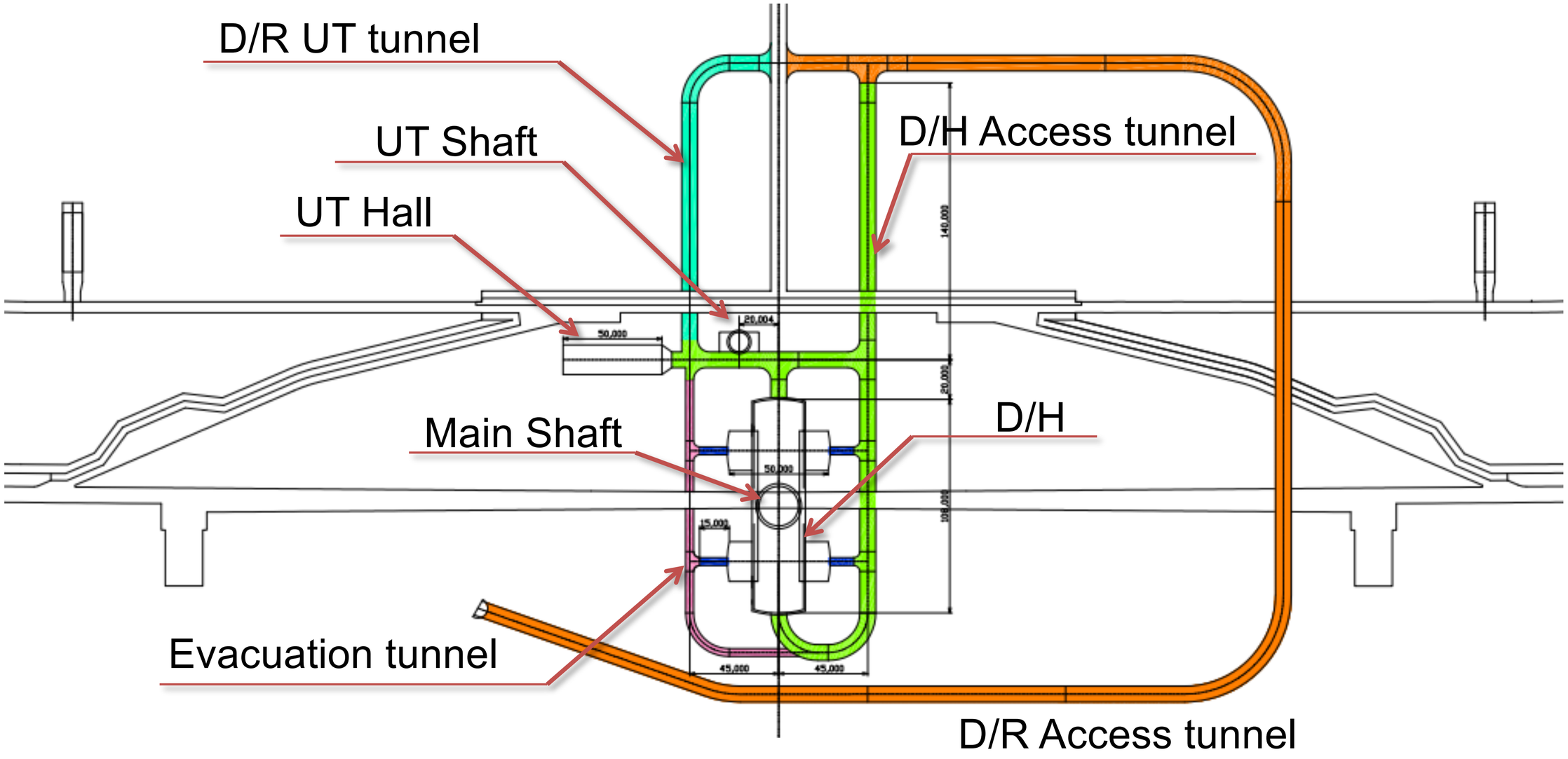
Surface Assembly - CMS Style

Handling

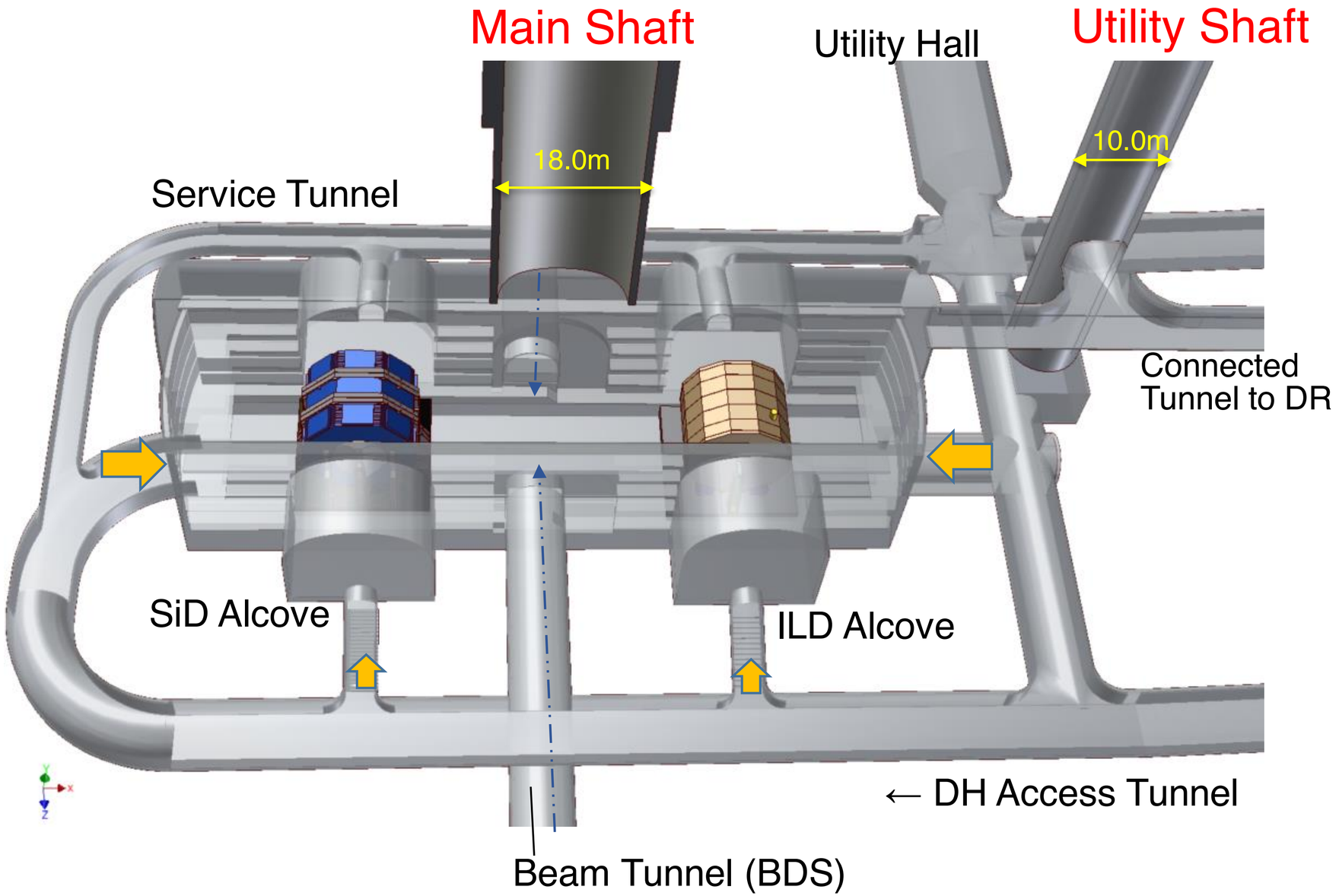
- Gantry crane (temp)
  - 4000t
- 250t cranes in assembly hall
- 40t cranes in underground area
- air pads
- platform system



