The General Arrangement Modification of Ion beam Application Building and Utility Building in Proton Accelerator Research center

G. P. Jeon [a*], J. Y. kim [a], K. J. Mun [a], Y. S. Min [a], J. M. Nam [a], S. K. Lee [a], J. S. Cho [a]
[a] PEFP, KAERI, P.O. Box 105 Deok-Jin Dong, Yu-Seong Gu, Dae-Jeon 305-353,
[*] *Corresponding author:gpjeon@kaeri.re.kr*

1. Introduction

As a basic design of conventional facility of Proton Accelerator research center, We made the site-independent GA of Ion beam Application Building and Utility Building at 2005. Since host site host site was selected Gyeong-ju city in January, 2006. we need design revision of Proton Accelerator research center to reflect on host site characteristics and several conditions.

Also the IAC recommended maximization of space utilization and construction cost saving.

In this paper, we have modified the General Arrangement of Ion beam Application Building and Utility Building in Proton Accelerator Research center. Also we revised the site plot plan of proton accelerator research center.

2. GA Modification

2.1 The configuration of Ion beam Application building

The Ion Beam Application Building consists of a reinforced concrete structure with two stories above ground. It is a space for installing and operating ion beam research facilities, and the design for shielding and so on necessary for operating the related equipment is to be considered. The design for spatial arrangement is also taken into consideration to make vehicles for the use of maintenance come in and out. It should also possess conveniences for the operators.

External expose dose rate is designed by below 12.5uSv/h around the Tandem. Also implanter is designed as General Public Area (0.25uSv/h) outside the building. In Ion Beam Application Building, through the source term estimation about the charged particles shielding design is performed, because the radiation risks are caused by secondary charged particles than ion beam itself.

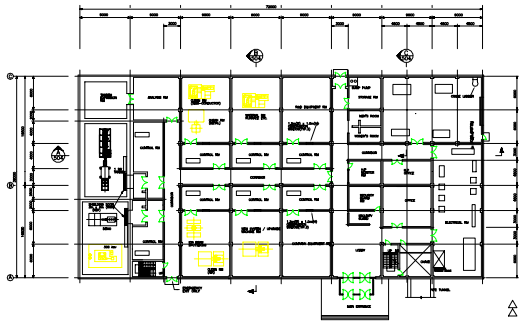
2.2 Modified GA of Ion beam Application building

The IAC recommended all ion-implanters should be easily managed and guaranteed accessibility. Also, they represented we should save the construction cost in coincidence with maximization of space utilization.

So we revised some items of Ion beam application GA as follows:

1) Position shift with equipments room(installed on 1MV tandem and 300keV ion implanter) and Machine rooms
2) Position shift of Main entrance
3) Size reduction of each equipment room
4) Elimination of overhead crane for construction cost saving
5) Rezoning of Radiation control area
6) Change of underground utility tunnel
7) Alteration of building elevation from 5m to 4m

a) Before Modified



b) Modified

Fig. 1. General Arrangement of Ion beam application building

2.3 The configuration of Utility building

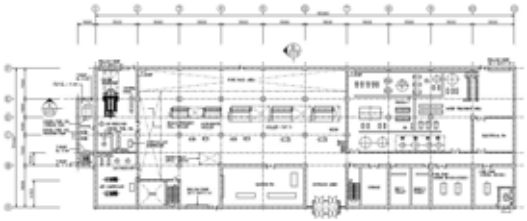
The Utility Building consists of a reinforced concrete structure with a single story above ground. It is a space for installing and operating the facilities which supply utilities in the central supplying type, such as an Heating, Ventilating and Air-Conditioning system, demineralized water, compressed air and so on, necessary for operating the Accelerator, Beam Experiment Hall and incidental facilities. The Utility Building is a non-radiation control area, and the equipment hatch has been considered for the purpose of carrying in related equipment.

2.4 Modified GA of Utility building

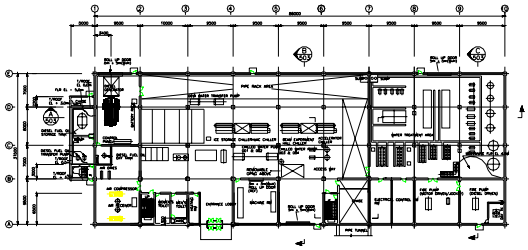
The IAC recommended we should recalculate the Utility capacity and re-estimate dimension of every

utility equipments such as process water and electric power. Also, they concentrated on reduction of building scale for save the construction cost . So we revised some items of Utility building GA as follows:

1) Position shift of Main entrance
2) Re-arrangement and re-sizing of utility equipments : Heat exchangers, water treatment facilities and so on
3) Reduction of building scale : from 9.5m X 31.5m to 88m X 31.5m
4) Minimizing the length of underground utility Tunnel



a) Before Modified



b) Modified

Fig. 2. General Arrangement of Utility building

2.5 Site plot plan Modification

In coincidence with GA modification, we should revise site plot plan of Proton Accelerator research center. The revised items of Site plot plan are as follows :

1) Scale reduction of Accelerator & Beam Application building, Ion beam Application building and Utility building due to GA modification
2) Adjustment of Utility facility position : cooling tower and several facility tanks
3) Changing the slope inclination angle : from 1:2 to 1:1.5
4) Modification of road slope angle
5) Road shifting

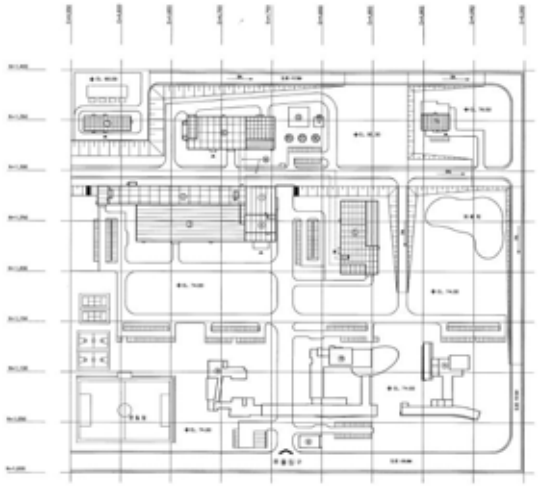


Fig. 3. Modified Site Plot plan of proton accelerator research center

3. Conclusions

We have modified the General Arrangement of Ion beam Application Building and Utility Building in Proton Accelerator Research center. in coincidence with host site characteristics and ICA recommendations. Consequently, we revised the site plot plan of proton accelerator research center. We can expect maximizing space utilization for ion beam implanters and saving the construction cost.

4. Acknowledgments

This work was supported by the Ministry of Education, Science and Technology of the Republic of Korea through the Proton Engineering Frontier Project.

REFERENCES

[1] PEFP, KOPEC, "Comprehensive Design Report", 2005. 6
[2] ORNL, Spallation Neutron Source Project Completion Report, UT-Battelle, LLC, p. xii, 5-136, June, 2006.