



# Elevators, Fire, and Accessibility

---

***Papers presented at:* The 2nd Symposium on Elevators, Fire, and Accessibility  
Baltimore, Maryland  
April 19 – 21, 1995**

***Sponsored by:***

American Society of Mechanical Engineers  
Accessibility Equipment Manufacturers Association  
American Hotel and Motel Association  
US Architectural and Transportation Barriers Compliance Board  
Building Officials and Code Administrators International, Inc.  
Building Owners and Managers Association International  
Council of American Building Officials  
Eastern Paralyzed Veterans Association  
International Conference of Building Officials  
National Association of Elevator Contractors  
National Association of Elevator Safety Authorities  
National Association of Vertical Transportation Professionals  
National Elevator Industry, Inc.  
National Easter Seal Society  
National Fire Protection Association  
National Institute of Standards and Technology Building and Fire Research Laboratory  
Paralyzed Veterans of America  
Southern Building Code Congress International, Inc.

## ELEVATORS AND PEOPLE WITH DISABILITIES IN JAPAN: FROM ACCESSIBILITY TO EGRESSIBILITY?

by Satoshi Kose, Dr. Eng. & Akihiko Hokugo, Ph.D.

### ABSTRACT

With a rapid aging of its society, Japan is trying to prepare for the graying of the building users. A new law on accessibility of the aged and the physically disabled is now being introduced, but it is not obligatory nor does it refer to anything on "egressibility." Will Japan recognize the accessibility requirement as universal to all buildings, or will the issue be taken as relevant just to a limited number of buildings? Are people prepared to accept accessibility requirements during emergencies as well as in daily situations or will they prefer to leave it untouched? Will there be any good ways toward providing safety for the aged and the disabled during fires? This paper presents current moves in Japan, and discusses problems and opportunities. It first explains the general context, then gives information on elevator regulations. Thereafter, new examples and proposals are shown, and possible directions discussed.

### INTRODUCTION

Japan has long assumed that building users are all healthy, robust people. Although the Japanese Building Standard Law states that it is for the safety and sanitation of building users, the viewpoint of non-average building users is almost non-existent. (Even the viewpoint of "safety in use" has largely been neglected.... For example, stairs don't have to have graspable handrails in a general sense. What is called as a handrail is actually primarily a guardrail to prevent a free fall to sideways.)

It is no wonder. More than 40 years ago when the Law was first established, few non-average persons were visible in town, still fewer moving around alone (It is perhaps worth noting that some of the basic ideas in the articles of the Law may date back as early as 1919 when the Building in Urban Areas Law was first made as a nationwide building control measure). Majorities of dwellings were single

storied, most commercial facilities were low rise, and only rarely people had to go to upper floors. There were many people around who were ready to assist people with disabilities (mostly informally, in-home care in particular). Average length of life of Japanese people was less than 60 that very few aged persons were visible in the outside, either. Those 65 and over have stayed only 5% of the population until 1960s.

Unfortunately, partly because there was no regular revision process for the law, and partly because Japan was too slow to recognize the importance of giving consideration to non-average people, non-standard situations, the provision for people with disabilities has been a kind of special privileges, not the norm. Even the increase of people with disabilities in town, and even the designation by the United Nations of the International Year of Disabled Persons (IYDP: 1981) or the International Decade of Disabled Persons (IDDP: 1983-1992), didn't succeed in pushing through accessibility provisions in the Building Standard Law. With the recognition of the emergence of a highly aged society, it suddenly came into the minds of ordinary people that Japan has to be made accessible to the aged and disabled persons. Only in 1994, the Ministry has submitted to the Diet a special Law (Act) to promote construction of buildings to be accessible with financial incentives. It became into force in September 1994 with its design standards. Its effectiveness is still to be seen.

