A.8 EIT STANDARD

A.8.1 Part 1: Definitions and Abbreviation

1.1 Definitions and Abbreviation

1.1.1 General

For the purpose of this code, certain terms, phrases, words and their derivatives shall be constructed as specified in this chapter and elsewhere in this code where specific definitions are provided.

1.1.2 Definitions

1.1.2.1 Common Definitions

Common definitions shall be described in this section (1.1.2.1). Specific definitions, which shall be mentioned in the next involved chapters, shall be described in the next section (1.1.2.2).

1.1.2.1.1 **Occupancy** means the purpose for which a building, or part thereof, is used or intended to be used.

1.1.2.1.2 **Fire resistance** means construction to resist the spread of fire, details of which are specified in this code.

1.1.2.1.3 **Wall** means a member, usually vertical, used to enclose, separate spaces or fencing.

1.1.2.1.4 **Building control zone** means any area or zone, which is conformed to Building Act.

1.1.2.1.5 **Way** means total width between two sides of property line, including traffic lanes, footpaths, empty space, ditches and others.

1.1.2.1.6 **Building committee** means a group of person, whom is established according to Building Act. B.E. 2522 (C.E.1979).

1.1.2.1.7 **Family** means an individual or two or more persons related by blood or marriage or a group of not more than six persons (excluding servants) who need not be related by blood or marriage living together in a dwelling unit.

1.1.2.1.8 **Warehouse** means any place, where is used for storage the goods, products or other items.

1.1.2.1.9 **Net Width** means an absolute clearance between two points without any obstruction.

1.1.2.1.10 **Occupant Load** means the total number of persons that may occupy a building or portion thereof at any one time.

1.1.2.1.11 **Floor Height** mean the vertical distance above a reference datum measured to the highest point of the next story.

1.1.2.1.12 **Height of building** means the vertical distance above ground level measured to the highest point of the roof or to the top of external wall (including the parapet).

1.1.2.1.13 **Net Floor Height** means a vertical distance above finished floor level to the lowest level of above structure.

1.1.2.1.14 **Frame** means various parts designed for providing strength and stability of the structure only, not including the things covering or containing therein.

1.1.2.1.15 **Structure** means that which is built or constructed, an edifice or building of any kind, or any piece of work artificially built up or composed of parts joined together in some definite manner.

1.1.2.1.16 **Decoration Boarders** means the thing affixed to decorate the various rims, including skirt, wall decorative line wall skirting.

1.1.2.1.17 **Decoration Works** means the thing affixed and/or the various decorative finish to change roughhew structure to be the complete building, but not including the various service parts.

1.1.2.1.18 **Ridges Gable** means the part of wall above the eaves which closes draughts of the sloping roofs.

1.1.2.1.19 Local Officers means

1. Mayor, for municipality.
2. Chairman of the Sanitation District Council, for sanitation district.
3. Governor, for the provincial

administrative organization.
4. Bangkok Governor, for Bangkok area.
5. Permanent Secretary of Pattaya City, for Pattaya City.
6. Chief of the Local Administration of the local administrative organization that the Minister has announced to be the local administration under this Act, for the area under the said local administrative organization.

1.1.2.1.20 **Stair's Step** means the vertical distance of succession of step.

1.1.2.1.21 **Floor or story** mean that portion of building included between the upper surface of a floor and the upper surface of the floor or roof next above.

1.1.2.1.22 **Basement** means whole story or portion of story which is below grade

1.1.2.1.23 **Attics** means any floor situated in the roof, either in whole or in part, which has been designed, arranged or built for commercial or storage or dwelling purpose.

1.1.2.1.24 **Mezzanine** means an intermediate floor placed within a room.

1.1.2.1.25 **Ground Floor** means a story in a building, which qualifies as a story, provided such floor level as same as graded level, or such floor level is not more than 150 cm above or below grade.

1.1.2.1.26 **Bridge Ramp** means portion of surface, connecting to the bridge, that has a slope steeper than 2 in 100.

1.1.2.1.27 **Repair** means the reconstruction or renewal of any part of an existing building for the purpose of its maintenance.

1.1.2.1.28 **Foundation** means the part of building used for transferring the load of the building onto the ground.

1.1.2.1.29 **Footing** mean that portion of the foundation of a structure, which spreads and transmits loads directly to the soil or the piles.

1.1.2.1.30 **Alteration** mean any change, addition or modification in construction or occupancy from the original construction, not include repairing or modification conforming to Building Act.

1.1.2.1.31 **Roof Deck** mean usable flat area of roof structure.

1.1.2.1.32 **Arrays** means a building constructed in row of more than two units with joint walls dividing the building into units and mostly consist of fire resisting materials.

1.1.2.1.33 **Street or Road** means any thoroughfare or public way, which has been dedicated or deeded to the public for public use.

1.1.2.1.34 **Private Roads** means the personal road that vehicles can pass through.

1.1.2.1.35 **Public Roads** means the road open for or consent the general public to enter or make use as thoroughfare, with or without collection of fee.

1.1.2.1.36 **Car Entrances** means the way used for vehicles coming in and going between the parking to the exit.

1.1.2.1.37 **Semi-public Ways** means the land that the owner has permitted the people to make use as passageway.

1.1.2.1.38 **Public Canal** means the public water way that the general public have the right to make use as passageway.

1.1.2.1.39 **Private Ways** means the land that people, who have been given a permission by the owner of the land, have right to make use as passageway.

1.1.2.1.40 **Public way** means any street, which is deeded or dedicated or otherwise permanently appropriated to the public for public use.

1.1.2.1.41 **Exit** means a continuous and unobstructed means of egress to a public way.

1.1.2.1.42 **U Turn** means any area, which is used for turning the cars.

1.1.2.1.43 **Car Park** means any area, which is used for parking the cars.

1.1.2.1.44 **Garbage Holding Areas** means the container or place provided for collecting garbage, pending removal to the central garbage collecting place.

1.1.2.1.45 **Garbage Collecting Areas** means the container or place provided for collecting garbage, pending disposal thereof.

1.1.2.1.46 **Empty Spaces** means the area without roof or covering structure such as well, swimming pool or parking lot, including the areas of the structure or building at the height not exceeding 1.20 meter from the ground level which has no roof or covering structure at that level.

1.1.2.1.47 **Dwelling** means any building or portion thereof which contains not more than two dwelling units.

1.1.2.1.48 **Foreman** means the engineer or architect of the public works department, or person who has been appointed by the local competent officer as an engineer.

1.1.2.1.49 **Inspector** means the person who has been appointed by the local competent officer as an inspector.

1.1.2.1.50 **Waste Water** means all types of liquid having been used, both with and without residue.

1.1.2.1.51 **Road Lines** means the road and footpath line having designated for public use.

1.1.2.1.52 **Land Property Lines** means the line dividing land and property between buildings which serves as the line dividing boundary

1.1.2.1.53 **Public Way Lines** means the line of the area designated as public way, both land and water way.

1.1.2.1.54 **Building Lines** means the line that the building must not intrude (not including the intruding part of window, balcony, windowsill, eaves and other architectural part), which is specified by the local competent officer.

1.1.2.1.55 **Safe Areas** means the safe area that is beyond 15 meter distance from the outer rim of spectators' stand, and has the capacity calculated from the number of people no the spectators' stand, with the average requirement of four persons/sqm

1.1.2.1.56 **Arrays House** means a row of rooms or row building used for dwelling, with an open space in front and at the rear between the fence or the boundary line near the building of each unit.

1.1.2.1.57 **Rental Houses** means a building or part of building of not exceeding five rooms that have paying guests staying not exceeding two persons per room.

1.1.2.1.58 **Twin Houses** means a twin building used for dwelling that has joint wall dividing the building into houses, with an open space between the fence or boundary line and the building , in front, at the rear and the side of each house, and have separate entrances.

1.1.2.1.59 **Construction Plan** means document that consists of scaled design drawings and specifications for the purpose of construction of new facilities or modification to existing facilities.

1.1.2.1.60 **Drafted Plan** means the plans having drawn roughly.

1.1.2.1.61 **Car Access Way** means a portion of entrance way or exit way connecting to public road.

1.1.2.1.62 **Wall** means a member, usually vertical, used to enclose, separate spaces or fencing.

1.1.2.1.63 **Fire Resisting Walls** means a solid wall made of ordinary bricks with thickness not less than 18 cm. And has no opening for passage of flame or smoke, a solid wall made of other fire resisting materials with the property for fire prevention not less than a wall made of ordinary bricks with thickness not less than 18 cm. If it is a reinforced concrete wall, the thickness must be not less than 12 cm.

1.1.2.1.64 **Partition Walls** means the joint wall of two buildings or two plots of land.

1.1.2.1.65 **Framing Walls** means a type of non-load bearing wall, built inside the frame or structure.

1.1.2.1.66 **Non-bearing Wall** is any wall that is not a bearing wall.

1.1.2.1.67 **Bearing Wall** means any wall supporting other weights rather than its own weight.

1.1.2.1.68 **Covering Walls** means a non-load/load bearing wall, which is built around outside the structure in order to be surrounding the building or structure.

1.1.2.1.69 **Guest** is any person hiring or occupying a room for living or sleeping purposes.

1.1.2.1.70 **Site Plan** means the map showing characteristics, location and boundary of the land and building under construction, modification, demolition, removal, used or change of use, including the boundary of the surrounding public ways and buildings.

1.1.2.1.71 **Floor Plan** is any drawing, which is seen from the top view.

1.1.2.1.72 **Partition** is a vertical member, used to enclose or separate the interior spaces.

1.1.2.1.73 **Exterior Wall** is any wall or element of wall, or any member or group of members, which defines as weather-exposed surface.

1.1.2.1.74 **Interior Wall** is any wall other than weather-exposed surface.

1.1.2.1.75 **Floors Space** means the area of the building in which persons dwell or make us within the scope of beam or joist supporting the floor, pr the area therein, or within the scope of building walls including balcony.

1.1.2.1.76 **Total floor area of Building** means the total area of all floors of the building.

1.1.2.1.77 **Floor area** is the area included within the surrounding exterior walls of building or portion thereof, exclusive of vent shafts and courts.

1.1.2.1.78 **Building Net Areas** means the area of calculating the ratio of building area to the land area, not including the top deck, stairs outside roof, the area on which the equipment are installed as necessary.

1.1.2.1.79 **Flats** mean a dwelling unit in a condominium.

1.1.2.1.80 **Restaurant** is any building or portion of building, which is used for selling foods or drinks, by providing service seats.

1.1.2.1.81 **Garbage** means the garbage under the law governing public health.

1.1.2.1.82 **Acceptable for Use** means the materials and construction methods having been approved by the local competent officer based on the test results, performed by the said officer or according to the test results and test by the said officer the method is recognized or the test is acceptable by the government official, or the various technical or scientific organization.

1.1.2.1.83 **Ground Level** is the lowest point of elevation of the finished surface of the ground, paving or sidewalk within the area between the building and the property line or, when the property line is more than 150 cm from the building, between the building and a line 150 cm from the building.

1.1.2.1.84 **1.1.2.1.83 Public Road Level** is the distance between the highest level of public road to construction land level, and relate to mean sea level.

1.1.2.1.85 **Water Supply System** means the water supply system for consumption and dinking

1.1.2.1.86 **Standpipe System** is a wet or dry system of piping, valves, outlets and related equipment designed to provide water at specified pressures and install exclusively for the fighting of fires.

1.1.2.1.87 **Waste Water Treatment System** means the process of making or improving waste water to have the quality as drain water, including dispatching thereof from the building

1.1.2.1.88 **Balcony** is a landing or porch projecting from the walls of building or structures.

1.1.2.1.89 **Access Balcony** is any above ground balcony used for access to multiple dwelling units.

1.1.2.1.90 **Calculations Sheet** means the sheet showing calculation of load of the loading materials and resistance of various parts of the building

1.1.2.1.91 **Specifications** means the detailed explanation regarding property and type of materials as well as procedure or method of construction, modification, demolition, re location, use or change of use of building to be in accordance with the construction plans.

1.1.2.1.92 **Factory** means any building or portion of building, which is established as factory according to Factory Act.

1.1.2.1.93 **Warehouse** is any place, where is used for storage the goods, products or other items.

1.1.2.1.94 **Theaters** means any building, house, hall or tent and site built as place for entertainment (such as Chinese opera, Thai drama, movie, etc.) and collecting changes from the audience.

1.1.2.1.95 **Garage** means a building or portion thereof in which a motor vehicle containing flammable or combustible liquids or gas in its tank is stored, repaired or kept.

1.1.2.1.96 **Private Garage** means a building or portion of building, not more than 100 m^2 in area, in which only motor vehicle used by tenants of building or buildings on the premises are stored or kept.

1.1.2.1.97 **Open Paring Garage** means any structure with the opening on two or more sides and which is used exclusively for the parking or storage of private vehicle. The area of such openings in exterior walls on a tier must be at least 50 percent of the total perimeter wall area of each tier.

1.1.2.1.98 **Hotel** means any building intended or designed to be used, or which are used, rented or hired out to be temporary occupied by guests.

1.1.2.1.99 **Court** means an open, uncovered, unoccupied space, unobstructed to the sky, bounded on three or more sides by exterior building walls.

1.1.2.1.100 **Lift** means a machine used for carrying people, goods or things among each floor of building.

1.1.2.1.101 **Fireman Lift** means a lift used by fireman for fighting the fires.

1.1.2.1.102 **Riser Height** means a vertical distance between adjacent tread nosing.

1.1.2.1.103 **Tread Depth** means a horizontal distance between adjacent tread nosing.

1.1.2.1.104 **Non-combustible Materials** means the construction materials having been used for construction as follows:
1. materials with no part flammable or flare up when having been on fire; and
2. any material with on flammable basic texture as described in 1 and surface is the material not spreading the fire.

1.1.2.1.105 **Fire Resistance Material** means non-combustible construction materials.

1.1.2.1.106 **Coving Materials** means the external part of roof preventing wind and weather, which is a different part from the structure.

1.1.2.1.107 **Durable Materials** means non-flammable material that does not change its condition easily by water, fire or weather, under the normal circumstances.

1.1.2.1.108 **Non-Durable Materials** means construction material if using outside without proper care it would become decayed and crumbling easily, or the flammable material including certain types of soft wood such as pine wood, ply wood for internal use, rattan mat, weaving bamboo strips, cloth and other similar material.

1.1.2.1.109 **Engineer** means an individual technically and legally qualified to practice the profession of engineering.

1.1.2.1.110 **Architect** means an individual technically and legally qualified to practice the profession of architecture.

1.1.2.1.111 **Architectural Overhangs** means a construction part overhang from the building for beautifying purpose, shielding sunlight, rain and others besides use of the floor area of such overhang part.

1.1.2.1.112 **Slope** means the ratio of vertical distance to horizontal distance.

1.1.2.1.113 **Office** means building or portion of building, which is used for official working.

1.1.2.1.114 **Decorations** means a thing affixed or decorative finish to change roughhew structure to complete building, but not including the various service parts.

1.1.2.1.115 **Residence Units** means one dwelling room and upwards arranged for a family to dwell in, with resting, bedding, cooking and dining furniture and equipment.

1.1.2.1.116 **Roofs** means the thing covering the top of the building to protect the building

from sunshine and rain, including any component made to strengthen the roof.

1.1.2.1.117 **Attics** means a dwelling room at the area between the ceiling and the roof of building.

1.1.2.1.118 **Arrays Room** means a building constructed in long row of two units and upwards, with joint wall dividing into units, and consisting most of non-fire-resisting materials.

1.1.2.1.119 **Hall** means any portion of building, which is used for gathering the people.

1.1.2.1.120 **Dwelling Room** means any room with the qualification as prescribed in the municipal law for sleeping, resting, cooking or dining, not including the enclosures, namely cabinet, pantry, rest room, toilet, service room, laundry room] undecorated attic room, entrance hall, space for storing equipment and similar space.

1.1.2.1.121 **Guest Room** means any room or rooms used or intend to be used by a guest for sleeping purposes. Every 10 m^2 of superficial floor area in a dormitory shall be considered to be a guest room.

1.1.2.1.122 **Dormitory** means any building, which is occupied by one or more guest but is not a building being a hotel.

1.1.2.1.123 **Department Store** means commercial building or portion of commercial building, which is used for display or selling the merchandize items.

1.1.2.1.124 **Drain Water Sources** means the public drainage, ditch, canal, river, sea and pubic water sources

1.1.2.1.125 **Buildings** means a brick building, house, habitation, shop, floating house, warehouse, office and other structure in which persons dwell or make use thereof, including

1. Spectators' stand or other structure built for congregation of people;
2. Dam, bridge, tunnel, way or drainage conduit, shipyard, dock, pier, fence, wall or door built adjacent to or near the public place or for use by the general public;
3. Billboard or structure built for attaching or installation of billboard
   a. Billboard that is attached or installed above the public place, with the size larger than one sqm. Or the total weight of the structure exceeding 10 kg.;
   b. Bill board that is attached or installed at a distance from the public place, with the distance in horizontal line from the public place is less than the height of the billboard measuring from the ground, with the size and load exceeding than prescribed in the Ministerial Regulation.
4. Area or structure built for parking, making U-turn and access of vehicles for the building as specified in Section 8 (9)
5. Other structure built as specified in the Ministerial Regulation, including various part of the building

1.1.2.1.126 **Educational Building** means buildings or portion of buildings used for educational purposes. Educational building includes school, college, university, academic institute and library.

1.1.2.1.127 **Large Building** means building or portion of building, which is occupied by single or multiple function. The building height from the street level shall be 15.0 m or more. Total floor area shall be 1,000 m^2 or more for single roof structure, or total area for every floor or total area for single floor is more than 2000 m^2.

1.1.2.1.128 **Extra Large Building** means building or portion of building, which is occupied by single or multiple function. Total area for every floor or single floor is more than 10,00 m^2 or more for single roof structure

1.1.2.1.129 **Car Park Buildings** (See 1.1.2.1.95)

1.1.2.1.130 **Temporary Building** means any construction having a certainly schedule to be demolished.

1.1.2.1.131 **Condominium** means a building in which persons may hold title separately for each unit, consisting of personal property and the common property.

1.1.2.1.132 **Assembly Building** means a building or portion of building used for the gathering together of persons for such purposes as

deliberation, education, instruction, worship, entertainment, amusement, drinking or dining or awaiting transportation.

1.1.2.1.133 **Existing Building** means any structure erected prior to the adoption of the Construction Regulation or for which a permit for construction has been issued.

1.1.2.1.134 **Business / Merchandise Buildings** means occupation or use of the building or part of the building is for operating business, professional services, trading of merchandize, materials, things, consumer products, which is not considered as a high-risk building.

1.1.2.1.135 **Miscellaneous Buildings** means possession or use of the building or part of the building for miscellaneous purposes, including, fence door, embankment, dam, bridge, statue, watch tower, water tank tower, tunnel, drainage conduit, power pole, road, walkway, swimming pool, guardhouse, billboard.

1.1.2.1.136 **Stall** means table, booth or seat, covered with roof, standing on the ground, movable, with the size not exceeding 4 meter, having no partition or wall, and being used for retail trade, with fixed daily business hours, and not for dwelling purpose.

1.1.2.1.137 **Commercial Buildings** means a building used for commercial purpose, or a factory using machinery with capacity not exceeding five horse power, or a building constructed at distance not more than 20 meter from a public way line or a road having condition as a public road, and the building may be used for commercial purpose.

1.1.2.1.138 **Special Buildings** means a building requiring high standard of strength and special safety such as the following building:

a. entertainment premises, spectators' stand, meeting hall, library, art galley, museum or religious place
b. shipyard, dock or pier for boats with capacity more than 100 ton gross.
c. Building with the height exceeding 10 meter, or bridge or building or roof structure more than 10 meter, or its structure may be harmful to the general public; and
d. Building storing flammable materials, explosive materials or materials that is toxic or radiation material in accordance with the low government such materials.

1.1.2.1.139 **Non-hazardous Buildings** means a building or part of building with the use or occupation for operating the business of production, storage and selling non-flammable materials or not explosive materials, which is not classified as trading building, including ice factor, power plant, cold storage, milk and butter factory, canned food factory, pharmaceutical factory, sanitary product bottling factory, and other factory operating non high-risk business.

1.1.2.1.140 **Institutional Buildings** means a building or part of building with occupation or use for dwelling place of persons under detention or imprisonment or for medical treatment or for providing social welfare or others.

1.1.2.1.141 **Public Buildings** means the place classified for congregation of the general public such as an entertainment premises, meeting hall, hotel, school, restaurant or hospital, for example.

1.1.2.1.142 **High Rise Building** means a building more than 23.0 m in height. Building height is measured from the ground level to the highest point of the roof.

1.1.2.1.143 **Health Risky Buildings** means a building or part of the building with occupation or use causing pollution to water, air, soil and which may be hazardous to the environment or living things or cause nuisance due to noise or odor or dust or smoke.

1.1.2.1.144 **Hazardous Buildings** means a building or part of the building with occupation or use for production, storage and selling flammable materials or explosive materials or materials with radiation or easily hazardous for fire or explosion or ray proliferation.

1.1.2.1.145 **Residential Buildings** means building in which normally persons dwell, both day and night, be it temporary or permanently.

1.1.2.1.146 **Apartment Building** means includes buildings or portion of buildings contain three or more living family with separate or common facilities; toilets, corridors, stairs or lifts.

1.1.2.1.147 **Industrial Building** means any building which id used for production, processing, assembling, disassembling, fabricating and the same working character.

