TORONTO TRANSIT COMMISSION
REPORT NO.

MEETING DATE: January 20, 2010

SUBJECT: 501 QUEEN STREETCAR ROUTE: FINAL RECOMMENDATIONS

ACTION ITEM

RECOMMENDATION

It is recommended that the Commission approve the following recommendations for the 501 Queen Streetcar Route:

1. Implement the "Step Forward Strategy" Monday to Friday from 12 to 8pm;

2. Investigate the opportunity to apply the 'Step Forward Strategy' to other routes; and

3. Continue to work with the City of Toronto regarding a Transit supportive Traffic Management Plan.

FUNDING

Sufficient funds to carry out these recommendations are included in the 2010 TTC Operating Budget which was approved by the Commission at its meeting of December 16, 2009.

BACKGROUND

At the July 2009 Commission meeting, staff presented an update on the 501 Queen Streetcar route. This was in response to concern on the degradation of Queen service with respect to short turns, gapping and bunching. This report discussed a number of route management strategies tested and associated performance.

During May and June 2008, staff tested the effectiveness of multiple point spacing using route supervisors at both ends of the line and two intermediate points in each direction. The strategy reduced gaps and bunching and increased the percentage of streetcar service operating near design headway between Humber and Neville, but had the negative effect of slowing service. Despite the improvement in large gaps and reduction of bunching, the strategy resulted in an elevated level of short turns.

In September 2008, staff implemented a new route management strategy on Queen during the mid-day (10am-4pm Monday to Friday) called 'Step Forward'. This strategy essentially disconnects the Operator's schedule from the vehicle and provides a method to ensure Operators are in their scheduled position each trip, without short turning streetcars. The residual short turns, are required to fill gaps in service caused by delay incidents. The

application of this strategy during the month of September 2008 resulted in significant and measurable improvements in short turns, gapping and bunching. These improvements were discussed and presented at the October 2008 Commission Meeting. The 'Step Forward' route management strategy was expanded to include the pm peak period on October 14th, 2008. Implementation of the strategy over this extended timeframe resulted in significant and measurable improvements in short turns, gapping and bunching during the pm peak and during the early evening.

A simplified schedule (discrete branches and simplified crewing) was implemented late November to reduce connectivity issues between runs and Operators on the two branches of the route. Although route performance during late November and early December was affected significantly by inclement weather and short turns, gapping and bunching levels were maintained at relatively low levels.

Based on observations made through the fall that streetcars had insufficient running time to complete trips on time and to start subsequent trips, additional running time was added to the simplified schedule in January 2009. The running time was added without increasing the number of vehicles by slightly increasing average headways. During the month of January 2009, a number of issues including extended periods of extreme cold, related vehicle breakdowns and multiple snowfalls affected reliable operation of the Queen route, although bunching, gapping and short turn levels were maintained at levels significantly lower than similar periods during the winters of 2006-2007 and 2007-2008.

The following recommendations on Queen 501 Route performance were approved at the July 2009 Commission meeting:

1. a) Staff will restart the 'Step Forward' route management strategy from 12:00 pm to 7:00 pm Monday to Friday following completion of the 'Modified Step Back' trial on August 3rd, 2009;

   b) Staff will test the effectiveness of 'Step Forward' from 12:00 pm to 5:00 pm on Weekends for one board period beginning August 2nd;

2. Staff will suspend the 'Step Forward' process and implement a Split Route concept (Downtown split, concept #6) during the October Board Period (October 18th – November 21st, 2009);

3. Staff will continue to work with the City of Toronto regarding a Transit supportive Traffic Management Plan;

DISCUSSION

Modified Step Back Trial (June 22nd to July 31st, 2009)

This strategy acts in a similar manner to 'Step forward', disconnecting the streetcar from the operator's schedule, but the operator steps back to a later run number. This introduces significant schedule complexity, as the schedule for an operator now entails a sequence of run numbers (rather than one run number).

While designing, preparing schedules, crewing and training operating, clerical and supervisory personnel to use this new system, staff recognized it adds a level of complex operator and branch connectivity issues. These issues resulted in an increase in the level of short turns required to manage the route and branches. Bunched service also increased during both midday and pm peak and % service close to design headway decreased during both periods.