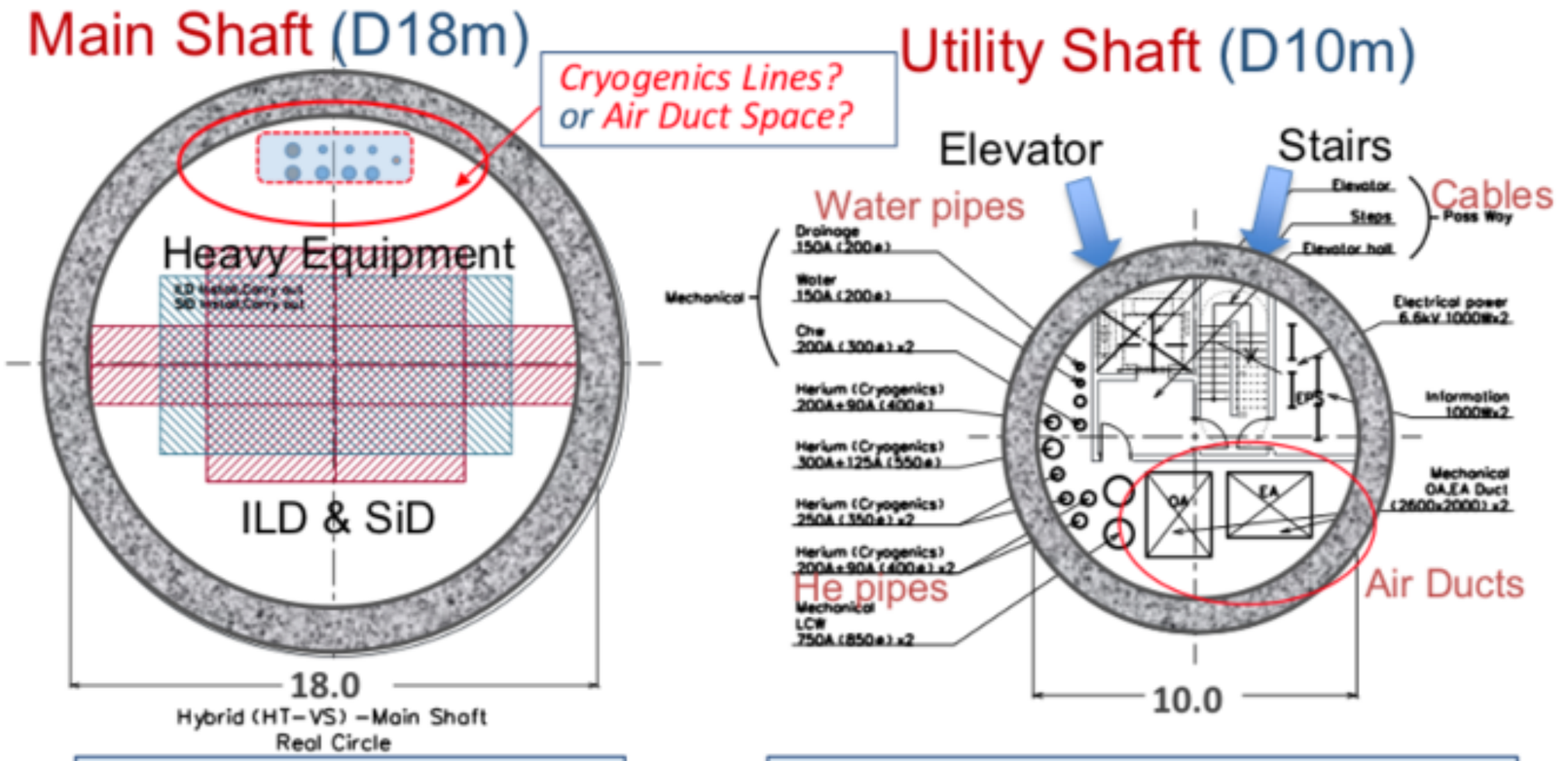
Underground Areas



Underground Detector Hall



Access Shafts



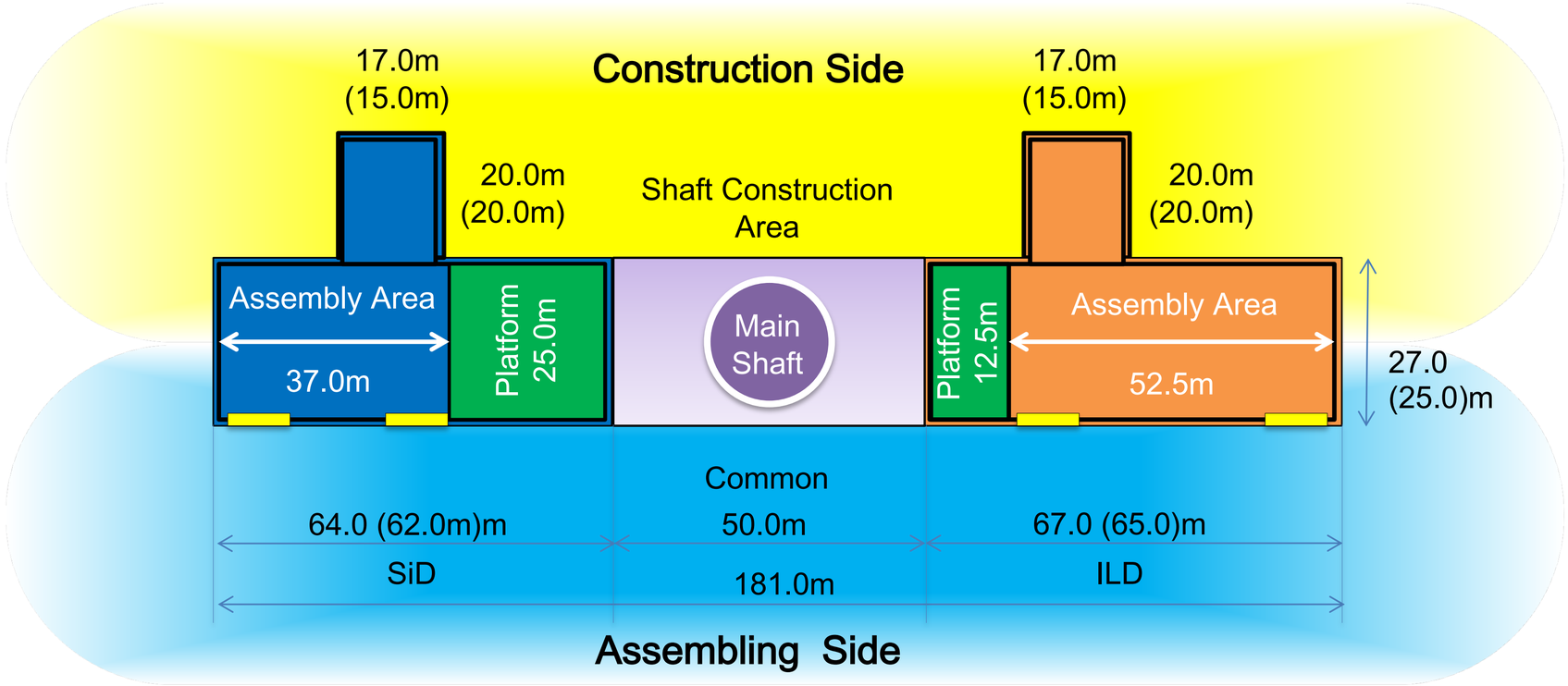
Main shaft D=18m

- Center of DH
- Detectors Installation by Gantry Crane

Utility shaft D=10m

- Utility lines: Pipes, ducts, cables
- Personnel access to Detector Hall by Elevator and Stairs

Assembly Hall Design

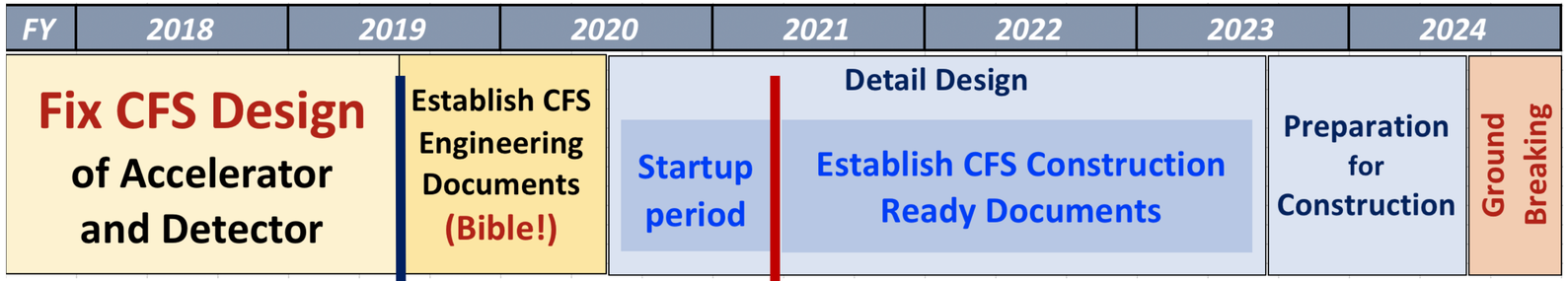


Two Garages for each Detector
Two Large Entrances for SiD
Two Large Entrances for ILD
All Large Entrances are at the same side

Outer space
ILD: L67.0m x w27.0m
SiD: L64.0m x w27.0m

CFS Timeline - ALCW2018

CFS timeline on “Pre- and Preparation Phase”



Our possible contribution

minor correction only

(A) Basic Design linked to CFS should be fixed.