1.1.2.1.148 **Brick** means construction member, which is made of burning clay.

1.1.2.2 Specific Definitions

1.1.2.2.1 **Construction Type 1, Fire Resisting Construction** means construction of building with major structures, being steel with fire proof covering or reinforced concrete or reinforced non-flammable materials and other structures such as exterior walls, floor, roof, permanent partition made of non-flammable materials such as steel, concrete, brick, concrete block, stone or other similar material. Various openings in exterior walls have fireproof pane, except non load bearing permanent partition, with fire resisting rate one hour, which may be made of the wood which has been improved and with non-flammable property. Construction Type 1, Fireproof Construction, is divided into two categories, as follows.

a. **Construction Type 1, Fireproof Construction with non restriction of size of building**, namely construction of building with full qualifications according to the first paragraph, with on restriction of the height and size of the floor area.
b. **Construction Type 1, Fireproof Construction with restriction of size of building**, namely construction of building with full qualifications according to the first paragraph, but with restriction in the municipal law regarding the height, not to have the height or number of floors more than specified therein and that size of the floor area must not exceed as specified therein.

1.1.2.2.2 **Construction Type 2, Non-combustible Frame Construction** means construction of building with major structures, durable partition and wells made of non-flammable materials. Construction type 2, Fire resisting Construction, is divided into categories, as follows :

a. **Construction Type 2, One-Hour Fire Resisting Element**, namely construction of building whose structure must have fire resisting rate at least one hour, and with non-load bearing permanent partitions may be made of wood which has been improved and with non-flammable property for internal structure, but fire resisting element must nit change.
b. **Construction Type 2, No Restriction on Fire Resisting Rare**, namely construction of building with major structure, wall and permanent partition made of non-flammable materials, with on restriction of the resisting rate.

1.1.2.2.3 **System Testing** means testing of fire protection piping system under water pressure. Testing includes the testing during the installation, after complete installation and intermittent testing.

1.1.2.2.4 **Compartment** means a space completely enclosed by dedicated fire rating walls and ceiling.

1.1.2.2.5 **Fire Compartment** means a space within a building that is enclosed by fire barriers on all sides, including the top and bottom.

1.1.2.2.6 **Fire Protection Zones** means the zones that the local competent officer, by endorsement of the Committee, announces to divide municipal area into fire prevention zone 1 or zone 2 or zone 3, in order to prevent and eradicate damages and danger due to fire'

1.1.2.2.7 **Smoke** means smoke occurring from fire, excluding smoke occurring from any working operation.

1.1.2.2.8 **Additional Occupancy Capacity** means the additional capacity for the number of people from the upper floor of the building in the order to calculate for the number and width of exit of each floor area.

1.1.2.2.9 **Equivalent Thickness** means the average thickness of solid material in the wall which may be calculated for the

total volume of each wall unit, deducted by hollow volume, and divided by the surface area of that particular unit.

1.1.2.2.10 **Air handling unit** means the equipment which delivery the air to the required space.

1.1.2.2.11 **Jockey Pumps** means small water pump for pumping water as replacement for the leak or for testing, thereby the fire water pump does not need to be started unnecessary, or to control operation and stopping by pressure switch.

1.1.2.2.12 **Fire Pumps** means the water pump with capacity not less than 150% of the specified volume, with dispatching pressure not less 65% of the specified pressure, and the water pressure when closing the valve is not less then 140% of the specified pressure.

1.1.2.2.13 **Exit Court** means a yard of court providing access to a public way for one or more required exits.

1.1.2.2.14 **Stairway** is vertical exit passageway, including stair's step and landing.

1.1.2.2.15 **Exterior Stairway** means a stairway that is open on two adjacent sides, except for required structural columns and open-type handrails and guardrails. The adjoining open areas shall be either yards, courts or public ways; the other two sides may be enclosed by exterior walls of the buildings.

1.1.2.2.16 **Interior Stairway** means any stairway not meeting the definition of exterior stairway.

1.1.2.2.17 **Stair Enclosures** means a staircase built separately from the building or structure, with fireproof surrounding walls, and has an access to the staircase from an aisle or corridor of each floor, which must have tire precaution.

1.1.2.2.18 **Opening in Fire Rating Structures** means an opening through which fire may spread, and may by an opening at the floor or walls, including duct shaft of other systems in the building.

1.1.2.2.19 **Atrium** means an opening through two or more floor levels other than enclosed stairways, elevators, hoist-ways, escalators, plumbing, electrical, air-conditioning or other equipment, which is closed at the top and not defined as mall. The area of opening is more than 93 m^2 or the width of opening is more than 6 meters.

1.1.2.2.20 **Common Way** means any corridor having rooms or usable areas on both sides of corridor, and having access from every rooms or usable areas to this way.

1.1.2.2.21 **Sub-duct** means 90 degree elbow-ductworks, which having two open ends. The elbow is installed to 90 degree upright position, and the top open end is installed in the horizontal level.

1.1.2.2.22 **Common Path of Travel** means that portion of exit access that must be traversed before two separate and distinct paths of travel to two exits are available.

1.1.2.2.23 **Exit Discharge** means that portion of a means of egress between the termination of an exit and a public way as required in 3.6.

1.1.2.2.24 **Exit Access** means that portion of a means of egress that leads to an exit.

1.1.2.2.25 **Exit Passageway** means an enclosed exit connecting a required exit or court with a public way.

1.1.2.2.26 **Exit** means the portion of means of egress that separated from all other spaces of the building or structure by construction or equipment as required in 1.4.2 to provide a protected way of travel to the exit discharge.

1.1.2.2.27 **Horizontal Exit** means a way of passage from one building to an area of refuge in another building on approximately the same level, or a way of passage through or around a fire barrier to an area of refuge on approximately the same level in the same building that affords safety from fire and smoke originating from the area of incidence.

1.1.2.2.28 **Stairs** means one or more flights of stair with more than two risers.

1.1.2.2.29 **Category of Occupancy** means classification of the area with similar occupation, disregarding type of construction, for the purpose of arrangement for fire precaution according to the standard.

1.1.2.2.30 Fire Classification

(a) Class A Fire means fire in ordinary combustible materials, such as wood, cloth, paper, rubber and many plastic.

(b) Class B Fire means fire in flammable liquids, oil, greases, tars, oil-based paints, lacquers and flammable gases.

(c) Class C Fire means fire that involves energized electrical equipment and short circuits.

(d) Class D Fire means fire in combustible metals, such as magnesium, titanium, zirconium, sodium, lithium and potassium. Architect is an individual technically and legally qualified to practice the profession of architecture.

1.1.2.2.31 **Smoke Spill Fan** means fan designing to use for delivery the air or smoke having the temperature of not less than 200°C.

1.1.2.2.32 **Ventilating Fan** means fan designing to use for removing the air from the space.

1.1.2.2.33 **Occupied Space, Class 1** means light hazard occupancy, which means that hazard contents are classified as those of such low combustibility that no self-propagating fire therein ca occur.

1.1.2.2.34 **Occupied Space, Class 2** means ordinary hazard occupancy, which means that hazard contents are classified as those that are likely to burn with moderate rapidly or to give off a considerable volume of smoke.

1.1.2.2.35 **Occupied Space, Class 3** means extra hazard occupancy, which means that hazard contents are classified as those that are likely to burn with extreme rapidity or from which explosive are likely.

1.1.2.2.36 **Landing Decks** means the landing deck which must be made of durable and non-flammable materials, and sloping on either side or both sides.

1.1.2.2.37 **Areas of Refuge** means a space, which is temporary used during egress, protected from the effects of fire. Area is classified to two types as follows:

(a) One dedicated floor of building providing fully automatic sprinkler system, and having two areas which are separated by smoke barriers or,

(b) One dedicated area of building providing exits to public area. That area is provided with the fire protection system by separate that area to other area.

1.1.2.2.38 **Water Motor Gong** means the gong serves as fire alarm.

1.1.2.2.39 **Fire Alarm System** means a manual or automatic alarm system notifying in case of fire.

1.1.2.2.40 **External Pipes for Fire Protection** means a piping network installing outside and around the building for only fighting the fire purposes.

1.1.2.2.41 **Wet pipe System** means a sprinkler system employing automatic sprinklers attached to a piping system containing water and connected to water supply so that water discharges immediately from sprinkler opened by heat from fire.

1.1.2.2.42 **Manual Wet Pipes** means standpipe system connecting to water supply system, the intention of system is to hold water within the piping only.

1.1.2.2.43 **Automatic Wet Pipes** means standpipe system connecting to water supply system, the intention of system is to automatically supply water via appropriate water flow rate and pressure.

1.1.2.2.44 **Standpipe System** means a wet or dry system of piping, valves, outlets and related equipment designed to provide water at specified pressures and install exclusively for the fighting of fires.

1.1.2.2.45 Combined Stand Pipes

1.1.2.2.46 **Pre-action System** means a sprinkler system employing automatic sprinklers attached to a piping system containing air that may or may not be under pressure, with a supplemental detection system installed in the same areas as the sprinklers. Actuation of the detection system opens a valve that permits water to flow into the sprinkler piping system and to be discharged from any sprinklers that are open.

1.1.2.2.47 **Deluge System** means a sprinkler system employing open sprinkler attached to a piping system connected to a water

supply through a valve that is opened by the operation of a detection system installed in the same areas as the sprinklers. When this valve opens, water flow into the piping system and discharge from all sprinklers attached thereto. Deluge System is a sprinkler system employing open sprinkler attached to a piping system connected to a water supply through a valve that is opened by the operation of a detection system installed in the same areas as the sprinklers. When this valve opens, water flow into the piping system and discharge from all sprinklers attached thereto.

1.1.2.2.48 **Zoned Smoke Control** means smoke-control system utilizing pressure differences between adjacent smoke-control zones.

1.1.2.2.49 **Air Distribution System** means a continuous passageway for the transmission of air which, in addition to air ducts, duct fittings, dampers, plenums, fan, and accessory air handling equipment.

1.1.2.2.50 **Water Sprinkler System** means a fire protection pipe network, pumping system, controlled valves, sprinkler heads and other related components. Sprinkler shall be automatically operated in case of fire incidents.

1.1.2.2.51 **Air Pressurization** means the creation and maintenance of pressure levels in zones of a building, including elevator shafts and stairwells that are higher than the pressure level at the smoke source, such pressure levels being produced by positive pressures of a supply of uncontaminated air ,by exhausting air and smoke at the smoke source, or by a combination of these methods.

1.1.2.2.52 **Exterior Exit Balcony** means a landing or porch projecting from the wall of a building, and which serves as a required exit. The long side shall be at least 50 percent open, and the open area above the guardrail shall be so distributed as to prevent the accumulation of smoke or toxic gases.

1.1.2.2.53 **Return Air** means air removing from a space to be then re-circulated or exhausted.

1.1.2.2.54 **Supply Air** means air delivery to the conditioned space by mechanical means.

1.1.2.2.55 **Heliport** means an area of structural roof surface, which is used for the landing and take-off of helicopters.

1.1.2.2.56 **Smoke Damper** means an approved damper designed to resist the passage of smoke to any part of ductworks. Damper shall be automatically operated by command signal from smoke detector. No fire rating of smoke damper is required.

1.1.2.2.57 **Fire Damper** means an approved damper designed to resist the passage of fire to any part of ductworks. Damper shall be automatically operated by pre-setting temperature fusible link. Fire rating of fire damper shall not be less than fire rating of structure in where are installed.

1.1.2.2.58 **Fire Protection Materials** means a material or construction complying with the requirement of the Fire Protection Code for the time period specified.

1.1.2.2.59 **Wet pipe Alarm Valves** means valve generating sound via water motor gong, including to send the signal from pressure switch to fire alarm system. This valve shall be used as testing station.

1.1.2.2.60 **Dry pipe Alarm Valves** means valve for dry piping system, which shall be opened to allow water flows from piping network to its piping. Dry piping system shall be filled with pressurized air or gases at pre-set point. When the sprinkler is broken, air or gases pressure will be decreased, the water will flow to distinguish the fires. This valve shall be used as testing station.

1.1.2.2.61 **Fire Command Center** means room or area collecting significant building information, in order to inspect and command any operation during fire events.

1.1.2.2.62 **Fire Exit Enclosures** means an enclosure constructed with fire rating materials, in order to protect the danger of fire or smoke. The enclosure shall be continuously constructed along whole

escape routes.

1.1.2.2.63 **Smoke-proof Enclosure** means a structure so designed that the movement into the smoke-proof enclosure of products of combustion produced by a fire occurring in any part of the building shall be limited.

1.1.2.2.64 **Means of Egress** means a continuous and unobstructed way of exit travel from any point in a building or structure to a public way and consists of three separate and distinct parts:

(a) Exit access
(b) Exit
(c) Exit discharge

1.1.2.2.65 **Automatic Sprinkler** means a fire suppression or control device that operate automatically when its heat-actuated element is heated to its thermal rating or above, allowing water to discharge over a specific area.

1.1.2.2.66 **Fire Hose Nozzles** means a device used for injection water to fight the fires. Nozzle is made of light - weight materials, one end is equipped with adjustable injection head (stream, spray or curtain) and another end equipped with quick coupling or thread coupling.

1.1.2.2.67 **Fire Hydrant** means any quick coupling connection on a water supply system having one or more outlets used to supply hose and fire department pumping with water. Fire hydrant shall be located to outside of building.

1.1.2.2.68 **Smoke-proof Tower** means a type of smoke-control system in which stair shafts are mechanically pressured with outside air to keep smoke from containing the during fire incident.

1.1.2.2.69 **Fire Department Connection** means a connection through which the fire department can pump water into a standpipe system, or sprinkler system.

1.1.2.2.70 **Fire Rating or Fire Resistance Rating** means the time, in minutes or hours, that materials have withstood a fire exposure as established in accordance with the test procedures of International Standards.

1.1.2.2.71 **Outside Air** means air taking from the external atmosphere or outside pf building.

1.1.2.2.72 **Exhaust Air** means air removing from a space and not reused therein.

1.1.2.2.73 **Re-circulating Air** is air removing from the conditioned space and intended for reuse as supply air

1.1.2.2.74 **Supervisory Devices** means device using for checking the position of valves (close or open) and send a signal to operator in control room.

1.2 Building Classification and Characteristic

1.2.1 Assembly Occupancies

A Assembly occupancies include the use of a building or structure for the gathering together of persons for purpose such as civic, social or religious functions, recreation or awaiting transportation. Assembly occupancies shall include the followings:

A1 A building or portion of a building having an assembly room with an occupant load of 1,000 persons or more and a legitimate stage.

A2 A building or portion of a buildings having an assembly room with an occupant load of less than 1,000 persons and a legitimate stage or a building or portion of a building having an assembly room with an occupant load of 250 persons or more without a legitimate stage.

A3 A building or portion of a building having an assembly room with an occupant load between 30 to 249 persons without a legitimate stage.

A4 A building or portion of a building having an outdoor assembly area or stadiums.

1.2.2 Educational Occupancies

E Educational occupancies include the use of a building or structure for the gathering together of persons for purpose such as learning and studying in high school level. Educational occupancies shall include the followings:

E1 Any building used for educational purposes with an occupant load of 50 persons or more (Exceptions: E3).

E2 Any building used for educational purposes

with an occupant load of less than 50 persons (Exceptions: E3).

E3 Any building used for pre-kindergarten and kindergarten purposes with an occupant load of 30 persons or more.

1.2.3 Social Welfare Occupancies (S)

S Social welfare occupancy is a building, or portion thereof, using for purposes of nursing, recovery, reformatory, jails, prison or the building having the same activities. The classification shall be as follows:

S1 Social welfare occupancy division 1 is building using for mental hospital, mental sanitarium or the building having the same occupancy.

S2 Social welfare occupancy division 2 is building using for nursery of children under the age of six, hospitals, sanitariums, old people nursing home or the building having the same activities.

S3 Social welfare occupancy division 3 is building excluding S1 and S2.

S4 Social welfare occupancy division 4 is building using for jails, prison, reformatory or building when personal liberties of inmates are similarly restrained.

1.2.4 Business Occupancies (B)

B Business occupancy building is building, or portion thereof, using for office, professional or service-type transaction or the building having the same activities, which are not classified as Danger Hazardous Occupancies. The classification shall be as follows:

B1 Business occupancy building division 1 is building having not more than 80 m^2 of area, using for office, professional or service-type transaction proposes.

B2 Business occupancy building division 2 is building having more than 80 m^2 of area, using for banking, financial institute, health services, medical services, police station, postal office or the building having the same activities.

1.2.5 Commercial Occupancies (C)

C Commercial occupancy building is building, or portion thereof, using for display the products, goods or selling & buying merchandised items, including building having the same activities. The classification shall be as follows:

C1 Commercial occupancy building division 1 is building using for wholesale and marketplace.

C2 Commercial occupancy building division 2 is building in which activities excluding C1.

1.2.6 High-Hazard Occupancies (H)

H Danger hazardous building is building, or portion thereof, involving the manufacturing, processing or containing explosive materials; i.e. guns, bullets, fireworks or those kinds of explosive materials complying Regulation of Containing Gases or Liquid Petroleum, which is announced by Ministry Order. The classification shall be as follows:

H1 Danger hazardous building division 1 is a building which production or filling oxygen gas, chemical substance or flammable materials.

H2 Danger hazardous building division 2 is a building which manufacturing, filling, containing, delivering or maintaining liquid fuel or gases, matches, paint, public garages, excluding building using LPG for cooking or generating energy.

H3 Danger hazardous building division 3 is a building which manufacturing, maintaining or delivering flammable materials; i.e. fireworks, papers, wooden items or furniture.

1.2.7 Factory Occupancies (F)

F Factory or industrial occupancy building is a building, or portion thereof, using for the purposes of manufacturing, processing or holding, storing and transferring non-explosive or non-flammable goods or materials.

1.2.8 Services Center Occupancies (SC)

1.2.9 Health Hazardous Occupancies (HH)

HH Health hazardous occupancy building is a building, or portion thereof, processing or generating pollution or toxic to the neighborhood or

environment, or generating nuisance to public accordance to Health Act. The classification shall be as follows:

HH1 Health hazardous occupancy building division 1 is a building having more than two pieces of musical instruments.

HH2 Health hazardous occupancy building division 2 is a building generating any nuisance to neighborhood or environment; i.e. massage.

HH3 Health hazardous occupancy building division 3 is a building producing pollution to neighborhood or environment.

HH4 Health hazardous occupancy building division 4 is a building producing pollution to neighborhood or environment, which building have to report the discharge of pollution to Environment Protection Agency according to Environment Act.

1.2.10 Residential Occupancies (R)

R Residential occupancy building is a building, or portion thereof, using for persons for living, both temporary living or permanent living. The classification shall be as follows:

R1 Residential occupancy building division 1 is building using for temporary living of several persons. The building shall be divided to multiple living rooms; for example dormitory, hotels, motels or hospital wards which excluding Social Welfare Occupancy.

R2 Residential occupancy building division 2 is building using for living of multiple families, by dividing to multiple units for each family.

R3 Residential occupancy building division 3 is building using for individually family; i.e. single houses, twin houses or detached houses.

1.2.11 Miscellaneous Occupancies (M)

M Miscellaneous occupancy building is a building, or portion thereof, excluding item 1.2.1 to 1.2.10, and shall be classified as follows:

M 1 Miscellaneous occupancy building division 1 is a billboard or signs constructing on outdoor, is divided to eight types as follows:

M1.1 Hanging billboard is a board attached or overhung from the building.

M1.2 Wall mounting billboard is a board fixed to the walls of building.

M1.3 Roof mounting billboard is a board installed on the roof or above the building.

M1.4 On grade billboard is a board installed on the ground.

M1.5 Electronic billboard is a board displaying motion pictures or letters by means of electronic control system.

M1.6 Blinking billboard is a board equipped with electrical system, which can change the brightness or contrast of lighting.

M1.7 Temporary billboard is a board installed by having limit day to remove.

M1.8 Symbolic billboard is a board fixed on the walls, using for point out the direction purposes.

M 2 Miscellaneous occupancy building division 2 is a construction designating by Engineering Institute of Thailand (E.I.T.), excluding item 1.2.1 to 1.2.10 and no occupancy inside the structure; i.e. pagodas, fences, dams, bridges, buns and monuments.

M 3 Miscellaneous occupancy building division 3 is a building conforming to M2, but having occupancy.

M 4 Miscellaneous occupancy building division 4 is a building having the time limit to occupy or temporary using. The sub-divisions shall be classified as follows:

M4.1 Temporary building type 1 is a temporary building using for assembling, education or commercial, which is allowed for using not exceed eighty days.

M4.2 Temporary building type 2 is a temporary building using for danger hazardous of factory occupancy or health hazardous by not exceed one year.

M4.3 Temporary building type 3 is a temporary building using for other activities, excluding M1 and M2, and is allowed for not exceed two years.

A.8.2 Part 2: Standard of Building

SECTION 1
PURPOSES AND SCOPES

2.1 PURPOSES AND SCOPES

2.1.1 Objective

This 2nd section of fire protection standards shall determine the details of buildings, which concern to the construction materials, standard components, fire compartment, the control of materials in the buildings, protection of openings and the site preparation. This section shall include the details of passive fire protection components, which shall be co-operated with the active fire protection system of the other section, in order to achieve a more life safety.

2.1.2 Scopes

This 2nd section shall cover the details of designing the buildings from the beginning stage i.e. the determination of buildings' using characters, the sizes, the height and the construction methods that should be conformed to the buildings' using characters. The standard shall consider the buildings compartment in order to protect the spread of fire. The appropriate location of fire compartment shall be considered, including the determination of fire ratings and the protection of any penetrations on the fire compartments. Prior walls and ceilings material shall be determined to control the spread of fire.