Implementation of this strategy created a number of other issues due to the non-standard methods required to manage waybills, transfers, crewing, operator breaks and relief crews. All operators required some level of coaching before the test was conducted. If this process had proved effective, changes to a number of operating practices and standard procedures would have been required.

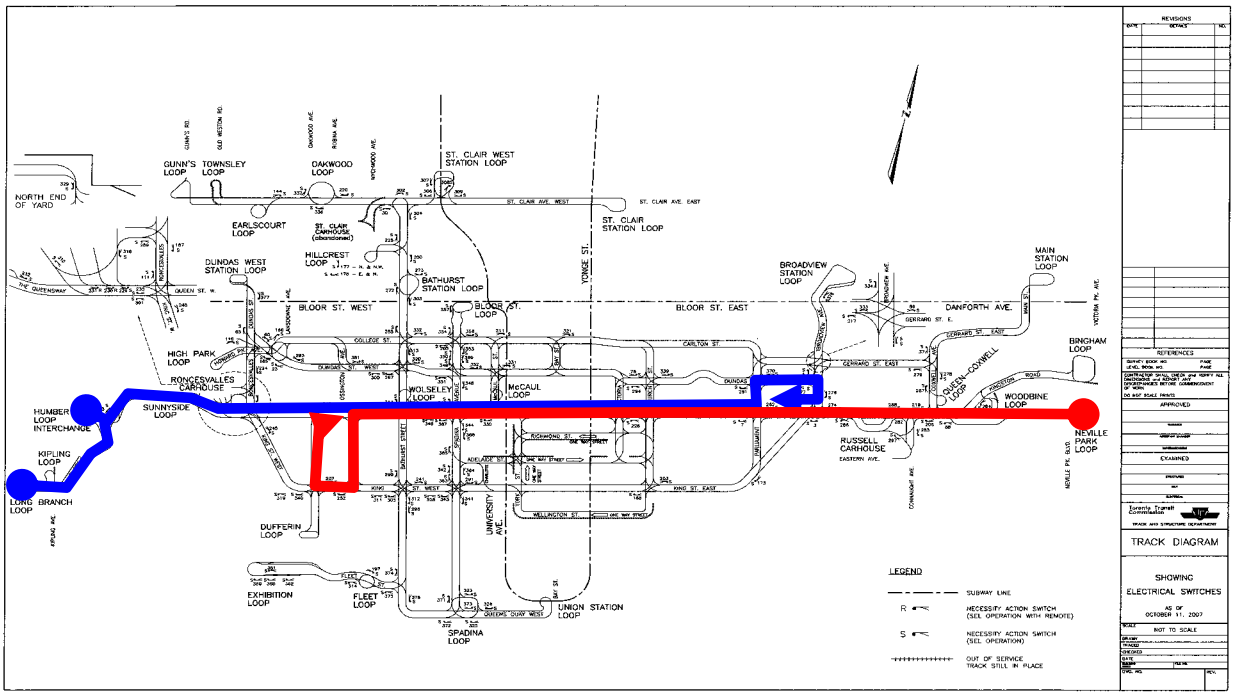
Staff concluded that the Modified Step-Back process contributed to route and schedule complication and resulted in poorer service.

Step-Forward on Weekends

Staff did not implement a test of the 'Step-Forward' process on weekends during the August Board Period because of the impact of the large double diversion caused by roadway construction on Queen at Church and at the Don Bridge. Staff concluded that measurements of performance on weekends during this period of severe service disruption would not be comparable to weekend performance without the diversion disruptions. Staff have concluded that simplification of the schedule (Discrete branches and run numbers) during day-base periods Saturday and Sunday will result in a reduction in the number of short turns required to manage service currently because of connectivity issues.

Split Route Trial (October 20th to November 20th, 2009)

A split route with a downtown overlap was implemented as show in the following map.



In the original 'Split with Downtown overlap' concept, Neville cars were intended to turn back via Bathurst and both branches of the west end cars were intended to turn back via Church and Victoria. Unfortunately, construction on Church and track switch problems at Bathurst made these choices unsuitable for scheduled turn-backs. In addition, and from an operational perspective, turn-back locations that provided suitable short turns on the far side of subway connections were preferable. Otherwise, downtown short turns would either miss subway connections or would have to be shifted away from the core to Kingston Rd or at Kipling or Sunnyside, near the ends of line. As a result, west end cars were scheduled to turn back via Parliament, Dundas and Broadview and east end cars turned back via Shaw, King and Dufferin. In both cases, service could be adjusted via downtown turns that did not compromise either Subway connection.