As to fire safety issues (and anti-seismic issues), the situation was a little different. Multiple loss of lives in building fires (and damages to buildings from severe earthquakes) almost invariably led to the tightening of the Building Standard Law, its Enforcement Order and Enforcement Regulations. Introduction of new types of building structures also triggered discussions on how to secure life safety of occupants there. For larger buildings with a large number of occupants, therefore, fire safety requirements are supposed to be strict enough to safeguard lives (but again only life safety of people

with average abilities in mind),

## JAPANESE REGULATIONS ON ELEVATORS

What about elevators? Like in most countries, Japanese custom is to tell building occupants not to use elevators in case of a fire (and an earthquake); use emergency stairs instead. Virtually no discussion was there before the introduction of ADA and its Accessibility Guidelines were widely known. Perhaps, it was only in September 1992 when Architectural Institute of Japan (AIJ) had a small symposium that the architects and designers were reminded of the issue of life safety of people with disabilities in a more general context (AIJ, 1992). As a panelist one of the authors pointed out the difficulties encountered (Kose, 1992c), and one of the panelists who used a wheelchair replied that he never came up with the idea before: Accessibility (in its narrower sense) was what he and his colleagues had sought for until then.

In the Building Standard Law, there are provisions of "emergency elevators ('elevatory equipment for emergency use' is the semi-official translation of the Japanese legal term, but I refer to it here as above)" for use by fire fighters in case of a fire, for buildings of exceeding 31m in height (Article 34 Paragraph 2 of the Law). The requirements are basically as follows (Article 129-13-3 of Enforcement Order. The translation is modified by the authors for clarification):

- Number of emergency elevators will be 1 up to 1,500 sq. m per floor; there must be 1 additional every 3,000 sq. m per floor.
- Passenger lobbies be connected to each floor space; be open to outside air, or smoke exhaust system be provided: entrance doors from occupied floor to passenger lobbies be fire resistant (Type-A); passenger lobbies be of fireproof construction; finishing materials be non-combustible; passenger lobbies be provided with emergency lighting; floor area be 10 sq. m or more per elevator; be installed with fire extinguishing equipment; be with signs indicating necessary information.
- Hoistways be fireproof construction with maximum two elevators in one unit.
- Walking distance on escape floors (i.e., ground floor or equivalent) from the lobby to the

outside is maximum 30m.

- The cage must be controllable by responsible persons as needed.
- Telephone communication systems be provided in the cage.
- Elevator doors should be able to be kept open during fire fighting operation.
- Emergency power supply be provided for operation.
- The elevator speed be 60 m per minute or greater.

A queer thing about building smoke control is that Japanese regulations normally assume smoke exhaust (extraction/venting, i.e., dilution of smoke), but not pressurization (keeping smoke away from space). A British architect called this kind of manner "conservative." Anyway, it seems to make things more complicated as to how to secure smokefree environment for emergency elevators and their lobbies as well as emergency stairs.

The use of emergency elevators in case of emergency is not assumed by people who can't climb down emergency exit stairs. Only with the discretion and under control of fire fighters, will they be allowed to use. No explicit statement is given as to the possibility of the use of emergency elevators by those who have difficulties going down emergency stairs. In most cases, however, the emergency elevators are placed next to the protected emergency stairs, mostly sharing the space with access lobby to the stairs and passenger lobby of elevators. It is therefore likely that people with mobility difficulties will be rescued by fire fighters in due course as their prime responsibility is to save lives of occupants as well as fire extinction.

## NEWLY EMERGING IDEAS

Some of the buildings where occupants or users are expected handicapped in the sense of egress capabilities (buildings for the aged and disabled persons, etc.), the concept of fire safety is being devised to make it easier to secure life safety of occupants in case of a fire. There are only limited examples of elevators designed for use during egress of people with disabilities. They are proposed when they apply for approval of Fire Safety Planning to the Building Center of Japan. The application process is assumed to be a preliminary stage for getting building permission to

certain kinds of buildings (large scale, high-rise, etc.) that they must be taken as examples of advanced, well-thought-of design, not the normal practice.

Ideas include: To make elevator design similar to high rise buildings (even for low or medium rise) by separating elevator and lobbies from the occupiable space to the far side of the building, to be exposed to outside air; To make floor plan completely separable to two (or more) identical compartmented areas, etc., and making every area to be countable as an area of refuge from other parts. The idea has long been used for larger-scale hospital buildings. Generally, this allows extended evacuation time, and the elevators could be used for evacuation if they are reliable (i.e., no fear of power failure, orderly use, overriding possibilities, etc.).

