How scheduling improves bus service reliability in Auckland?

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1. Introduction.
2. Timetable design.
3. Calculation Model
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1. Introduction.

This paper presents an analysis of service reliability based on optimizing of long headway services in Auckland public transport.

* Setting the total runtime of the trip,
* The departure time at the first stop, and
* Arrival time at the last stop.

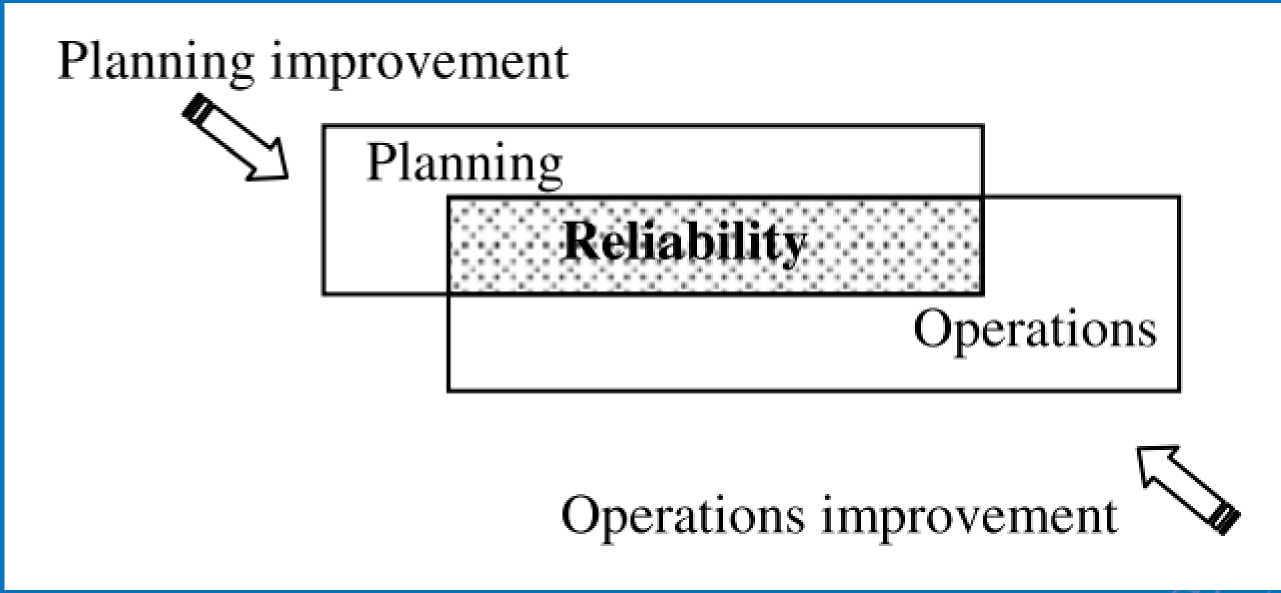
The quality of public transport is determined by many aspects, such as availability, comfort, travel time and costs. Reliability of travel time has become increasingly important over the last decade.

In urban public transport, service reliability is not optimal.

A case study in The Hague in The Netherlands shows the effects of unreliability on travel time of passengers: travel time can be extended by 25 % due to distribution in trip times.

Think before you print

Fig. 1 (Improving) reliability



To achieve the highest level of reliability, planning and operations should be equal. Improving service reliability is thus a matter of adjusting one of these aspects to the other.

