

Basic infrastructure and services

Building Services

- There are three types of **convoying methods** in buildings, Elevators & Escalators & Ramps

ELEVATOR

<http://www.electrical-knowhow.com/2012/04/elevators-types-and-classification-part.html>

ELEVATOR

A type of **vertical** transport equipment that efficiently moves **people or goods** between **floors** (levels, decks) of a building, vessel or other structures.

Elevators are generally powered by **electric motors** that either drive traction cables or counterweight systems like a hoist, or pump hydraulic fluid to raise a cylindrical piston like a jack.

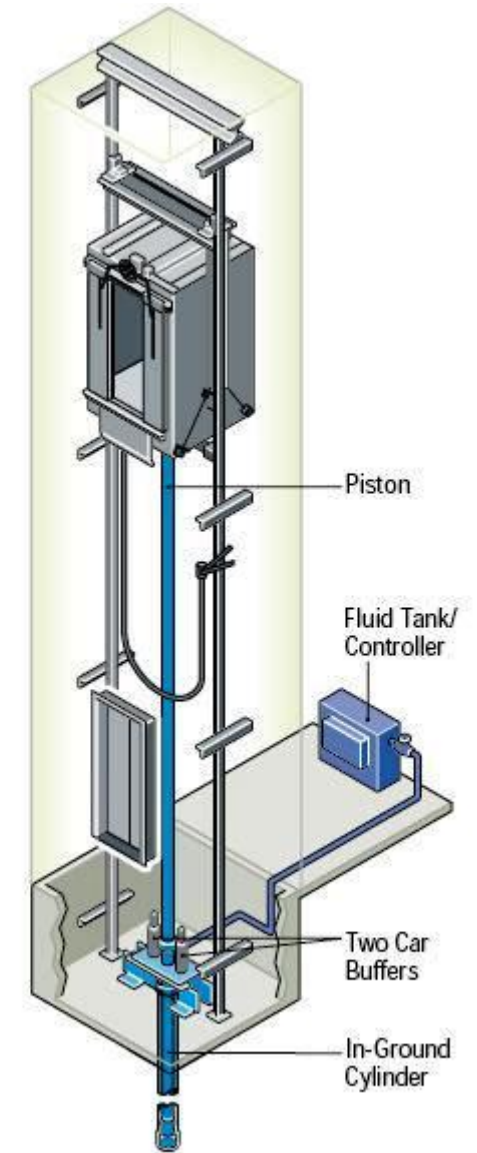
Elevator Types

- According to hoist mechanism.
- According to building height.
- According to building type.
- According to elevator Location.
- According to Special uses.

According to hoist mechanism:

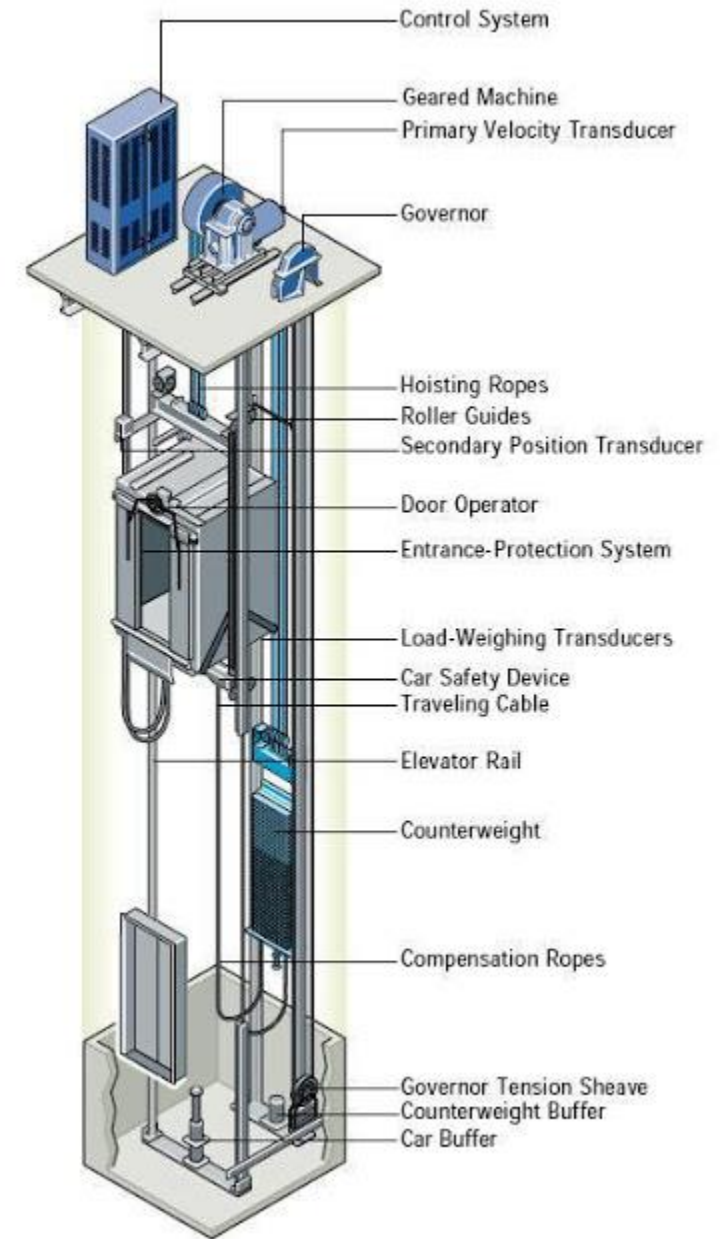
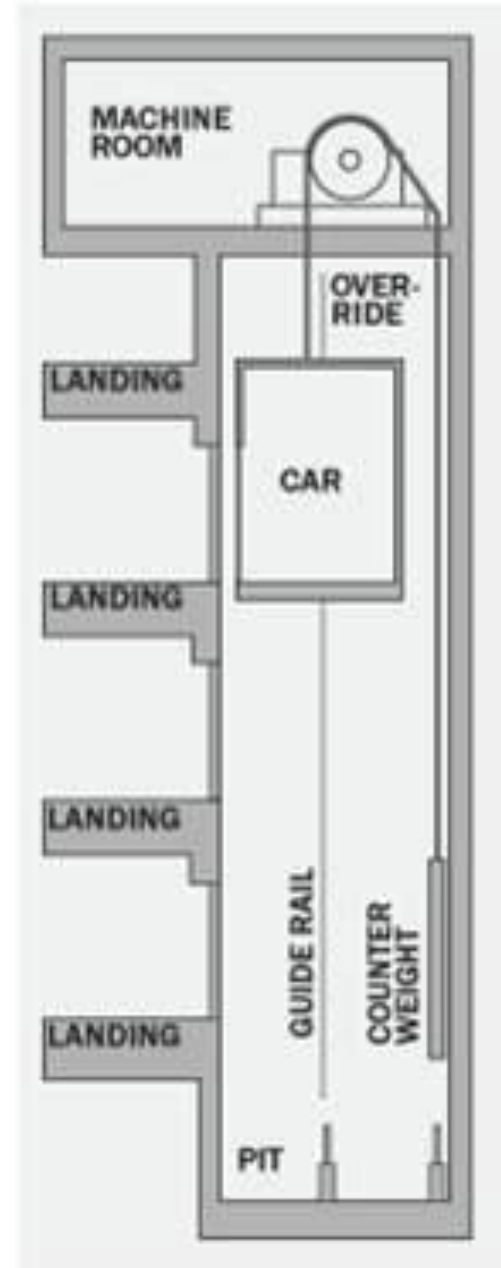
1. Hydraulic Elevators
2. Traction Elevators
3. Climbing elevator
4. Pneumatic Elevators

- **Hydraulic elevators** are supported by a **piston at the bottom** of the elevator that pushes the elevator up. They are used for low-rise applications of **2-8 stories** and travel at a maximum speed of **200 feet per minute**. The machine room for hydraulic elevators is located at the lowest level adjacent to the elevator shaft.

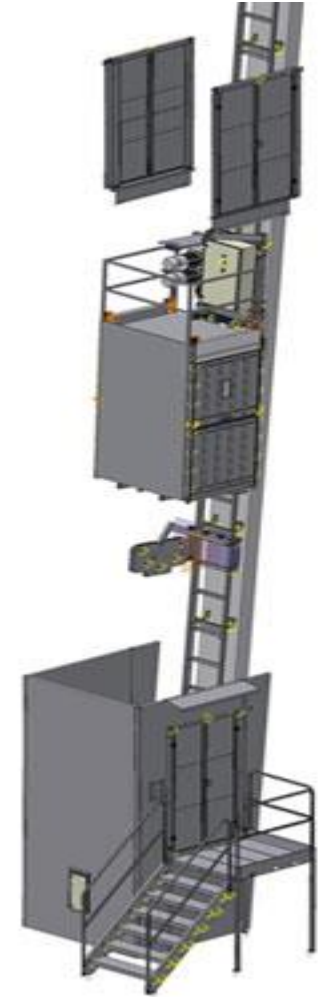


Holed (Conventional) Hydraulic Elevators

Traction elevators are lifted by ropes, which pass over a wheel attached to an electric motor above the elevator shaft. They are used for mid and high-rise applications and have much higher travel speeds than hydraulic elevators. A counterweight makes the elevators more efficient.