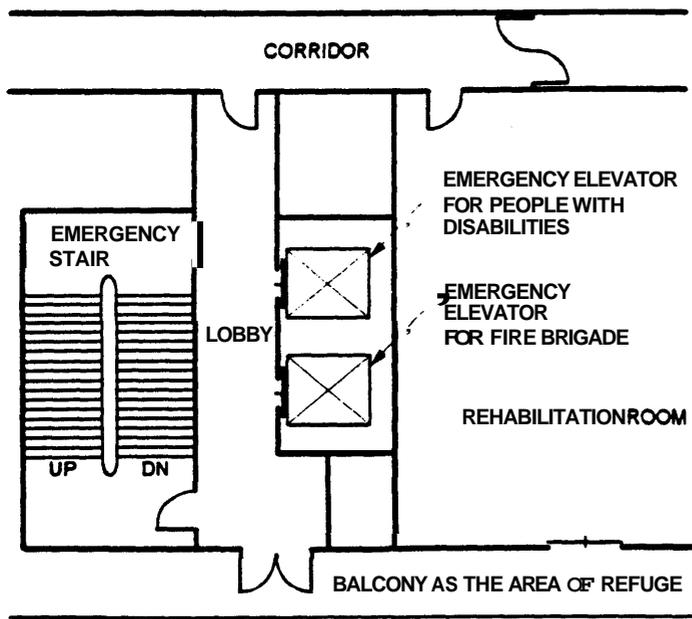
The following two examples show schematic diagram of such arrangements for recent proposed buildings. Both buildings house spaces for use by people with disabilities - a rehabilitation room (Fig. 1) and a technical aids showroom (Fig. 2), etc. - that some of the building occupants are expected

to have difficulties using emergency stairs. They both use outdoor balconies as the area of refuge. In addition to the protected lobby of emergency elevators, because the lobbies are primarily intended for use by fire fighters and thus they can be narrow if there are more than a few number of persons with disabilities on specific floors, or if such lobbies have to be the crucial space for fire fighting operations.

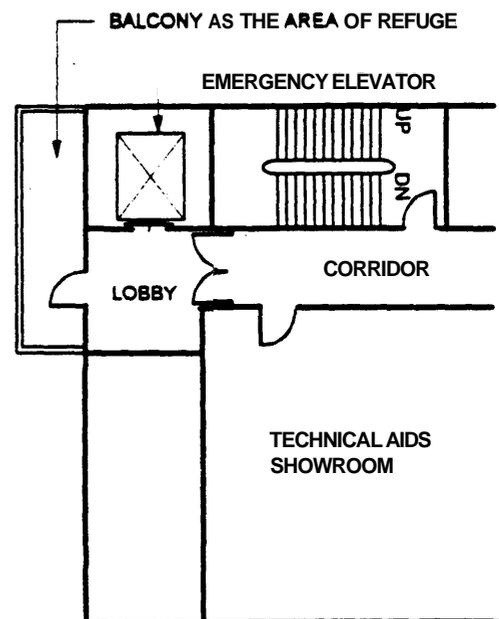
The two examples shown here differ in its concept on the assignment of emergency stairs. It seems to be based on the assumption of occupant load, apparently rehabilitation rooms being more crowded when training is in progress. The size of the outdoor balcony also reflects such possibilities.

### UNDER WHAT CONDITIONS CAN ELEVATORS BE USED FOREGRESS?

There is another new move, from the side of the elevator manufacturers. After detailed examination of the ways matters are handled in the States and



**Figure 1** Example of emergency elevators coupled with a continuous balcony acting as an area of refuge. Here, one of the emergency elevators is designated for use by people with disabilities. The lobby is also protected from fire and smoke, and has access to the emergency stair.



**Figure 2** Example of an emergency elevator with an adjoining separate balcony acting as an area of refuge. The access lobby is also protected from fire and smoke. Here, the stair is not an emergency stair.

in England, they are trying to present Japanese proposals for elevators to be used for egress of people with disabilities. The principles as I am told are not so much different from what are accepted in other countries. Their draft report (Technical Committee on Elevators, 1994) states that the followings are basic requirements for elevators to be usable for egress of people with disabilities:

