

## Design Concept for Access Control System of PEFP

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### 1. Introduction

Proton Engineering Frontier Project (PEFP) has been developing a 100 MeV proton linear accelerator.

This paper describes the design concept for Access Control System (ACS), which in Proton Accelerator Research Center of PEFP protects personnel from radiation hazards by controlling access to restricted areas and interrupting the machine operation in case unsafe conditions occur.

### 2. Access Control System

In this section, some of the design concept for ACS is described. The design concept includes access control areas and access modes.

#### 2.1 Access control areas

Proton Accelerator Research Center of PEFP is divided into three types of access control areas as listed below in accordance with the expected time of stay and of personnel and radiation level of each area (Fig. 1):

- High Radiation Area (Orange color) :  
 $RL > 12.5$
- Restricted Access Area (Yellow color) :  
 $0.25 < RL \leq 12.5$
- General Public Area (Lack of color) :  
 $RL \leq 0.25$ .

[RL : Radiation Level (uSv/hu) ]

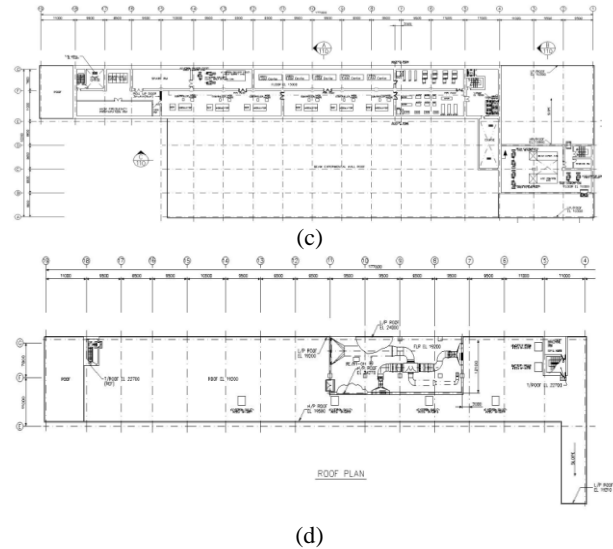
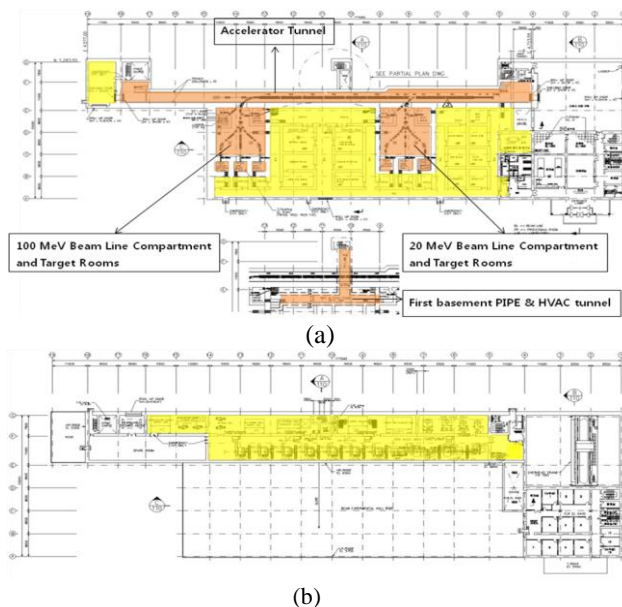


Fig. 1. Radiation area of proton accelerator research center. (a) : First basement level and first floor, (b) : Second floor, (c) : Third floor, and (d) : Roof .

Operation of the entrances for each access control areas are classified as explained below in accordance with the prior permission and items necessary to access individual entrances:

- High Radiation Area :  
 prior operation permit, ID card, alarm pocket dosimeter, and mechanical personal key
- Restricted Access Area :  
 prior operation permit, ID card, alarm pocket dosimeter
- General Public Area : ID card.

The setting of the ID card varies according to classification of the access control area. The ID card for high radiation area permits access to all three access control area and the ID card for restricted access area permits only access to restricted access area and general public area. The ID card for general public area permits access to general public area only.

For the protection against excess exposure, the personnel is required to get an alarm pocket dosimeter when accessing the high radiation area and restricted access area.

The mechanical personal key is provided only for personnel with prior access permission to high radiation area. Its function is to survey the number of personnel to the high radiation area and provide a condition for the opening and closing of the access door to the area.

## 2.2 Access modes

The access mode is designed to provide the three different access modes (Fig. 2) :

- Free Access Mode
- Controlled Access Mode
- No Access Mode.

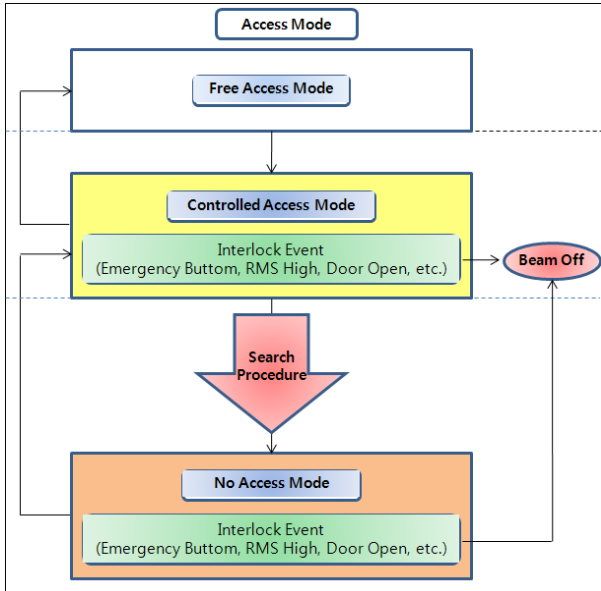


Fig. 2. Access mode transition structure

The free access mode is applied only in special situations such as the initial installation of the accelerator equipments and test working. In this mode, beam is not extracted and the personnel permit free access to the high radiation area, restricted access area, and general public area.

The controlled access mode allows only the personnel with prior access permission to enter and leave through their designated entrance. In this mode, every access is controlled and supervised by the operator in the main control room.

The no access mode prohibits access to the high radiation areas such as first basement PIPE & HVAC tunnel, accelerator tunnel, beam line compartment (20 MeV, 100 MeV), and each of the target rooms to be used in accordance with accelerator operation procedures. In this mode, beam is extracted.

The search procedure is needed to certify that no person has remained in the high radiation areas before the controlled access mode transfers to the no access mode.

## 3. Conclusions

We designed the concept for ACS in Proton Accelerator Research Center to control access to the restricted areas of the research center in order to guarantee the safety and protect the lives of personnel from radiation hazards, abnormal operation, and unexpected accidents.

## ACKNOWLEDGEMENT

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