- **Accelerator layout**
  - beamline
  - power supplies
- **Requirement of Utilities**
  - specification and route

(B) Selection of Positron Source Scheme

Exception: Positron Source

- **Prepare designs for all possible schemes by (A)**
- **Scheme choice should be done by (B)?**

Note:
This timeline has been discussed and reached a consensus by the KEK LC-CFS members.

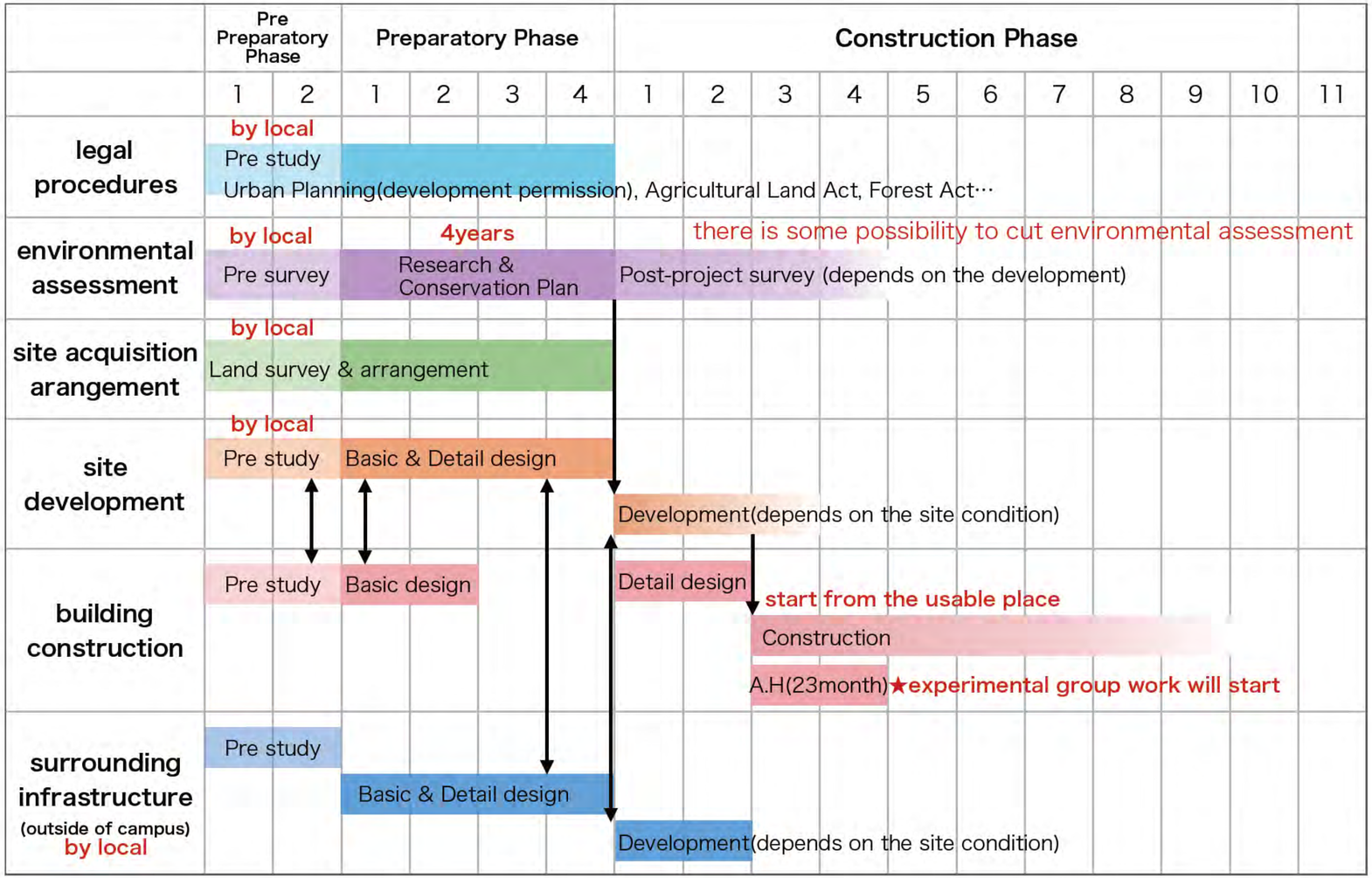
- M. Miyahara,
- H. Hayano,
- N. Terunuma,
- S. Michizono,
- K. Yokoya

CFS Timeline, Nobuhiro Terunuma (KEK), 29 May 2018, ALCW2018, Fukuoka.

N. Terunuma

IP Campus Development (Draft 03/2016)

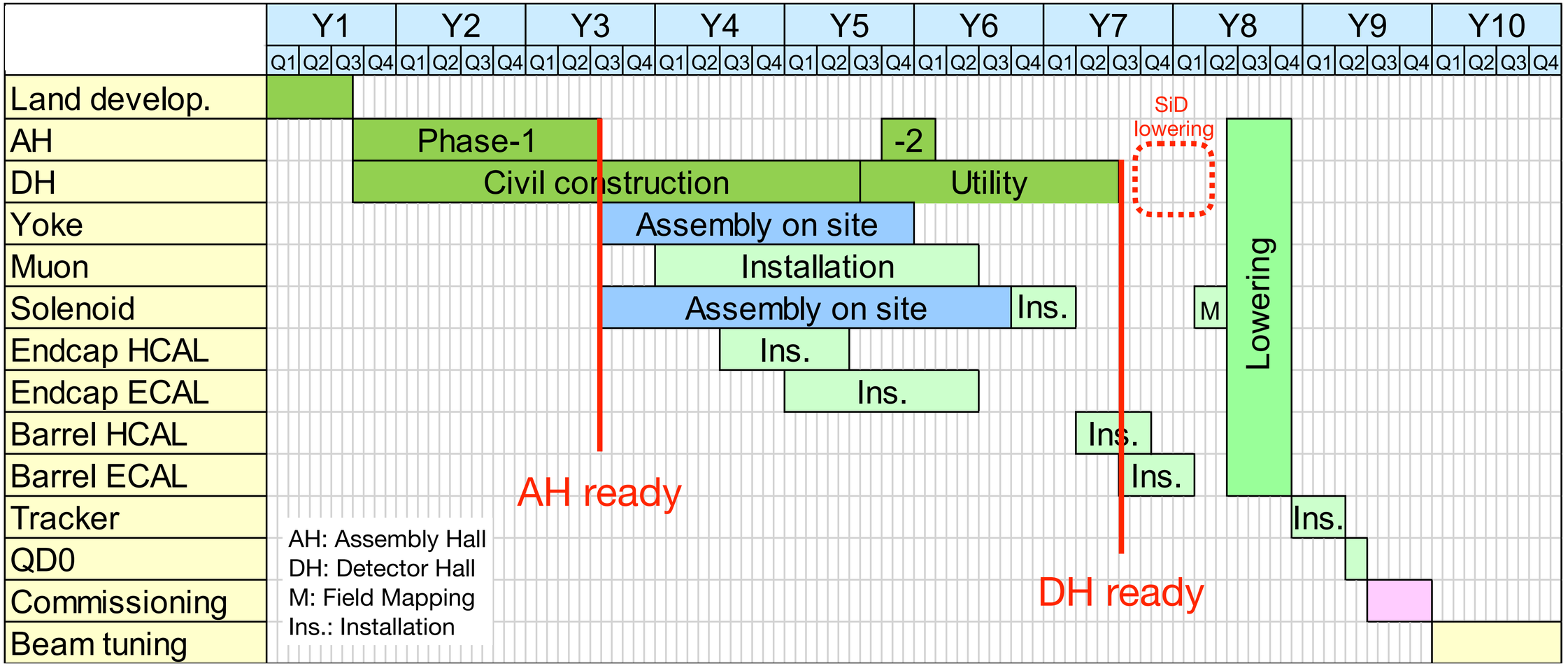
IP campus schedule(draft)