2. Timetable design.

2.1 Trip time: The time necessary to drive from stop to stop and finally from terminal to terminal.

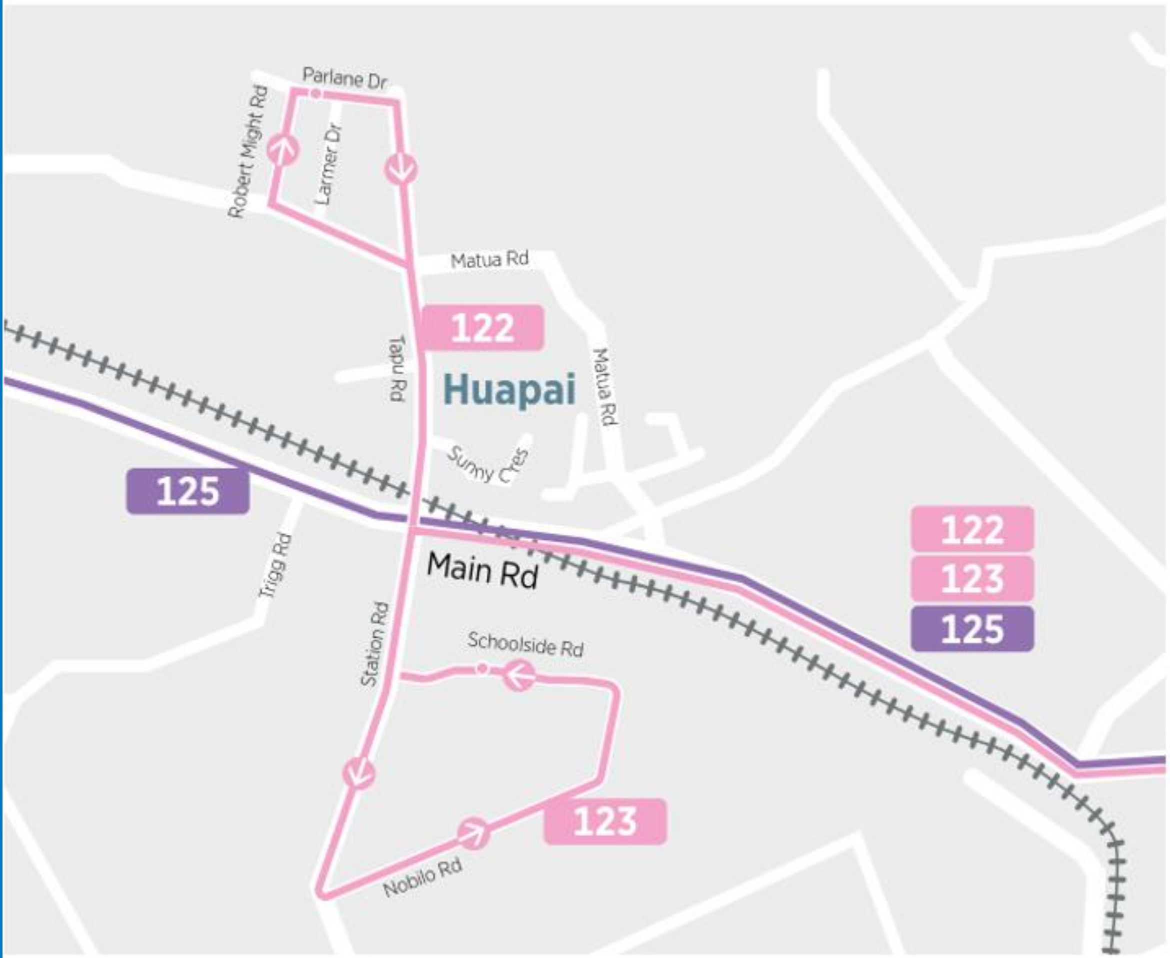
Empirical data.

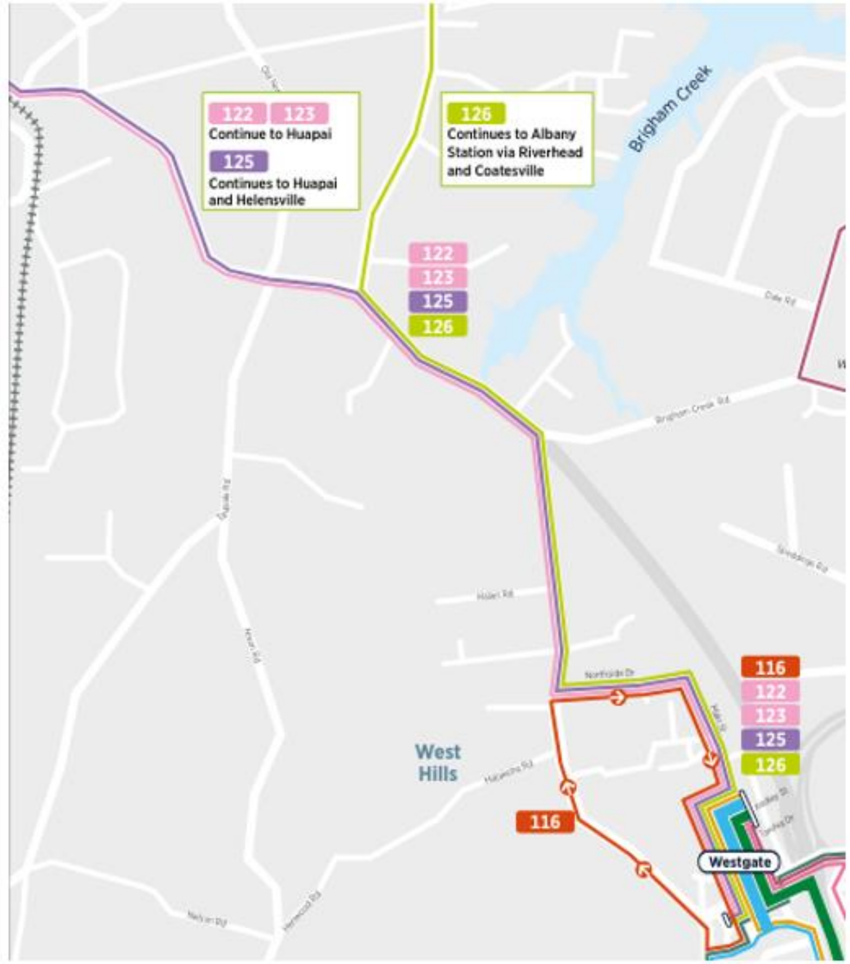
Traffic & Infrastructure.

Special characteristics of locations along the route.

2.2 Timing Point (Holding Point) 40 percentile

Western Routes





Waiheke Routes

RT Method.

