Brief Notes on Lifts and Escalators Design

1. **Design Guides**

2. **Regulations and Standards**
   - Buildings (Lifts) Regulations (Cap.123)
   - Buildings (Escalators) Regulations (Cap.123)
   - Lifts and Escalators (Safety) Ordinance (Cap. 327)
   - Code of Practice on the Design and Construction of Lifts and Escalators (EMSD)
   - British Standard BS 5655: Part 1 to 11 – Lifts and Services Lifts

3. **Design Considerations**
   - intended usages of the building, height, storeys, etc.
   - expected characteristics of “internal traffic” by occupants
     - domestic floors (less demand on lift service)
     - office floors (higher demand on lift service)
     - commercial floors e.g. shopping arcade (high population density & traffic)
     - restaurant or catering facilities (peak demand at lunch and dinner)
   - level and quality of lift service required
   - types of lift systems: (electric or hydraulic)
     - passenger lifts
     - service lifts
     - goods lifts
     - fireman’s lift
     - dumbwaiter (e.g. for restaurant)
   - escalators & passenger conveyors (if needed)

4. **Lift Traffic Analysis**
   - assumptions to be made:
     - assessment of building population & nos. of persons using the service
     - determine critical traffic period
     - occupancy loading of lift car
   - basic design criteria for lift performance: (depends on the class of service)
     - five minutes handling capacity (HC)
     - average interval time or waiting time (AIT)
     - maximum passenger transit time
• calculation of lift performance
  o up-peak, down peak and two-way traffic
  o performed by manual calculation or by computer programs
  o determine nos. of lifts, lift capacity (rated load) and lift speed
• calculation of escalator performance is similar to lift but based on turnover rate
  o determine nos. of escalators, capacity, speed, inclined angle and width

5. Lift and Escalator Planning

• layout and grouping of lifts, zoning of the lift system, etc.
• lift core (service core) design to be coordinated with architectural layout
• design of lift lobby and entrance, proximity of staircases, etc.
• location and arrangements of escalators
  o effective for large shopping arcade with high turnover rate
  o may also serve as a focus point in atrium or mall
• modes of operation and control functions (e.g. collective, duplex & triplex control)
• contract arrangement for lifts & escalators installations
  o usually by nominated sub-contractors in HK (e.g. OTIS, Schindler, Fujitec)
  o coordinations with builder and other sub-contractors
  o must be installed by a “registered lift engineer/contractor” and submit for approval from the EMSD
• relationships with other Building Services systems
  o electrical services (normal power supply and emergency supply)
  o fire services (e.g. fireman’s lift)
  o HVAC (lift machine room ventilation, lift shaft venting, etc.)
  o others (e.g. intercom system and CCTV inside lift car)

6. Design and Planning Information Required

• a lift chart showing the concept of the vertical transportation system
• a clear and concise list of design criteria and assumptions
• a summary of lift performance (usually in table form) gives:
  o lift designated nos., grouping, floor served
  o lift capacity, speed, type of control
  o lift performance calculated: HC and AIT
• technical requirements:
  o electrical power supply, estimated power required
  o location and size of lift motor (or lift machine) room
  o lift pit size, overrun headroom above lift shaft
  o lighting and ventilation (or air conditioning) of lift car
  o safety and emergency devices
  o escalator dimensional requirement
  o fire safety aspects of lift & escalator system
  o maintenance and inspection
• estimated costs for lifts & escalators installations