- A **climbing elevator** is a self-ascending **elevator** with its own propulsion. The propulsion can be done by an electric or a combustion engine. **Climbing elevators** are used in guyed masts or towers, in order to make **easy access to parts of these constructions**, such as flight safety lamps for maintenance.

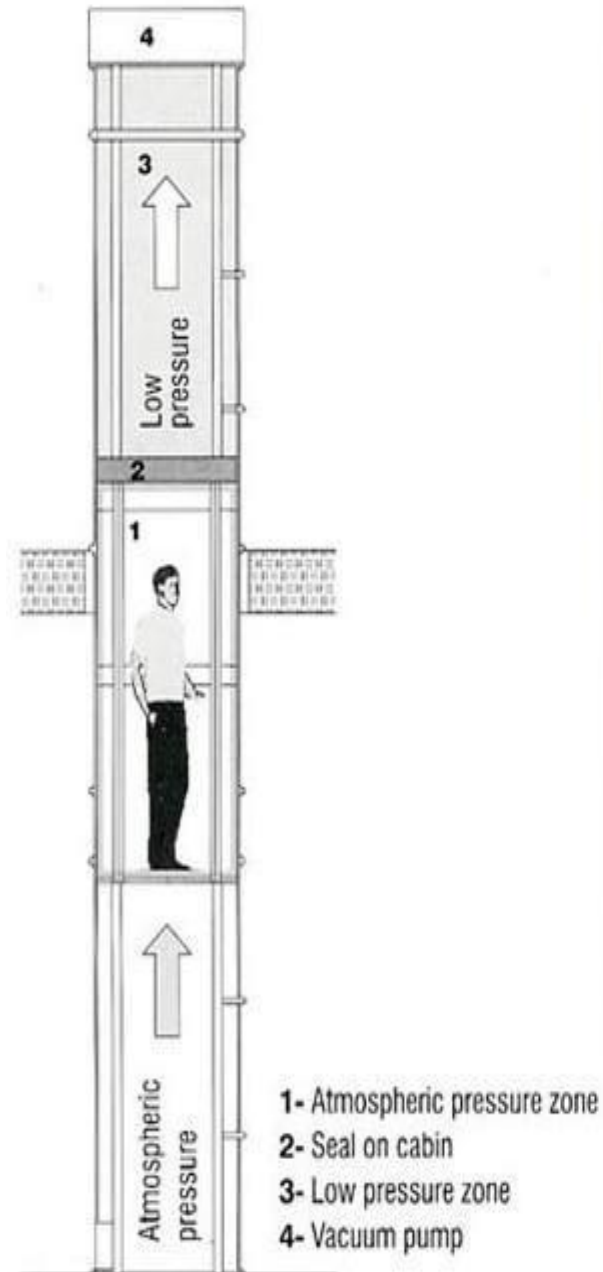


Pneumatic elevators are raised and lowered by **controlling air pressure** in a chamber in which the elevator sits.

By simple principles of physics; the **difference in air pressure** above and beneath the vacuum elevator cab literally transports cab by air.

It is the **vacuum pumps or turbines** that pull cab up to the next Floor and the slow release of air pressure that floats cab down.

compact design → excavating a pit and hoist way are not required.



According to building height

A- Low-Rise buildings (1- 3 stories)

Buildings up to about (1 to 3) stories typically use **hydraulic elevators** because of their lower initial cost