Seven additional streetcars were added to the route because of the overlapped portion of the route in the core. Headways to both Humber and Long Branch to the west and to Neville in the east were slightly increased. Because the west end and east end headways were not the same, they were not blended in the downtown core.

Unfortunately downtown turns and overlap created its own congestion and delays. This congestion and the time it takes for streetcars to complete turns on Queen, King and Dundas, affects service on all three routes, ultimately resulting in slower trips, gaps, bunching and higher levels of short turns to avoid run and operator connectivity issues.

During the Split Route Schedule test, short turns unrelated to construction increased by 90% overall; +87% in the midday and + 223% during the PM peak vs. the September and November schedules, which included pm Step-Forward, extended run time and simplified scheduling. During the midday, turns in the east and west were reduced, but core turns reached significant levels. During the PM peak, turns in the west and east did not change; the increase in turns was limited to the core area.

From the perspective of large gaps, there was no real improvement or deterioration during the am peak, midday or early evening. Gaps were measurably larger during the PM peak and smaller during the late evening.

Bunching improved during all timeframes, possibly because of the larger headways outside of the core. With larger headways, gaps between cars could get larger, before bunching occurred.

The Split Schedule's impact on '% service close to design headway' showed no real change during the AM peak, midday or early evening, but a significant improvement during the late evening; the pm peak showed some deterioration.

Customer response to the Split route test was very negative based on the quantity of complaints received. Customers from the East area submitted the greatest number of complaints in all top five complaint types.

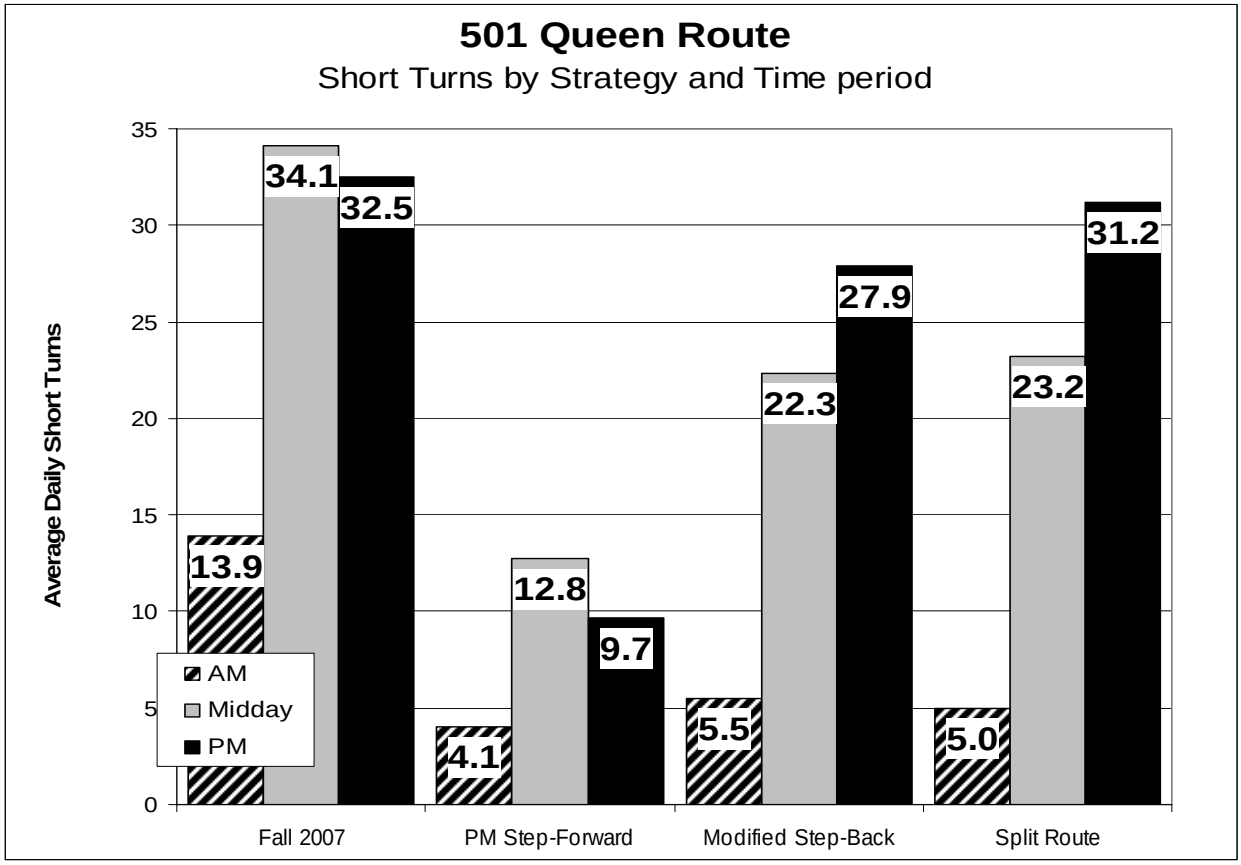
Overall, while the Split Route concept provided benefits from downtown dispatch spacing, congestion in the core related to the frequency of streetcars turning in the core caused significant deterioration to service levels; contributed to an increase in short turns and longer customer trip times and forced many customers in the downtown core to transfer at least once during their trips. Customers travelling through the core from outside of the core were