Finally, the site around the buildings shall be proper prepared for the convenience of fireman. Many parts of this section shall mention about the testing of materials or structures. The testing results shall be considered by the Engineers, who having the knowledge of testing methodology including the concept and the reason of the properties' determination in order to justify the right results which conform to the purposes of this standards.

SECTION 2
FIRE RESISTANCE STANDARDS FOR CONSTRUCTION MATERIAL AND COMPONENT

2.2 FIRE RESISTANCE STANDARDS FOR CONSTRUCTION MATERIAL AND COMPONENT

2.2.1 General

2.2.1.1 Fire rating testing procedures of construction materials and component shall conform to the testing standards of ASTM E119 or BS 476. The testing shall be done in acceptable laboratory.

2.2.1.2 The indicated fire rating of construction materials in this standards shall be used or referred whenever no having the actual fire testing of those materials. The figures shall be an allowable maximum fire rating for construction materials and their components.

2.2.1.3 In case of having the differences between the standard figures and the testing results, the results of testing shall be allowed only for the fire rating which exceed the standard figures, and the testing results shall be certified by the responsible engineers.

2.2.2 Fire rating of Construction Material and Component

In case of no having the fire testing reports, the fire rating of construction materials and their components shall not be more than the following instructions:

2.2.2.1 Fire rating of non-bearing walls

Non-bearing walls of buildings shall be used for partition inside the buildings to the compartments, in order to prevent the spread of fire. The fire rating of various kinds of non-bearing walls shall be indicated to Table 2.2.1, and the fire rating of reinforced concrete structures shall be shown in Table 2.2.2.

2.2.2.2 Fire rating of reinforced concrete structures

Beams, columns and floors shall be categorized to be the reinforced concrete structures. The fire rating of these kinds of structures shall be determined by the minimum width and the minimum thickness of covering materials. The recommended figures shall be indicated to Table 2.2.2.

2.2.2.3 Fire rating of compressed concrete structures

The fire rating of compressed concrete structures, i.e. floors and beams, shall be conformed to EIT standards (Compressed Concrete).

2.2.2.4 Fire rating of fire protection covering materials for steel structures

The fire rating of fire protection covering materials for steel structures depend upon the ratio of heat contacted perimeters to the cross sectional areas of steel structures or Hp/A. The heat transfer of material with a higher Hp/A ratio is faster than the heat transfer of material with lower Hp/A ratio. So, more thickness of covering materials shall be required for steel structures having higher Hp/A ratio.

The fire rating of fire protection covering materials for steel structures shall be determined by only the fire testing. The fire testing result of one cross sectional steel shall be able to apply to another cross sectional steel with the same Hp/A ratio of the tested specimens, or less.

Table 2.2.1 **Fire rating for Non-bearing Wall**	
Type of Wall	**Fire Rating * (Minutes)**
Half width brick walls, 2 sides of 1.5-2.0 cm. cement plaster	60
Full width brick walls, 2 sides of 1.5-2.0 cm. cement plaster	120
14 cm. thick cement block walls, 2 sides of 1.5-2.0 cm. cement plaster	120
19 cm. thick cement block walls, 2 sides of 1.5-2.0 cm. cement plaster	180
Light weight cement walls	Refer to Manufacturer
Gypsum walls	Refer to Manufacturer

* The different fire rating might be allowed to use, whenever the fire testing result is submitted for consideration.

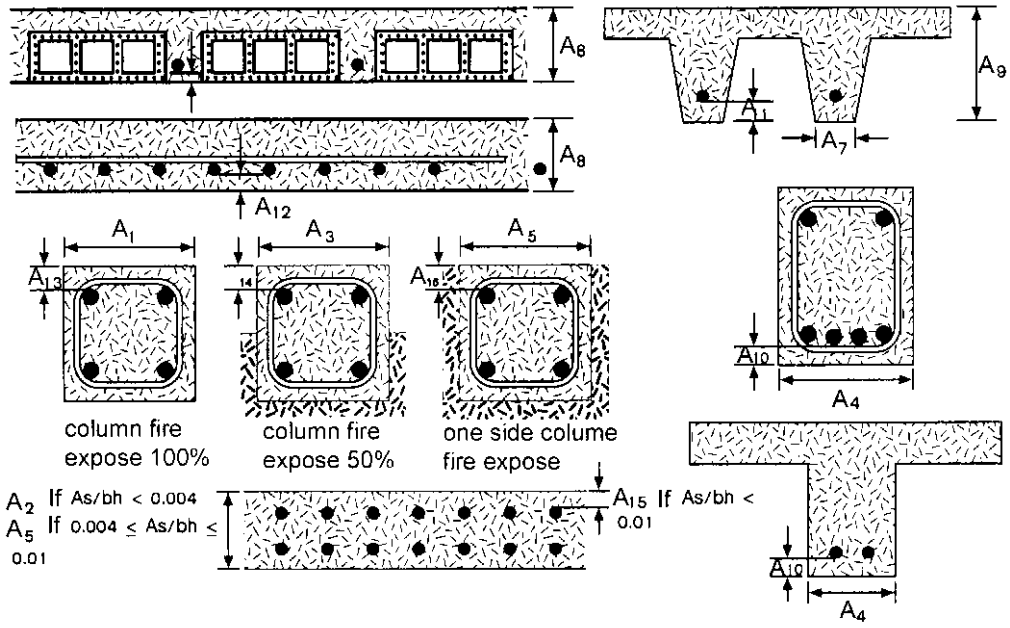

Table 2.2.2
Covering thickness for concrete and the thickness of reinforced concrete component

	Minimum thickness for specified fire rating (millimeters)					
Fire rating	0.5 Hr	1.0 Hr	1.5 Hr	2.0 Hr	3.0 Hr	4.0 Hr
A1	150	200	250	300	400	450
A2	150	150	175	Not Allow		
A3	125	160	200	200	300	350
A4 single beam	80	120	150	200	240	280
A4 continuous beam	80	80	120	150	200	240
A4	100	120	140	160	200	240
A6	75	75	100	100	150	180
A7 single beam	75	90	110	125	150	180
A7 continuous beam	75	80	90	110	125	150
A8	75	95	110	125	150	170
A9	70	90	105	115	135	150
A10 single beam	20	30	40	50	70	80
A10 continuous beam	20	20	35	50	60	70
A11 single beam	15	25	35	45	55	65
A11 continuous beam	15	20	25	35	45	55
A12 single beam	15	20	25	35	45	55
A12 continuous beam	15	20	20	25	35	45
A14	20	25	25	25	30	35
A15	25	25	25	25	25	25
A16	20	25	25	25	25	25
A17	15	15	25	25	25	25

SECTION 3
STANDARDS OF BUILDINGS STRUCTURE FOR FIRE PROTECTION

2.3 STANDARDS OF BUILDINGS STRUCTURE FOR FIRE PROTECTION

2.3.1 General

The concept of determination for construction standard depends on two (2) factors, i.e. type of construction and application of buildings. One type of construction shall have the fire rating specification differs from another. The application of buildings shall relate to floor area requirement or the height of floor space, which shall be restricted by the type of construction. For examples, higher fire rating structures shall be applied or controlled to a more fire risky buildings or large buildings. On the other, lower fire rating structures shall be applied to a less fire risky buildings or smaller buildings.

2.3.2 Construction Types

Type of construction shall be divided to three (3) classes as follows:

1. Construction Type 1
   - No limiting size of buildings
   - Limiting size of buildings

2. Construction Type 2
   - 1 Hour fire rating
   - No limiting fire rating

3. Construction Type 3
   - 1 Hour fire rating
   - No limiting fire rating

The structure of Construction Type 1 and Type 2 shall be of non-combustible materials; i.e. reinforced concrete steel. While, the structure of Construction Type 3 shall be of combustible materials; i.e. wood.

The fire rating for various components of each construction type shall be indicated to Table 2.3.1.

2.3.3 Floor Area and Height Limit of Buildings

2.3.3.1 The maximum areas for one (1) floor of building (all kinds of occupation, except to miscellaneous occupation and temporary occupation) shall be related to the construction type, which shall be allowed to not exceed the figures shown in Table 2.3.2. For multiple used buildings, the compartment shall be constructed to separate each function to another.

2.3.3.2 The area of single floor buildings might be allowed to exceed the figures shown in Table 2.3.2 under the following conditions:

(a) There are no less than 6.0 m. of empty spaces or public ways on two (2) sides of buildings. The allowable additional areas of buildings shall be one (1) percent of the figures shown in Table 2.3.2 for every 25 cm. apart from 6.0 m. of empty spaces or public ways. However, the additional areas shall not exceed a half (1/2) of allowable building's area shown in Table 2.3.2.

(b) There are no less than 6.0 m. of empty spaces or public ways on three (3) sides of buildings. The allowable additional areas of buildings shall be two (2) percent of the figures shown in Table 2.3.2 for every 25 cm. apart from 6.0 m. of empty spaces or public ways. However, the additional areas shall not exceed one (1) time of allowable building's area shown in Table 2.3.2.

(c) There are no less than 6.0 m. of empty spaces or public ways on every side of buildings. The allowable additional areas of buildings shall be five (5) percent of the figures shown in Table 2.3.2 for every 25 cm. apart from 6.0 m. of empty spaces or public ways. For hazardous occupation, the additional areas shall not exceed one (1) time of allowable building's area shown in Table 4. For other or non-hazardous occupation, the additional areas shall not exceed two (2) times of allowable building's area shown in Table 2.3.2.

2.3.3.3 Allowable building's areas for each kind of buildings

In case of building having more than one (1) floor, total building's areas shall not be more than two (2) times of the total areas for single floor buildings according to

item 2.3.3.2. Area of basement shall not be accounted to the calculations, and each floor area shall not be more than the allowable areas for single floor building according to item 2.3.3.2.

2.3.3.4 If automatic sprinkler system is installed according to EIT standard for Type 1 and 2 of hazardous occupation buildings, which is classified to the Construction Type 1 and no limiting size of building and having more than two (2) floors. And there are no less than 18.0 m. of empty spaces or public ways on every side of buildings. The areas of buildings shall not be limited.

2.3.3.5 Otherwise specified, if the building is fully provided with the automatic sprinkler system according to EIT standard, the allowable building's area shall be three (3) times of allowable building's area shown in Table 2.3.2 for single floor building and shall be two (2) times for more than single floor building.

2.3.3.6 In case of the maximum number of floors conform to item 2.3.3.9, no additional building's area for item 2.3.3.5 shall be allowed.

2.3.3.7 Building having the vertical separation with fire rating compartment according to Table 2.3.1 shall be considered to be the separated individual buildings.

2.3.3.8 The allowable maximum height of buildings shall not exceed the figures indicated to Table 2.3.3. Except that buildings are fully provided with the automatic sprinkler system according to EIT standard, additional height of one (1) floor shall be allowed.

2.3.3.9 In case of the maximum building's area conforms to item 2.3.3.5, no additional number of floors for item 2.3.3.8 shall be allowed.

Table 2.3.1
Fire Rating (Hour)

	Construction Type 1		Construction Type 2		Construction Type 3	
	Non Combustible Structure				Combustible Structure	
	No limiting size of buildings	Limiting size of buildings	1 Hour fire rating	No limiting fire rating	1 Hour fire rating	No limiting fire rating
Main structure of building [1]	3	2	1	Not Control	1	Not Control
Main structure of building [1]	3	2	1	Not Control	1	Not Control
Floors	2	2	1	Not Control	1	Not Control
Roofs [2]	2	1	1	Not Control	1	Not Control
External Walls [3]	4	4	1	Not Control	1	Not Control
Internal Partitions [4]	4	4	2	2	2	2
Enclosure of Vertical Opening	2	2	1	1	1	1

[1] Main structures comprise of bearing walls, columns, beams and other structure concerned the strength of whole buildings.

[2] Roof of buildings; which exclude to assembly occupation, hazardous occupation and commercial occupation building with higher than 8.0 m. above floor level. Those kinds of buildings might be constructed of non-combustible materials and no fir protection covering is required.

[3] Not control for external walls, which face to not less than 12.0 m. of public spaces or empty spaces. Except external bearing walls, which must be considered to be the fire rating main structures.

[4] Vertical separation walls shall be continuously constructed from footings to level of 75 cm. above roof.

Table 2.3.2
Allowable maximum built-up areas (m^2)

	Construction Type 1		Construction Type 2		Construction Type 3	
	Non Combustible Structure				Combustible Structure	
	No limiting size of buildings	Limiting size of buildings	1 Hour fire rating	No limiting fire rating	1 Hour fire rating	No limiting fire rating
A1	Not limit	2700	Not allow	Not allow	Not allow	Not allow
A2	Not limit	2700	1200	Not allow	900	Not allow
A3	Not limit	2700	1200	800	900	500
A4	Not limit	2700	1200	800	900	500
E1	Not limit	4100	1800	1200	1400	800
E2	Not limit	4100	1800	1200	1400	800
E3	Not limit	4100	1800	1200	1400	800
S1	Not limit	4100	Not allow	Not allow	Not allow	Not allow
S2	Not limit	1400	Not allow	Not allow	Not allow	Not allow
S3	Not limit	1400	600	Not allow	500	Not allow
S4	Not limit	1400	Not allow	Not allow	Not allow	Not allow
B	Not limit	3600	1600	1100	1300	700
C	Not limit	3600	1600	1100	1300	700
F	Not limit	3600	1600	1100	1300	700
SC	Not limit	3600	1600	1100	1300	700
H1	1400	1100	500	300	Not allow	Not allow
H2	1400	1100	500	300	400	200
H3	Not limit	2200	1000	700	800	500
HH	Not limit	3600	1600	1100	1300	700
R1	Not limit	2700	1200	800	900	500
R2	Not limit	Not limit	Not limit	Not limit	Not limit	Not limit
R3	Not limit	Not limit	Not limit	Not limit	Not limit	Not limit

Table 2.3.3
The Maximum Height of Buildings

	Construction Classification					
	Construction Type 1		Construction Type 2		Construction Type 3	
	Non Combustible Structure				Combustible Structure	
	No limiting size of buildings	Limiting size of buildings	1 Hour fire rating	No limiting fire rating	1 Hour fire rating	No limiting fire rating
	Maximum Height (meter)					
	Not allow	48	20	17	15	12
	Maximum Number of Floor (s)					
A1	Not allow	4	Not allow	Not allow	Not allow	Not allow
A2	Not allow	4	2	Not allow	2	Not allow
A3	Not allow	12	2	1	2	1
A4	Not allow	12	2	1	2	1
E1	Not allow	4	2	1	2	1
E2	Not allow	4	2	1	2	1
E3	Not allow	4	2	1	2	1
S1	Not allow	2	Not allow	Not allow	Not allow	Not allow
S2	Not allow	2	Not allow	Not allow	Not allow	Not allow
S3	Not allow	3	1	Not allow	1	Not allow
S4	Not allow	1	Not allow	Not allow	Not allow	Not allow
B	Not allow	12	4	2	3	2
C	Not allow	12	4	2	3	2
F	Not allow	12	4	2	3	2
SC	Not allow	12	4	2	3	2
H1	1	1	1	1	Not allow	Not allow
H2	Not allow	2	1	1	1	1
H3	Not allow	5	2	1	2	1
HH	Not allow	12	4	2	3	2
M1	Not allow	12	4	2	3	2
M2	Not allow	3	3	3	3	3

Note: Descriptions
See definitions in item 1.2

Main Category	Sub Category	Code
Assembly Occupancy Building	Category 1	A1
	Category 2	A2
	Category 3	A3
	Category 4	A4
Educational Occupancy Building	Category 1	E1
	Category 2	E2
	Category 3	E3
Social Welfare Occupancy Building	Category 1	S1
	Category 2	S2
	Category 3	S3
	Category 4	S4
Business Occupancy Building	Category 1	B
	Category 2	B
High-Hazard Occupancy Building	Category 1	H1
	Category 2	H2
	Category 3	H3
Factory Occupancy Building		F
Services Center Occupancy Building	Category 1	SC
	Category 2	SC
Health Hazardous Occupancy Building	Category 1	HH
	Category 2	HH
	Category 3	HH
	Category 4	HH
Residential Occupancy Building	Category 1	R1
	Category 2	R2
	Category 3	R3
Miscellaneous Occupancy Building		M

SECTION 4
BUILDING COMPARTMENT

2.4 BUILDING COMPARTMENT

2.4.1 GENERAL

2.4.1.1 Purposes

The objectives of fire protection system by means of building's compartment are to divide the areas inside the building by using the appropriate floors and fire rating walls. The building's compartment shall control the fire and the damages, resist the spread of fire to other areas, increase the evacuation time and fire fighting times.

2.4.1.2 Testing Standards

Fire testing standard procedures for the compartment shall be conformed to BS (British Standards) or ASTM (American Society for Testing and Materials) standards.

2.4.1.3 Definitions

Compartment means parts of building structures, which separate the areas inside the building into their individual areas, having the ability to protect the spread of fire from one area to another areas. The compartment shall include horizontal compartment; i.e. walls, doors, windows, and vertical compartment; i.e. floors.

2.4.2 Fire Rating of Compartment

2.4.2.1 Compartment's fire rating shall be classified to four types as follows:

2.4.2.1.1 4 hours fire rating compartment, which means the compartment having the fire rating capacity of not less than four (4) hours and no openings on that compartment.

2.4.2.1.2 3 hours fire rating compartment, which means the compartment having the fire rating capacity of not less than three (3) hours. In case of having the openings on those compartments, the openings shall be protected by not less than three (3) hours fire rating devices. The total areas of all openings shall not exceed 25 percent of the compartment's length, and each opening's area shall not more than 10.0 m^2.

2.4.2.1.3 2 hours fire rating compartment, which means the compartment having the fire rating capacity of not less than two (2) hours. In case of having the openings on those compartments, the openings shall be protected by not less than one-half (1.5) hours fire rating devices.

2.4.2.1.4 1 hours fire rating compartment, which means the compartment having the fire rating capacity of not less than one (1) hour. In case of having the openings on those compartments, the openings shall be protected by not less than one (1) hour fire rating devices.

2.4.3 Compartment Standards

2.4.3.1 The compartment of building having multiple functions shall be constructed in order to separate each function. The compartment's fire rating shall not be less than the indicating in Table 2.4.1.

2.4.3.2 If the buildings have multiple basements, each basement's floor shall be separated with not less than four (4) hours fire rating compartment. Except, the basements are used for cars parking and are fully provided with the automatic sprinkler system, those basements shall be constructed with not less than two (2) hours fire rating compartment.

2.4.3.3 Common used areas shall not be allowed for high hazardous areas and other general areas.

2.4.3.4 Fire rating of fire compartment of fire escape routes shall be constructed according to Section 3 (Means of Egress)

2.4.3.5 Opening protection of fire compartment shall be conformed to item 2.6 (Protection of Openings).

2.4.3.6 The significant areas used during emergency situation or fire risky areas shall be separately partitioned from the rested areas. The fire rating of compartment shall not be less than the indicating in Table 2.4.2.

Table 2.4.1
Fire Rating of Compartment and Application
Fire Rating, Hour(s)
Application for each type of buildings

	A1	A2	A3	A4	E1	E2	E3	S1	S2	S3	S4	B	C	F	SC	H1	H2	H3	HH	M1	M2
A1		0	0	0	0	0	0	3	3	3	3	3	3	3	3		4	4	3	1	1
A2	0		0	0	0	0	0	3	3	3	3	1	1	1	1		4	4	1	1	1
A3	0	0		0	0	0	0	3	3	3	3	1	1	1	1		4	4	1	1	1
A4	0	0	0		0	0	0	3	3	3	3	1	1	1	1		4	4	1	1	1
E1	0	0	0	0		0	0	1	1	1	1	1	1	1	1		4	4	1	1	1
E2	0	0	0	0	0		0	1	1	1	1	1	1	1	1		4	4	1	1	1
E3	0	0	0	0	0	0		1	1	1	1	1	1	1	1		4	4	1	1	1
S1	3	3	3	3	1	1	1		0	0	0	2	2	2	2		4	4	2	1	1
S2	3	3	3	3	1	1	1	0		0	0	2	2	2	2		4	4	2	1	1
S3	3	3	3	3	1	1	1	0	0		0	2	2	2	2		4	4	2	1	1
S4	3	3	3	3	1	1	1	0	0	0		2	2	2	2		4	4	2	1	1
B	3	1	1	1	1	1	1	2	2	2	2		2	2	2		4	4	2	1	1
C	3	1	1	1	1	1	1	2	2	2	2	2		2	2		2	1	2	1	1
F	3	1	1	1	1	1	1	2	2	2	2	2	2		2		2	1	2	1	1
SC	3	1	1	1	1	1	1	2	2	2	2	2	2	2			2	1	2	1	1
H1																					
H2	4	4	4	4	4	4	4	4	4	4	4	2	2	2	2			1	2	4	4
H3	4	4	4	4	4	4	4	4	4	4	4	1	1	1	1		1		1	3	3
HH	3	1	1	1	1	1	1	2	2	2	2	2	2	2	2		2	1		1	1
M1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		4	3	1		0
M2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		4	3	1	0	

Remarks:
‘ 0 ‘ means the requirement of general compartment without fire rating ability.
‘ Blank Space ‘ means no compartment is required.
‘ Bold Area’ means high hazardous areas (type 1) and common used areas shall not be allowed.

