

ELEVATORING REPORT

OtisPlan+™

Lodha Thane Project

Lodha Group

May 12, 2021

OTIS' EXPERIENCE IS YOURS...

Elevatoring simulations are controller group behavior studies, made with state-of-the-art computerized applications, by our experts, in accord with Otis' library of worldwide building references.

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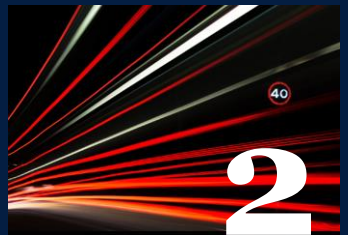
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Traffic Studies Fundamental Steps



STEP 1
Building input data

- Building dimensions
- Global population and distribution
- Elevator & group dimensions
- Human flow dispersions
- Tailored to building



STEP 2
Traffic patterns selection

- Predefined Otis traffic profiles
- Custom traffic profiles
- Use of morning up peak profiles
- Use of lunch time two ways peak profiles
- Tailored to traffic



STEP 3
Traffic simulations

- Use of OtisPlan+™ program
- Simulate different Otis dispatching systems
- Tailored to customer



STEP 4
Criteria of reference

- Integrate criteria for traffic quality
- Different morning/ lunch period criteria
- Criteria/simulation results comparison
- Tailored to building type



STEP 5
Output data, analysis and conclusion

- Feasibility control
- Estimate of maximum traffic level capacity
- Validation of a final tailored solution

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Riser Diagram/Configuration

The recommended values for a class A Residential Apartment
Building Population: 435

G1 - Group1 - Refer to Two Way Traffic for Evaluation

- Up AWT: 44.8 s;
- Up ATTD: 122.9 s;



Key: Service | No Service | Express Zone | Mechanical Floor | Shuttle

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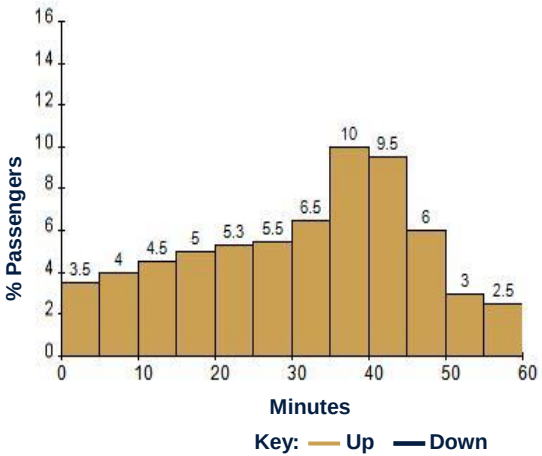
Group1 Simulation Input

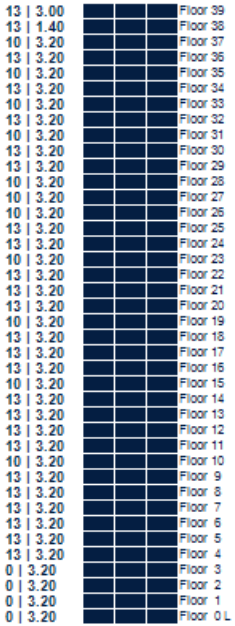
3 cars, Serves 0-39

Group Input Data:

Acceleration	0.8 m/s²
Jerk	1.4 m/s³
Door Opening Time (s)	2.5 s
Door Closing Time (s)	2.7 s
Group Population	435
Elevator Passengers	284

Input Traffic Pattern: 284 Passengers





Elevator Configuration:

Elevator	#1	#2	#3
Speed (m/s)	2.5	2.5	2.5
Duty (kg)	630	630	630
Max Passengers	8	8	8

Key: Service | No Service | Express Zone | Mechanical Floor | Shuttle

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Group1 Simulation Output

Up Peak

Performance Metric Table			
Item	**Total**	**Up**	**Down**
Number of Passengers	284	284	0
Avg. Stops Per Passenger	2.2	2.2	0
Avg. In Car Time	78.1	78.1	0
Dispatcher		RSR	
Wait Time			
Avg. Wait Time (AWT)	44.8	44.8	0
Less than 30 S. (%)	54.2	54.2	NA
Less than 60 S. (%)	69.3	69.3	NA
Less than 90 S. (%)	80.1	80.1	NA
Time To Destination			
Avg. Time to Dest (ATTD)	122.9	122.9	0
Less than 90 S. (%)	40.8	40.8	NA
Less than 120 S. (%)	56.3	56.3	NA
Less than 180 S. (%)	79.6	79.6	NA



Recommended Performance:
Average Wait Time(AWT):
Average Time To Destination(ATTD):