negatively impacted by the split route schedule. Customers receiving the most benefit from the split schedule were those, whose trips were wholly within the core.

Route Performance by Strategy

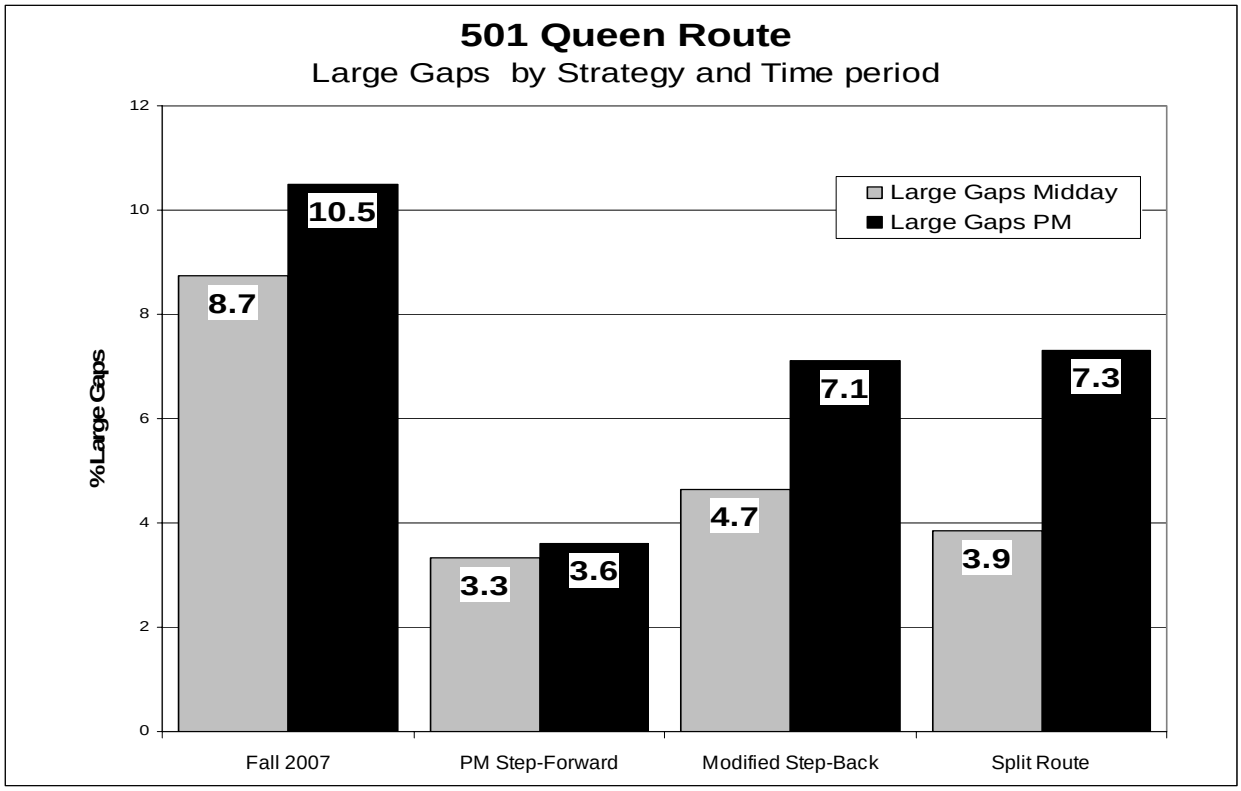
Staff have measured the performance of these strategies based on their impact on the following criteria; short turns, gapping, bunching, and adherence to scheduled headway. Customer complaints were monitored to provide a comparison of the order of magnitude.