Table 2.4.2
Fire Rating Capacity of Compartment and Fire Doors

Application	Fire Rating of Separation Partitions (Hour)		Fire Rating of Doors (Hour)	
Boiler Room	4[1]		4[1]	
Transformer Room (Oil Type)	4		4	
Storage Room for Fuel, Flammable Substance or Explosive Material	4		4	
Generator Room	4[1]		4[1]	
Main Switch Board Room	2		2	
Main Machine Room for Air-Conditioning Room	2		2	
Lift Machine Room	2		2	
Emergency Fan Room	2		2	
Battery Room	2		2	
Fire Pump Room	2		2	
Sub Switch Board Room	Hospital	2	Hospital	2
	Other(s)	1	Other(s)	1
PABX Room	2		2	
Kitchen	Hospital	2	Hospital	2
	Other(s)	1	Other(s)	1
Storage Room (More than 12 m^2)	Below Ground Level	2	Below Ground Level	2
	Above Ground Level	1	Above Ground Level	1
Bed Room (Hotel / Apartment / Condominium)	1		1	

Note:
The fire rating of 2 hours shall be allowed, if the automatic sprinkler system is installed or there is a appropriate fuel controlling measures.

SECTION 5
MATERIAL CONTROL IN BUILDINGS

2.5 CONTROL OF BUILDING MATERIAL

2.5.1 General

2.5.1.1 The purpose of this code shall be to control any material used in the buildings. The scope of the code shall be covered the application of interior walls and ceilings finishing materials, in order to protect the flame spread inside the building which is caused from burning of these materials.

2.5.1.2 Testing Standard

Flame spread testing standard for these materials shall be conformed to ASTM 84 Test Method for Surface-burning Characteristics of Building Materials.

2.5.1.3 Definitions

Interior walls and ceilings finishing materials are the covering materials over the surface of internal walls or partitions including fixed walls, movable partitions, wall papers, sound proving materials and insulations, not including the materials having the thickness of less than 0.9 mm which coat over the walls or ceilings.

2.5.2 Type of Wall / Ceiling Materials

2.5.2.1 The ability of flame spreading for any materials shall follow NFPA 255. It shall be classified to 3 categories (Class I, II, III), the ability of flame spread index and smoke density as shown in the Table 2.5.1

2.5.3 Specification to Using Walls and Ceilings Materials

2.5.3.1 The flame spreading ability for interior walls and ceilings finishing materials of the buildings having the various applications shall not exceed the category indicated in the Table 2.5.2.

2.5.3.2 In case of the water sprinkler system following to EIT Standards is provided for the considered areas. The maximum flame spreading ability for interior walls and ceilings finishing materials, which are indicated in the Table 2.5.2 shall be one step degrading. However, the flame spreading ability of any materials shall not be exceeded Class III.

2.5.4 Flooring Materials

2.5.4.1 The flame spreading ability of materials shall follow NFPA 253. It shall be classified to 2 classes (A, B), which the burning of materials shall be caused by critical radiant flux.

(a) Class A: for flooring materials and the critical radiant flux is not less than 4.5 kW/m^2.

(b) Class B: for flooring materials and the critical radiant flux is less than 4.5 kW/m^2 but not less than 2.2 kW/m^2.

2.5.5 Specification to Using Flooring Materials

2.5.5.1 The flame spreading ability for flooring materials of the buildings having the various applications shall not exceed the category indicated in the Table 2.5.3.

2.5.5.2 In case of the water sprinkler system following to EIT Standards is provided for the considered areas. The maximum flame spreading ability for flooring materials, which are indicated in the Table 2.5.3 shall be one step degrading. However, the flame spreading ability of any materials shall not be exceeded Class B.

Table 2.5.1: Material Classification (Flame Spread Property)		
Class	**Flame Spread Index**	**Smoke Density**
I	0 – 25	≤ 450
II	26 – 75	≤ 450
III	76 – 200	≤ 450

Table 2.5.2: Allowable maximum frame spread for interior finishing materials and ceilings			
Building's Category	**Area of Application**		
	Main Exit Way	**Other Exit Way**	**Rooms & General Area**
A1 A2	I	II	II
A3 A4	I	II	III
E1, E2, E3	I	II	III
S1, S2	I	I	I[1]
S3, S4	I	I	II[1]
B	I	II	III
C	I	II	III
F	II	III	III
SC	I	II	III
H1, H2, H3	I	II	III
HH	I	II	III
M1	I	II	III
M2, M3	III	III	III

[1] Fire rating material of Class III shall be allowed for administration area.

Table 2.5.3: Maximum Flame Spread of Decorated Building Surface Material		
Building's Category	**Area of Application**	
	Main Exit Way	**Other Exit Way**
S1, S4	A	A
S2, S3	B	B
B	B	B
M1, M2, M3	B	B

SECTION 6
PROTECTION OF OPENING

2.6 PROTECTION OF OPENINGS

2.6.1 General

2.6.1.1 Purposes

To establish the design guideline for protection the openings in order to protect the spread of fire and improve the protection efficiency of fire barriers and firewalls.

2.6.1.2 Scopes

This standard shall cover the design and installation the various kinds of protection of openings, including materials and equipment selection.

2.6.2 Protection of Horizontal Openings

2.6.2.1 Fire-resisting Doors

2.6.2.1.1 Fire-resisting doors shall be made of steel, wood or other materials. The doors should be of opaque rigid type or should be provided with internal insulation or fire rating materials. The doors shall be tested according to ASTM E119 standards.

2.6.2.1.2 Automatic self-closing devices shall be provided for fire-resisting doors.

2.6.2.1.3 Hinges of fire-resisting doors shall be made of non-combustible materials, and shall have the fire rating as same as the doors.

Fire-resisting doors shall be of swing type and shall be always opened. The door opening direction shall be the same direction as the fire escaping direction. In case of, two (2) swing doors are used for wider fire escaping ways, fire-resisting doors of smooth edges shall be used. Door's fins shall be allowed and fire strip shall be fixed on the door's edges.

2.6.2.1.5 Fire-resisting doors having air pressurization system shall be always closed during normal operation mode. If the doors are required to open during normal operation mode, the doors shall be equipped with self-closing devices; i.e. magnetic door holder, which shall send the command signal to close the doors during fire operation mode.

2.6.2.1.6 Gaps among the doors, door's frame, floors and ceilings shall not be more than 5 mm.

2.6.2.1.7 Unless otherwise specified, the fire rating of fire-resisting door shall not be less than one (1) hour, and shall not be less than the fire rating of the walls where the doors are fixed.

2.6.2.2 Smoke Control Doors

2.6.2.2.1 Smoke control doors shall be made of steel, wood or other materials and having the fire rating of not less than 30 minutes. The doors shall be tested according to ASTM E119 standards.

2.6.2.2.2 Automatic self-closing devices shall be provided for smoke control doors.

2.6.2.2.3 Hinges of smoke control doors shall be made of non-combustible materials, and shall have the fire rating of not less than one (1) hour.

2.6.2.2.4 Smoke seal shall be fixed on the edge of smoke control doors in order to protect the smoke migration to the other zones.

2.6.2.2.5 Smoke control doors are always opened during normal operation mode, the doors shall be equipped with self-closing devices; i.e. magnetic door holder, which shall be closed by the command signal of fire alarm system to close the doors during fire operation mode.

2.6.2.3 Fire-resisting Windows and Glazed Screen

2.6.2.3.1 The fire rating of windows or glazed screen for compartment, fire escape corridors or firewalls shall not be less than the fire rating of the walls where they are fixed.

2.6.2.3.2 Wired type fire-resisting glass including glass block shall be used for the firewalls having the fire rating of not more than 30 minutes.

2.6.2.3.3 The fire rating of frames shall not be less than the fire rating of the walls where they are fixed. In case of wooden frames are used, the frame shall have the fire rating of

not more than one (1) hour. If the fire rating of more than one (1) hour is required, the frame shall be made of steel or other materials.

2.6.2.3.4 The fire rating of sealant for glazed screen and window's frame shall not be less than the fire rating of the window's frame. Sealant shall be expanded when the heat is applied.

2.6.2.3.5 The dimension of fire-resisting windows and glazed screen shall follow the manufacturer' s standard, and shall be certified by the authorized institutions.

2.6.2.4 Conveyor Closer

2.6.2.4.1 Conveyor closer penetrating through fire compartment or firewalls shall be equipped with the fire alarm system activated automatic devices, which can automatically push the items out the conveyor.

2.6.2.4.2 Fire curtains, which are made of non-combustible materials and their fire rating of not less than one (1) hour, shall be installed over the conveyor closer. When the fire alarm system is activated and the timer delays are operated until to the pre-set timing, the fire curtains shall automatic close the conveyor closer.

2.6.3 Protection of Vertical Openings

2.6.3.1 Garbage Chute and Laundry Chute

2.6.3.1.1 The walls around garbage chute and laundry chute shall have the fire rating of not less than one (1) hour. If the chutes are closed to the fire escape spaces, the walls around the chutes shall have the fire rating of not less than two (2) hours.

2.6.3.1.2 The fire rating of openings for garbage chute and laundry chute shall not be less than the fire rating of the walls where they are fixed.

2.6.3.1.3 Chutes shall be inside the chute's room. The walls of the chute's room shall have the fire rating of not less than one (1) hour.

2.6.3.1.4 Doors of chute's room shall be made of fire-resisting doors, and shall have the fire rating of not less than one (1) hour.

2.6.3.2 Cavity Barriers

2.6.3.2.1 Large voids being between walls, floors and ceilings (more than 600 mm.) or hidden voids being above ceilings or below floors, shall have the cavity barriers in order to prevent the spread of fire or the smoke movement.

2.6.3.2.2 Cavity barriers shall have the fire rating of not less than 30 minutes, and shall be installed to the following locations:

(a) Install cavity barriers along the fire separating walls or floors, if having the voids between the walls.

(b) Install cavity barriers at every 20.0 m. or along the upper/ lower walls, if having the voids between floors or ceilings.

2.6.3.2.3 Cavity barriers shall not be allowed to be parts of fire compartment or firewalls. Cavity barriers shall not be allowed to be parts of common walls or separation wall between occupancies.

2.6.3.2.4 In case of the voids of item 2.6.3.2.1 are smaller than 100 mm., cavity barriers shall not be required and normal fire stopping materials can be instead of cavity barriers.

2.6.3.3 Fire Stopping and Linear Gap Sealing

Apply fire stop to the joints between fire floors, firewalls and fire-resisting ceilings. The fire stop shall be appropriate selected for each application and joints. The fire stop's properties should not reduce the fire rating ability of fire floors, firewalls or fire-resisting ceilings. The fire rating of fire stop shall not be less than the rating of compartment where the fire stop are sealed.

2.6.3.4 Stairs

2.6.3.4.1 The fire rating of stairs shall not be less than two (2) hours for the stairs connecting to 4 floors or more. Otherwise specified, one (1) hour rating stair shall be allowed. Except stairs inside the atrium connecting from ground floor to the 2nd floor or mezzanine floor, these stairs shall have the protection according to item 2.6.3.6.

2.6.3.4.2 Unless otherwise specified, the entrance door to stair's lobby shall be of fire-resisting

doors and having the fire rating of not less than rating of firewall where the doors are installed.

2.6.3.4.3 Acceptable opened escalators, with no enclosure according to this standard, shall be installed with smoke barriers around the voids nearby the ceilings. The depth of smoke barriers shall not be less than 450 mm. below ceiling level. Smoke barriers shall be made of non-combustible materials. The sprinkler heads shall be installed around the openings. The spacing between each sprinkler heads shall not exceed 1.80 m., and the distance between sprinkler heads to smoke barrier shall not exceed 300 mm.

2.6.3.5 Lift Shaft

2.6.3.5.1 Walls, including a minimum of two (2) hours fire doors, shall be constructed around the hoist-ways. Except having the lift's lobby, every wall around the lift's lobby shall be constructed by a minimum of two (2) hours firewalls.

2.6.3.5.2 Entrance door to lift's lobby shall be of fire-resisting doors and having the fire rating of not less than rating of firewall where the doors are installed.

2.6.3.5.3 Level of lift's lobby shall be a minimum of 50 mm. higher than closed area's level.

2.6.3.6 Atriums

2.6.3.6.1 Atriums of buildings having fully automatic sprinkler system shall be provided with the smoke exhaust system at the ceiling of atrium.

2.6.3.6.2 Smoke barriers shall be provided around the atriums. The depth of smoke barriers shall not be less than 450 mm. below ceiling level. Fire rating of smoke barriers shall not be less than one (1) hour.

2.6.3.6.3 In case of false ceilings are provided nearby the atrium. The depth of smoke barriers shall be measured to the lowest level of those ceilings level.

2.6.4 Protection of Electrical & Mechanical System Penetration

2.6.4.1 Protection of Air Ducts

2.6.4.1.1 Protection of air duct not using during fire mode, fire dampers shall be installed to the ductworks where the ductworks pass through floors, firewalls or fire-resisting ceilings. Fire dampers shall be tested and certified by approved institute, and shall have the fire rating of not less than rating of floors, firewalls or fire-resisting ceilings where the doors are installed. Where the fire compartment is penetrated, fire stop shall be applied between exterior surface of ductworks and floors, firewalls or fire-resisting ceilings. The fire stop's properties should not reduce the fire rating ability of fire floors, firewalls or fire-resisting ceilings.

2.6.4.1.2 Protection of air duct using during fire mode, where the fire compartment is penetrated, fire stop shall be applied between exterior surface of ductworks and floors, firewalls or fire-resisting ceilings. Fire stop shall be tested and certified by approved institute, and fire stop's properties should not reduce the fire rating ability of fire floors, firewalls or fire-resisting ceilings.

Remarks:
Air duct using during fire mode, shall be tested by approved institute in terms of fire-resistance ability, integrity and the ability to operate on fire by not less than 1.5 hours (for example, BS476: Part24).

2.6.4.2 Protection of Cable Trays

Where the fire compartment is penetrated, fire stop shall be applied between exterior surface of cable trays and floors, firewalls or fire-resisting ceilings. Fire stop shall be tested and certified by approved institute, and fire stop's properties should not reduce the fire rating ability of fire floors, firewalls or fire-resisting ceilings.

2.6.4.3 Protection of Plastic Pipes

Where the fire compartment is penetrated, expanded type fire stop (intumescent) or pipe collar with intumescent shall be applied between exterior surface of plastic pipes and floors, firewalls or fire-resisting ceilings. Intumescent shall be tested and certified by approved institute, and intumescent's properties should not reduce the fire rating ability of fire floors, firewalls or fire-resisting ceilings.

2.6.4.4 Protection of Metal Pipes

Where the fire compartment is penetrated, fire stop shall be applied between exterior surface of metal pipes and floors, firewalls or fire-resisting ceilings. Fire stop shall be tested and certified by approved institute, and fire stop's properties should not reduce the fire rating ability of fire floors, firewalls or fire-resisting ceilings.

2.6.4.5 Protection of Other Pipes

Beside of items 6.4.1, 6.4.2, 6.4.3 and 6.4.4, where the fire compartment is penetrated, intumescent shall be applied between exterior surface of pipes and floors, firewalls or fire-resisting ceilings. Intumescent shall be tested and certified by approved institute, and intumescent's properties should not reduce the fire rating ability of fire floors, firewalls or fire-resisting ceilings.

