KEKB Review 2010

Facility and Infrastructure

KEK; M. Ono

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Contents:

(1) Stock Area for Removed and New components;

Magnet/Vacuum components.

(2) New Building of infrastructure and of stock area;

RF/Klystrons will be rearranged within the present galleries.

(3) Improve/Increase ; Cooling Water, Electricity…

Following Discussions depend on the not recent Machine parameters (~June-09). My talk's results may not be depend on the details of the parameters.

(1-1) Area Requirement by Vacuum & Magnet group ; June-09.

Vacuum Group	
New Chamber Stock Area: 1000m^2	Crane/ Air Conditioning
TiN Coating Plant: 300m^2	Crane/ Air Conditioning
Ion Pump Stock Area: 120m^2	
Magnet Group	
4 Power Supply stations: 150m^2 x 4	
B-field measurement Lab.: 870m^2	Crane/ Air Conditioning
Reuse Mag. Stock area; 1500m^2	Crane/ (Air Condition?)/ Partially remove from the ring.
New Mag. Stock area: 900m^2	Crane/ (Air Condition?)
Abandon Mag. Cable area: 900m^2	

Total: ~6200m^2

(1-2)Stock Area for Removed Vacuum Chamber & Magnets

Radio active of present KEB components are measured at 09-Aug. ~Sep. to classify the components to tree levels; White(can abandon immediately)/ Gray(store at less restricted manner)/ Yellow(store at restricted manner).

Vacuum Chamber : Not reuse but radio activated

--> White: Abandon / Gray: Store at tents or out side restricted area with covered by sheet?/ Yellow: Store at ruin Tunnel (ex. PS/neutrino-line).

(~300m^2; pile up stock) 40-50% White, 50-60%Gray, <10%Yellow

Magnet(HER/LER) : Reuse except Long Bend(HER)

Long B; --> Abandon or store; same condition at vacuum chamber.

(~700m^2) 341 (144White/189Gray/ 8Yellow)

Reuse(others) --> Store at good condition ; Air conditioning/ Crane…

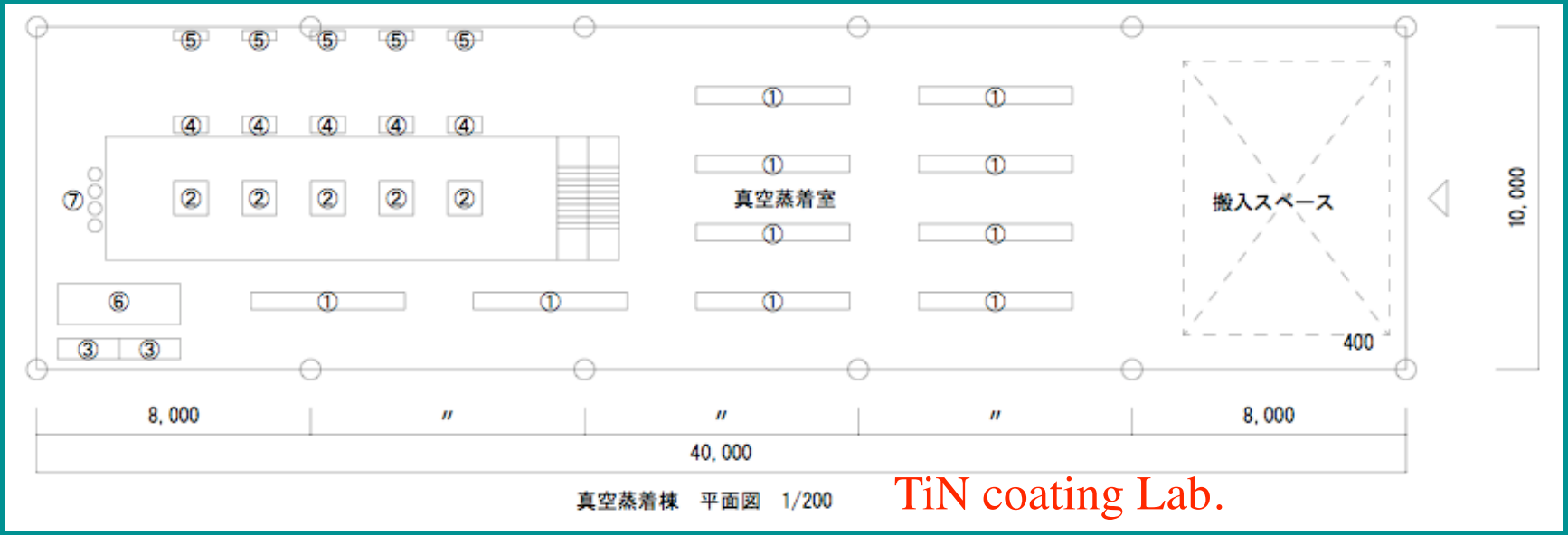
(~5000m^2 ? in total) 70%White, 30%Gray, 2-3%Yellow