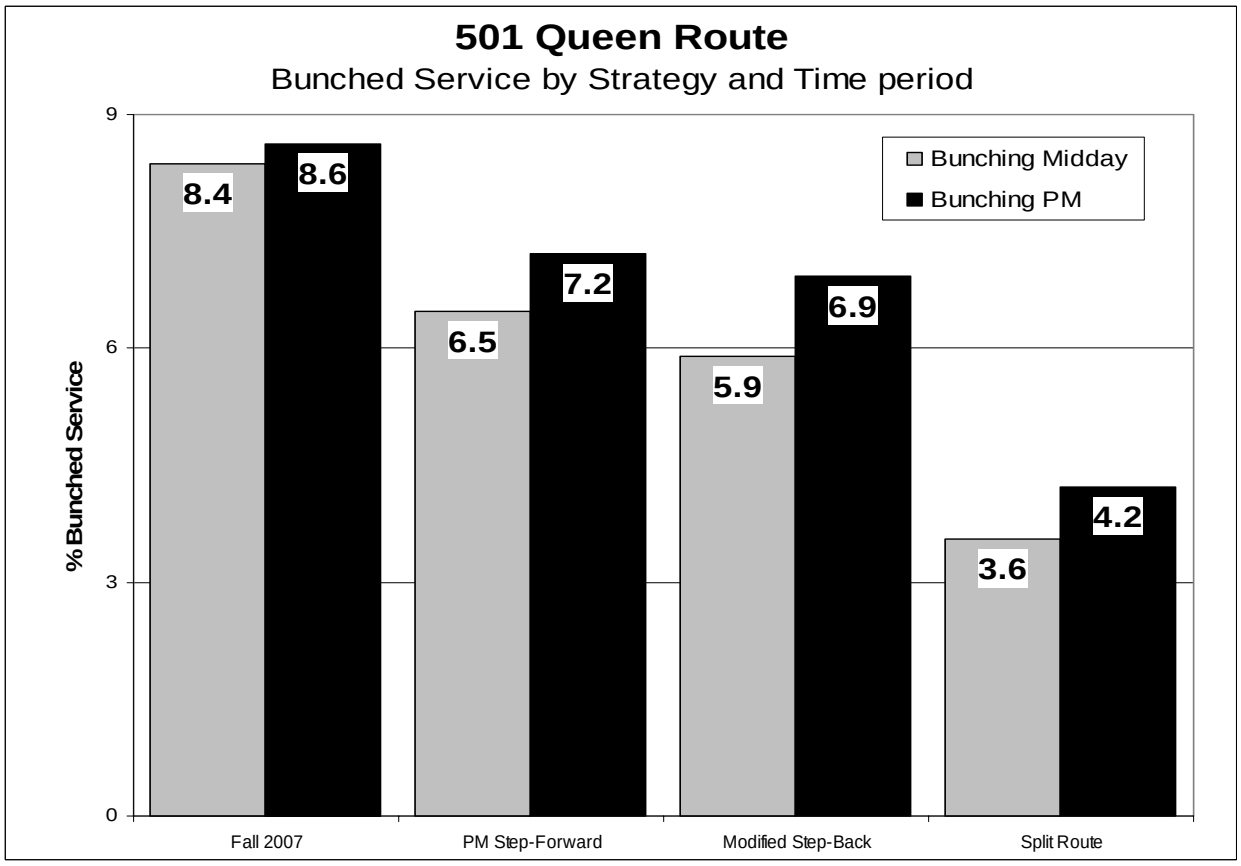
The effect of various Route Management Strategies on Short Turn levels is illustrated in the following chart:



This Chart measures the average daily (Mon-Fri) short turns by time of day and Route Management strategy. The AM peak period (Unaffected by Step-Forward or Modified Step Back) acts as a control to confirm all time periods measured were relatively consistent with respect to construction and diversions.