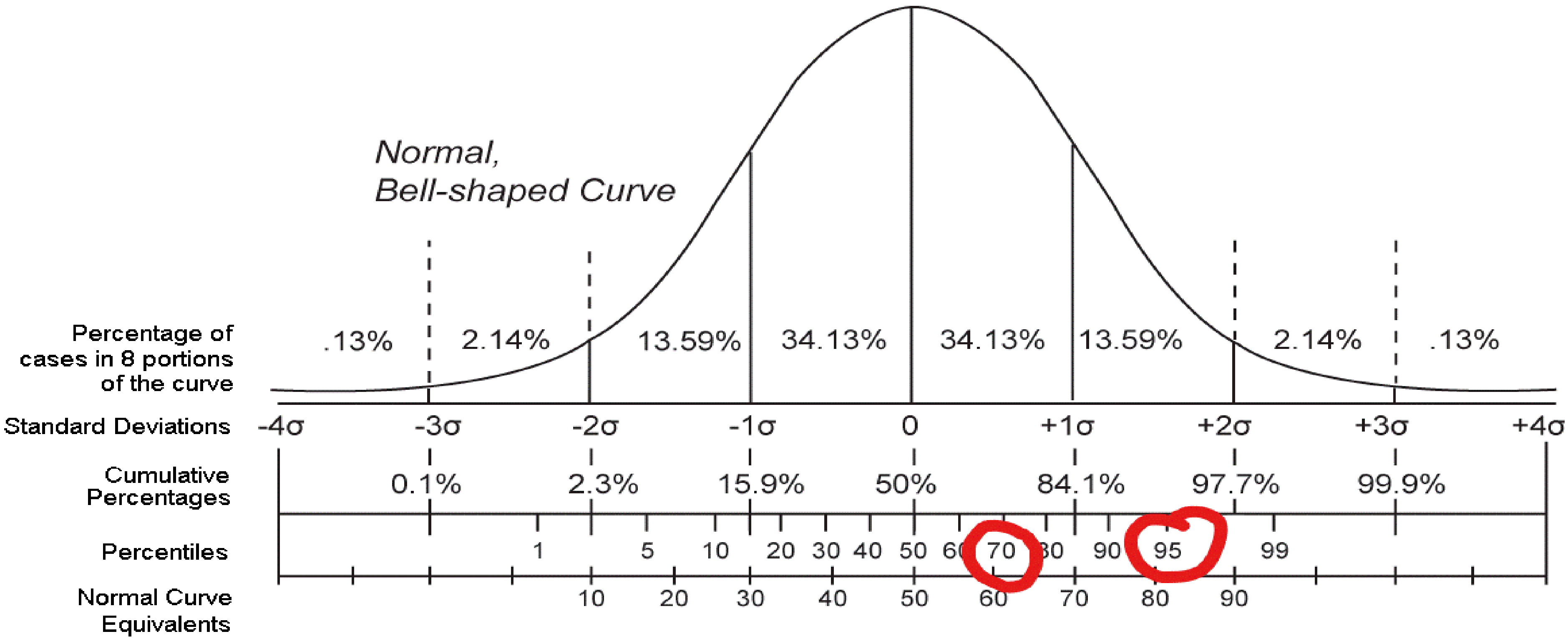
Use of Data to achieve RT principles

AIM: The broad intention is to set run times (RT) so that 95% or more of trips on a route, will arrive within 5 minutes of the scheduled arrival time, (assuming the trip left on time.)

HOW:

- Compare the 70th percentile RT to the 95th tile -5 mins. (this covers RT distribution between different types of route)
- The higher of the 2 values may be selected as the indicative RT for the trip.
- The RT is compared to the preceding and successive trips to establish blocks of time, that fit into a typical timetable pattern (e.g. morning peak).
- The appropriate RT is then set for the block of trips.

Data Distribution



3. Calculation Model.

$$p_l = \frac{\sum_j^{n_{l,j}} \sum_i^{n_{l,i}} |\tilde{D}_{l,i,j}^{act} - D_{l,i,j}^{sched}|}{n_{l,j} \cdot n_{l,i}}$$

where:

p_l	average punctuality on line l
$\tilde{D}_{l,i,j}^{act}$	actual departure time of vehicle i on stop j on line l
$D_{l,i,j}^{sched}$	scheduled departure time of vehicle i on stop j on line l
$n_{l,i}$	number of trips of line l
$n_{l,j}$	number of stops of line l

4. Results.

Table 1: Characteristics Auckland routes case study

Routes	Length (Kms)	Scheduled trip time (min)	Standard deviation (min)	Relative Standard deviation
WX1	19.918	60	3	5%
35	13.007	43	3	6%
70	13.705	40	4	10%
883	8.168	22	2	9%
355	16.197	52	3	7%
123	16.414	42	3	7%
22R	14.586	49	7	15%

5. Conclusions

1. The value of the relative standard deviation. The higher the standard deviation, the higher the optimal percentile value.
2. Too long or too short timetable trip times. The tighter the schedule (i.e. applying smaller percentile values), the lower the optimal percentile value.
3. The number of Timing Points. The impact of two-timing points on the additional travel time is greater than when only one is used, but almost equal to three or four.
4. The best location for a Timing Point depends on the distribution of travellers on a line.