Components(BT/DR) : Not yet considered (~500m^2??)

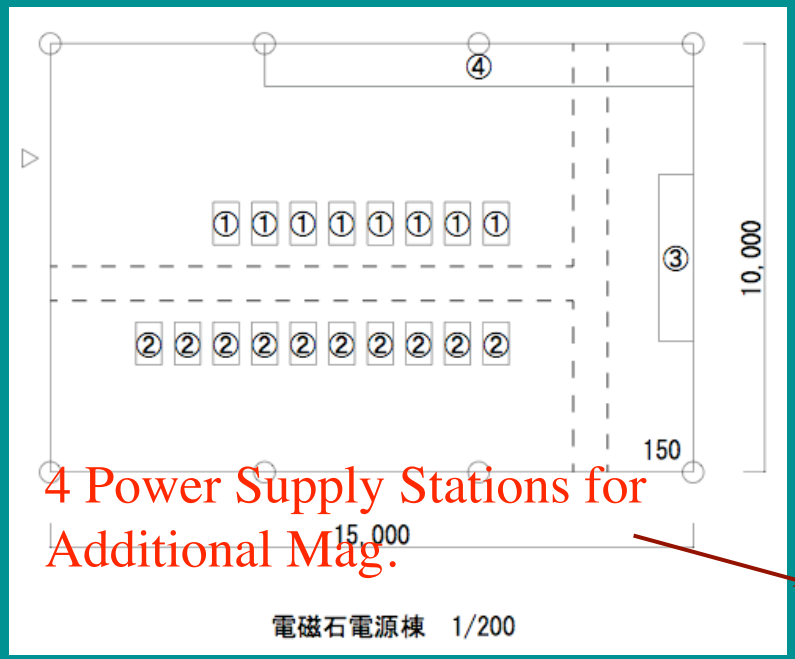
(2) New Building for the Ring; 1st requirements; June- 09

Facility	Area (m^2)		Comment
Mag. Power Supply Station	150 (10x15)	4	For additional mag. (--> stock area at construction)
B field measurement Lab.	870 (43.5x20)	1	Measurement/ Stock new mag.
Vac. tube coating Lab.	400 (40x10)	1	TiN coating/ stock new chamber.
Stock area of Gray radio activate	900	1	Ware house? Stock reuse mag.?
Compressor Plant for QCS	70 (10x7)	1	Add to present.
Water Plant	450 x2 (two floor building)	4	Cooling water at arc.