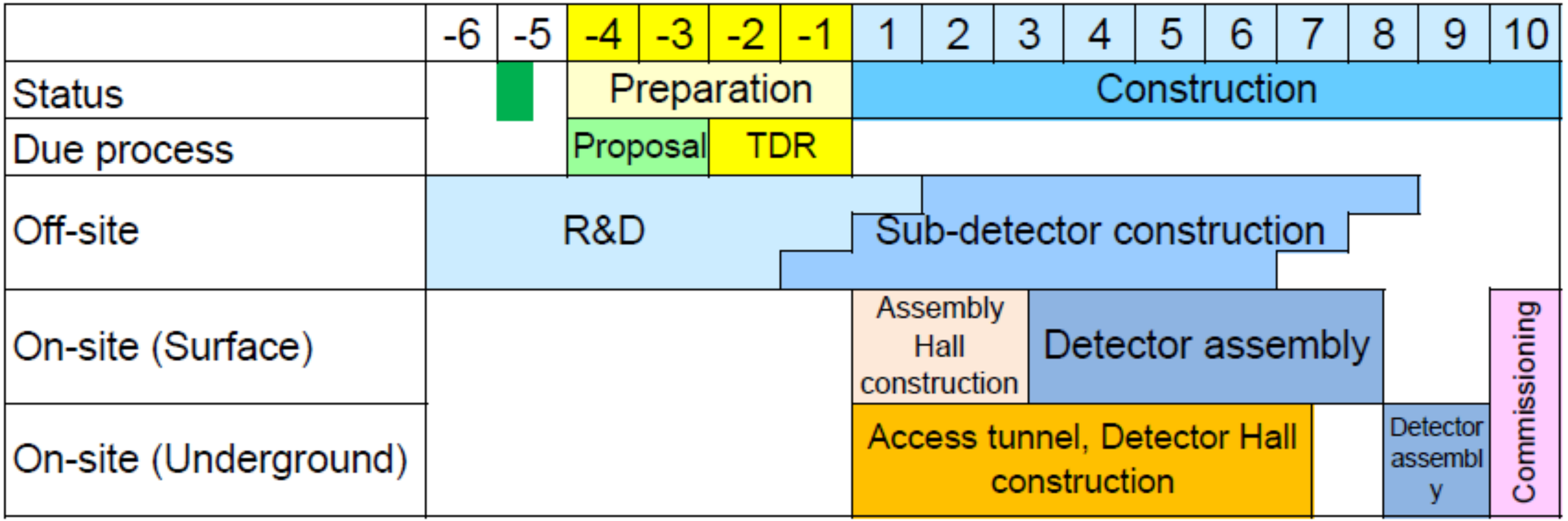
※all include the contract procedure ※A.H. schedule is from change request NO.ILC-CR-000R

T. Onuki

Technical Detector Construction/Assembly Time Line



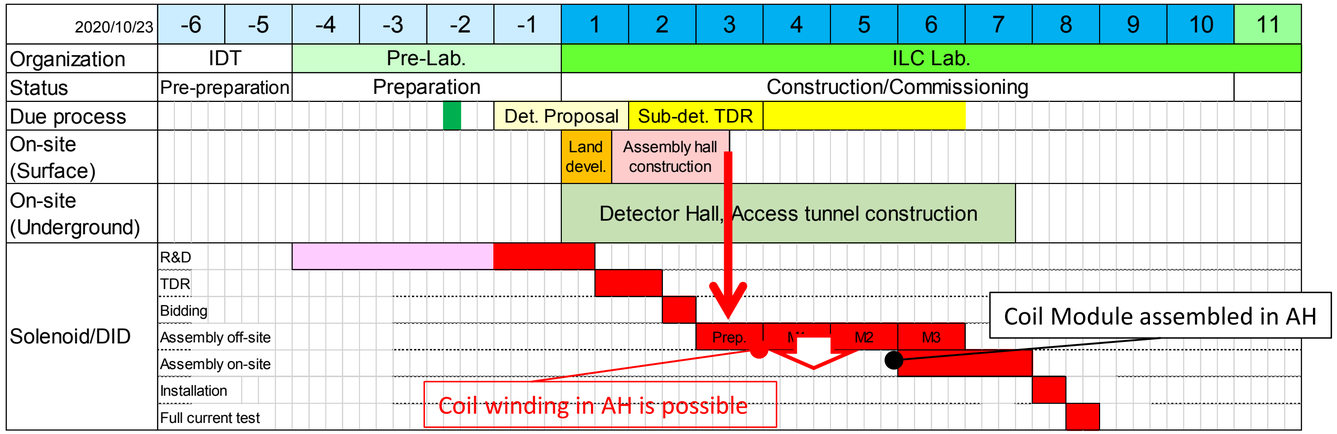
ILC Detector Timeline?



Solenoid Manufacturing

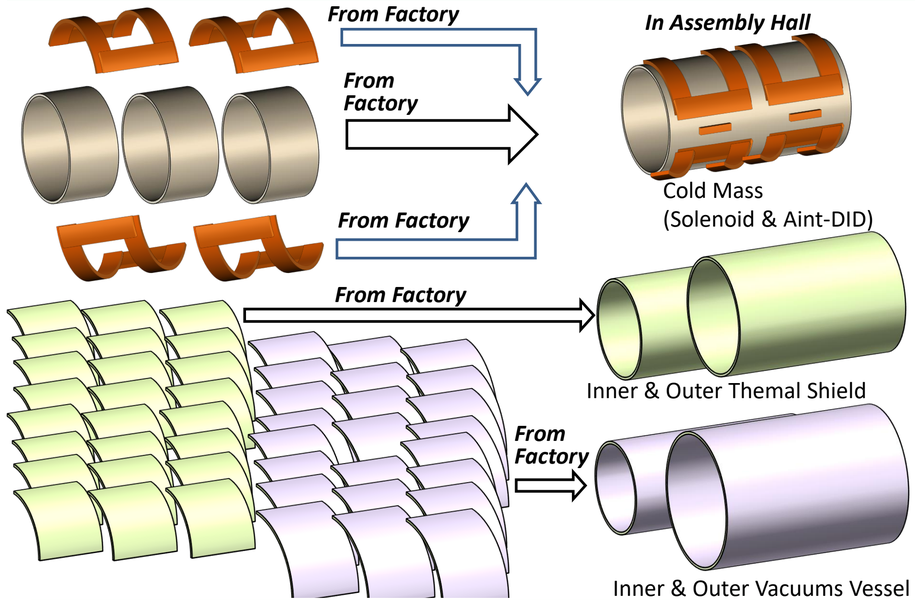
Solenoid production

- Assumed module production in industry, assembly on site
- Transportation is an issue
- New idea: wind coil modules on-site also
  - needs to be studied in more details
  - should fit into time lines
  - space in on-site assembly area is required

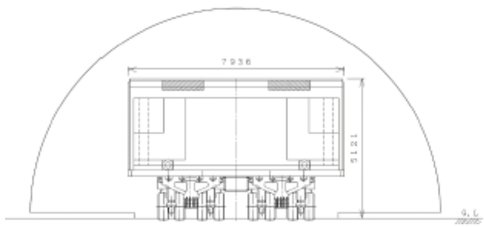


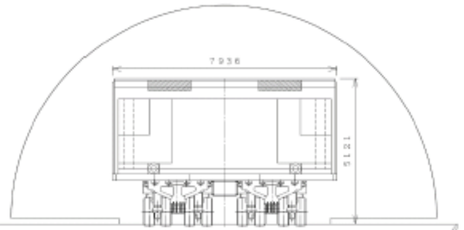
Y. Makida, ILCX

Outline of ILD Coil manufacturing process (1)