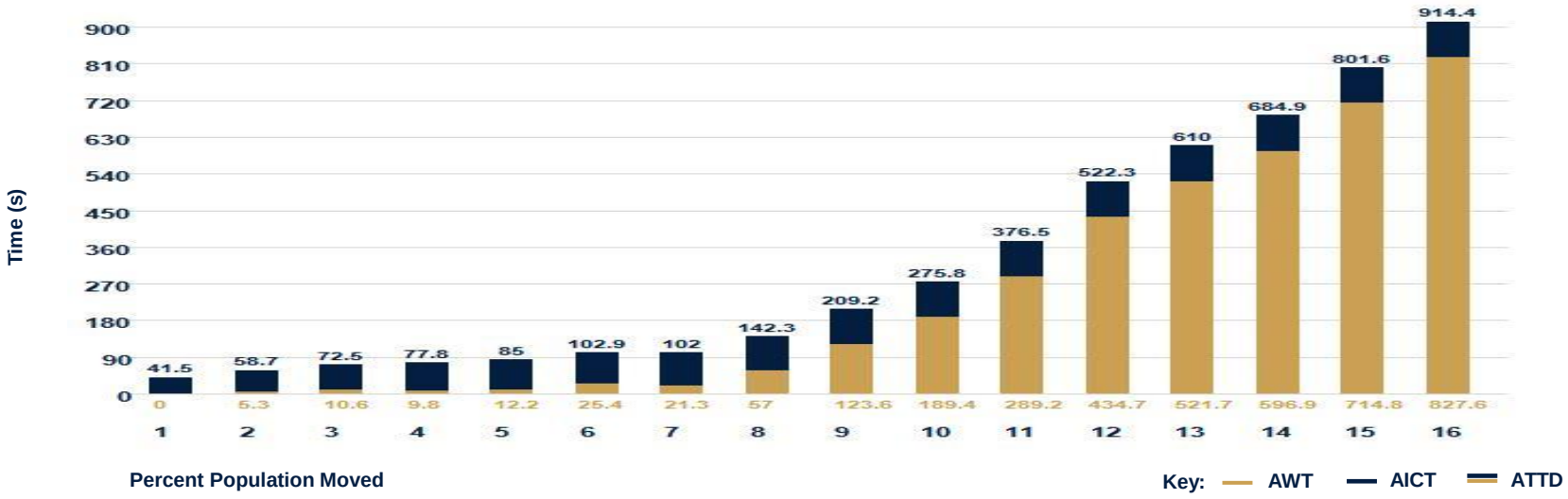
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Group1 Simulated Progressive Demand

Up Peak

Up – 100%; Down – 0%; Interfloor – 0%

Simulated Progressive Demand – Flat Traffic in increments of 1%



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Recommended Performance Values

		Generally Recommended	Neutral	Not Generally Recommended
Up Peak	**Average Wait Time (AWT)**			
	Prestige Office Building	<= 20 s	> 20, <= 26 s	> 26 s
	Office Building	<= 20 s	> 20, <= 26 s	> 26 s
	Residential Apartments	Use two way data	Use two way data	Use two way data
	Hotel	<= 33 s	> 33, <= 40 s	> 40 s
	Hospital	<= 30 s	> 30, <= 40 s	> 40 s
	Average Time to Destination (ATTD)			
	Prestige Office Building	<= 90 s	> 90, <= 100 s	> 100 s
	Office Building	<= 90 s	> 90, <= 100 s	> 100 s
	Residential Apartments	Use two way data	Use two way data	Use two way data
	Hotel	<= 100 s	> 100, <=105 s	> 105 s
	Hospital	<= 100 s	> 100, <= 110 s	> 110 s
Two Way	**Average Wait Time (AWT)**			
	Prestige Office Building	<= 26 s	> 26, <= 36 s	> 36 s
	Office Building	<= 26 s	> 26, <= 36 s	> 36 s
	Residential Apartments	<= 40 s	> 40, <= 50 s	> 50 s
	Hotel	<= 33 s	> 33, <= 40 s	> 40 s
	Hospital	<= 30 s	> 30, <= 40 s	> 40 s
	Average Time to Destination (ATTD)			
	Prestige Office Building	<= 105 s	> 105, <= 110 s	> 110 s
	Office Building	<= 105 s	> 105, <= 110 s	> 110 s
	Residential Apartments	<= 100 s	> 100, <= 110 s	> 110 s
	Hotel	<= 100 s	> 100, <= 110 s	> 110 s
	Hospital	<= 100 s	> 100, <= 110 s	> 110 s

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Recommended Performance Values