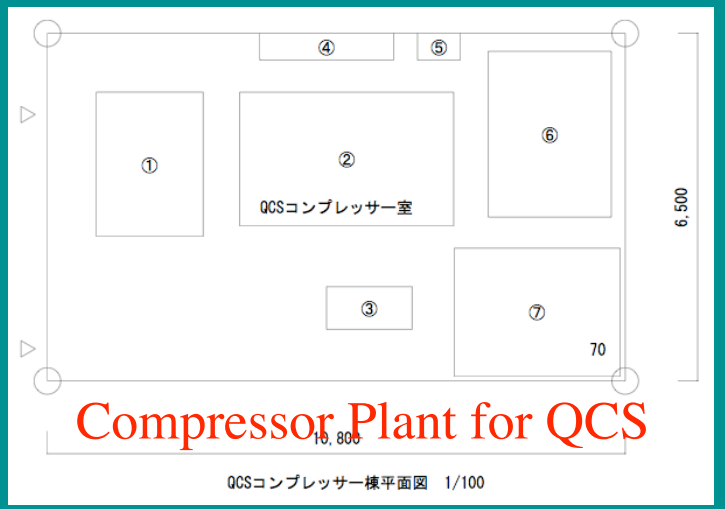
Plant & Station : must build.
Blue(Stock/Lab.) : seek existing area in KEK site
; suggestion from upper level person(K).



TiN coating Lab.



4 Power Supply Stations for Additional Mag.



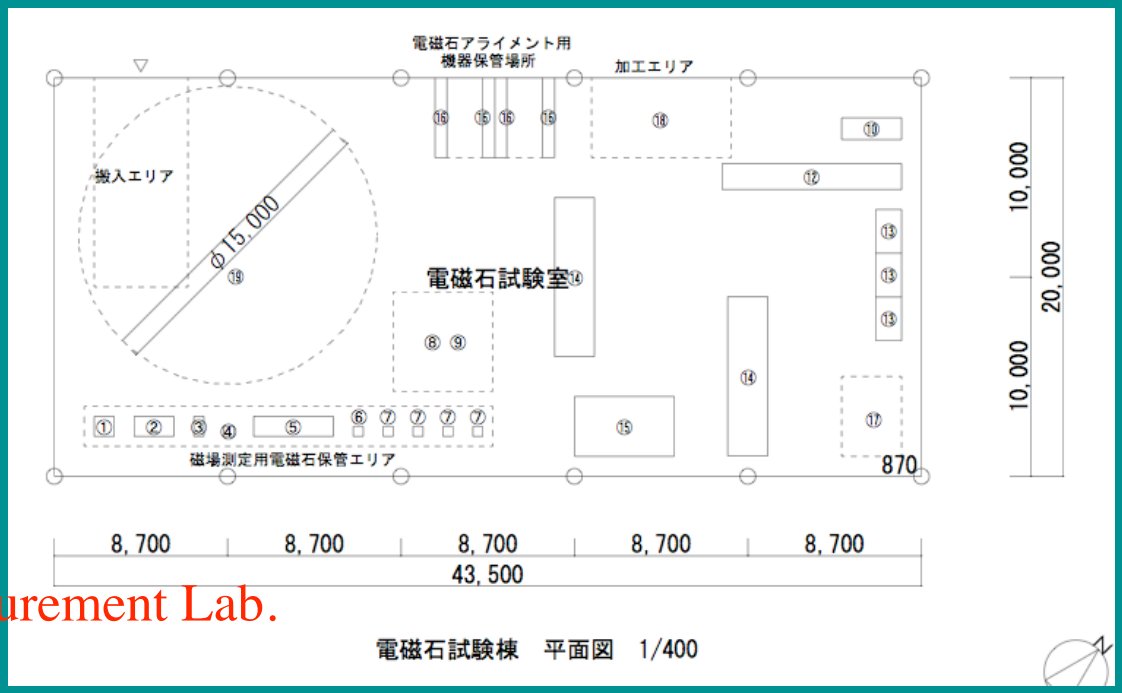
Compressor Plant for QCS

May change to larger area because of increasing of new magnets ; figure reflect initial requirement(June-09).

