

## Vertical Transportation Planning – Retail/Mixed-Use

This paper is to provide design guidance for the initial planning of vertical transportation in either a standalone retail project or within the podium levels of a mixed-use project. The vertical circulation in this type of space consists of shoppers and possibly a mix of office employees as well. Both populations have a unique traffic signature that should be properly studied before finalizing a vertical transportation design.

### **Traffic Pattern**

The heavy traffic period in a retail facility is typically a two hour period with two-way traffic. Many destination type malls will experience a longer visitation period, however, the 120 minute period can be considered for peak traffic calculations. Many retail facilities will also experience a “Black Friday” type population surge; planning for this type of surge can result in “over-elevating” for the typical traffic.

For a mixed-use retail podium there are two design periods which require consideration – weekday and weekend/holiday periods. During the weekday period the office tower population travels to the podium floors for lunch; this period is approximately one hour. The heaviest demand will be on the vertical transport serving the food court and office levels above. During the weekend or holiday period an outside population arrives to shop; this design period is approximately two hours. The heaviest demand will occur on the podium vertical transport, or in cases with below ground parking, on the garage lifts.


### **Retail Design Guidance**

The following points are offered for consideration during preliminary planning:

- As a general rule, multiple escalator connections are normally provided as the primary means for vertical transport. Escalators are designed to provide about 90% of the vertical transport, with the remainder being provided by passenger lift groups
- Vertical transport cores, including monumental stairs, should be strategically placed throughout the retail facility approximately 100m on horizontal walking centers, with particular emphasis on multiple groups of escalators located at the main entry/exit points, at each anchor story entry point and to service the banquet, food court and upper level cinemas.
- Stairs create an affecting means of vertical circulation for ambulatory persons in the down direction; the usage ratio is approximately 60:40 down to up.

- Lifts should be placed within a line of sight of the escalator boarding. Signage may be required to ensure parents with strollers divert from the escalators to the lifts.
- One retail service/freight elevator should be planned for each 10,000m<sup>2</sup> of space. Narrow and deep, service shaped platforms, are recommended with a capacity of 1800kg to 2000kgs with two-speed side opening doors. Corridors landings should be sufficiently sized to allow for the movement of wheeled carts into the cab, and space planning should also account for the inevitable stacking of goods outside the lift entrance. Planners should consider the need for service redundancy, especially if the loading dock is to be below grade.
- Many countries require a firefighter's lift if the project meets a certain minimum height or has a number of landings below grade requirements. Most jurisdictions will permit the service lifts to function as firefighters' lifts, thus, planners should consider providing stops at every landing.
- If cinemas are planned the peak vertical transport demand will occur during exiting. Planners can assume about 150-200 persons/theater and no more than 2 theaters exiting every 30 minutes. It is best to design escalators to the cinema level, placed in parallel.
- Each anchor store will typically provide their own internal escalators, handicapped passenger shuttle(s) and freight lifts(s).

### Car Park

- A parking garage located below a mixed-use podium will have two usages – office parking during the week and retail parking during the weekend. During the normal workweek, the car park office population will approximate 1.2 persons per vehicle, during the weekends the population will grow to 2.5 to 3.5 persons per vehicle. If the garage vertical transport is to be shared by these populations than the parking garage passenger lift must be sized for the larger, weekend/holiday peak periods.
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- Vertical transportation dedicated to retail parking can initially be planned for one passenger lift for each 500 vehicle spaces.
  - Occupied space within the car park, below a retail or office lift hoistways, will impact the dimensions of the hoistway due to the space required for a counterweight safety.
  - If the project is to have more retail floors than garage floors, it is best to separate the parking garage vertical transport from the retail transport. This is especially true if a large percentage

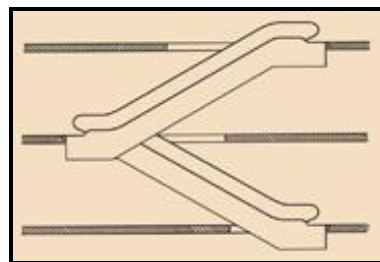
of the shoppers will arrive on foot. Otherwise the garage parkers will become disgruntled as they wait longer for a lift to respond to their parking floor.

- Many mixed-use projects include a hotel on the upper floors. It is best to provide separate vertical transport for this population arriving for their stay. The hotel guests have a different expectation of service than the visiting shopper.
- Finally, visiting shoppers should never be allowed vertical access to a residential zone. This is best addressed by separating the residential and shopping parking floors.

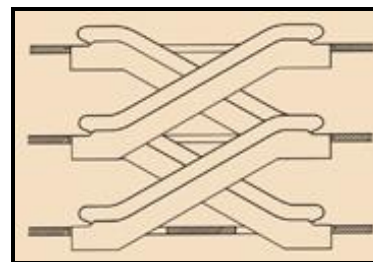
### Vertical Transport Selection

Typical retail escalators are 1200mm wide at a speed of .5mps. This unit has a nominal 5-minute capacity of about 565 persons.