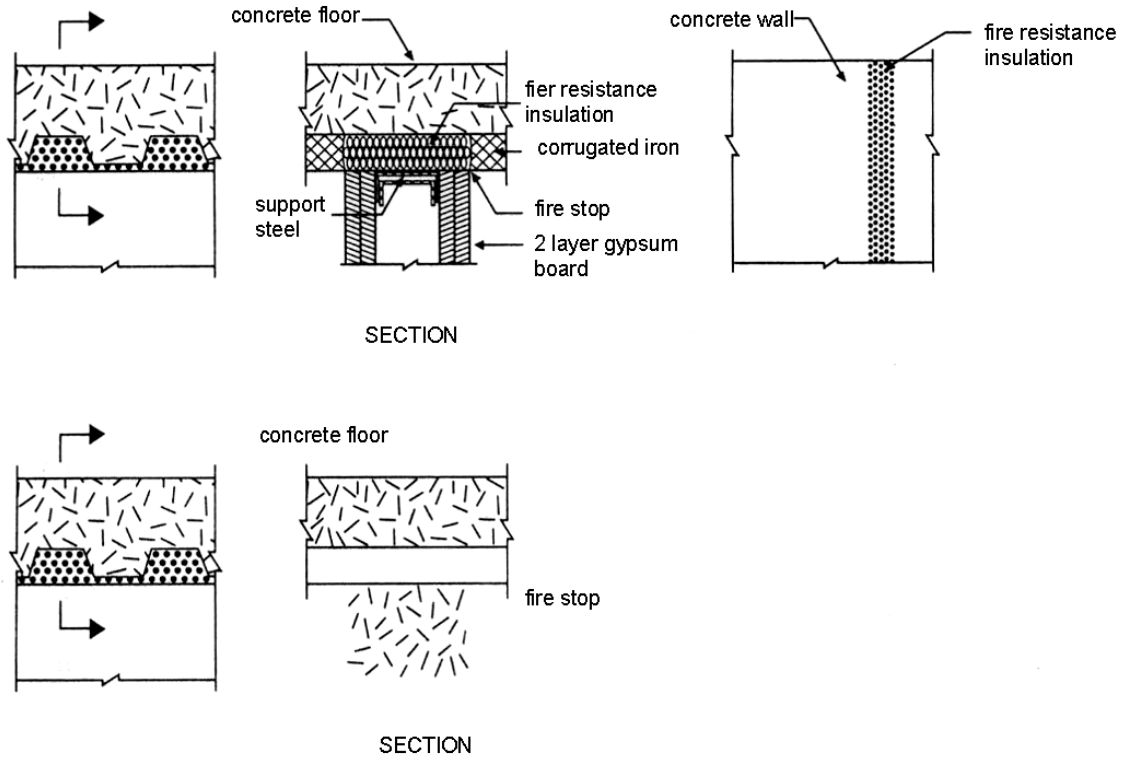

Figure 2.6.1 Protection of Compartment's Joint

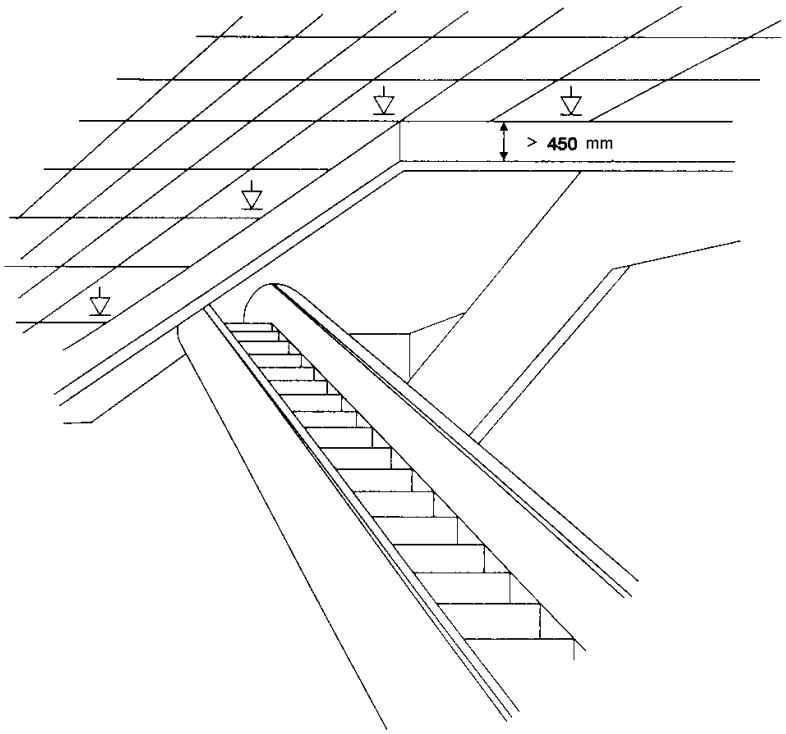

Figure 2.6.2 Installation of Sprinkler Head and Smoke Barriers around Escalator

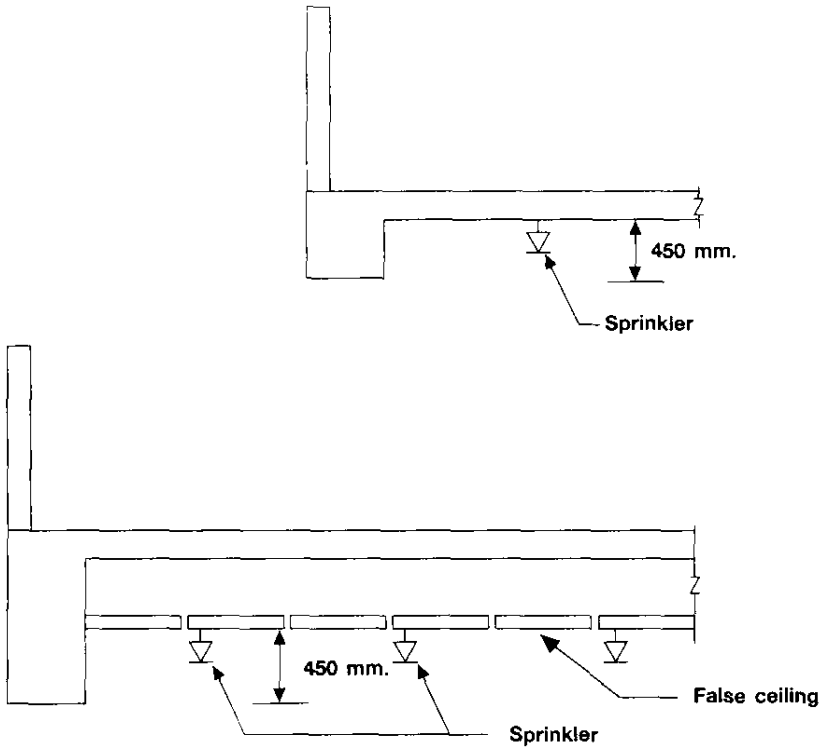

Figure 2.6.3 Installation of Smoke Barriers around Atrium

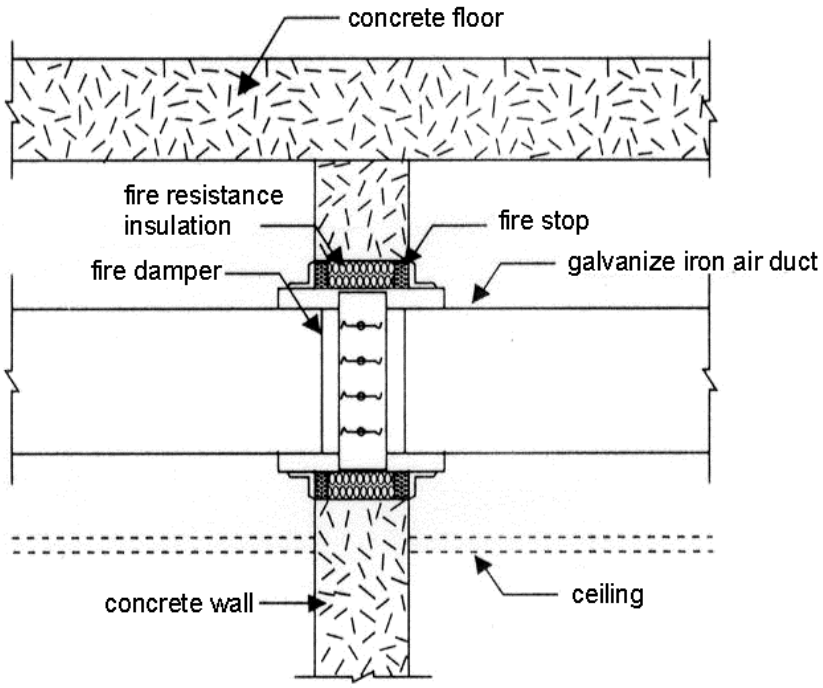

Figure 2.6.4 Protection of Air Duct Penetrate through Concrete Walls

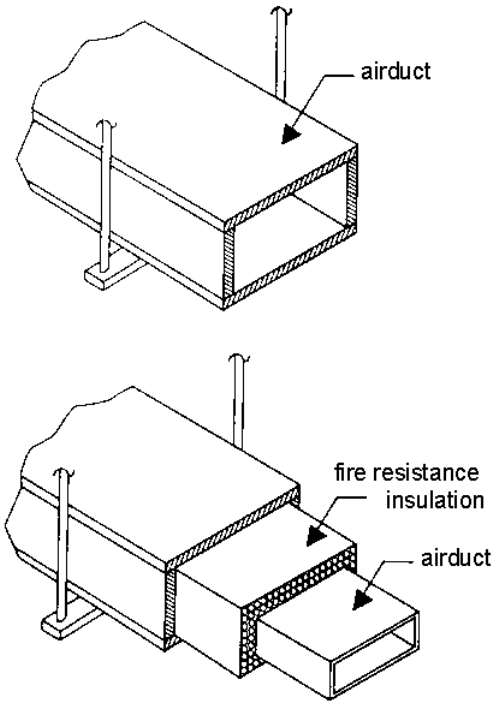

Figure 2.6.5 Protection of Air Duct during Fire Mode

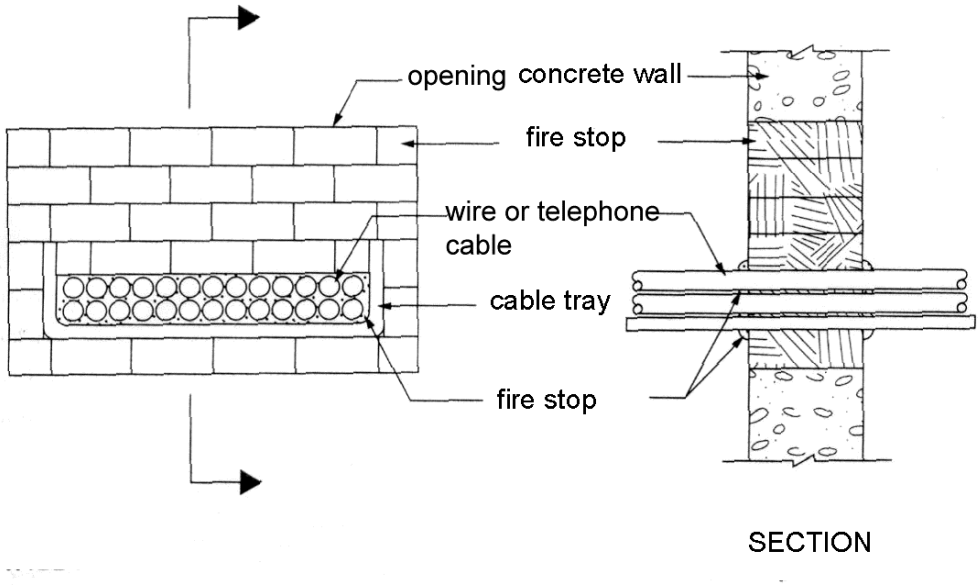

Figure 2.6.6 Protection of Cable Trays through Concrete Walls

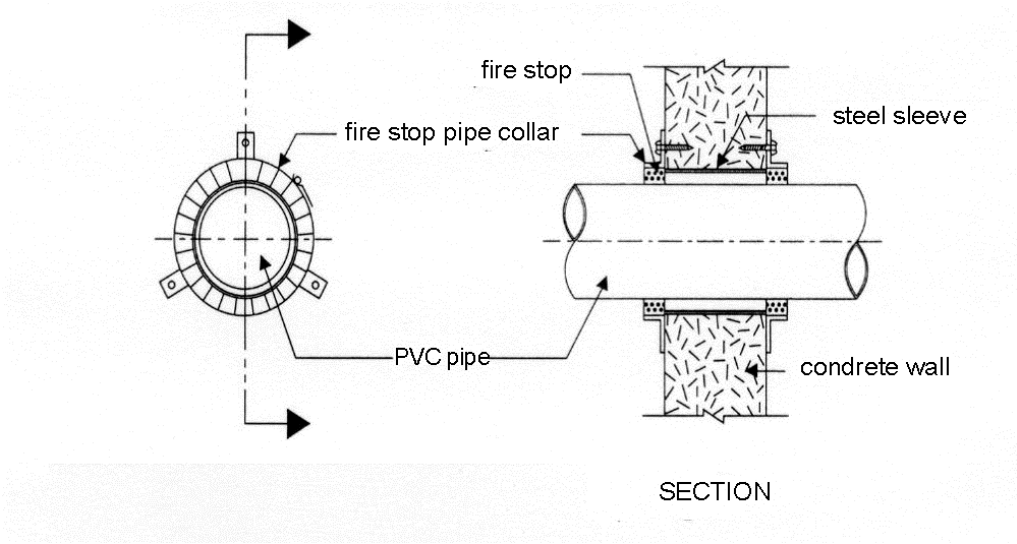

Figure 2.6.7 Protection of Plastic Pipes through Concrete Walls

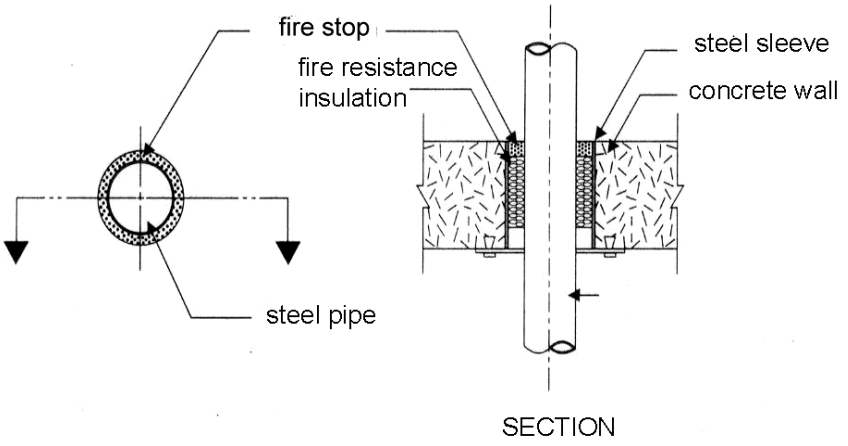

Figure 2.6.8 Protection of Metal Pipes through Concrete Floors

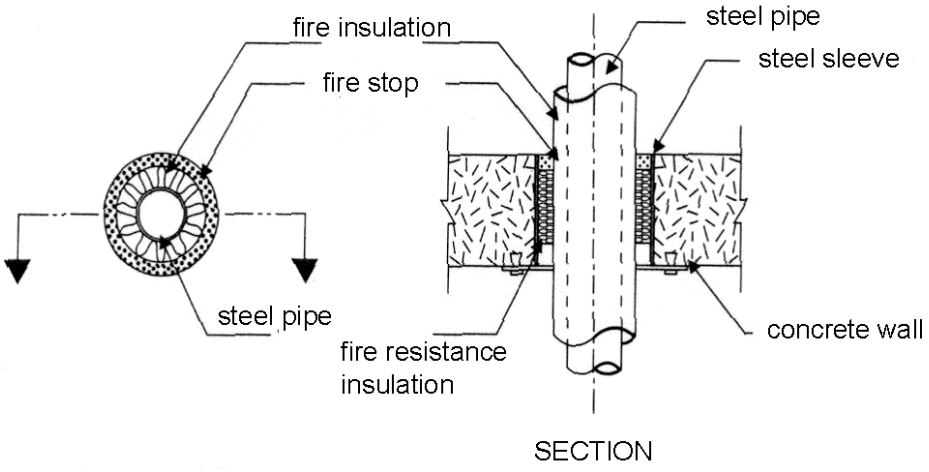

Figure 2.6.9 Protection of Other Pipes through Concrete Floors

SECTION 7
SITE PREPARATION

2.7 SITE PREPARATION

2.7.1 General

2.7.1.1 Purposes

The objectives of the project site preparation is to provide the spaces around the building in order to improve the operation of fireman for evacuate and fighting the fire, including to reduce the fire cross-over from one building to another building.

2.7.1.2 Definitions

Project site means the areas inside the property line, which having the construction or related works. The total of every floor and every building shall not exceed 10,000 m^2. or, the height of building, which is measured from ground level to the highest point of roof level, shall not be over 23.0 m.

2.7.2 Access Ways to Project Site and Space for Fire Truck

2.7. 2.1 Access to the project site shall be easily to designate parking areas. The width of access ways shall not be less than 6.0 m. Clear height of not less than 5.0 m. shall be provided over whole access ways.

2.7. 2.2 Access ways and parking space for fire trucks should have enough strength for the biggest size of fire truck.

2.7. 2.3 Parking areas for fire truck shall not be less than 9.0 m. of width and 18.0 m. of length. The distance of parking areas for fire truck from the building shall not be less than 6.0 m. and not be more than 18.0 m. measuring at the centered-line of fire truck.

2.7. 2.4 Number of parking areas for fire truck shall be enough for rescue the people inside the building. The parking areas shall be easily to park and access by no obstruction; i.e. trees, footpaths, etc, shall be allowed.

2.7.2.5 Parking areas of fire truck shall be related to access ways to the buildings. Fore department connections shall be provided and located nearby the parking areas, in order to supply the water to the water storage tank inside the building and to supply the water to building's fire protection piping system.

2.7.3 Emergency Access openings

2.7.3.1 In case of every side of building having the opaque rigid walls at level not higher than 23.0 m. above parking space for fire truck, the emergency access shall be provided for access to every floor. Each floor shall be provided with at least two (2) accesses, triangle signage should be provided for each access.

2.7.3.2 Balcony, windows and glazes along the external walls shall be allowed to be the external accesses.

2.7.3.3 The distance between two (2) external accesses shall not exceed 30.0 m.

2.7.3.4 The size of external accesses shall not be less than 0.90 m. of width, and not less than 1.20 m. of height. Clear height of internal accesses inside the building shall not be less than 1.80 m.

2.7.4 Fire Hydrants Location

2.7.4.1 In case of no public fire hydrants are provided for the project site, the building owner shall provide their own fire hydrant. The details of fire hydrants shall be described to Section 5, Chapter 5 (Fire Hydrant).

2.7.5 Prevention of Fire Cross-Over Another Building.

The buildings have to provide the procedure for prevent of fire cross-over another building as follows:

2.7.5.1 External walls shall be constructed of non-combustible materials having the fire rating conformed to Section 2, Chapter 3 (Standards Of Buildings Structure for Fire Protection).

2.7.5.2 In case of openings, windows or glazes are provided for the external walls. External clear spaces shall be provided of these sides of external walls in order to prevent the

spread of fire or cross-over the buildings (Refer to NFPA 80A, Recommended Practice for Protection of Building from Exterior Fire Exposures). Automatic closing devices with the same fire rating as the external walls, which according to Section 2, Chapter 6 (Protection of Openings), shall be provided.

A.8.3 Part 3 : Mean of Egress Standard

SECTION 1
PURPOSE, SCOPE AND GENERAL REQUIREMENT

3.1 OBJECTIVE, SCOPE AND GENERAL REQUIREMENT

3.1.1 OBJECTIVE

The standards in this section shall be used to design and construct a mean of egress in a building that safe for occupants.

3.1.2 Scope

3.1.2.1 To protect occupant, the standard in this section and other standards such as fire suppression system, fire alarm system and smoke control system shall be observed.

3.1.2.2 Occupancy change through building modification shall be inspect and recalculate the capacity of the mean of egress to observe this standard.

3.1.2.3 The standard in this section is minimum to rapidly and safety crowed movement from a building.

3.1.3 Separation of Means of Egress

3.1.3.1 Exit Access Corridors

Corridors used as exit access and serving an area having an occupant load exceeding 30 shall be separated from other parts of the building by walls having not less than a 1-hour fire resistance rating.

3.1.3.2 Exits

An exit shall be separated from other parts of the building, the separating construction shall meet the requirements of the following.

(a) The separation shall have not less than a 1-hour fire resistance rating where the exit connects three stories or less.

(b) The separation shall have not less than a 2-hour fire resistance rating where the exit connects four or more stories and shall be supported by construction having not less than a 2-hour fire resistance rating.

(c) Openings in the separation shall be protected by fire door assemblies equipped with door closures or fire dampers

(d) Openings in exit enclosures shall be limited to those necessary for access to the enclosure from normally occupied spaces and corridors and for egress from the enclosure.

(e) Penetrations into and openings through an exit enclosure assembly shall be prohibited except Electrical conduit serving the stairway , Required exit doors ,Ductwork and equipment necessary for independent stair pressurization ,Water or steam piping necessary for the exit enclosure ,Sprinkler piping , Standpipes and Electrical conduit serving the fire alarm system.

(f) Penetrations or communicating openings shall be prohibited between adjacent exit enclosures.

(g) An exit enclosure shall provide a continuous protected path of travel to an exit discharge.

(h) An exit enclosure shall not be used for any purpose that has the potential to interfere with its use as an exit.

3.1.4 Interior Finish in Exits

3.1.4.1 Interior finish on walls and ceilings in the means of egress shall be in accordance with Section 2.5

3.1.4.2 Furniture, decoration or other combustible material shall not be used in exit

3.1.4.3 A mirror shall not be installed on mean of egress door. The mirror can confuse occupant in direction of egress.

3.1.5 Headroom

3.1.5.1 Means of egress shall be designed headroom not less than 2 m nominal height above the finished floor or shall be measured vertically above a plane parallel to and tangent with the stair tread.

3.1.6 Walking Surfaces in the Means of Egress.

3.1.6.1 The walking surface of each element in the means of egress shall be uniformly slip resistant along the natural path of travel.

3.1.6.2 The walking surface of each element in the means of egress shall be nominally level if changes in elevation of walking surfaces exceeding 6 mm but not exceeding 13 mm, shall be beveled 1 to 2. Changes in elevation exceeding 13 mm shall be subject to the requirements of section 1.8

3.1.7 Changes in Level in Means of Egress.

3.1.7.1 Changes in level in means of egress shall be achieved either by a ramp, a stair or the others method in this standard.

3.1.7.2 Guards shall be provided at the open sides of means of egress that exceed 0.75 m. above the floor or grade below.

SECTION 2
CAPACITY OF MEAN OF EGRESS

3.2 CAPACITY OF MEAN OF EGRESS

3.2.1 Occupant Load.

3.2.1.1 The occupant load in any building or portion thereof shall be determined by dividing the floor area assigned to that use by the occupant load factor for that use as specified in Table 3.2.1.1 (A) and 3.2.1.1 (B) This table shall be used only for capacity of mean of egress calculation.

3.2.1.2 The number of seat bed or other equipment that are permanent installed can be used to calculate capacity of mean of egress if this number more than occupant load that is calculated in 3.2.1.1

3.2.1.3 If occupant load is calculated accordance with 3.2.1.1 when exit access is provide for occupant from other area, the occupant load in other area shall be included in the calculation.

3.2.1.4 Where an area or a room is used in varied purpose. There shall be calculated occupant load from the activity that has most occupant load.

3.2.1.5 If the occupancy of a building is changed after finish construction, the new occupancy shall not have occupant load more than the old occupancy.

3.2.1.6 The occupant load calculation accordance with 3.1.2 shall be used for either permanent structure or non-permanent structure.

3.2.2 Egress Capacity.

3.2.2.1 A capacity of mean of egress of each story include balcony and useful area shall adequate for occupant load that calculate accordance with 3.2.1

3.2.2.2 Where exits serve more than one story, only the occupant load of each story considered individually shall be used in computing the required capacity of the exits at that story, provided that the required egress capacity of the exit is not decreased in the direction of egress travel.

3.2.2.3 Where means of egress from a story above and a story below converge at an intermediate story, the capacity of the means of egress from the point of convergence shall be not less than the sum of the capacity of the two means of egress.

3.2.2.4 The required capacity of a corridor shall be the occupant load that utilizes the corridor for exit access divided by the required number of exits to which the corridor connects, but the corridor capacity shall be not less than the required capacity of the exit to which the corridor leads.

3.2.2.5 The width of exit way shall not less than 900 mm, except protrusive part accordance with this standard. The clear width shall not less than result that is calculated by use table 3.2.2 multiply with capacity of egress.

Table 3.2.1 (A) Occupancy and area per Occupant that are used in calculation

Unit : m^2 occupant

general occupancy[1]	**note**	**area per occupant**[2]
general occupancy		
office		10
cafeteria		1.5
restaurant		1.5
food center	self-service	1.0
shop		5.0
storage are or store room		30.0
kitchen		10.0
laundry		10.0
lobby	not a waiting area	.30
multi-purpose		1.0
convention hall		1.5
hotel room, apartment room	each room calculated	20.0
student's hostel	each room calculated	5.0
library	special occupancy considerate	10.0
machine room	with permanent compartment	30
corridor		-
toilet		-
others occupancy		10.0

Note
[1] In calculation gross area shall include area of machine equipment furniture.
[2] Area per occupant accordance with this table except others occupancy in table 3.2.1 (B)

Table 3.2.1 (B) specific occupancy and area per occupant that are used in calculation

Unit: m^2/occupant

Specific occupancy [1]	Note	Area per occupant [2]
Nursing home occupancy [2]		
Outpatient		1.5
Nurse station		10.0
I.C.U. room		20.0
Consultant / exam / treatment		5.0
Outpatient ward		20.0
Laboratory		20.0
Drug storage		
Educational institution occupancy [2]		
Classroom		1.5
Computer room		3.0
Library		5.0
Study room		1.5
Laboratory		5.0
Workshop		5.0
Tutorial room		1.0
Cafeteria		1.0
Offices occupancy [2]		
Banking hall		3.0
File room		10.0
Business center		10.0
Strong room		30.0
Drawing and Design room		5.0

Table 3.2.1 (B) specific occupancy and area per occupant that are used in calculation

Unit: m^2/occupant

Specific occupancy [1]	Note	Area per occupant [2]
Mercantile [2]		
Exposition area		1.5
Promotion commodity sale area		1.5
Super market, Super store		5.0
General commodity sale area		5.0
Industrial occupancy [2]		
Production area [3]		
Manual line		2.0
Manual line and Automatic line		6.0
Automatic line		10.0
Mechanical Workshop		10.0
Library		5.0
Laboratory		5.0
Cafeteria		1.0
Assembly occupancy[2]		
Gymnasium		3.5
Sport training area		3.0
Swimming pool		5.0
Bowling center	Not include bowling lanes	1.0
Amusement park	Not include plaything area	1.0
Billiard room		5.0
Skate arena		3.0
Disco-Floor		1.0
Karaoke club		2.5
Night club		2.0
Club/fitness center		5.0
Lock room/Bath room		-
Transport stain Concourse		3.0
Transport station departure area		3.0
Transport station arrival area		1.0
Stage		-
Back stage area		3.0
Clothing room of house of entertainment		3.0
Control room of house of entertainment		5.0
Waiting area	Stand type	0.3
Lobby or siting area stadium	Seat type	1.5
Multi-purpose area or Multi purpose hall	Stand type	0.3
Concert area or Concert hall	Stand type	0.3

Note

[1] In calculation gross area shall include area of machine equipment furniture.