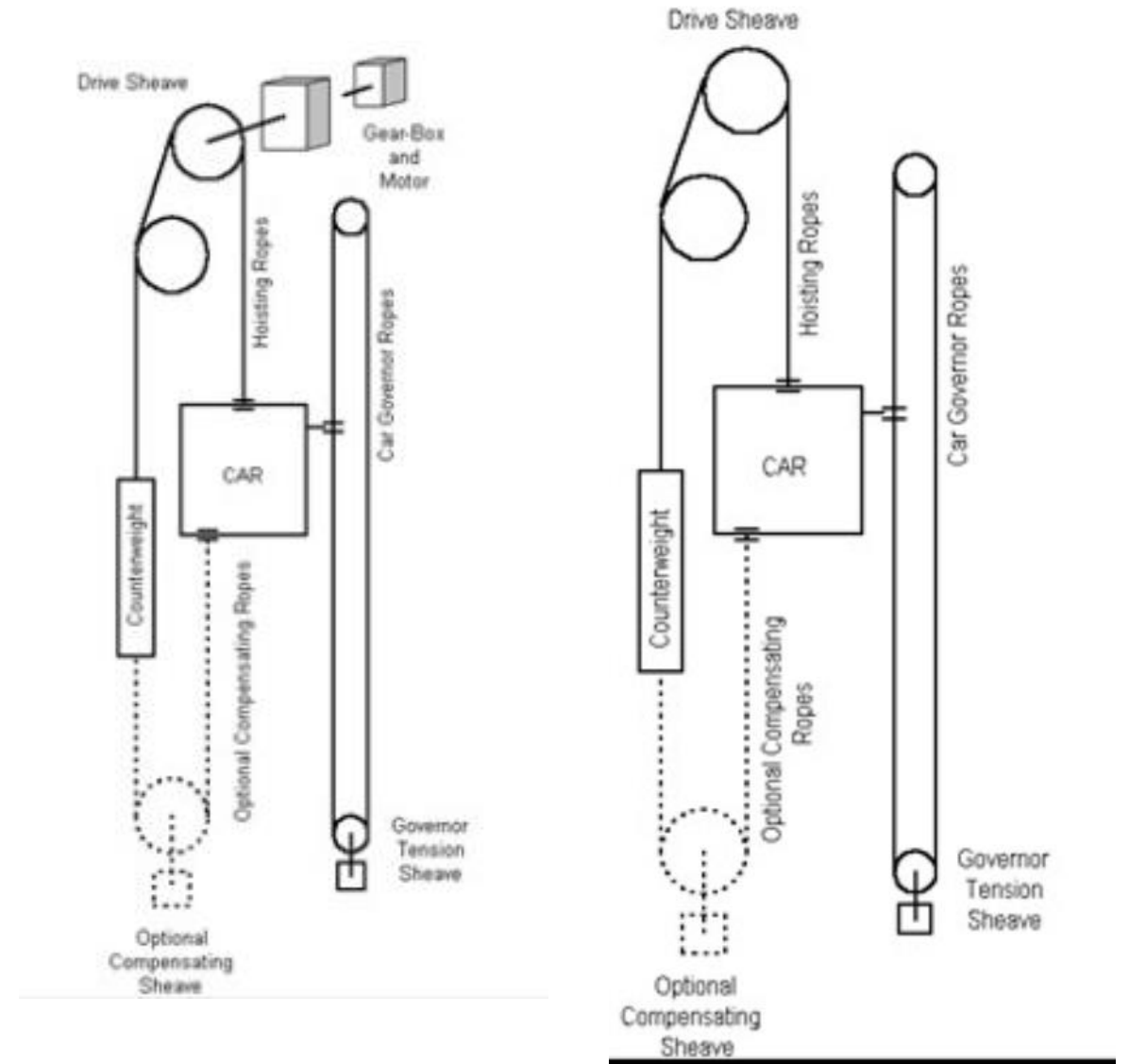
B- Mid-Rise buildings (4 -11 stories) Buildings up to about (4 to 11) stories typically use **Geared Traction Elevators**

C- High-Rise buildings (12 + stories)





Buildings up to about 12+ stories typically use **Gear-Less Traction Elevators**

- **Geared Traction Elevators** have a **gearbox** that is attached to the motor, which drives the wheel that moves the ropes. Geared traction elevators are capable of travel speeds up to **500 feet per minute**. The maximum travel distance for a geared traction elevator is around 250 feet.

Gear-less Traction Elevators have the **wheel attached directly to the motor**. Gear-less traction elevators are capable of speeds up to **2,000 feet per minute** and they have a maximum travel distance of around 2,000 feet so they are the only choice for high-rise applications.