- Call from elevator lobbies should be negated during emergencies. Rather, specially trained and designated staff with assistant be ready to operate elevators for rescue of people with disabilities. To enable this to occur, communication devices be provided in elevator lobbies. Video cameras installed in lobbies will assist to check the status of urgency in these lobbies. Temporary area of refuge (elevator lobbies) be provided. Emergency power supply is advisable.
- In order to make the above workable, the following features will be necessary:
- Elevator lobbies specially for people with disabilities (areas of temporary refuge) be provided (this means that if the number of disabled occupants is large, in such buildings as rehabilitation centers, they have to be wide enough to hold all occupants who have difficulties in negotiating stairs); the hoistways and lobbies be pressurized against smoke intrusion; lobbies be connected to emergency stairs, or safe route be provided; fire control center be provided for operation; elevator operator and assistant should work for rescue operation; elevator operator should be directed from control center for operation; emergency operation of elevators be call-back and operator controls; elevator lobbies at each floor should be provided with communication systems for request of operation; clear signs be provided that the elevators will be out of operation for those who can climb down stairs.
- The above operation should be basically under the control of building management, and only be done at the initial stage of a fire. It is also possible that emergency elevators be used for egress of people with disabilities, but communication system will be needed.

The authors basically agree what are stated above. One difficulty the authors noticed is the concept of emergency power supply. Their draft proposal states that emergency power supply is advisable, not mandatory. It can lead to a cage being trapped

between floors upon power failure. Even though the operation be limited to the initial stage, the risk of power failure shouldn't be underestimated. After all, fatal fires have almost always been triggered by the occurrence of unthought of incidents, that we should take into account the merits of redundancies. The provision of emergency power supply and its robustness is crucial to safeguard elevators in operation.

The incident at the New York WTC demonstrated that thoughtful planning of emergency power supply is essential for effective operation. A more recent incident at the Osaka Airport during flooding of underground emergency power station in September 1994 (just after the moving out of its key functions to the New Kansai International Airport), which paralyzed the function of the airport, again demonstrated the issue. Completely separated two-way power supply may reduce the risk to a negligible degree, but this requirement should at least clearly be stated. The use of emergency elevators to evacuate people with disabilities until the Fire Department arrives will cause no troubles, provided that appropriate communication systems are installed in the lobby.

## CONCLUDING REMARKS

The emergence of a highly aged society, and easier access for people with disabilities is sure to unveil the crucial problems in Japan as well as in other countries. The above proposal would be a first step toward accessible and egressible built environment in Japan. As researchers specialized in human factors, and building users among the Japanese baby-boomer and its succeeding generation, the authors wish to have suggestions from experts around the world and to see the situation in Japan changed for a better future.

## ACKNOWLEDGMENT

The authors would like to express their gratitude to the Technical Committee on Elevators of the Japan Society of Industrial Machinery Manufacturers for permission to use its draft proposal as a basis of present discussion.

## NOTE

The word "egress" is originally to be paired with "ingress," not with "access." However, for me, a non-native speaker of English language, "access" and "egress" sounds a good pair, thus I decided to use the words "egressibility" as a **term** having the meaning of "(outbound) accessibility during emergencies." It appears in page 329 of IAPS12 Proceedings, Vol. I, in a convener's foreword to a Symposium "Lifesafety Design of Buildings for the Disabled and Aged Persons: A Cross-Cultural Comparison." When I suggested Dr. Jonathan Sime of JSA in the UK, he accepted the expression and his presentation title was, "From Access to Egress: Life Safety of People with Mobility Difficulties in Buildings." page 333, IAPS12 Proceedings, Vol. I: Book of Abstracts, 1992. I also used the word egressibility in my own abstract, page 330, and its full paper, "Lifesafety Design of Buildings for the Aged Persons: Recent Developments in Japan," in IAPS12 Proceedings, Vol. V: pages 324-327. Up until now, I have not yet heard any strong objections; instead, I found someone other than me using the Same word, egressibility.