低放射化物保管棟　平面図　1/300

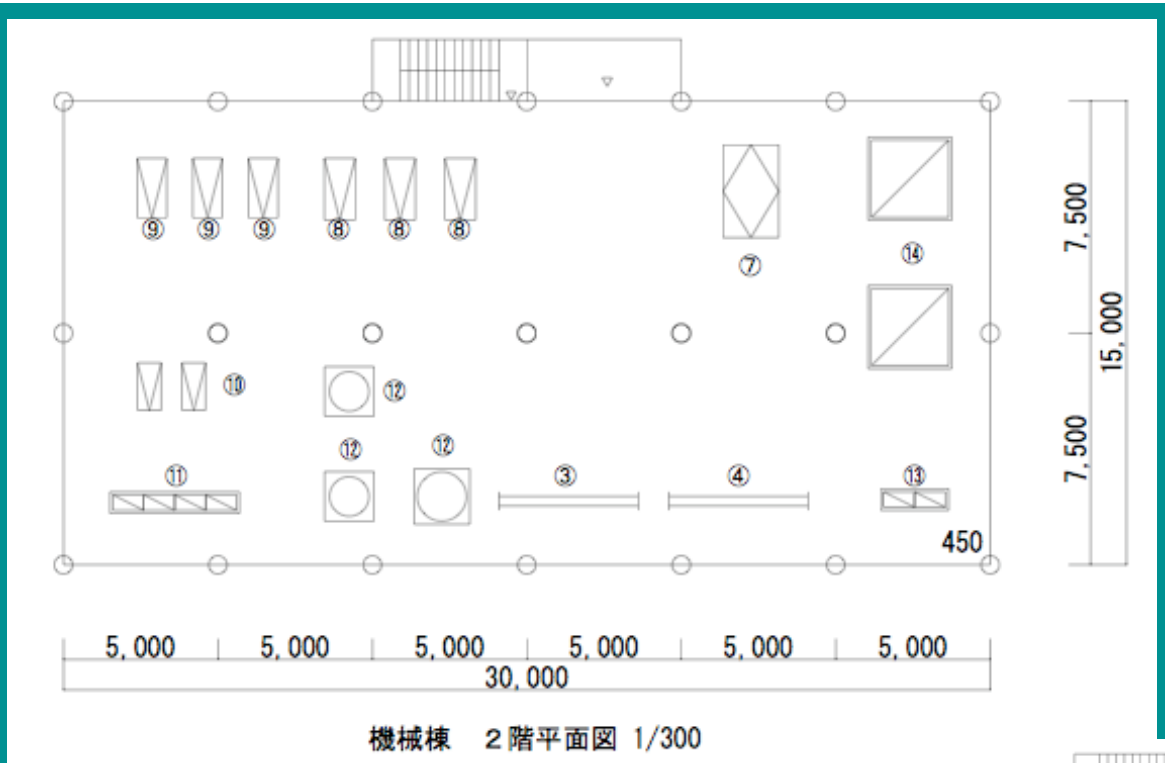
Ware house for Gray radio activity

Don't take the layout seriously; only the size of area is important.



電磁石試験棟　平面図　1/400

B-field measurement Lab.