		Prestige	Prestige	Prestige	Prestige
		Offices (UP+2W)	Retails/Public (UP+2W)	Hotel (2W)	Residential (UP)
Excellent	AWT	<= 15 (Up) <= 20 (2W)	<= 20 (Up) <= 25 (2W)	<= 25	<= 30
Excellent	ATTD	<= 80 (except when EZ)	<= 90 (except when EZ)	<= 90 (except when EZ)	<= 90 (except when EZ)
Excellent	30-60-90	70-90-99	65-85-97	70-85-95	60-75-90
Excellent	**HC5**	**14-16**	**12-15**	**12-15**	**10-12**
Good	AWT	<= 20 (Up) <= 25 (2W)	<= 30 (Up) <= 35 (2W)	<= 30	<= 40
Good	ATTD	<= 90 (except when EZ)	<= 110 (except when EZ)	<= 100 (except when EZ)	<= 100 (except when EZ)
Good	30-60-90	65-85-97	60-75-90	65-80-90	60-70-90
Good	**HC5**	**13-15**	**11-14**	**11-14**	**9-10**
Satisfactory	AWT	<= 30 (Up) <= 35 (2W)	<= 35 (Up) <= 40 (2W)	<= 35	<= 50
Satisfactory	ATTD	<= 110 (except when EZ)	<= 120 (except when EZ)	<= 110 (except when EZ)	<= 110 (except when EZ)
Satisfactory	30-60-90	60-75-90	60-75-90	60-70-90	60-70-90
Satisfactory	**HC5**	**12-14**	**10-13**	**10-13**	**8-9**
Unacceptable	AWT	<= 35 (Up) <= 40 (2W)	<= 50	<= 45	<= 60
Unacceptable	ATTD	<= 120 (except when EZ)	<= 140	<= 130 (except when EZ)	<= 125 (except when EZ)
Unacceptable	30-60-90	60-75-90	40-60-80	55-65-90	40-50-70
Unacceptable	**HC5**	**10-12**	**9-12**	**9-12**	**7-8**

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Recommended Performance Values

		Standard	Standard	Standard	Standard
		Offices (UP+2W)	Retails/Public (UP+2W)	Hotel (2W)	Residential (UP)
Excellent	AWT	<= 20 (Up) <= 25 (2W)	<= 30 (Up) <= 35 (2W)	<= 30	<= 40
Excellent	ATTD	<= 90 (except when EZ)	<= 110 (except when EZ)	<= 100 (except when EZ)	<= 100 (except when EZ)
Excellent	30-60-90	65-85-97	60-75-90	65-80-90	60-70-90
Excellent	**HC5**	**13-15**	**11-14**	**11-14**	**9-10**
Good	AWT	<= 30 (Up) <= 35 (2W)	<= 35 (Up) <= 40 (2W)	<= 35	<= 50
Good	ATTD	<= 100 (except when EZ)	<= 120 (except when EZ)	<= 110 (except when EZ)	<= 110 (except when EZ)
Good	30-60-90	60-75-92	60-75-90	60-70-90	60-70-90
Good	**HC5**	**12-14**	**10-13**	**10-13**	**8-9**
Satisfactory	AWT	<= 35 (Up) <= 40 (2W)	<= 50	<= 45	<= 60
Satisfactory	ATTD	<= 120 (except when EZ)	<= 140	<= 130 (except when EZ)	<= 125 (except when EZ)
Satisfactory	30-60-90	60-75-90	40-60-80	55-65-90	40-50-70
Satisfactory	**HC5**	**10-12**	**9-12**	**9-12**	**7-8**
Unacceptable	AWT	<= 50	<= 60	<= 50	<= 70
Unacceptable	ATTD	<= 140	<= 160	<= 150	<= 150 (except when EZ)
Unacceptable	30-60-90	40-60-80	35-45-70	40-60-75	40-50-70
Unacceptable	**HC5**	**<10**	**<9**	**<8**	**<7**

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Conclusion & Recommendations

Conclusion

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Recommendations

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Taking success to another level



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Back up



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Performance Metric Definitions

Passenger comfort values:

- AWT is Average Wait Time: A passenger's wait time is measured from the time (s)he enters the queue until the responding car starts to open its doors at the passenger's origin floor. (In destination systems the time entering the queue corresponds to the time that the passenger arrives in the elevator lobby). The AWT is the average of all passengers' individual wait times.

- AICT is Average In Car Time: A passenger's in car time is the time spent by each passenger during travel inside a car. This time is measured from the time the car has closed its doors at the passenger's starting floor to the time the car opens its doors at the destination floor. The AICT is the average of all passengers' individual in car times.

- ATTD is Average Time To Destination: Also known as service time, a passenger's time to destination is the time from when a passenger arrives at the elevator system to the time he or she gets to his or her destination floor. This time is measured from the time the person arrives at the starting floor car to the time the car opens its doors at the destination floor. (In destination systems the time entering the queue corresponds to the time that the passenger arrives in the elevator lobby). The ATTD is the average of all passengers' individual times to destination.

Dispatching system performances value:

- HC5 is Handling capacity in 5 minutes: The number of passengers that can be carried by an elevator group in a 5 minutes period, expressed as a percentage of the group population for up, down or interfloor traffic. For proper elevatoring, the required handling capacity is assumed to be the equal to arrival rate for the peak - 5 minutes design period.

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