'Large Gaps' measures the % of streetcars operating with gaps of 15 minutes or more east of Humber and gaps of 30 minutes or more west of Humber.

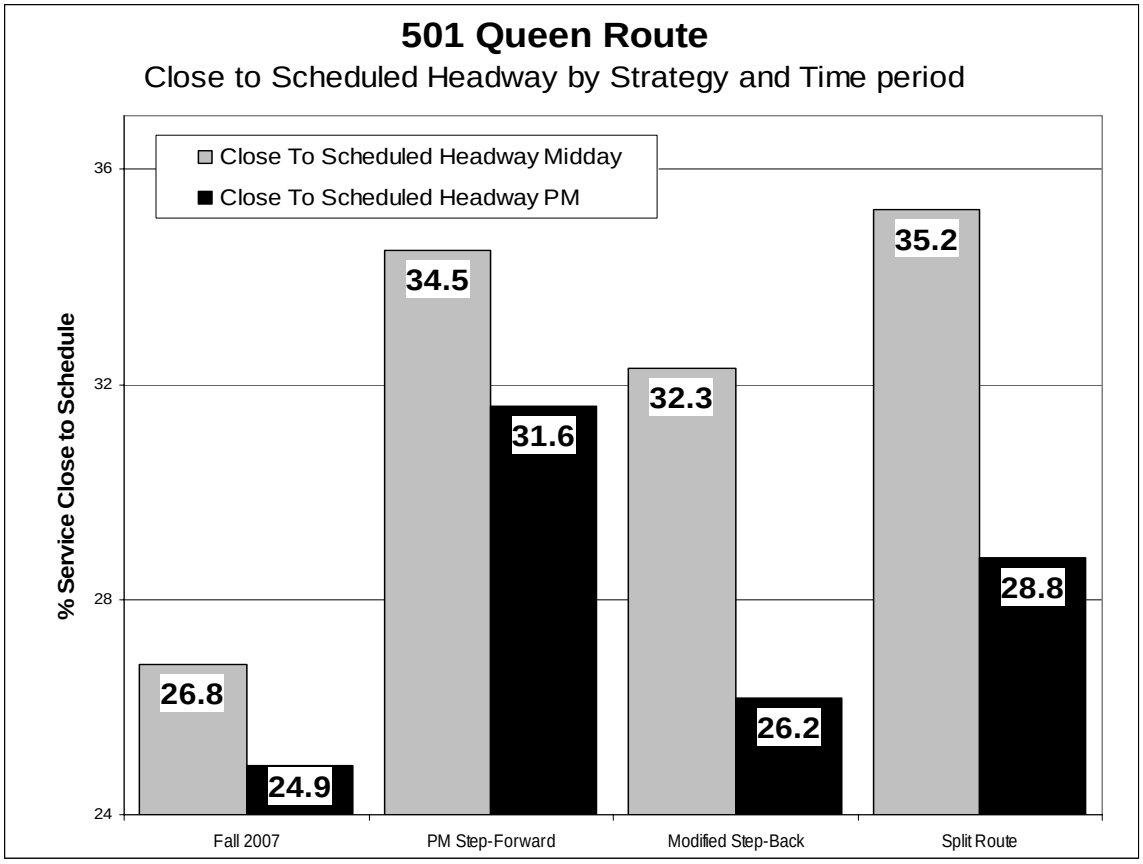




'Bunching' measures the % of streetcars within one minute of each other. The drop in bunching during the Split Route test is indicative of both the increase in headway and that