Passing Through Tunnels





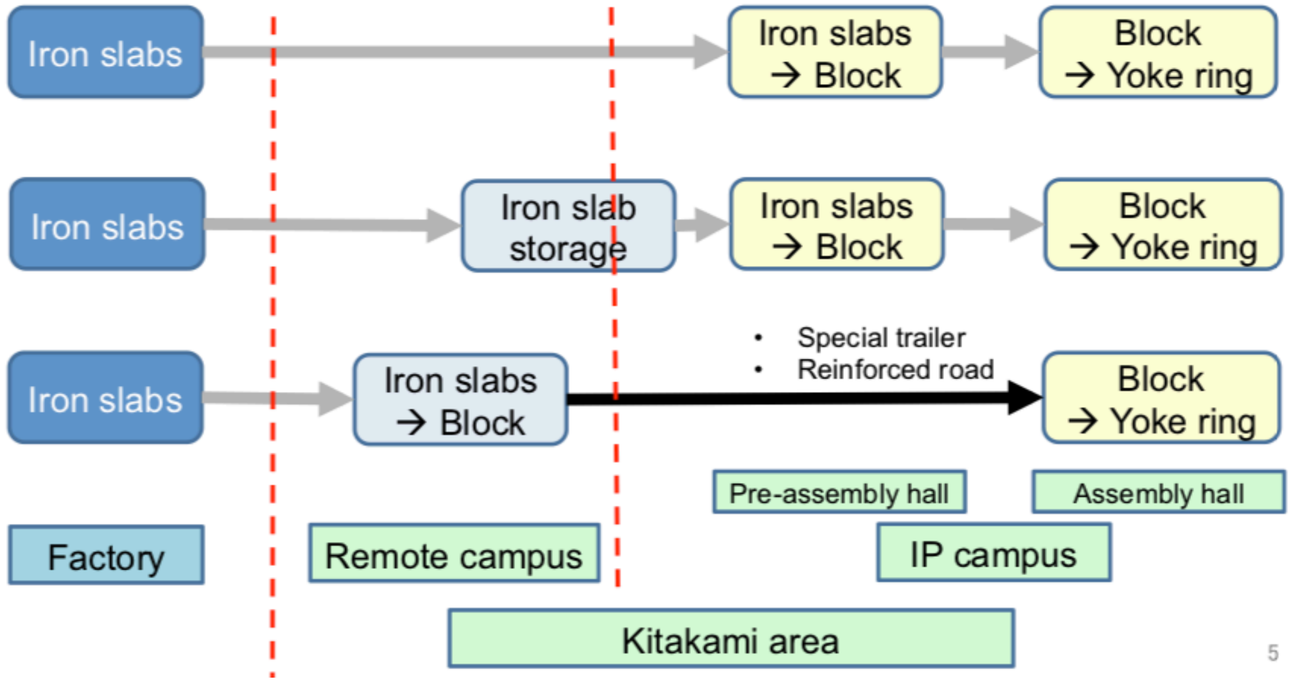
Assembly and Transportation

Transportation

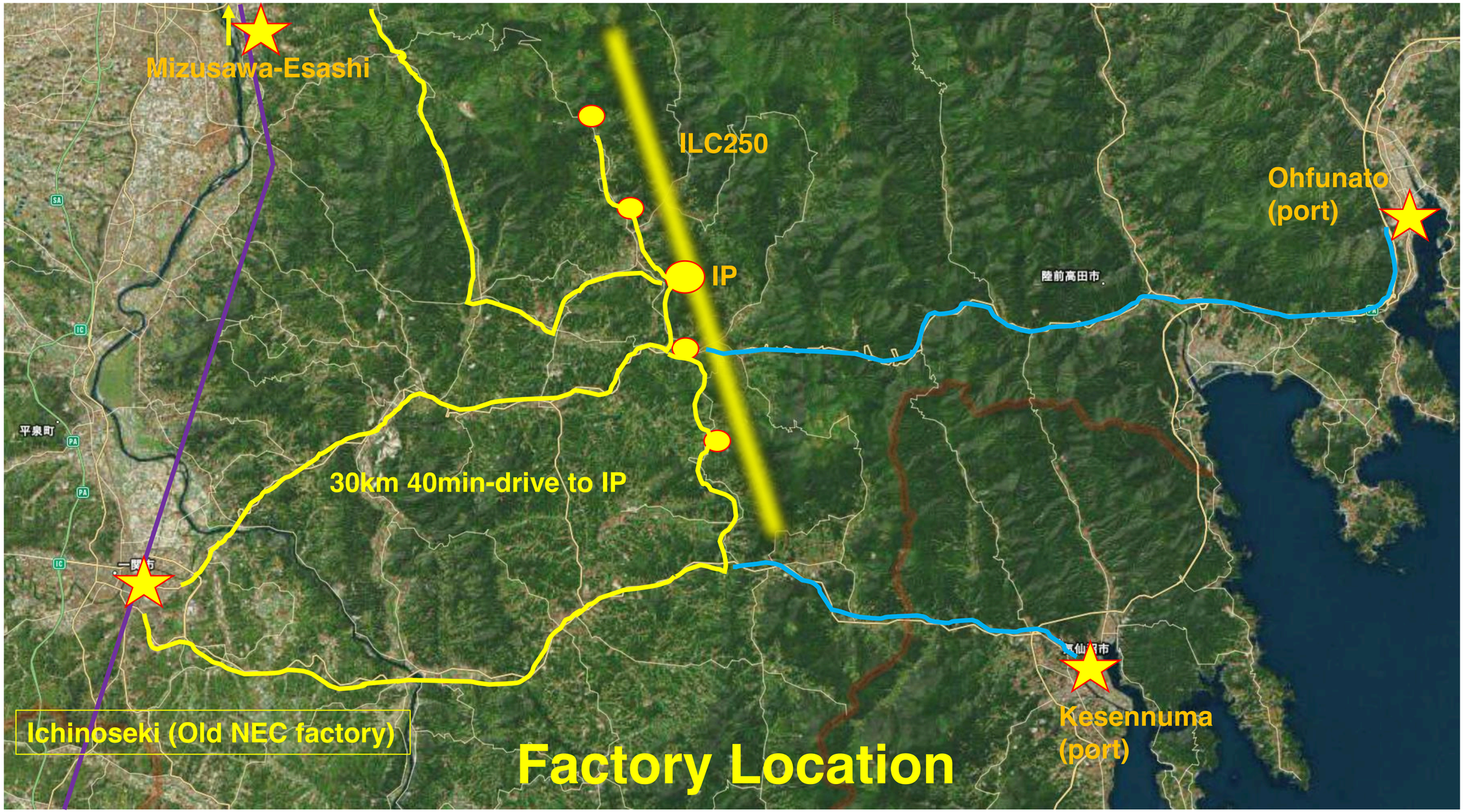
- next sea ports are O(30km) away from site
- rural, hilly landscape, winding roads
- max. truck size in Japan: 30t
- heavy-load transports are possible only in very exceptional circumstances
  - requires reinforcements of roads and bridges

Assembly

- transportation limits require heavy assembly work at or close by the IP site
  - assembly hall at IP campus
  - additional work space in close-by temporary areas