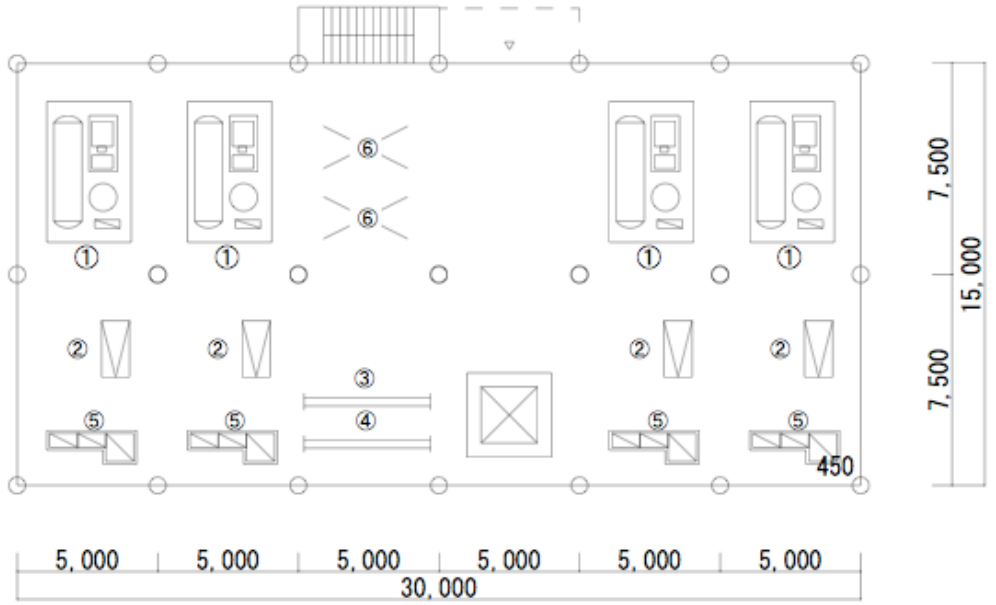
機械棟　２階平面図 1/300

The layouts are rather realistic; for assumed cooling power(June-09).

(2nd floor)

4 Water Plants: Cooling water for arc section

(1st floor)



機械棟　１階平面図 1/300

Seek Area

Candidate Area : for Stock and Area of B-field Lab. & of TiN-coating Lab.; because New buildings are difficult to construct.

(1) East-Exp. Hall (1/3~1000m^2) ; converted to cERL area : with Crane

(2) North-Exp. Hall (1/3~800m^2) ; (素核研 hold rule) : with Crane

素核研 : Ins. Particle & Nuclear studies

(3) Fuji-B4 (all~1000m^2) ; (素核研 hold rule) : with Crane

(4) (ruin of)PS-Infra. Plant (1/3~500m^2) ; get area with flat floor, but without Crane; available from FY2010.

Use period : ~4 years? Total Area : 3300m^2

Current KEKB use area :

(5) Nikko-B4 (~1000m^2) ; Occupied by Mag. and SCC group : with Crane

(6) Oho (~500m^2 x3? ; 3 floor) ; Occupied by Vac. and Mag. Group : (with Crane)

(7) 8 Klystron galleries; Occupied by RF /BT/Monitor, no space for others

(8) 4 Power Supply Stations; Occupied by Mag., no space for others

Total ~500m^2 ??? ; if sum up of small areas.

Consistency between requirement and candidate area :

(new buildings for Plants/Stations are not included; -->must build if needed)

(areas for not reuse rad. active components are not included; available? in KEK site)

Requirement :

Magnet;

- B-field Lab. (870m^2)
- Reuse Mag. Stock (1500m^2)
- New Mag. Stock (900m^2)

Vacuum;

- New chamber Stock (1000m^2)
- TiN coating Lab. (300m^2)
- Ion Pump Stock (120m^2)

Candidate :

- East-Exp. Hall (1000m^2)
- North-Exp. Hall (800m^2)
- Fuji-B4 (1000m^2)
- ruin of PS Plant (500m^2)
- sum up of small areas (500m^2??)

3200m^2 / 1500m^2 (radio act.) <---> 2000m^2 / 1800m^2 (radio act.)

Comments on Consistency:

3200m^2 / 1500m^2 (radio act.) <---> 2000m^2 / 1800m^2 (radio act.)

(1) Consistent ; because usually requirements are exaggerated, and precise estimation can not be expected at this moment.

(2) But, the stock area of reuse magnets(1500) are estimated based on the assumptions; only the magnets at the construction area of the Ring move to the stock area (KEKB ring is major stock area).

(3) Also, candidate areas are really available? ; tough negotiations are expected between other projects people (cERL/ 素核研, etc) and us.