According to building type

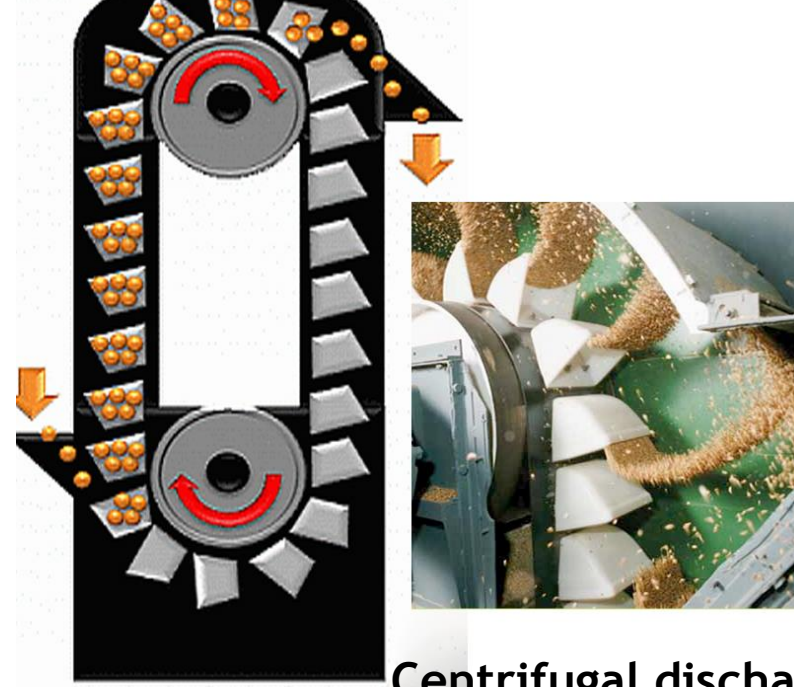
- Hospital Elevators.  Hospital Bed Elevators
Hospital Stretcher Lift
- Residential /Domestic Elevators.  Passenger Elevators
Stairway Elevators
- Agricultural Elevators.  Bucket Elevators
Centrifugal discharge elevators
- Industrial Elevators.  Hoist Elevators
Incline Elevators
- Commercial Elevators. Commercial passenger elevators
Freight elevators
Commercial Dumbwaiter Configurations
- Parking buildings Elevators. Auto Car Parking Elevators_
Passenger Parking Elevators_



Stairway Elevators



Dumbwaiters Elevators



Centrifugal discharge elevators



Hoist Elevators



Vertical bucket Elevators



Incline Elevators

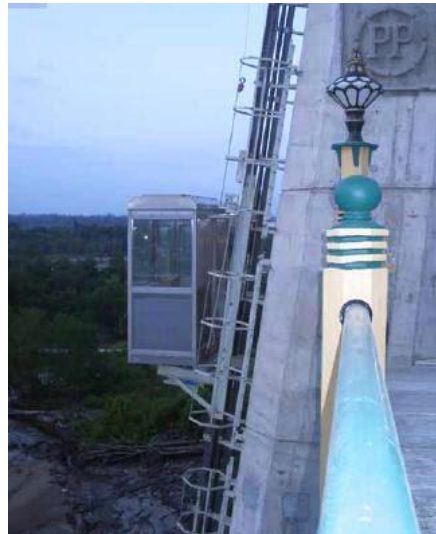
According to elevator location

- **Outdoor Elevators** :cargo elevators, platform elevators, and incline and vertical elevators.

Observation elevator



Incline Elevators



Platform Elevators



Freight Elevators



According to elevator location

- **Indoor elevators:** All elevators installed inside a building which usually need a hoist ways and pits.



According to special uses

Handicap Elevators_



Grain Elevators



A grain elevator is a tower containing a bucket elevator, which scoops up, elevates, and then uses gravity to deposit grain in a silo or other storage facility.

Limited use / limited application (LU/LA)



Special purpose passenger elevator used infrequently, and which is exempt from many commercial regulations and accommodations.

ESCALATORS

Escalators

- **An escalator** is a moving staircase – a conveyor transport device for carrying people between floors of a building.
- Escalators are powered by constant-speed alternating current motors and move at approximately 1–2 feet (0.30–0.61 m) per second.
- The maximum angle of inclination of an escalator to the horizontal floor level is 30 degrees with a standard rise up to about 60 feet (18 m).
- Modern escalators have single piece aluminum or steel steps that move on a system of tracks in a continuous loop.

The benefits of escalators are many:

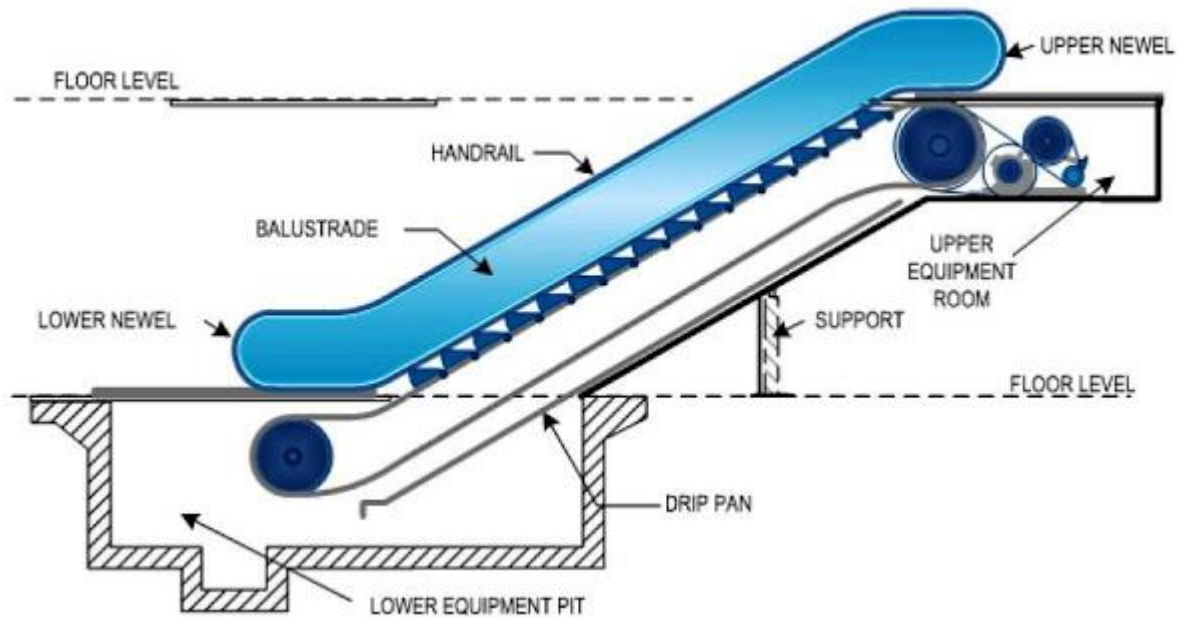
- They have the capacity to move large numbers of people.
- They can be placed in the same physical space as one might install a staircase.
- They have no waiting interval (except during very heavy traffic).
- They can be used to guide people toward main exits or special exhibits.)
- They may be weatherproofed for outdoor use.
- They can help in controlling the traffic flow of people For example, an escalator to an exit effectively discourages most people from using it as an entrance, and may reduce security concerns.

Escalators Configurations:

- Parallel
- Crisscross
- Multiple parallel
- “Up” Escalator next to Staircase



Components



- Landing Platforms.
- Truss.
- Tracks.
- Steps.
- Handrail.
- Escalator Exterior (Balustrade).
- Drive system.
- Auto-Lubrication System.
- Braking system.
- Safety devices.
- Electrical & Control Systems.

<http://www.electrical-knowhow.com/2012/04/escalators-basic-components-part-one.html>

- **Landing Platforms** :These two platforms house the curved sections of the tracks, as well as the gears and motors that drive the stairs. The top platform contains the motor assembly and the main drive gear, while the bottom holds the step return idler sprockets.
- **The escalator truss** is the structural frame of the escalator. It is a hollow metal structure that bridges the lower and upper landings. It is composed of two side sections joined together with cross braces across the bottom and just below the top.
- The **track system** is built into the truss to guide the step chain, which continuously pulls the steps from the bottom platform and back to the top in an endless loop.
- The **steps** are solid, one piece, die-cast aluminum or steel.
- The **Handrail** provides a convenient handhold for passengers while they are riding the escalator. In an escalator, the handrail is pulled along its track by a chain that is connected to the main drive gear by a series of pulleys.