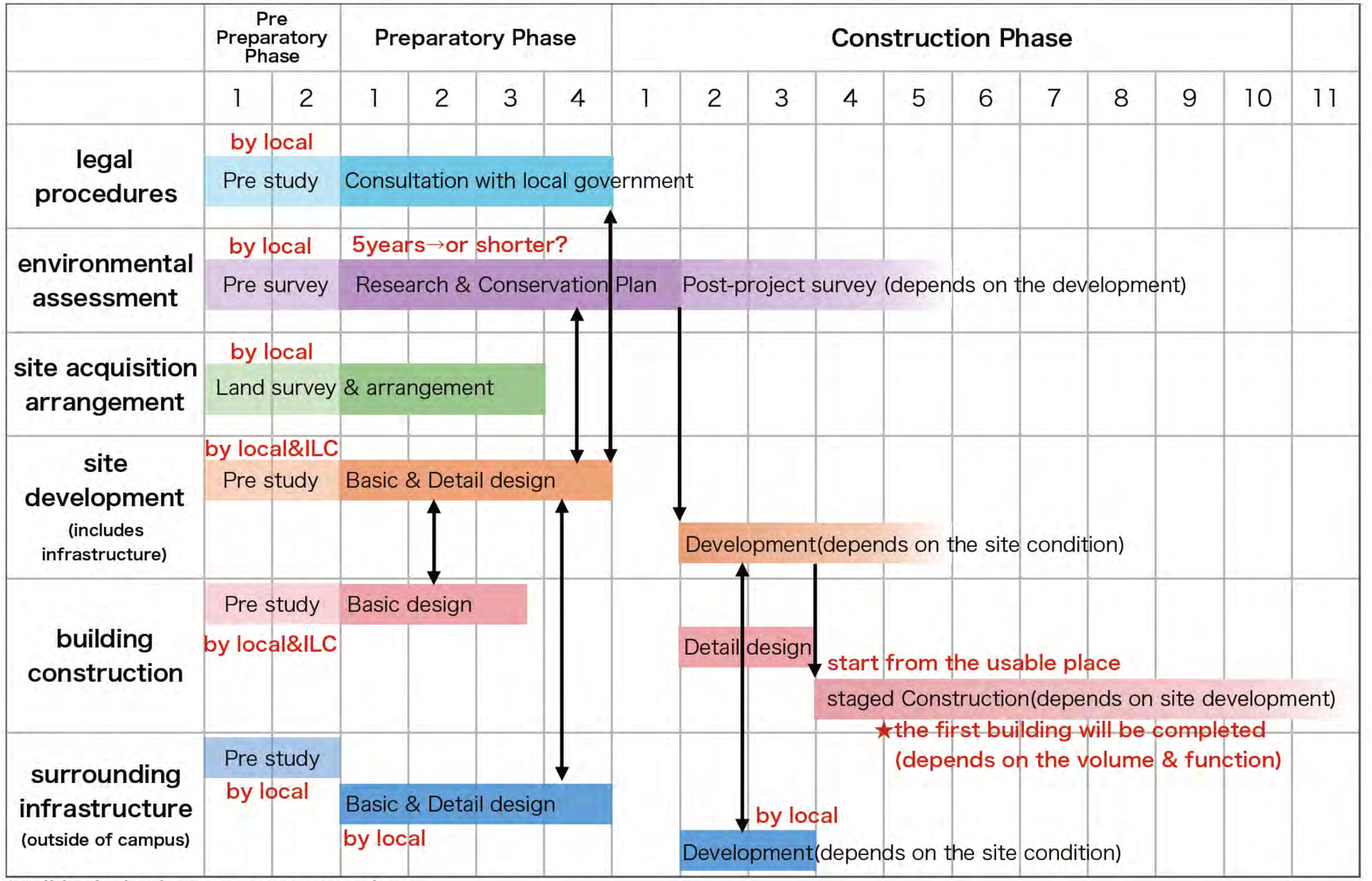
IP Campus Access



ILC Main Campus Development (Draft 03/2016)

ILC main campus-Schedule(Draft)

main critical point is environmental assessment.



※all include the contract procedure

T. Onuki

NEC Facility at Ichinoseki

Recently given up facility

- O(20.000 m2) of floor space
- Used for electronics assembly

Directly next to Ichinoseki Shinkansen station

Under discussion (2019) to be made available for preparatory ILC project works

Conclusions

Detector Assembly has been studied in quite some detail in the past

- Check E-JADE Deliverable Report #22: https://www.e-jade.eu/publications/deliverable_reports/
- Technical schedule assumes 9 years of construction, 1 year of commissioning
  - Solenoid construction is on the critical path for the detectors
    - R&D, preparation, and construction in industry requires significant funds very early
    - to some extent already in preparatory phase

CFS and site schedules have been estimated by LCC and local experts

- Need a significant „preparatory phase“ after green light and before construction start
  - legal procedures, environmental assessment, land acquisition, etc.
    - requires already significant project funding
    - takes 4 (-6) years
- On-site assembly of detector parts can only start after Assembly Hall is ready
  - 3-4 years after construction start, 8-10 years after green light

Caveats

- Need to update knowledge about status of local planning
  - Ball has been dropped 2019
- Large uncertainties in all schedules

Backup

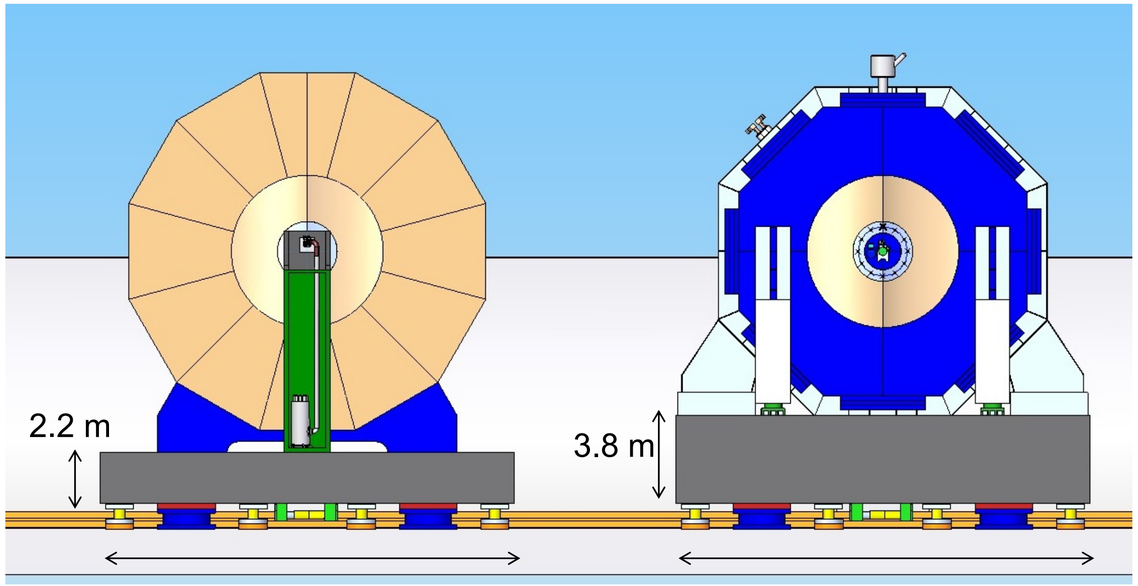
Push-pull System

ILC Baseline

- one interaction region for two detectors
- push-pull system allows for lumi-lumi transition within O(1d)

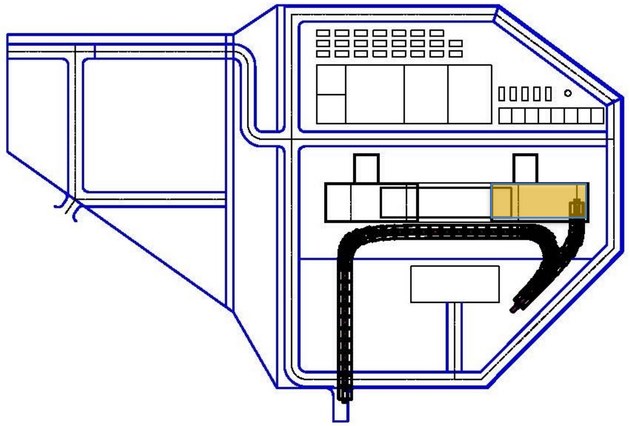
Constraints

- Set of rules for the friendly co-existence of two detectors
  - one taking data, one being maintained
- Functional requirements laid down in 2009
  - SLAC-PUB-13657
  - geometric boundary conditions
  - magnetic and radiation environment
  - vacuum
  - alignment and vibration limits
  - etc.