(4) Construction schedules of the infrastructure (piping of water & floor preparation at tunnel/ new buildings, etc.) and of the machine components (magnets/chambers, etc.) may affect the present scenario, greatly; accordance between the two schedule is important.

(5) Damping Ring and BT must be included; not included at this moment, even though the construction of DR will start next FY.

Map of New Building and Seeking Area

New 5 Plants
& 4 Stations

New 2 Lab.

Ware house
(initial plan)
↓

East Exp. Hall
North Exp.Hall
Fuji B4
PS Plant; renewing
(for ILC/KEKB/..)

(3-1) Improve/Increase ; Cooling Water

First estimations of Cooling Water Plant;(June-09)

(1) RF; 24 klystrons for ARES, 8 Klystrons for SCC

(2) Magnet & Vacuum; System configuration/
present 4 Cooling water plants are for 4 Straight/Arc sections
new 4 Cooling water plants are for 4 Arc sections

No precise estimations reflecting the recent parameters are carried out; just twice the present Water Plant for Mag. & Vac.
No significant increasing for RF from the original Water Plant at TRISTAN; add 2 ARES units at D11(Nikko) in Recent Design.

KEK-Bの高度化　　Increase Water Plant　　２００９．５．２５

Magnet Cooling Water

		Current Plant		New Plant	
		Flow(l/min)	Δ t (30-52.4)	Flow(l/min)	Δ t (30-52.4)
Existing Facility	Tsukuba	3,660	22.4	3,660	22.4
	Oho	3,660	22.4	3,660	22.4
	Fuji	4,020	22.4	4,020	22.4
	Nikko	3,860	22.4	3,860	22.4
New Facility	North			3,500	22.4
	East			3,500	22.4
	South			3,500	22.4
	West			3,500	22.4
Total		15,200		29,200	

Vac. Chamber Cooling Water

		Current Plant		New Plant	
		Flow(l/min)	Δ t (15-25)	Flow(l/min)	Δ t (15-25)
Existing Facility	Tsukuba	1,800	10.0	1,800	10.0
	Oho	1,800	10.0	1,800	10.0
	Fuji	1,800	10.0	1,800	10.0
	Nikko	1,800	10.0	1,800	10.0
New Facility	North			1,700	10.0
	East			1,700	10.0
	South			1,700	10.0
	West			1,700	10.0
Total		7,200		14,000	

Add 400 l/min Water Plant at North Facility for two ARES units.

Machine design will decide the water distribution from new and old plants.

(3-1) Improve/Increase ; Electricity

First estimation of Electricity Consumption;

(1) 24 klystrons for ARES, 8 Klystrons for SCC
(2) Add 500kW at each New Power supply station;
total 2MW increasing for Magnet.
(3) Add 500kW at new QCS compressor plant.
(4) Add ~1MW at each 4 Plant Facility(old +new);
total 4MW increasing for Infrastructure;
(~2 --> 3MW at each Facility).

Above assumptions does not reflect the Recent design.

Electricity Consumption: June-09

	KEKB/KEK total			
(Design option)	KEKB:MW	ΔMW	KEK:MW	ΔMW
Present(Average)	45		64	
Nano Beam: June-09	70.7	24.3	96	32
Upgrade: Feb.-09	94.8	49.8	120	56
Super: '07-July	102.6	57.6	128	64

Recent Design(Feb.-10): Add 2 ARES units--> +(3~4)MW

Summary/ Comment/

(1) Building, Area; (can) build only inevitable houses, effort of seeking area is not avoidable.
(2) Construction schedule of Infrastructures and of Machine Components should be consistent each other.
(3) Electricity consumption reduced to TRISTAN level; acceptable(?).
(4) Many components are old enough; Cooling Water Plants, Air Condition Plants, He Refrigerator, Klystron Power Supply.
(5) Keep “good/ sustainable” relationship with Administration/ Facility peoples of the KEK; several veterans will retire(d).