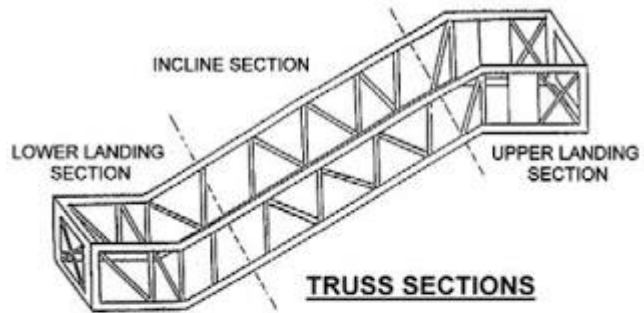
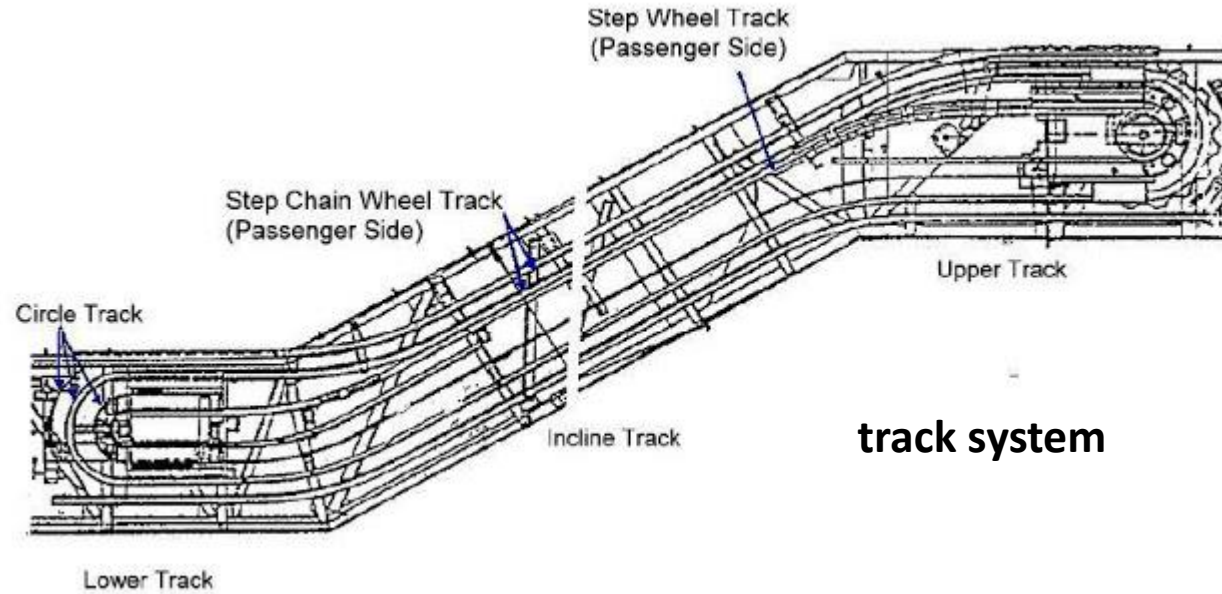
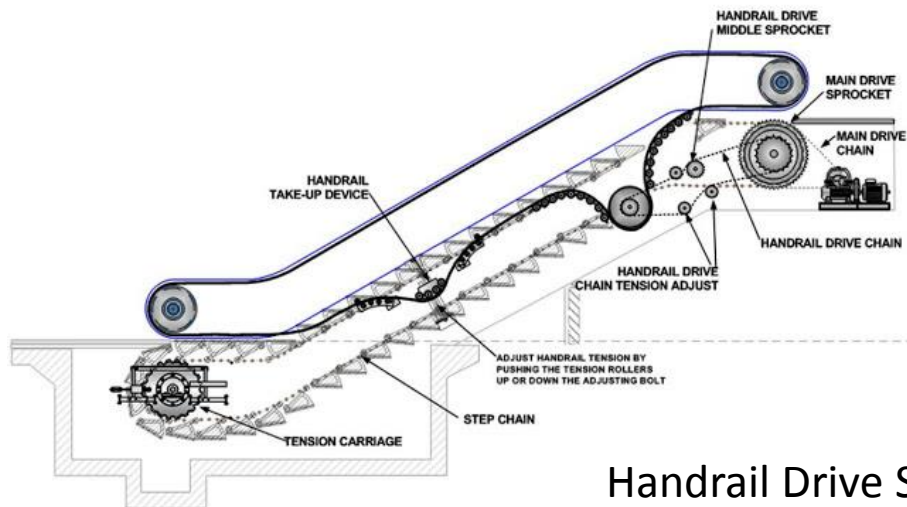