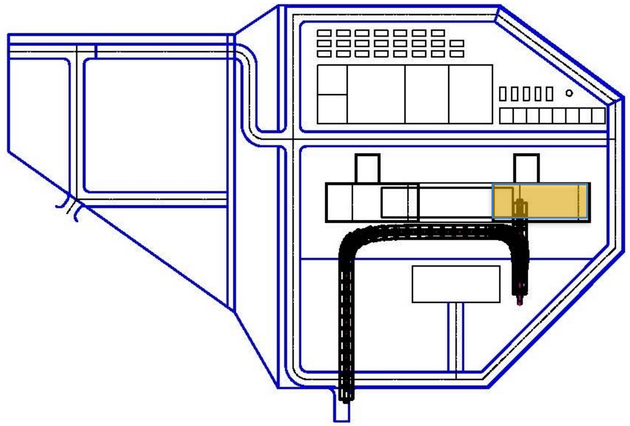


Trailer access around Assembly hall

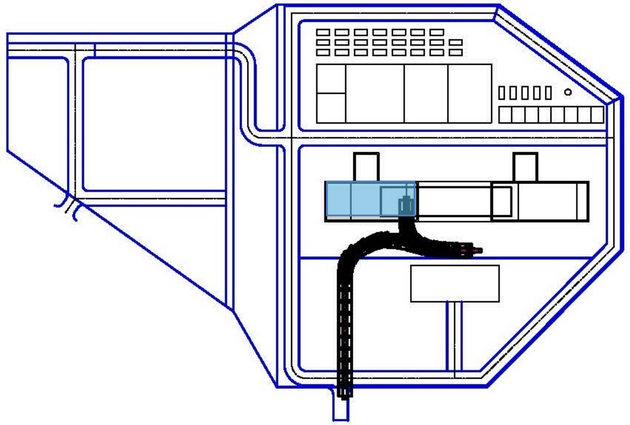
ILD End Side Entrance access



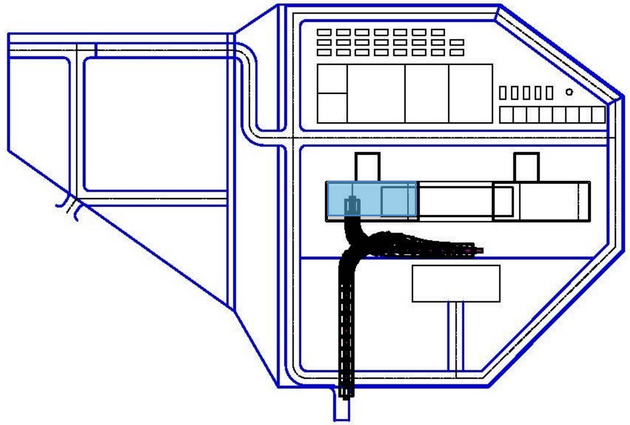
ILD Platform Side Entrance access



SiD Platform Side Entrance access



SiD End Side Entrance access



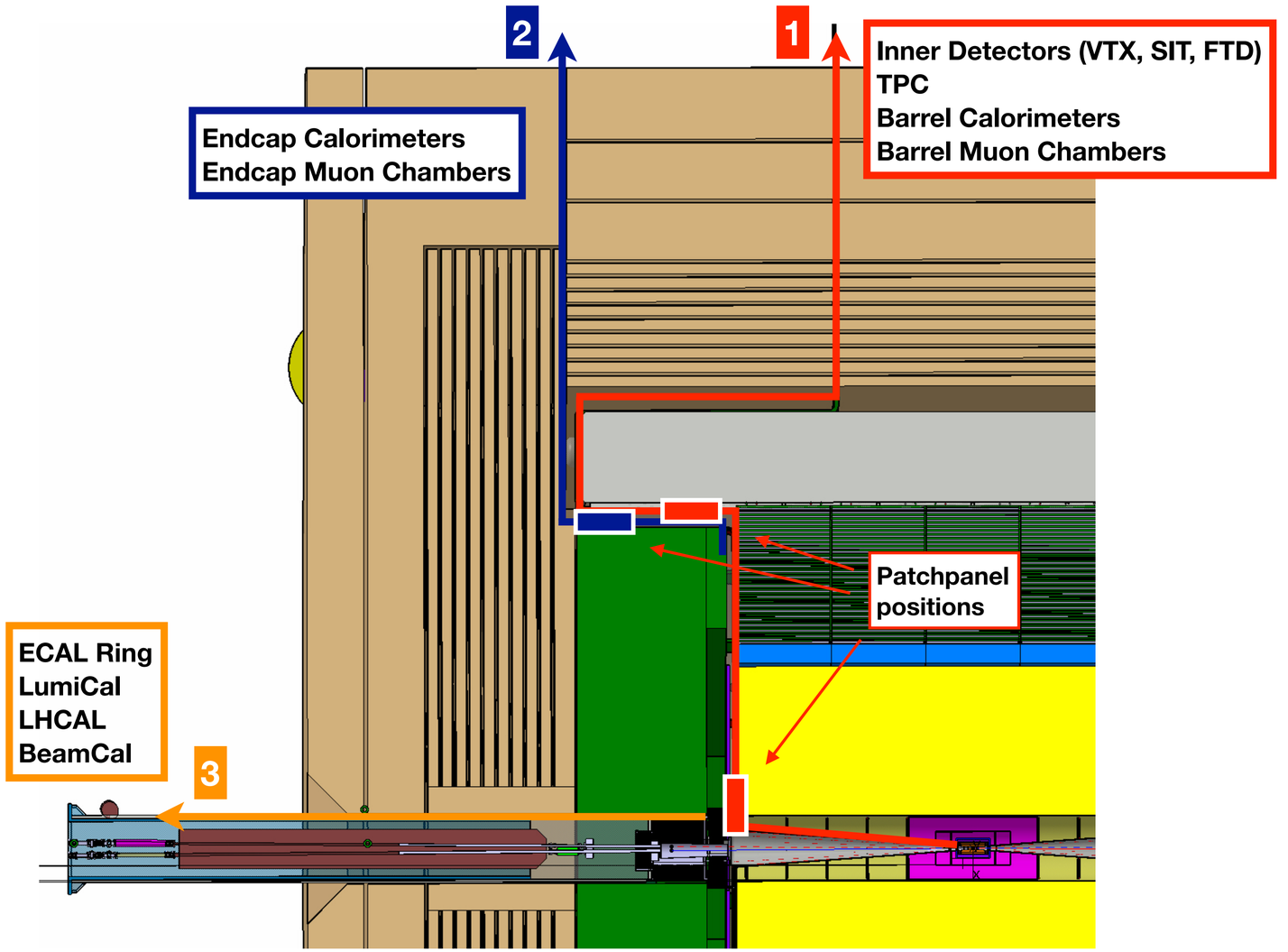
ILD Cabling Scheme

General exits:

- Barrel detector: gap between barrel yoke rings
- Endcap detector: gap between endcap and barrel yoke
- FCAL: along QD0

The occupation of the available cable paths needs to be reviewed

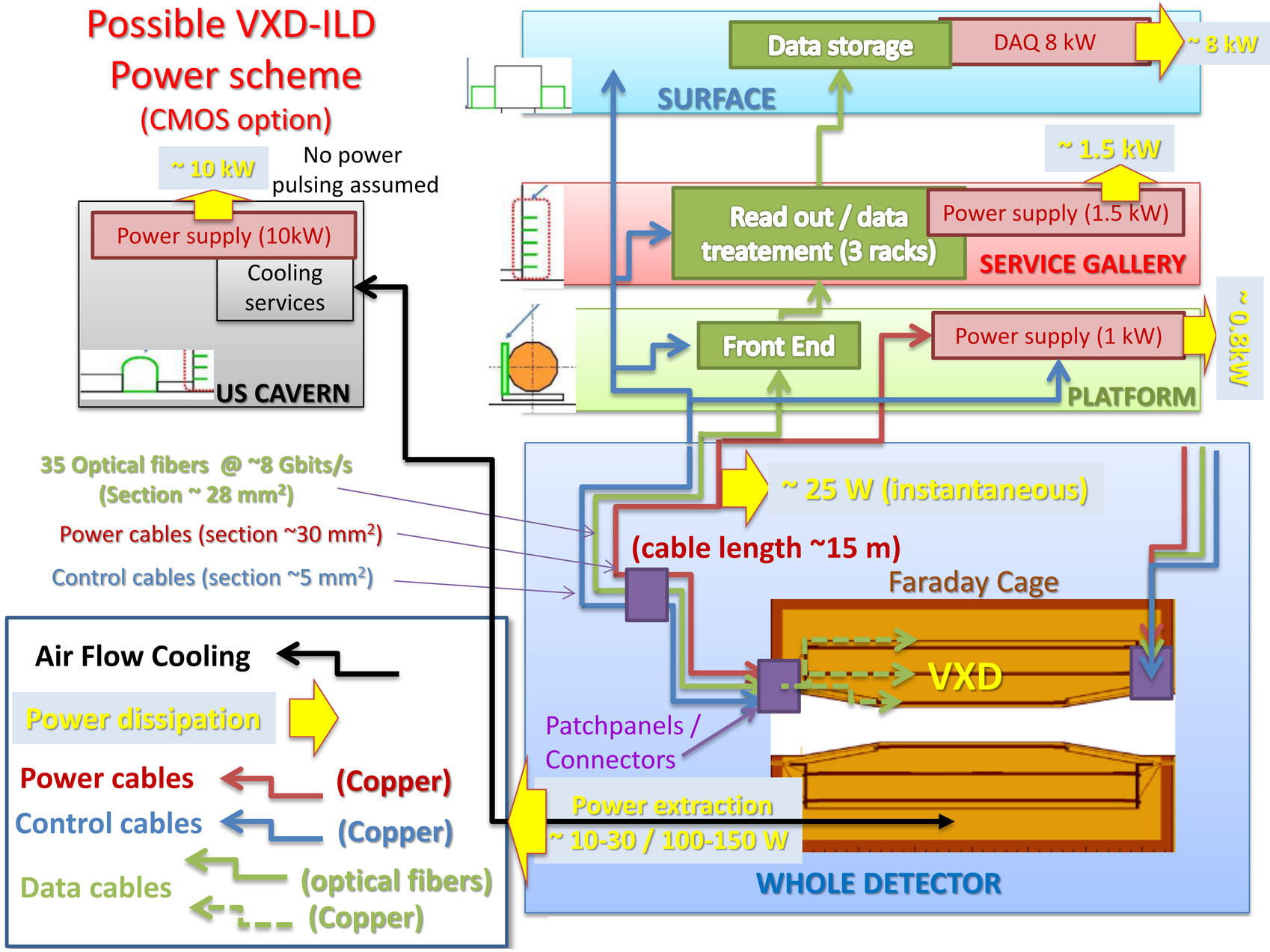
The location and size of the patch panels is critical