[2] In the case of multi-purpose occupancy, the area per occupant in table 3.2.1 shall be used and the minimum area per occupant shall be used to calculation.

[3] The number of occupant in production area shall accordance with the number of occupant that is permitted by government officer but this number shall not less than valve that is calculated from Table 3.2.1 (B) industrial occupancy

Table 3.2.2 width per person for calculation width of exit way

Occupancy	Stair (mm./ occupant)	Door or Horizontal exit (mm. / occupant)
Extra hazard occupancy H1, H2, H3	18	10
Social welfare occupancy S1, S2	15	13
Others occupancy	8	5

SECTION 3
NUMBER OF MEAN OF EGRESS

3.3 NUMBER OF MEAN OF EGRESS

3.3.1 The number of means of egress shall be not less than two. This requirement shall not apply where a single means of egress is permitted in this standard, except where a single mean of egress is permitted accordance this standard.

3.3.2 The number of means of egress from any story or portion thereof shall be as follows:

Occupant load more than 500 but not more than 1000 — not less than 3

Occupant load more than 1000 — not less than 4

3.3.3 The occupant load of each story considered individually shall be required to be used in computing the number of means of egress at each story, provided that the required number of means of egress is not decreased in the direction of egress travel.

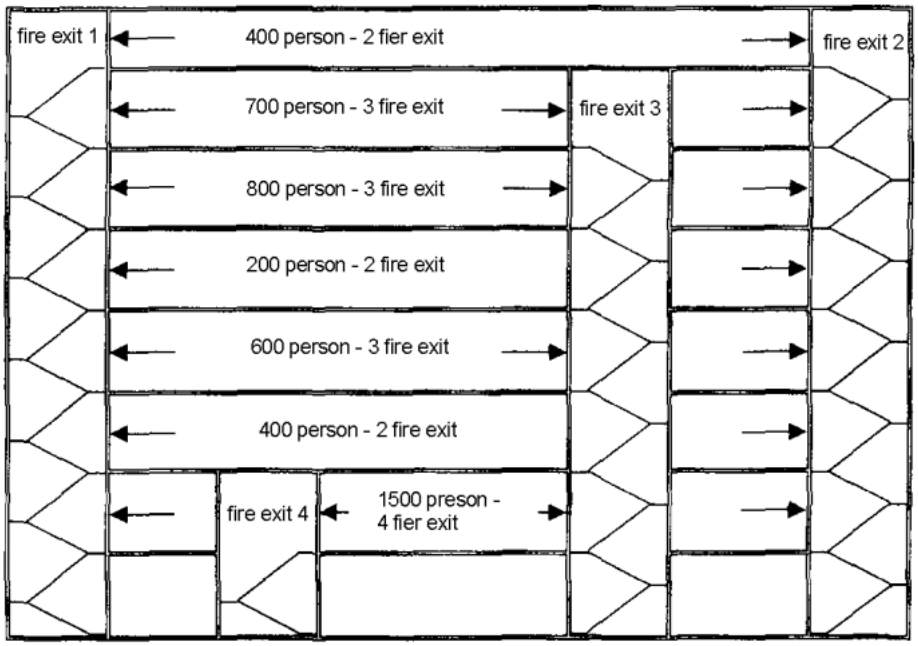

Figure 3.3.1 Minimum Fire Exit

SECTION 4
ARRANGEMENT OF MEAN OF EGRESS

3.4 ARRANGEMENT OF MEAN OF EGRESS

3.4.1 General.

3.4.1.1 Exits shall be located and exit access shall be arranged so that exits are readily accessible at all times.

3.4.1.2 Areas are not immediately accessible to an exit, shall be arranged to provide exit access not less than 2 way to exits without passing through any intervening rooms other than corridors, lobbies, dead end, aisle permitted by this standard.

3.4.1.3 Where more than one exit is required from a building or portion thereof, such exits shall be remotely located from each other and shall be arranged and constructed to minimize the possibility that more than one has the potential to be blocked by any one fire or other emergency condition.

3.4.1.4 Where two exits or exit access doors are required, they shall be placed at a distance from one another not less than one-half the length of the maximum overall diagonal dimension of the building or area to be served, measured in a straight line between the nearest edge of the exit doors or exit access doors. Where exit enclosures are provided as the required exits and are interconnected by fire resistance corridor, exit separation shall be permitted to be measured along the line of travel within the corridor.

3.4.1.5 Arrangement of means of egress and exit access shall be arranged so that there are no dead ends unless permitted in this standard.

3.4.1.6 Access to an exit shall not be through kitchens, storerooms, restrooms, workrooms, closets, bedrooms or similar spaces, or other rooms or spaces subject to locking.

3.4.1.7 Exit access and exit doors shall be designed and arranged to be clearly recognizable. Hangings or draperies shall not be placed over exit doors or located to conceal or obscure any exit. Mirrors shall not be placed on exit doors. Mirrors shall not be placed in or adjacent to any exit in such a manner as to confuse the direction of exit.

3.4.2 Exterior Ways of Exit Access.

3.4.2.1 The long side of the balcony, porch, gallery shall be at least 50 percent open and shall be arranged to restrict the accumulation of smoke.

3.4.2.2 Exterior Ways of Exit Access shall be separated from the means of egress inside the building.

3.4.2.3 Exterior Ways of Exit Access shall be strong and guard that not less than 1100 mm high shall be provided.

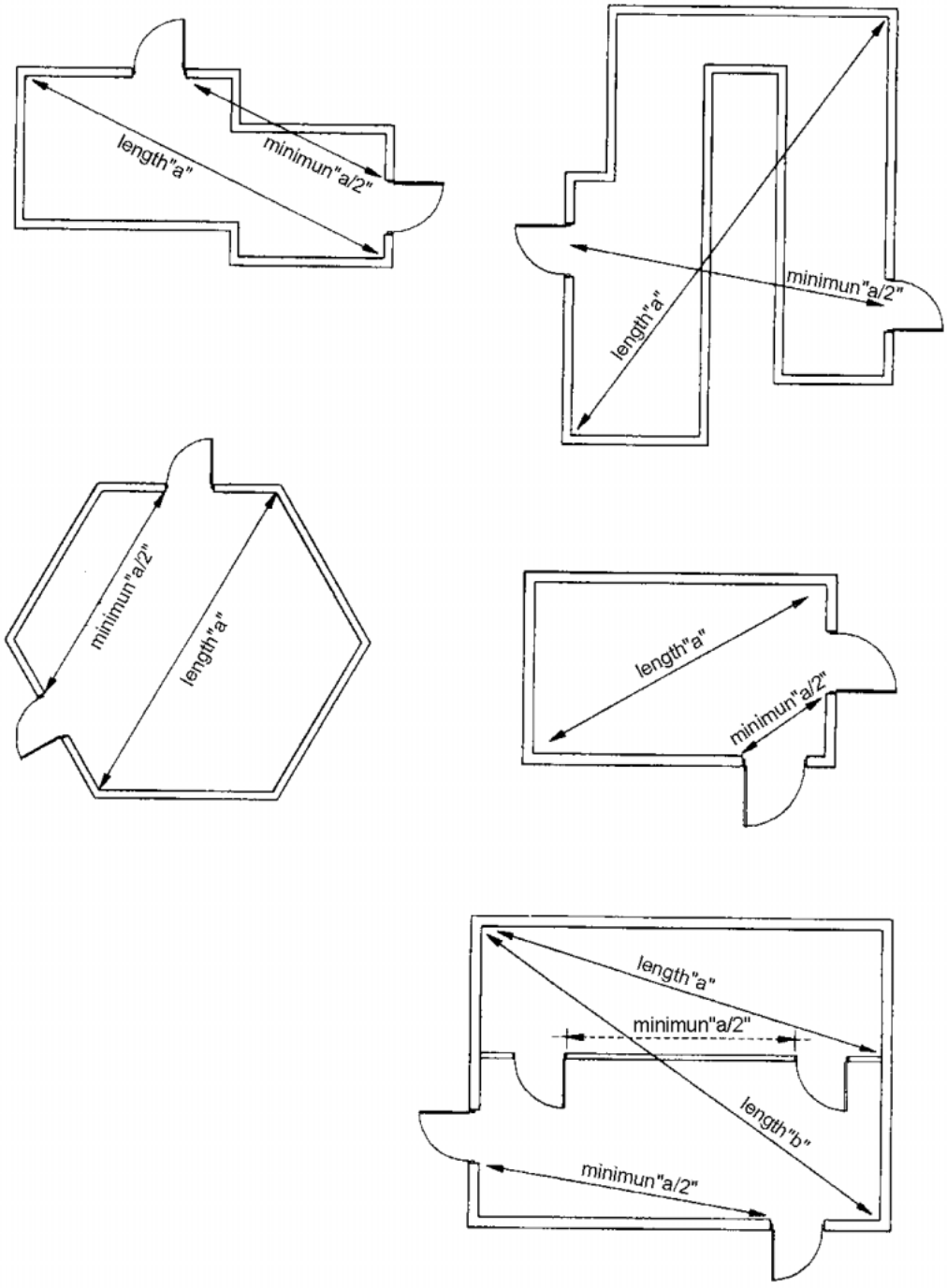

Figure 3.4.1 Position of Fire Exit

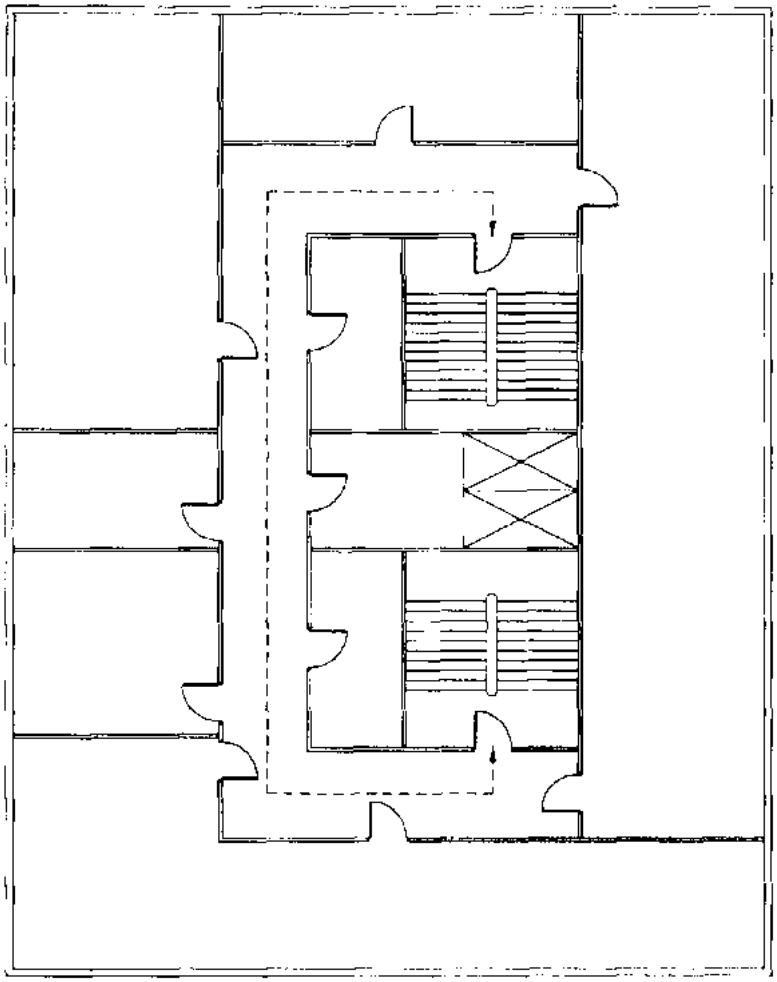

Figure 3.4.2 Distance between 2 Fire Exit

SECTION 5
TRAVEL DISTANCE

3.5 TRAVEL DISTANCE

The travel distance means distance from any occupied space to not a nearest exit shall not exceed the limits specified in table 3.5.1 or others requirement in this standard.

3.5.1 The travel distance to an exit shall be measured on the floor along the centerline, starting from the most remote point subject to occupancy and ending at the center of the doorway or other point at which the exit begins. Where measurement includes stairs, the measurement shall be taken in the plane of the tread nosing. See Figure 3.5.1.

3.5.2 Where open stairways or ramps are permitted as a path of travel to required exits, the distance shall include the travel on the stairway or ramp and the travel from the end of the stairway or ramp to an outside door or other exit in addition to the distance traveled to reach the stairway or ramp.

3.5.3 Where horizontal partition that connect to the entrance side of stairway, travel distance shall be distance from a most remote point that subject to occupancy to the partition door.

3.3.4 Where any part of an exterior exit is within 3 m of horizontal distance of any unprotected building opening the travel distance to the exit shall include the length of travel from a most remote point that subject to occupancy to ground level.

Table 3.5.1 Travel distance and maximum dead-end distance

Occupancy	Maximum travel distance (m)		Maximum dead-end distance (m)
	Non-automatic sprinkler protection	Automatic sprinkler protection	
Nursing home	30	60	6
Residential building	30	60	10
Assembly building	45	60	6
Educational building	45	60	6
Mega store	45	60	6
Offices	60	90	6

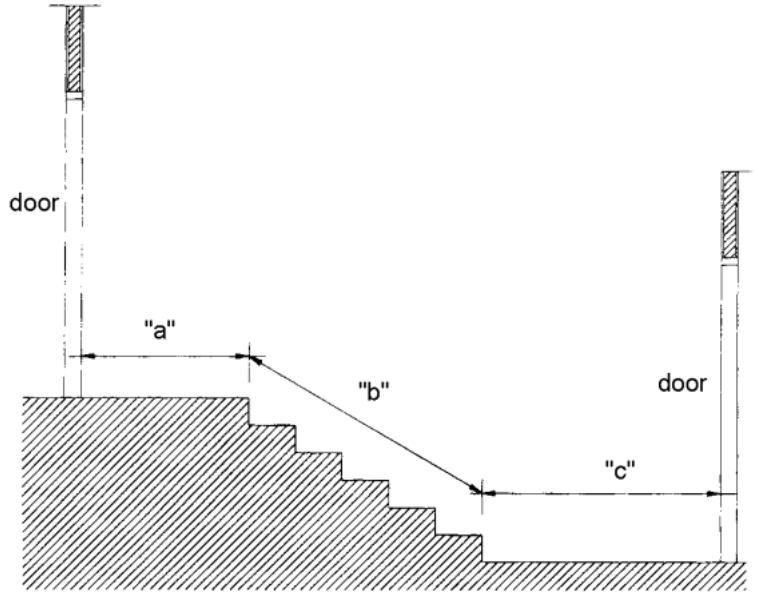

Figure 3.5.1 Measurement of Stair Travel Distance

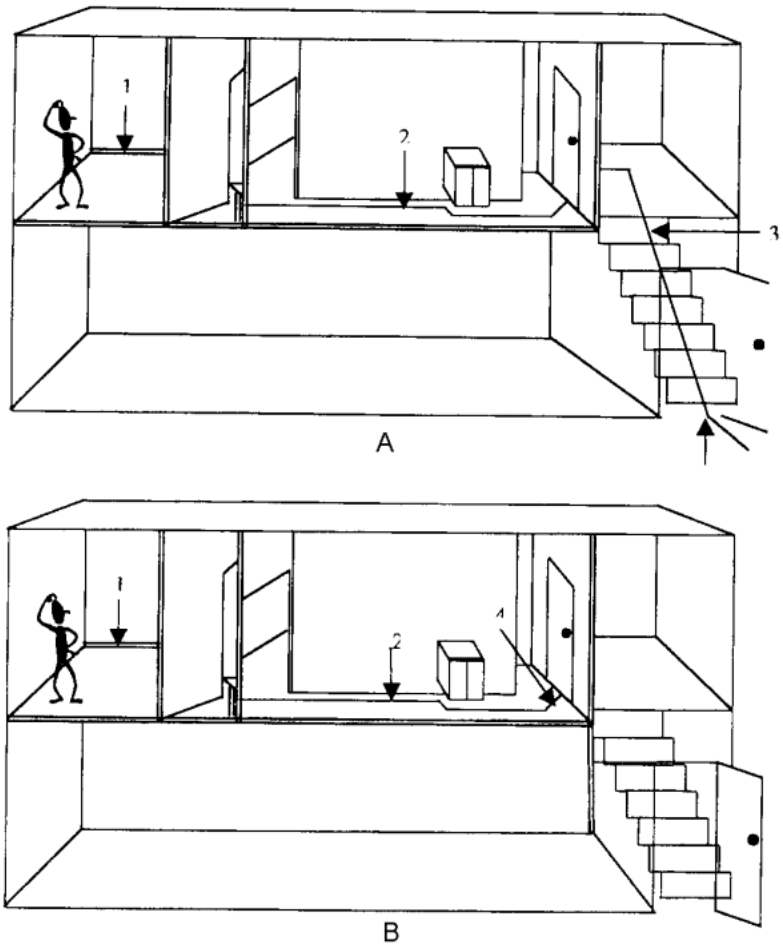

Figure 3.5.2 Total Travel Distance

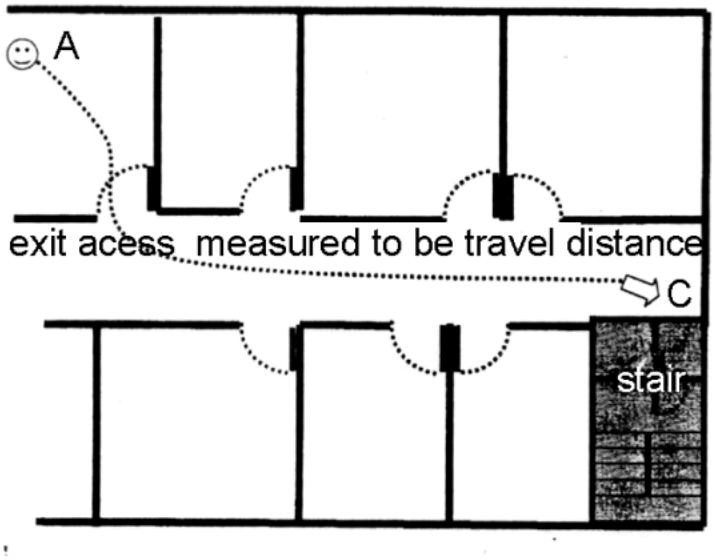

Figure 3.5.3 Exit Access and Fire Exit (Stair)

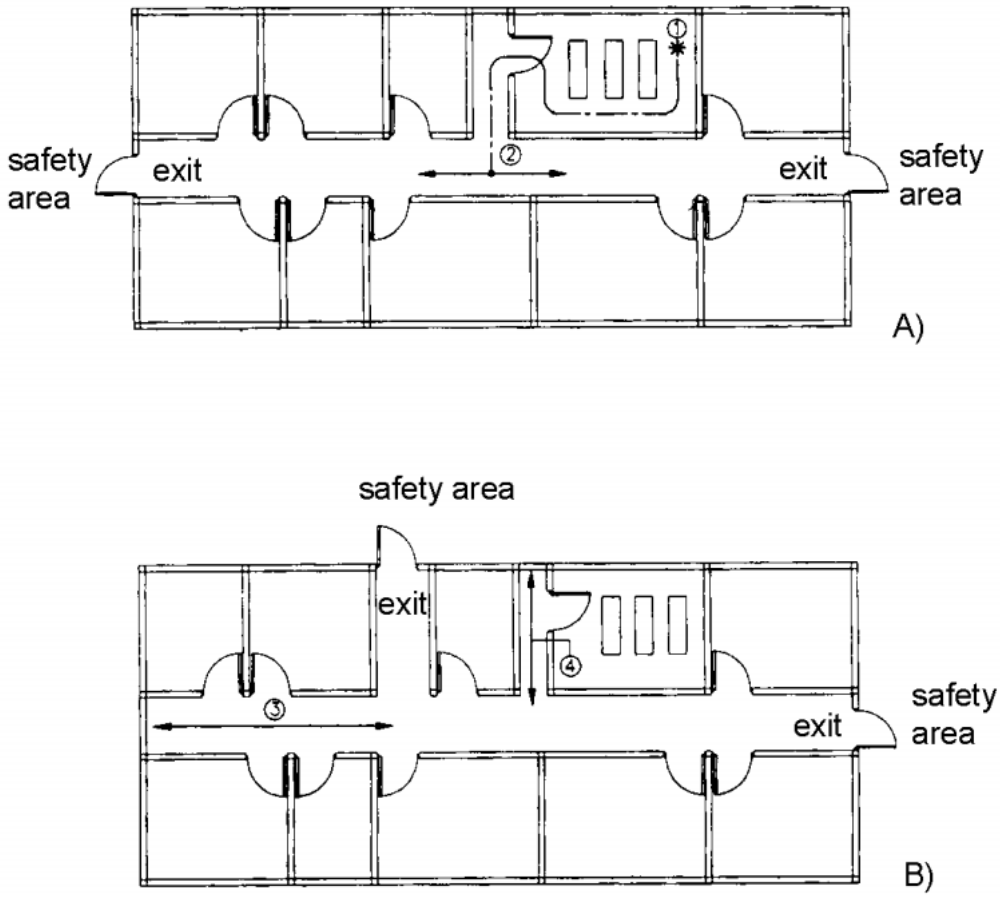

Figure 3.5.4 Example of Common Path of Travel and Dead-End

A) distance from 1 to 2 is exit access
B) distance form 3 to 4 is dead-end

SECTION 6
DETAIL OF DISCHARGE FROM FIRE EXITS

3.6 DETAIL OF DISCHARGE FROM FIRE EXIT

3.6.1 Exits shall terminate directly at a public way or at an exterior exit discharge. Yards, courts or open spaces shall be of required width and size to provide all occupants.