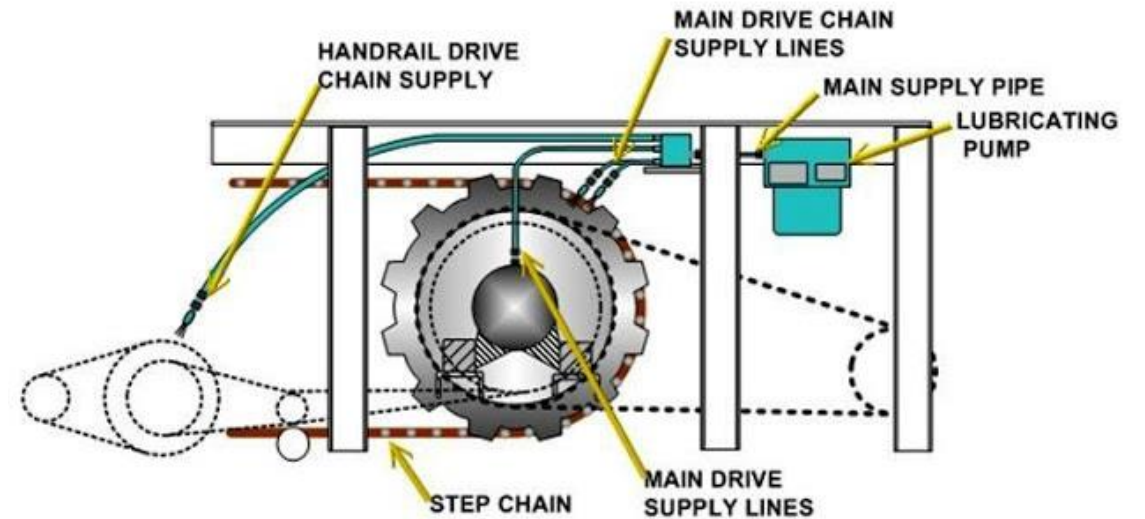
Figure 18 Truss Sections



track system



Handrail Drive System



Automatic Lubrication System

- **The Balustrade** consists of the handrail and the exterior supporting structure of the escalator. It is the escalator exterior components extending above the steps and it supports the handrail. It is either designed as Interior Low-deck or Interior High-deck.
- An **escalator drive system** includes the following components:
 - Drive Machine and Gear Reducer.
 - The Step Drive System.
 - The Handrail Drive System.
- The escalators have an **Automatic Lubrication System** that supplies oil to lubricate the main drive chain, step chain, and the handrail drive chains. Oil flow rate is adjustable by setting the automatic timer control “off” and “on” periods to supply more or less lubrication.
- The **braking systems** on an escalator utilize three different braking methods as follows:
 - The Machine Brake.
 - The drive shaft brake system.
 - The Main Drive Shaft Brake.
- Escalator systems are provided with many **safety devices** that will automatically stop the escalator by cutting electrical power to the motor and applying the brake if a problem occurs. When a safety device stops the escalator, the problem must be corrected and the fault cleared before restarting the system.

RAMPS

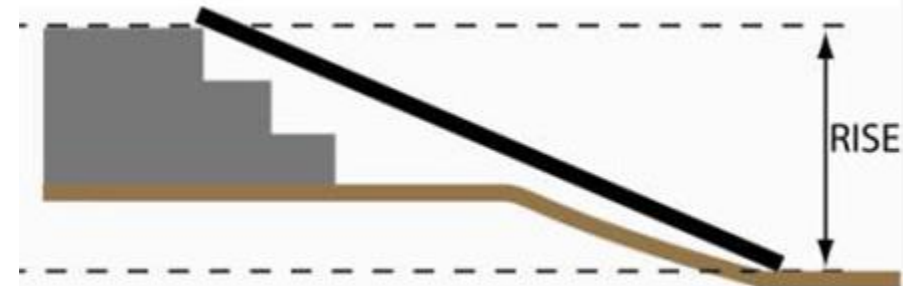
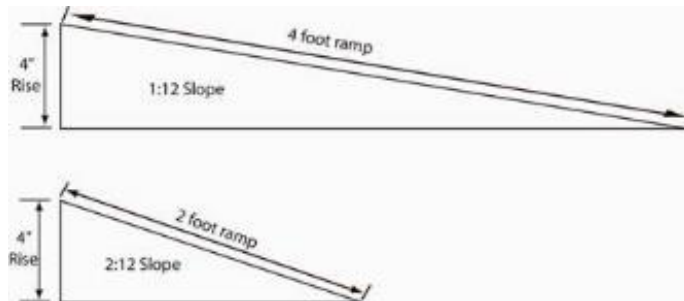
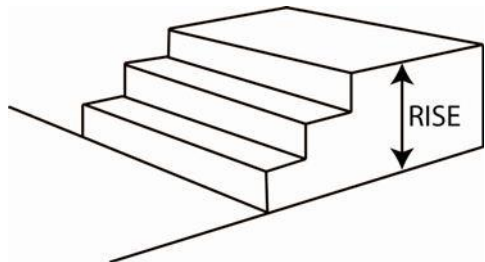
Ramp

An inclined plane designed to allow a person to with disabilities to move between levels, usually installed in addition to or instead of stairs

- Portable Ramp → are easily moved from one place to another as needed.
- *Semi-permanent ramps* are designed to be durable enough for long time use but can easily be moved if necessary.
- *Permanent wheelchair ramps* are expensive can not be easily moved from their position.

Rise and Slope

- **Rise** - Rise is the vertical distance from the ground (where you enter the ramp at ground level) to where you want the top of the ramp to be.
- **Slope** - The Slope is the "steepness" of the ramp. This is usually expressed as 2 numbers that show the relationship between the Rise and the length of the ramp. For example, a slope of 1:12 means that for every inch of total rise, there needs to be 12 inches of ramp length. So a rise of 4" would need a 4ft ramp to achieve a 1:12 slope.





Aluminum wheelchair ramps



Wood Ramps



Galvanized Steel Ramps



Concrete Deck Ramps



Portable Ramps