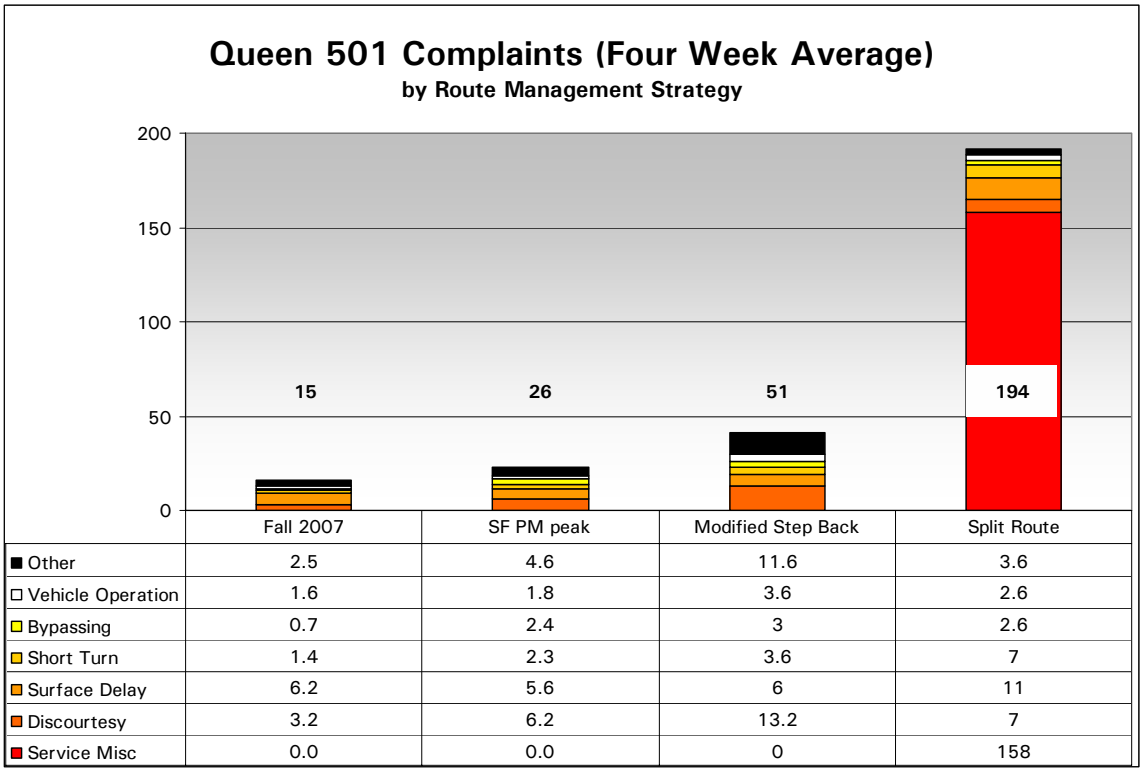
we measured West end and East end bunching discretely.

'Close to Schedule' measures the % of Streetcars with headways within 2 minutes of design headway, essentially headways of 4 to 8 minutes, east of Humber and operating with headways of 10 to 14 minutes, west of Humber.



Customer Complaints:

An analysis of customer complaints received on the 501 Queen Route for each strategy reveals the following:



	Fall 2007	SF PM peak	Modified Step Back	Split Route
Other	2.5	4.6	11.6	3.6
Vehicle Operation	1.6	1.8	3.6	2.6
Bypassing	0.7	2.4	3	2.6
Short Turn	1.4	2.3	3.6	7
Surface Delay	6.2	5.6	6	11
Discourtesy	3.2	6.2	13.2	7
Service Misc	0.0	0.0	0	158

During the Split Route test we also received 34 complaints from residents near turnback points related to noise and vibration. These are not included in the above normalized totals.

COMPARISON

The following table shows a comparison of the metrics for each strategy:

Strategy	Short Turns	Large Gaps	Bunching	On Schedule	Complaints
	Avg. PM Peak				4 wk Avg.
PM Peak Step- Forward	9.7	3.6%	7.2%	31.6%	26.3
Step Back	27.9	7.1%	6.9%	26.2%	51.2
Split Route	31.2	7.3%	4.2%	28.8%	193.6

Note: Shading indicates the best performance

The two metrics that have the greatest impact on our customer's trips are short turns as customers must exit the streetcar and wait for the next car, and large gaps as these directly affect length of time they must wait for a streetcar. As can be seen from the chart the Step-Forward implementation provides significantly improved performance over the other 2 strategies.

PLAN

The following plan optimizes line performance on the 501 Queen Streetcar Route :

1. Implement the Step Forward Strategy Monday to Friday from 12 to 8pm including:
   a. Simplified crewing and scheduling for weekdays
   b. Additional run time Monday to Friday

2. Staff will investigate strategies to expand Neville Loop to accommodate a longer recovery time;

3. Staff will investigate the possibility of applying the 'Step Forward Strategy' to other routes; and

4. Staff will continue to work with the City of Toronto regarding a Transit supportive Traffic Management Plan.

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January 6th, 2009
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