- The escalators are typically furnished with glass balustrades and stainless steel deck covers and trims.
- If the escalators are provided outdoors than they should be covered with some type of canopy to protect them from the weather.
- Units designed in parallel provide the quickest means of transport between floors. This arrangement is commonly used for transport to upper level cinemas.



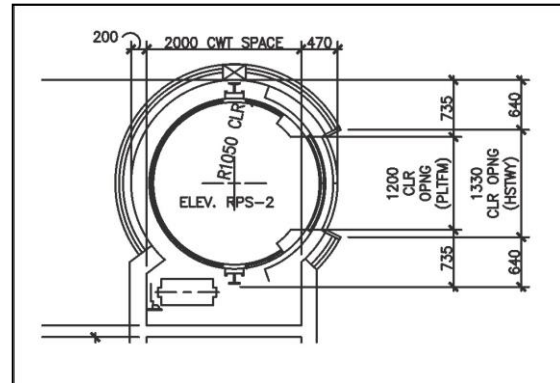
Parallel Design



Crossing Design

- Units design in crossing facilitates shoppers walking past the retail stores or merchandise. This arrangement is commonly used within anchor stores.
- Passenger safety is of paramount concern with escalators. The designer should ensure that there is adequate clearance at the entrance and exit of the escalators; a clear space of 3.6m is recommended. Designers should also be aware of the applicable code requirement for adjacent decking heights to prevent persons, especially children, from finding their way between the escalator balustrade and any adjacent glass railing. The ASME Code and Building Code establish the maximum separation and height of these railings.

Lifts can take on two forms – functional transport or design element. Functional lifts are primarily designed to accommodate persons with disabilities or to accommodate parents with strollers. They are typically designed with standard finishes, placed down a corridor and require signage to direct users to their location. These are A typical unit has a capacity of 1350kg to 1600kg, and is provided with center-opening doors. This allows for efficient movement of a stroller or wheelchair with the accompanying person.



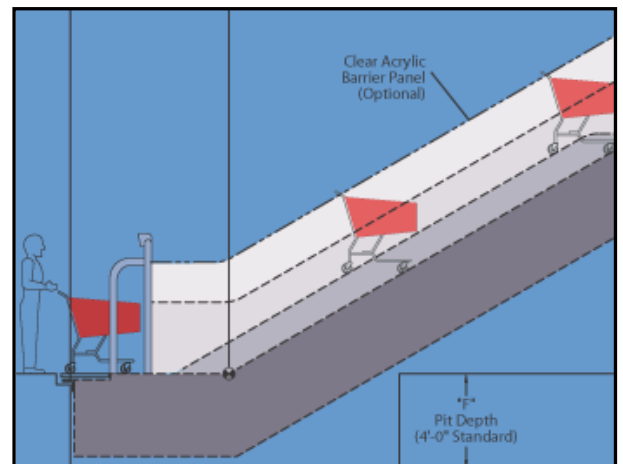
Scenic lifts designed as a center-piece to a vertical core offer a unique element to the project. The most economical application is a rectangular, standard glass back cabin. These lifts can be provided with glass in the entrances to create a see-through effect. More elaborate designs include circular glass cabs with claim shell glass doors. The minimum capacity of a circular cab is 1600kg to allow for the radius movement of the doors.



Designers of scenic lifts should consider the desired degree to which the mechanical components should be visible or hidden from the public's view. The cab components can be concealed by exterior shrouds at the cab top and bottom. The hoistway components – machine, guide rails, wiring troughs, entrance tracks and closures – all require hoistway design coordination to limit their visibility. These appointments will affect the required pit and overhead dimensions.

If possible, lifts should have openings in line. Lifts with front and rear openings are inconvenient for retail applications. Visitors are not familiar with the facility and become confused as to which door will open at each level. They also create traffic congestion as persons with strollers or carts cannot maneuver within the lift cab.

European retail planners have long dealt with the movement of shopping carts between floors. Their solution has been a cart conveyor located adjacent to the escalators. In the U.S. many big box retailers have moved into the city with vertical stores. Store planners have adopted the European solution as well as oversized lift platforms that are impossible in Europe. U.S. solutions have included oversized passenger lifts, dedicated employee cart retrieval lifts, and the cart conveyors.



## **Summary**

This brief is intended to provide designers initial considerations when planning vertical circulation between retail floors. Emphasis has been placed on the retail podium of a mixed-use project. Initial considerations include the separation of types of traffic populations, the anticipated traffic flow, and the selection of various types of vertical transport. As the project develops the designer should consider the impact of special selections on the building design.

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