Exception No. 1: This requirement shall not apply to interior exit discharge as otherwise provided in 3.6.2

Exception No. 2: This requirement shall not apply to rooftop exit discharge as otherwise provided in 3.6.6

Exception No. 3: Means of egress shall be permitted to terminate in an exterior area of refuge as provided in this Standard

3.6.2 Not more than 50 percent of the required number of exits, and not more than

50 percents of the required egress capacity. A discharge is readily visible and identifiable to the public way or the exterior of the building and the level of discharge shall be protected by an automatic sprinkler system, or the portion of the level of discharge shall be protected by an approved automatic sprinkler system.

3.6.3 The exit discharge shall be arranged and marked to make clear the direction of egress to a public way. Stairs shall be arranged so as to make clear the direction of egress to a public way. Stairs that continue beyond the level of exit discharge shall be interrupted at the level of exit discharge by partitions, doors, or other effective means.

3.6.4 3.6.4 Doors, stairs, ramps, bridges, balconies, escalators and other components of an exit discharge shall comply with the requirements of this standard.

3.6.5 Signs shall comply with the requirements of this standard.

3.6.6 Exits shall be permitted to discharge to a roof if the roof construction has a fire resistant rating not less than that required for the exit enclosure. A continuous and safe means of egress from the roof to the ground shall be provided.

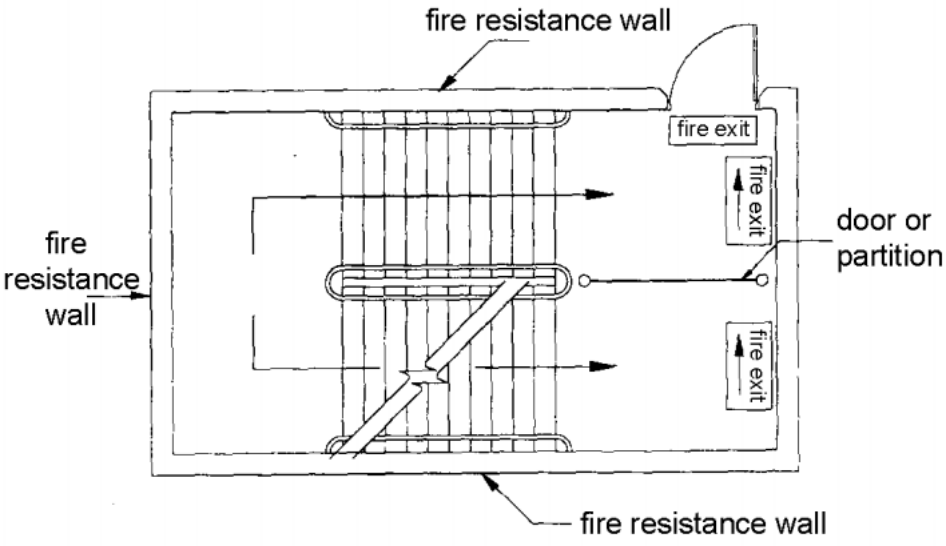

Figure 3.6.1 Protected wrong way evacuation partition

SECTION 7
MEANS OF EGRESS COMPONENTS

3.7 MEANS OF EGRESS COMPONENTS

3.7.1 Doors.

3.7.1.1 General.

For the purposes of Section 3.7.1, a building shall be considered to be occupied at any time it is open for general occupancy, any time it is open to the public, or at any other time it is occupied by more than 10 persons.

3.7.1.2 Properties, Characteristic and Fire door assemblies.

3.7.1.2.1 A door in mean of egress shall be fire resistant, not deform when subject to fire and not good heat transfer. The door shall be tested and listed from Authority Having Jurisdiction.

3.7.1.2.2 A door in mean of egress shall be readily used by occupant in the room or building for immediately and safely evacuate to safety area.

An exit door shall be differently visible from nearby wall.

3.7.1.2.3 Locks, Latches, and Alarm Devices.

3.7.1.2.3.1 Locks or latches that are used with door in a stair enclosure shall be arranged to be opened readily from the inside of the building. Locks shall not require the use of a key or effort for operation from the egress side.

3.7.1.2.3.2 An exit stairway door in a high rise building shall have unlock equipment for re-entry to the building. A unlock equipment shall be provide shall be provided every 3-5 storied. Through the exit stairway door that open to the roof shall be provided and unlock equipment for re-entry to building.

3.7.1.2.4 In the case of an occupant load more than 50. A door shall be equipped with a panic fire exit hardware. The width of push bar shall not less than one-haft of the door leaf width and not less than 0.8 m, nor not more than 1.2 m, above the floor. A push bar shall be constructed so that a horizontal force not exceed 66 N.

3.7.1.2.5 A door normally required to be kept closed shall not be secured in the open position at any time and shall be self-closing or automatic-closing.

3.7.1.2.6 A door that is used in a pressurized stair shall be normally close.

3.7.1.2.7 An egress door hinge shall be made from fire resistant material and melting point not less than 800 ^{o} C.

3.7.1.2.8 An equipment that is used to open the door shall be provided in opposite door side of push bar or lock equipment.

3.7.1.3 Width and Height of the Door.

A door in the building mean of egress shall not less than 2.0 m and not more than 1.2 m in height. When fully open the door shall have angle not less than 90^{o} measured from the frame.

3.7.1.4 Position of the Opened Door and Open Direction of the Door.

In a high-risk building or a room that have an occupant load more than 50, the direction of a door open shall be the same direction of the egress. When the door open 90^{o} measured from the wall, it shall not protrude more than the middle of the egress width. When fully open, no parts of the door protrude more than 200 mm measured from the wall surface.

3.7.1.5 Change in Level in a Door.

Floor of both side of doorway shall be level and there level with top of the door step. Where have the door step, the height of a door step shall not exceed 25 mm and floor level of both side shall be modified to level with the top of a door step in the door position. The slope of the floor shall not exceed than 1 in 2. Where the mean of egress is opened to outside building, the difference between outside floor level and inside floor level shall not exceed 150 mm.

3.7.1.6 Increased Door.

A door that is increased more than the standard requirement shall have properties accordance this standard.

3.7.1.7 The Other Kinds of Door.

The other kinds of door such as turnstiles, horizontal sliding door, folding door shall not be used in the building mean of egress.

3.7.2 Stairs.

3.7.2.1 General.

Stairs inside a building used as a component in the means of egress shall conform to the general requirements of this chapter, except the stair that is used for equipment inspection.

3.7.2.2 Dimensional Criteria.

The height of riser in the same stair shall be equivalent and not higher than 200 mm. The tread depth shall not less than 250 mm.

Exception : Where a total occupant load served by stairway is fewer than 10,a raiser not higher than 200 mm and a tread depth that not less than 250 mm shall be permitted to used.

3.7.2.2.1 Winders.

A winder that is used in a dwelling building that have tread depth more than 300 mm in the deeper tread and narrowest depth tread shall not less than 150 mm shall be permitted to be mean of egress.

3.7.2.2.2 Curved Stairs

Curved stair shall be permitted as a component in a mean of egress, provided that the depth of tread is not less than 250 mm and the smallest radius is not less than twice the stair width.

3.7.2.3 Landings

Landings shall have a width measured in the direction of travel that is not less than stair width. Landing shall exceed 900 mm, in the case of the stairs has a straight run.

3.7.2.3.1 Length between landings

The vertical length between landings shall not exceed than 3 m.

3.7.2.4 Handrails.

Stair shall have handrails on both sides. Where the width of stair more than 1.8 m, handrail shall be provided in the middle point of stair. The distance between handrails shall not more than 0.9 m. The handrail shall not be installed lower than 0.75 m and not higher than 0.95 m measured in vertical from the tread nosing. Where handrails are installed lower than 0.9 m, guard shall be provided.

Exception : Where the stair width not exceed than 1.2 m or the stair are used in dwelling, handrails shall be provided only one side that is open side of stair.

3.7.2.4.1 Size of handrails

Handrails shall have a circular cross section with a diameter of not more than 40 mm.

3.7.2.5 Scissor stairs

Scissor stair shall be permitted to be a mean of egress if the stair is separated to be 2 stairs by 2-hour fire resistance-rated non combustible construction. There shall be no penetration or opening between 2 stairs. The distance between doors shall be accordance with section 3.4

3.7.2.6 Underground Stairs

If a building stair and an underground stair terminate in the same enclosure of the mean of egress, the stair shall be interrupted by the wall and door to protect confusing in direction of egress travel and provided a clear direction sign.

3.7.2.7 Head Height

The gross of head height is measured from any positions on tread step, where is near size way at edge of step, to beneath of stair, step, or ceiling in stair that is not less than 1.9 m in height.

3.7.2.8 Stair Identification Sign.

Sign shall be provided within enclosure at each floor landing. The sign shall indicate the story, the terminus of top and bottom of stair enclosure. The sign shall be installed in a position that readily visible when the door is in the open or closed position.

3.7.2.9 Outside Stairs Protection.

Outside wall openings of more than 2 stories building that is at the point not more than 3 m measured in horizontal shall have self-closing opening protective that is not less than 45 min fire resistance.

Exception : In the case of outsides serving an exterior balcony that has 2 outside stairway shall be permitted to be unprotected.

3.7.2.10 Inside Stairs Construction.

Inside stairs shall be constructed accordance with E.I.T. standard. section 2 standard of building and fire

resistance. Where the stair is separated to be an under stair room, wall and ceiling in the room shall not less than 1 hour fire resistance.

3.7.2.11 Outside Stairs Construction.

Non-combustible materials shall be used for construction of outside stairs. Outside stair shall not be protrude in the area that is indicated to have an opening protection accordance with E.I.T.standard. Where the stair is separated to be an under stair room, wall and ceiling in the room shall not less than 1 hour fire resistance.

3.7.3 Exit Access or Corridor or Exterior Ways.

3.7.3.1 General

This standard shall be used in exit access, corridor or exterior balcony that is used to be more than 10 occupants mean of egress. 3.7.3.5, 3.7.3.6 and 3.7.3.7 in this section shall be used with all kind of buildings.

3.7.3.2 Width.

Exit access, corridor or exterior balcony shall not less than 0.9 m in width.

3.7.3.3 Protrusive Part.

Protrusive Part or obstruction stall not be permitted to be in exit access, corridor or exterior balcony.

Exception : When the door fully open, there can protrude in the corridor or balcony width but the clear width of corridor or balcony shall not be reduced more than 200 mm. The door shall not decrease the width more than a haft.

3.7.3.4 Exit Access.

Where the building that is required more than 1 mean of egress, mean of egress shall be proper arranged. Mean of egress can be entered in every position along exit access, corridor or exterior balcony, except a dead end.

3.7.3.5 Dead ends.

Corridor and exterior balcony shall be permitted to have dead ends if corridor and exterior balcony length not more than length that accordance with table 3.5.1.

3.7.3.6 Construction.

In the case of occupant load more than 30, walls and ceilings in the exit access or the corridor shall be not less than 1 hour fire resistance material. Walls and ceilings in the exterior balcony shall be material that has fire resistance rate equivalent to wall and ceiling material of the building.

3.7.3.7 Opening

The wall that passes through fire exit or passageway shall be fire resistance not less than 1 hour and fire door on this wall shall be fire resistance not less than ¾ hour. Opening inside the way, except ventilation duct which has fire damper, shall be fire resistance glass or wired glass. Total glazed area shall not more than 25% of total opening area on the wall that is separated room area and corridor, which is not included door area, and each glazed area shall not more than 0.75 m^2.

Exception

1) For corridor of commercial building and un-risk building, opening inside the corridor which is clear glass shall be unlimited size if it is less than 3 m. in width, and this corridor is not a fire exit route for other floors, and there are two fire exits on both ends of corridor.
2) Opening on wall that locates on the end of exterior fire exit balcony and the nearest fire stair shall be protected as specific for corridor, other wall openings to exterior fire exit balcony that has no fire protection.

3.7.4 Smoke Proof Enclosures.

3.7.4.1 General.

A smokeproof enclosure including stair that enclosed from the highest point to the lowest point by barriers having 2-hour fire resistance ratings.

3.7.4.2 Openings and Access.

Opening shall be permitted in the exit door and outside wall of smokeproof enclosure only. The smokeproof enclosure door shall not be permitted to directly open into building. The vestibule shall be provided between the enclosure and the outside building. The vestibule shall have the exit door from inside the building and the enclosure access door. The exterior balcony that is constructed from non combustible material shall be permitted to be the smokeproof enclosure access instead of a vestibule.

3.7.4.3 Doors.

Openings from the building into vestibules or balconies shall be protected by fire resistance door having a 1-hour fire resistance rating.

3.7.4.4 Discharge.

Smokeproof enclosure shall discharge into a public way, or into an exit passageway. Such exit passageways shall be without openings. Wall, floor and ceiling shall be separated from the remainder of the building by not less than 2-hour fire resistance rating.

3.7.4.5 Interruption

Stairs in the smokeproof enclosure shall terminate at the ground level. Where the stair can go to underground, the interruption shall be provided to protect occupant go to underground.

3.7.4.6 Smoke proof enclosures using natural ventilation shall comply with the following.

3.7.4.6.1 Every vestibule shall have a minimum dimension of not less than the required width of the corridor leading to it and a dimension of not less than 1.8 m. in the direction of travel and shall have a net area of not less than 1.5 m2 of opening in an exterior wall or

3.7.4.6.2 A net area of not less than 1.5 m^2 of opening shall be provided in an enclosure wall.

3.7.4.7 Mechanical ventilation smokeproof enclosures can be the pressurized stair. The pressurized stair shall comply with 4.8 and not have vestibule.

3.7.5 Horizontal Exits

3.7.5.1 General.

Where horizontal exits are used in the means of egress, they shall conform to the general requirements by the following.

3.7.5.1.1 Horizontal exit shall have fire barriers for separate the exit at least 2 parts to protect fire spread between parts of horizontal exit. Fire barriers shall be continued from outside building wall or from outside building wall to the other fire barrier or both continued from outside building wall and from outside building wall to the other fire barrier.

3.7.5.1.2 Horizontal exits shall be permitted to be substituted for other exits where the total egress capacity of the other exits (stairs, ramps, doors leading outside the building) is not less than half that required for the entire area of the building or connected buildings and provided that none of the other exits is a horizontal exit.

3.7.5.1.3 The floor area on either side of a horizontal exit shall be sufficient to hold the occupants of both floor areas, providing at least 0.28 m^2 clear floor area per person unless hospital, providing at least 2.8 m^2 clear floor area per person

3.7.5.2 Fire compartments.

3.7.5.2.1 Fire barriers separating building areas between which there are horizontal exits shall have a -hour fire resistance rating.

3.7.5.2.2 Any opening in such fire barriers of horizontal exits shall be protected not less than a 1-hour fire protection rating in accordance with section 2.6.

3.7.5.2.3 Doors in horizontal exits shall comply with chapter 7 of this part.

3.7.5.2.4 The doors shall swing in the direction of egress travel.

3.7.5.2.5 Where a horizontal exit serves areas on both sides of a fire barrier, 2 exit doors shall be provided and they shall open in opposite direction. Signs or egress travel mark shall be provided only the side of the wall that occupant travel through or the 2 open direction shall be provided. The exit door properties shall accordance with section 3.7 mean of egress component.

3.7.6 Ramps

3.7.6.1 General.

Every ramp used as a component in a means of egress shall conform to the general requirements of this chapter.

3.7.6.2 Width.

The ramp width shall not less than the corridor width. The ramp slope shall not more than 1 in 8.

3.7.6.3 Handrails.

Where the ramp slope more than 1 in 10 shall be provided a handrail that is like the stair handrail accordance with 3.7.2.5.

3.7.6.4 Construction.

Ramps shall be constructed accordance with the requirements of construction of stairs accordance with section 3.7.2.10 and 3.7.2.11.

3.7.7 Area of Refuges.

3.7.7.1 General.

An area of refuge used as part of a required accessible means of egress in accordance or used as a part of any required means of egress

3.7.7.2 Area of refuges shall be separated and enclosed by wall or material that has fire resistance rate not less than 2 hours. Opening in an area of refuse shall be not less than 2 hours fire resistance. Area of refuges shall accordance with section 2 of the standard. Capacity of an area of refuge shall adequate for all occupant load in emergency situation

3.7.7.3 Accessibility.

Required portions of an area of refuge shall be accessible from the space they serve by an accessible means of egress and portions of an area of refuge shall have access to a public way, via an exit passageway or an exit stair enclosure or an elevator. Where an elevator provides access from an area of refuge to a public way , an exit discharge or safe areas. The elevator shall have properties accordance with latest version fireman elevator standard of E.I.T.

3.7.7.4 The area of refuge shall be provided with a two-way communication system for communication between the area of refuge and a fire command center.

3.7.7.5 Each area of refuge shall be sized to accommodate one wheelchair space of 0.76 m. x 1.2 m. for each 200 occupants and such wheelchair spaces shall maintain the width of a means of egress to not less than 0.90 m.

3.7.7.6 Each area of refuge shall be identified by a sign stating the following

AREA OF REFUGE

The sign shall be installed at each door providing access to the area of refuge. Signs shall be conformed with chapter 9.

3.7.8 Exit passageways

3.7.8.1 General

Exit passageways used as exit components shall conform to the general requirements of this chapter.

3.7.8.2 Enclosure

An exit passageway shall be separated from other parts of the building as specified in section 3.1.3. Where an exit passageway that serves as a discharge from a stair enclosure shall have not less than the same fire resistance rating and opening protective fire protection rating as those required for the stair enclosure.

3.7.8.3 Width.

The width of an exit passageway shall be adequate to accommodate the aggregate required capacity of all exits that discharge through it.