VTX Infrastructure

Conceptual design

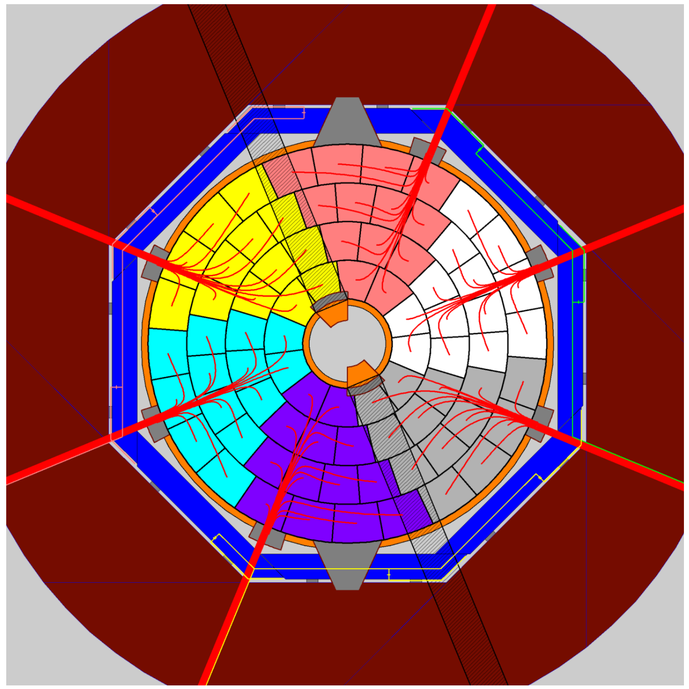
- CMOS option

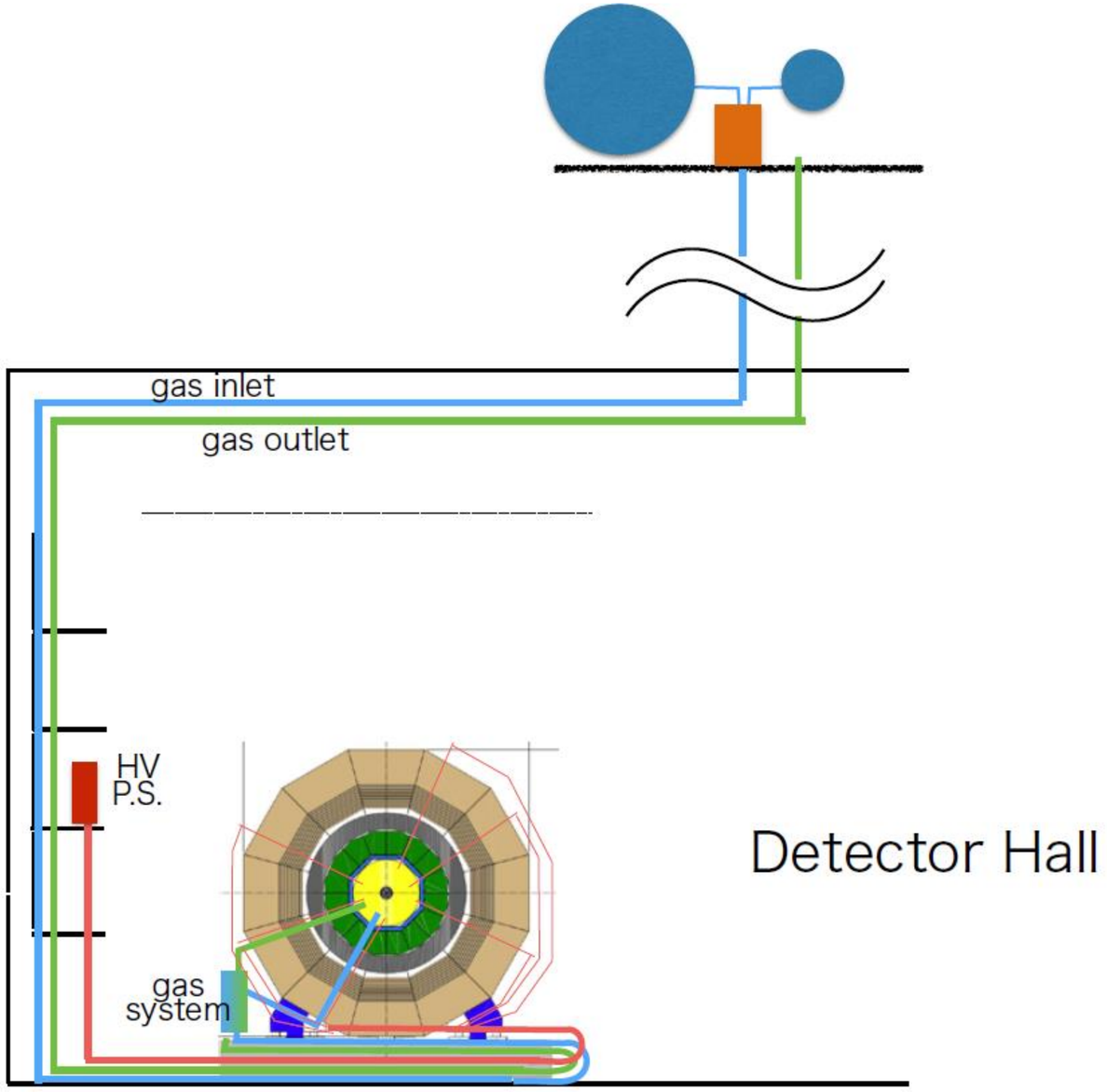


TPC Infrastructure

Special requirements

- HV, gas system
- requires integration with civil infrastructure underground and on surface
- conceptual plans exist

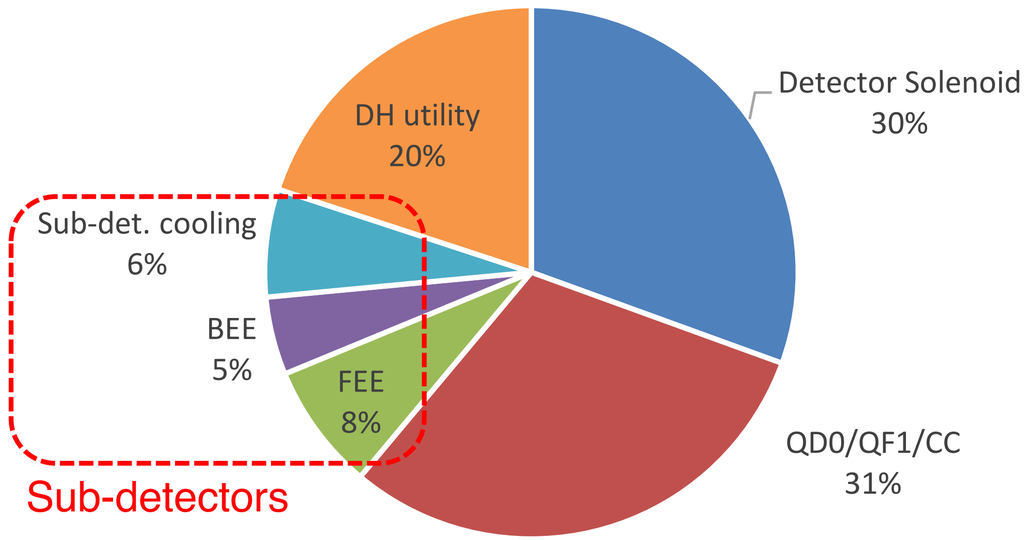




ILD Infrastructure

Infrastructure planning

- underground and on surface
- has impact on civil facilities design!
  - cost, timelines
- conceptual studies under way



Power consumption distribution