## REFERENCES

- AJJ (1992) *Life Safety of People with Disabilities during Fires, 6th Symposium on Safety of Buildings Preprint*, Building Safety Planning Subcommittee of the Architectural Institute of Japan (in Japanese).
- AIJ (1993) *Fire Safety and Elevators, 7th Symposium on Safety of Buildings Preprint*, Building Safety Planning Subcommittee of the Architectural Institute of Japan (in Japanese).
- ASME (1991) *Symposium on Elevators and Fire*, ASME.
- Barrier Free Environments (1994) *Areas of Rescue Assistance, ADAAG Tech Sheet Series*, 22p.
- Juillet, E. (1990) Fire Safety of People Vulnerable to Disasters. in *Kenchiku Gijutsu*, No. 470, pp. 191-196 (in Japanese).
- Juillet, E. (1993) Evacuating People with Disabilities. in *Fire Engineering*, 146(12), pp. 100-103.
- Kose, S. (1992a) Barrier-Free Design in Japan. in *Building Design for Handicapped and Aged Persons* (G.M. Haber & T.O. Blank, eds.), MacGraw Hill, Chapter 2, pp. 15-26.
- Kose, S. (1992b) **Lifesafety** Design of Buildings for the Aged Persons: Recent Developments in Japan. In *Socio-Environmental Metamorphoses: IAPS 12 International Conference Proceedings, Vol. V: Builtscap*e, University of Thessaloniki, pp. 324-327.
- Kose, S. (1992c) Life **Safety** of the Aged and the Disabled: Recent Move in Foreign Countries. in *Preprint of 6th Symposium on Safety of Buildings*, Building Safety Planning Subcommittee of the Architectural Institute of Japan, pp. 3-9 (in Japanese).
- Kose, S. (1993) Emergence of Aged Populace: Who is at Higher Risk in Fires? in *Proceedings of CIBW14 International Symposium and Workshops Engineering Fire Safety in the Process of Design: Demonstrating Equivalency*, Part 1, University of Ulster, pp. 59-64.
- Kose, S. (1994) Accessible Environment for the Aged Society: Need of Barrier-Free Legislation in Japan. to appear in *Proceedings of the 2nd Bilateral Workshop between Italy and Japan*, The Building Research Institute
- Ministry of Construction (1990) *The Building Standard Law of Japan* (in English). (Building Guidance Division & Urban Building Division, eds.) The Building Center of Japan, pp. 35-36, pp. 220-222.
- Ministry of Construction (1994) *The Act on Buildings Accessible and Usable for the Elderly and the Physically Disabled (Law No. 44)*.
- Pauls, J. & Juillet, E. (1993) Life Safety of People with Disabilities: How Far Have We Progressed? in *Proceedings of CIBW74 International Symposium and Workshops Engineering Fire Safety in the Process of Design: Demonstrating Equivalency, Part 1*, University of Ulster, pp. 17-40.
- Saxon, R. (1994) *The Atrium Comes of Age*. Longman.
- Sime, J. (1992a) Access and Egress for Handicapped **Persons** in Public Buildings. in *Building Design for Handicapped and Aged Persons*, (G.M. Haber & T.O. Blank, eds.), MacGraw

Hill, Chapter 10, pp. 153-163.

Sime, J. (1992b) From Access to Egress: Life Safety of People with Mobility Difficulties in Buildings. in *Socio-Environmental Metamorphoses: IAPS12 International Conference Proceedings, Vol. I: Book of Abstracts*, University of Thessaloniki, p. 333.

Technical Committee on Elevators (1994) study Report on the Use of Elevators during Emergencies. Japan Society of Industrial Machinery Manufacturers: Tokyo (in Japanese).

*Dr. Satoshi Kose is the Head of the Building Design and Use Division of the Building Research Institute (BRI), Japanese Ministry of Construction. He specializes in building ergonomics and user safety design and deals with issues for people with all abilities, aged persons in particular. He got his Dr. Eng. on stair safety from the Tokyo University, Japan. His most recent accomplishments include writing up of Design Guidelines of Dwellings for the Japanese Ageing Society. He is a member of a number of professional organizations including NFPA, IAFSS, Environmental Design Research Association--EDRA, International Association of People-Environment Studies--IAPS, as well as many Japanese academic associations such as Architectural Institute of Japan--AIJ and Man-Environment Research Association--MERA. He serves as a board member for IAPS and MERA, and he is currently editor-in-chief of the MERA Journal.*

*Dr. Akhiko Hokugo is a senior researcher of the Fire Safety Division of the Building Research Institute, Japanese Ministry of Construction. He is currently an expert member of the Fire Safety Planning Committee of the Building Center of Japan. He holds a B. Eng. in architecture, a M. Eng. in disaster planning and a Ph.D. in fire safety science, all from the Kobe University, Japan. He is now working on occupant evacuation, smoke movement and methodologies to evaluate risks in highrise buildings. He is a member of NFPA and IAFSS. Previous to employment with BRI, he was with the Fire Information Research Center of Japan, where he has done fire safety assessments on several sites of petrochemical plants and fire safety planning for underground structures.*