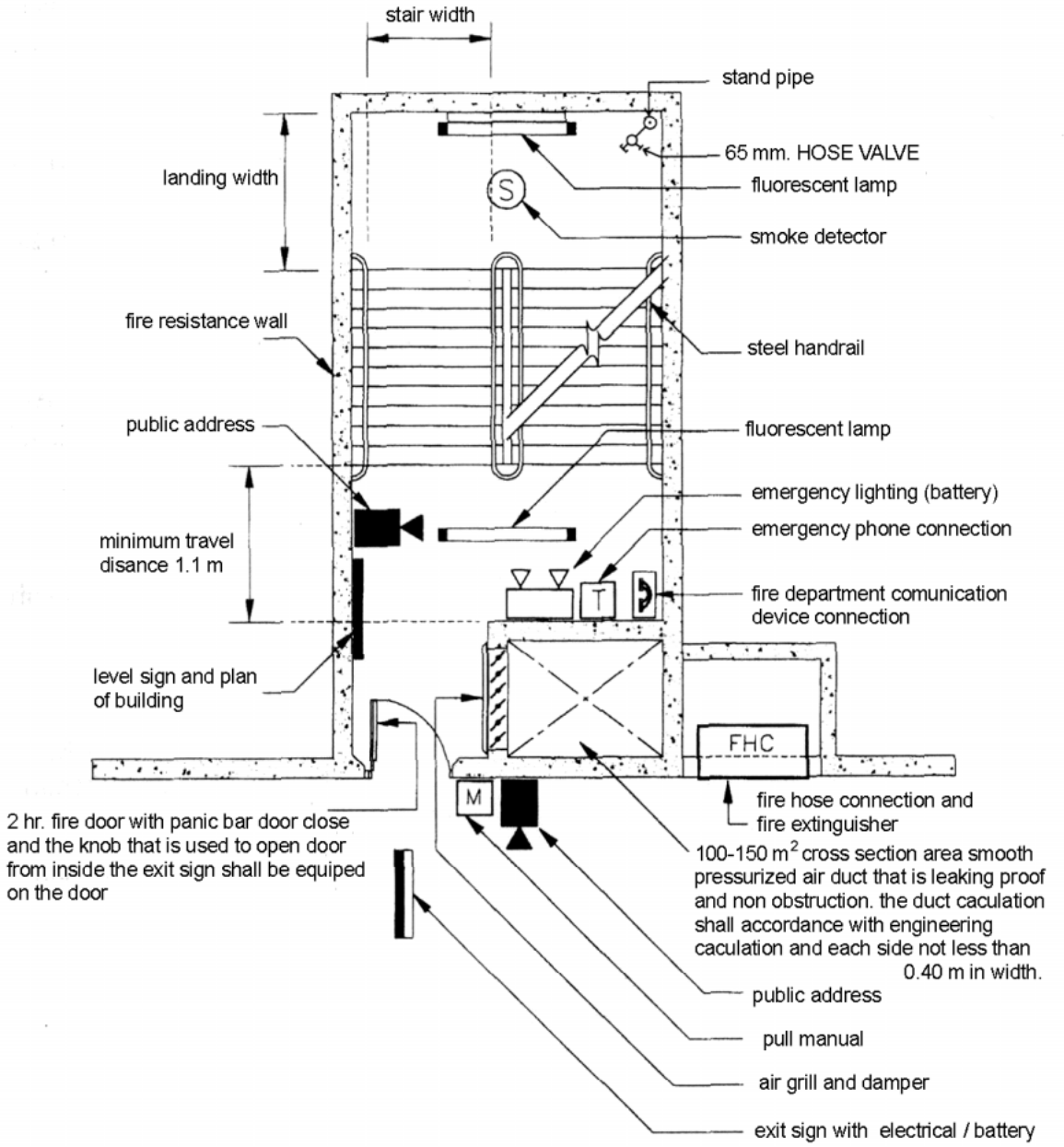

Figure 3.7.1 Standard stair

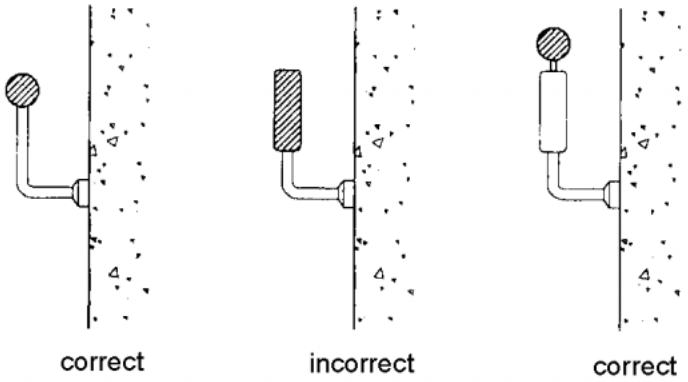

Figure 3.7.2 Handrails

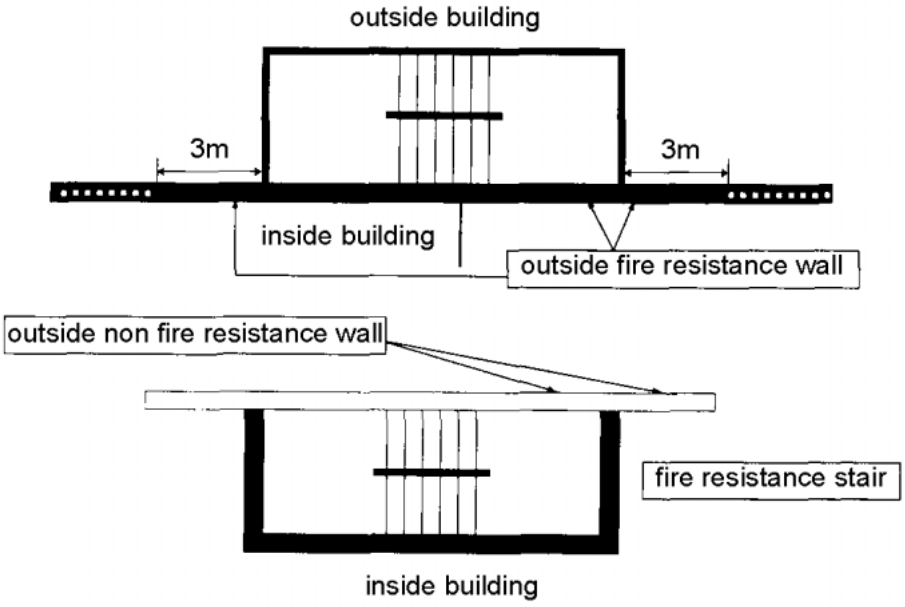

Figure 3.7.3 Protection of Stair

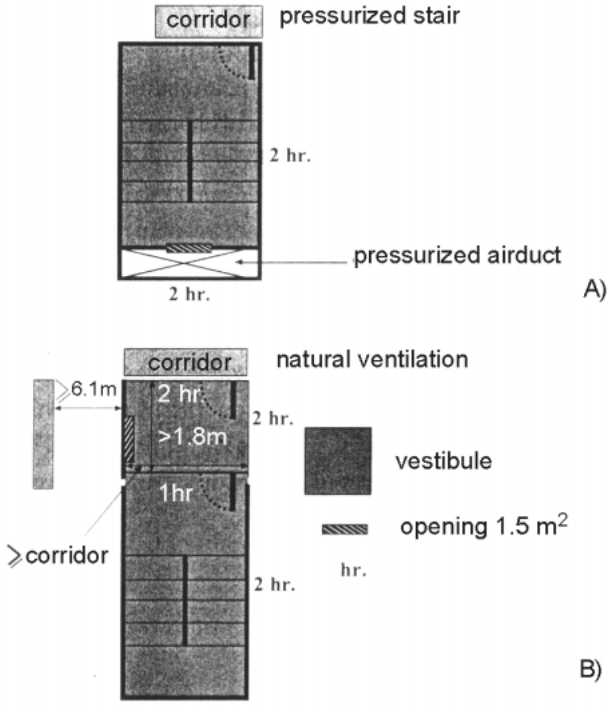

Figure 3.7.4 Smoke Proof Enclosure

A) pressurize stair

B) natural ventilation

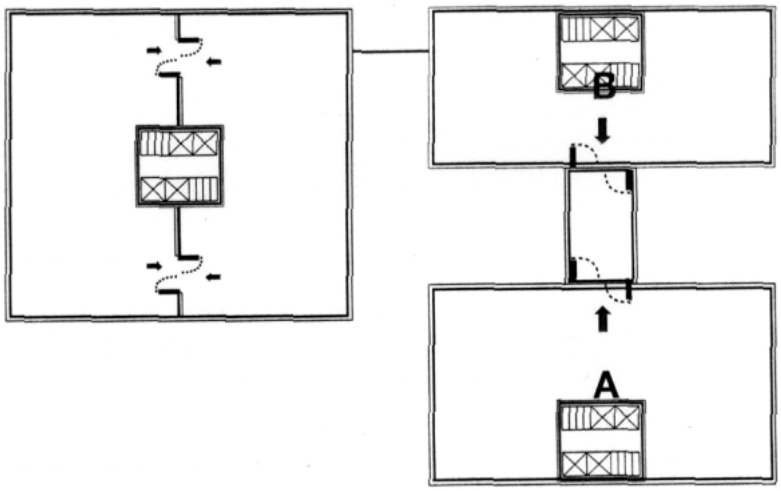

Figure 3.7.5 Horizontal Fire Exit

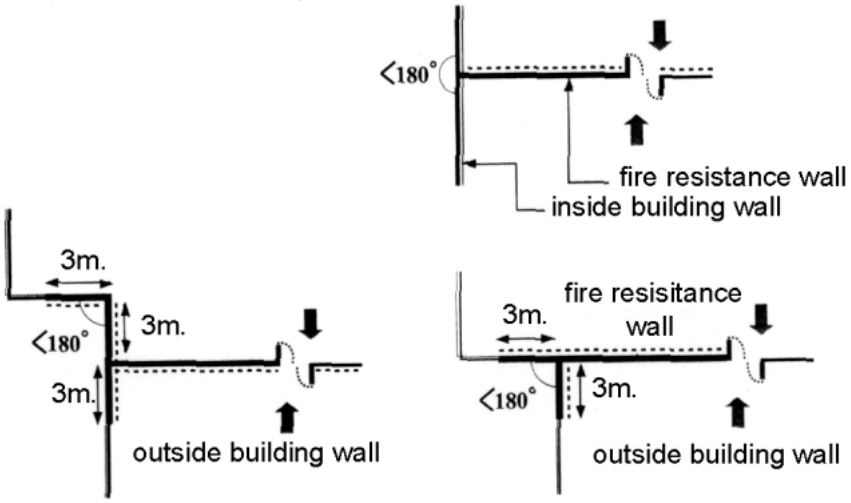

Figure 3.7.6 Outside Fire Wall

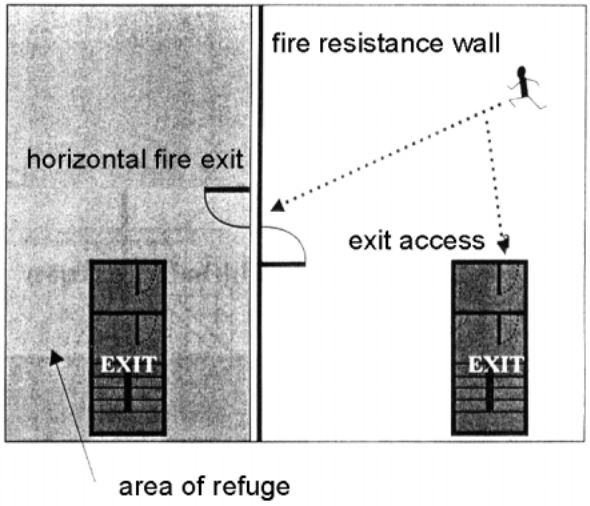

Figure 3.7.7 Horizontal Fire Exit Area of Refuge

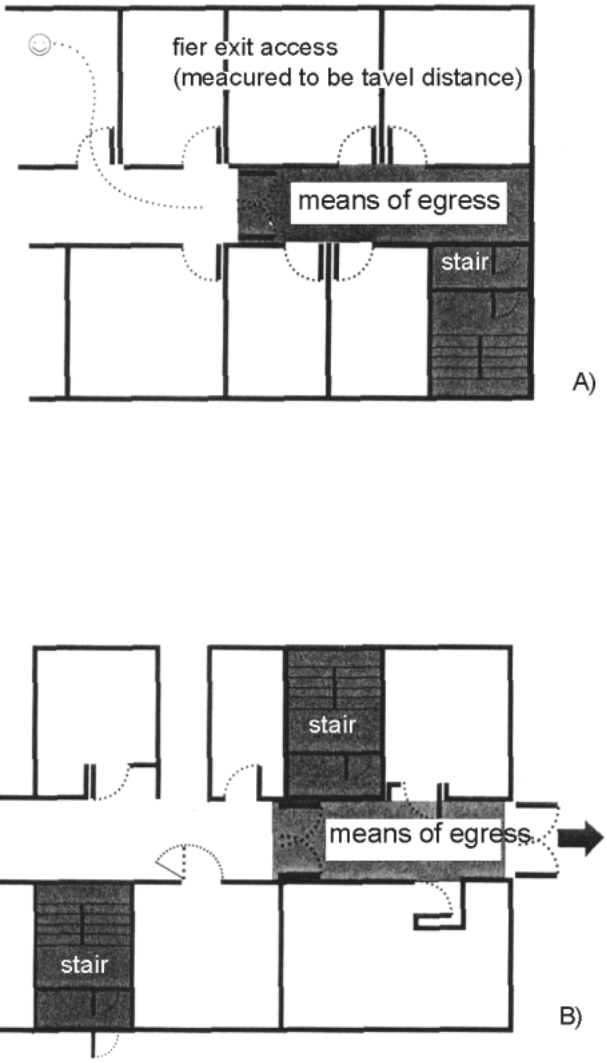

Figure 3.7.8 F ire Exit Passageway

A) way that connects to fire exit on building

B) way that connects to exit discharge on ground level.

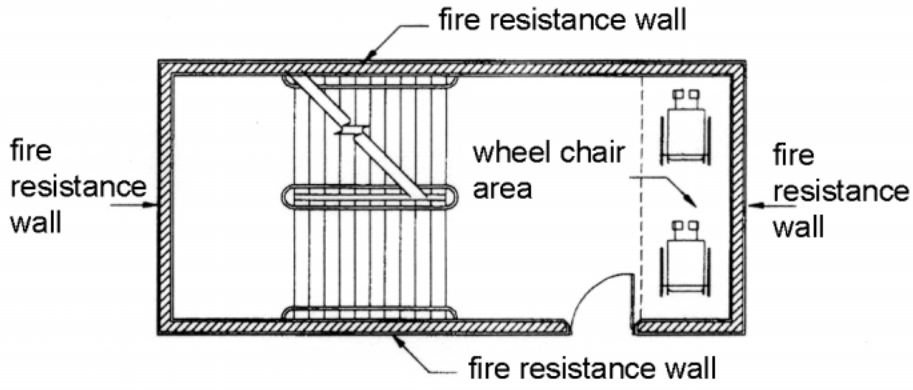

Figure 3.7.9 Area of Refuge for Disability Person in Stair Way

SECTION 8
ILLUMINATION OF MEANS OF EGRESS

3.8 ILLUMINATION OF MEANS OF EGRESS.

3.8.1 Mean of egress shall be provided adequate illumination for safety of occupant in panic and confuse situation

3.8.2 The floors within the means of egress shall be illuminated to values of at least 10 lux (1 foot candle) measured at the floor.

3.8.3 Power that is supplied to illumination system shall be supplied from reliable source such as emergency generator.

3.8.4 The other requirements of mean of egress illumination system shall accordance with section 4.7

PART 3
SECTION 9
SIGN AND MARKING

3.9 SIGN AND MARKING

3.9.1 Signs and marking that are used for locate and show the direction of egress travel shall be provided readily visible in the mean of egress.

3.9.2 Signs and marking shall have light for clear visible all time.

3.9.3 Exit signs shall have an arrow symbol. The arrow symbol that are used in a mean of egress shall be one of this examples.

EXIT ------->
<------- EXIT
<------- EXIT ------->

Where a door, a stair or corridor that is not the part of a mean of egress near a exit the sign that state following shall be provided:

NO EXIT

Other words shall be proper used

GO TO UNDERGROUND
STORE ROOM

3.9.4 Signs help occupant to readily know and visible a exit. Such as exit and fire protection symbols in Fig. 9.2

3.9.5 The other exit signs or marking shall be accordance with section 4.7

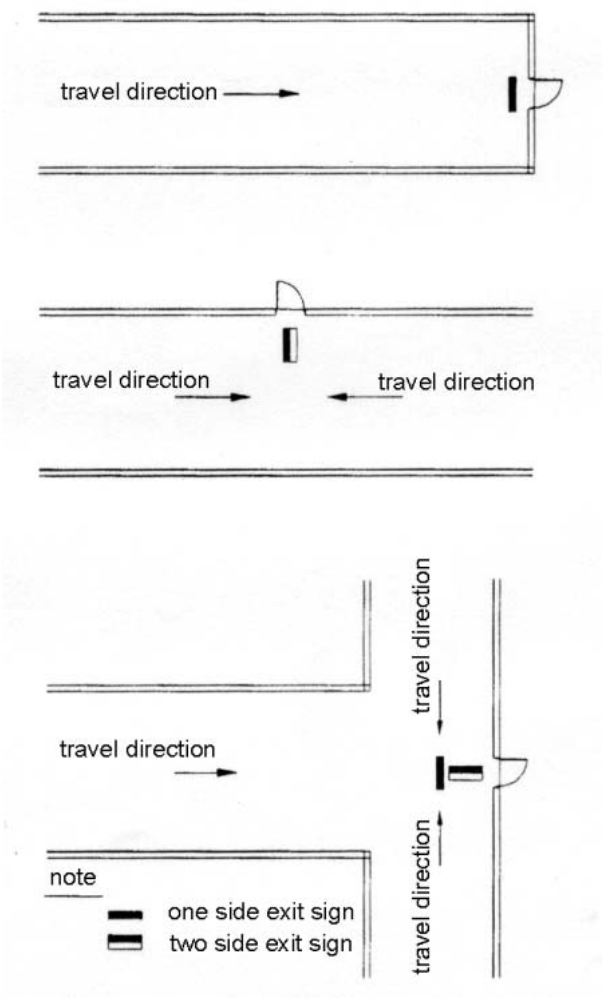

Figure 3.9.1 Position of Exit sign

SECTION 10
FIRE DRILL

3.10 FIRE DRILL

3.10.1 General

Fire hazards have led to loss of lives and property. Fire drill is a part of fire precaution, especially for the lives of people living in high-rise buildings. Because of the changing life style of people in big city who have to live together in the same building of in limited space. It is difficult to evacuate several people from the building safely within limited time, if there is no preparation for evacuation and fire drill regularly. The goal is for safety of the people living in the building. Besides the design and construction of building according to the safety standards, every person in the building must evacuate from the building without assistance from outsider. So, please remember that the most important part of evacuation plan is ourselves.

It is the duty of every person to participate in fire drill. The management must realize the necessity and be responsible for the people living in the building by supporting fire drill, in terms of both expenses and time.

3.10.1.1 Fire drill for high-rise building has the objectives as follows:

3.10.1.1.1 To evacuate a lot of people from high-rise building in orderly manner according to the evacuation plan;

3.10.1.1.2 To familiarize with the general practice of evacuation;

3.10.1.1.3 To understand and realize one's responsibility during evacuation and the importance of participation in fire drill;

3.10.1.1.4 To understand and realize smoke hazard and the method of evacuation with condition surrounded by smoke;

3.10.1.1.5 To familiarize with the building's structure and unsafe areas in the high-rise building;

3.10.1.1.6 To familiarize with fire prevention system such as fire detector device;

3.10.1.1.7 To be confident in life safety to living in the high rise building.

3.10.1.1.8 For firemen from the fire brigade to familiarize themselves with the premises and responsible officers.

Before planning for fire drill, familiarization must be made with regard to type of occupancies, fire escape method and alarm devices in the building first. Moreover, the most important factor to take into consideration is behavior of people in the building. It is similar in most large buildings that when an alarm rings, people would understand the alarm system is malfunction and did not react until others began to panic and scream. Them, everyone would be panic and look for the exit at the same time. If no fire drill is conducted regularly, it would lead to disaster and injuries and even death. Just imagine an office building with and area 30,000 sqm. and generally is higher than 30-story, having 3,000 people working, how can they evacuate without advance planning because two stairs of 30-story building which is considered the safest area in the building have capacity for 1,200 people only (exit stairs with the design according to law).

Before one-half of these people can get to the stairs, they must wait for people in the lower floors to leave the building first, which is depending on the rate of dispersing people to the safe area. Therefore, if some people happen to be stuck on the floor that was on fire or the nearby floors, this would lead to loss of lives. In case of fire stairs with compressed air system, if the fire escape door remains open because too people are trying to get in at the same time, the smoke will come in and it would be a tragedy because there must be several hundreds of people therein.

Therefore, fire drill is necessary for high-rise building and must be conducted regularly. In view of this, the building owner must submit the fire drill report, including evacuation plan and name list of fire wardens to the concerned government agency yearly in June. The procedure and guidelines for every building are as follows:

3.10.2 Safety Officer Qualifications

The qualifications of the fire Safety Director of building and Fire Wardens, to be selected prudently, are as follows:

3.10.2.1 Must be of good health and strong;

3.10.2.2 Should be selected from volunteers; and

3.10.2.3 Having been trained and certified by public disaster relief unit or other reliable organization.

3.10.3 Fire Drill

3.10.3.1 Drill on fire alarm;

3.10.3.2 Drill on preliminary fire fighting by using portable fire extinguisher and fire hose; and

3.10.3.3 Drill on evacuation of people from the building to the safe area as planned.

3.10.4 Evacuation Plan

Evacuation plan must be in place as follows (for specific type of occupancy, an evacuation plan must be prepared suitable for that particular building):

3.10.4.1 Fire Emergency Organization must be established, comprising of the persons with the following positions and duties :

3.10.4.1.1 Fire Safety Director has the duty to arrange for fire drill and to be the Fire Warden when fire occurs. The Fire Warden shall be provided in the Fire Command Center during fire and at least one reserve persons.

3.10.4.1.2 Floor Fire Warden, or for certain area, has the duty to oversee evacuation to fire stairs safely, assist disability person or senior person or those who cannot help themselves (to be surveyed in advance), assist in preliminary fire fighting, check the number of people and the people remaining in various rooms and report to the Fire Safety Director. There must be four Floor Fire Wardens for evacuation of 100 people and at least four Floor Fire Wardens on stand-by for evacuation of 100 people

3.10.4.2 Reporting to Fire

3.10.3.2.1 Press or pull fire alarm when seeing that a fire broke out.

3.10.4.2.2 Report to the Floor Fire Warden, or for certain area, or make an emergency call to the Fire Command Center to confirm the area of fire.

3.10.4.2.3 A person seeing a fire broke out is to attempt to put out or control it, but must ensure of his own safety. If expecting to be unable to control the fire, he must escape and close the door immediately.

3.10.4.3 Evacuation Procedure

3.10.4.3.1 When the gong or alarm rings, the person seeing the fire and those around him must attempt to put out or control it by using portable fire extinguishers or fire hose, but must ensure of their own safety

3.10.4.3.2 When the gong or alarm rings for 1.5 minutes and the Fire Safety Director at the Fire Command Center has not announced instruction or reported the incident, Clause 10.3.3 will proceed.

The public address system must function automatically, giving instructions by tape to the floor having reported the fire and the nearby floors, both upper and lower, instructing people on these three floors to evacuate to the safe floor or area of refuge, which is at least two floors from the floor on fire, and waiting for further instruction.

3.10.4.3.3 If there is no instruction, the public address system must function automatically, giving instruction by type to the further upper three floors and one lower floor to evacuate to the ground floor and leave the building, until all people have evacuated from the building (The number of floors is given as a guideline, which is subject to change to be suitable for each building).

Note 1) When a fire broke out in a high-rise building with automatic sprinkler system and the area of refuge according to the standard, it may not need to evacuate all people at the initial alarm, except at least the three floors nearest to the floor on fire.

2) To prepare necessary in formation to everyone in the high-rise building, according to the sample in the next page.

NAME	COMPANY NAME / FLOOR	# TELEPHONE NUMBER

WHEN FIRE OCCURS.

PRESS or PULL manual call point……

PLEASE CALL to #..... #.....
FIRE COMMAND CENTER # FIRE DEPARTMENT

FLOOR FIRE WARDENS

NAME	POSITION	FLOOR	#TELEPHONE NUMBER
……	……	……	……
……	……	……	……
……	……	……	……
……	……	……	……

WHEN YOUR HEAR ALARM, proceed the plan that is provided, waiting for command aṣsist disability person or senior person

DON'T USE ELEVATOR
YOUR EXIT……
NEARBY FIRE EXTINGUISHER……..