

Appendix 1, Attachment 2

SmartTrack Ridership Forecast Including Scarborough Subway Extension



Memorandum

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February 29, 2016

To: John Livey, Deputy City Manager

From: Jennifer Keesmaat, Chief Planner and Executive Director

Re: **SmartTrack and Scarborough Subway Extension Ridership Forecasts, Release 2 Forecast Runs, Summary Report**

I am pleased to send you the *SmartTrack and Scarborough Subway Extension Ridership Forecasts, Summary Report*. This report represents the third in a series of three reports which present summary results from the SmartTrack ridership forecasts prepared by UTTRI (University of Toronto Transportation Research Institute) in collaboration with City of Toronto Planning staff using GTAModel V4.0 travel demand forecasting system.

It completes our initial analysis of the ridership potential of SmartTrack, including associated ridership implications for other transportation infrastructure currently under study including the Relief Line, the Yonge Subway extension, and the Scarborough Subway Extension (SSE). This report focuses on SmartTrack in the context of the SSE.

Four Scarborough Subway Extension (SSE) options have been analyzed to date, consistent with the City Manager's October 15, 2015 report to Executive Committee. The results of the ridership analysis are summarized in the attached report. Further work is currently underway to analyze the ridership implications of an Express Subway option terminating at Scarborough Centre in conjunction with an easterly extension of the Crosstown LRT to the University of Toronto Scarborough Campus and further refinements to SmartTrack. Recommendations concerning this ongoing work to develop an optimized transit network for Scarborough will be reported in June.

The SSE options analysed include:

- Two options running along McCowan Road:
 - "McCowan3" has three stations at Lawrence, Scarborough Centre (SCC) and the intersection of Sheppard/McCowan;

- “McCowan4” is similar to “McCowan3” but includes an additional station between Kennedy and Lawrence stations at the intersection of Eglinton/Danforth;
- An alignment running along Midland Avenue with three stations at Lawrence, SCC and Sheppard/McCowan; and
- An alignment running along Bellamy Road with four stations at the Eglinton GO Station, Lawrence, SCC and the intersection of Sheppard/McCowan.

The base SmartTrack scenario is used in all the model runs presented in the attached report. This base scenario consists of the full alignment from Unionville in the northeast, running along the Stouffville line, with through service at Union Station continuing along the Kitchener line to the Mississauga Airport Corporate Centre (MACC) in the northwest. At Mount Dennis this base alignment is assumed to leave the existing Kitchener line to continue to the MACC on a new alignment along Eglinton Avenue. This base SmartTrack configuration is assumed to have 24 stations. The “with SmartTrack” options examined in this report assume that a TTC fare is charged for using SmartTrack and SmartTrack headways of 15, 10 and 5 minutes are considered.

As noted in the SmartTrack ridership summary report released on January 18, 2016, the SmartTrack heavy rail option along Eglinton Avenue generates lower ridership in the Eglinton West corridor than the alternative westerly extension of the Eglinton Crosstown LRT to the MACC recommended in the HDR Western Corridor Feasibility Review. Notwithstanding this observation, technology choice in the Eglinton West corridor does not materially affect ridership forecasts in the Stouffville rail corridor and does not materially affect the ridership forecasts presented in this report (i.e. less than 1% variation in ridership in the SmartTrack and SSE corridors in the vicinity of Kennedy station).

The base population and employment scenario for the model runs discussed in the attached report that do not include SmartTrack assume the “low population/medium employment” scenario. Base runs which include SmartTrack assume the “low population/medium employment scenario with SmartTrack influence”.

Two assumptions concerning SSE headways were tested. The base assumption is that SSE headways are the same as for the rest of the Bloor-Danforth line. A sensitivity test was undertaken to determine the impact of short-turning every second train eastbound at Kennedy Station in the morning peak period (i.e. only every second train travels through to SCC). Similarly, a sensitivity analysis was undertaken to test a more conservative (i.e. lower) employment growth forecast.

Alternative Scarborough Subway Corridors

The "base" ridership forecasts show that by 2031:

- The McCowan4 and Bellamy corridors would attract similar ridership, ranging from about 146,100 to 147,300 daily users respectively. Similarly, the morning peak hour, peak direction, peak point ridership ranges from 17,400 to 17,700 riders (i.e. westbound approaching Kennedy Station).

- The Midland corridor would attract about 124,700 daily riders. The morning peak hour, peak direction, peak point ridership would be about 14,400 (i.e. westbound approaching Kennedy Station).
- The McCowan3 corridor would attract about 115,600 daily riders. The morning peak hour, peak direction, peak point ridership is about 13,700 (i.e. westbound approaching Kennedy Station).
- The SSE corridors modelled contribute to further crowding on the Yonge Subway, adding between 830 and 1,230 riders to the critical southbound link, south of Bloor Station, depending on the SSE alignment considered.

The subway headway sensitivity test revealed that daily SSE users would fall from 115,600 to about 107,700 users in 2031, and morning peak hour, peak direction, peak point ridership would fall from 13,700 to about 11,700 (i.e. westbound approaching Kennedy Station) if every other eastbound train is short-turned at Kennedy station in the morning peak period. However, the TTC has confirmed that their Fleet Plan, by 2031, provides for every eastbound train running through Kennedy station to Sheppard Avenue in the morning peak period. Consequently, the forecast ridership of 115,600 daily users and 13,700 morning peak hour, peak direction, peak point riders remains relevant.

A land use sensitivity test considering lower employment growth than assumed in the base forecast, but assuming SSE headways that are consistent with the rest of the Bloor-Danforth subway, revealed that daily SSE users would fall from 115,600 to about 112,200 users in 2031. Morning peak hour, peak direction, peak point ridership would fall from 13,700 to about 13,200 (i.e. westbound approaching Kennedy Station).

McCowan 3 Station Option With SmartTrack

The impact of introducing the "base" SmartTrack scenario with the "base" McCowan3 SSE alternative was tested. Assuming 15-minute SmartTrack services, daily SSE users fell modestly by about 5,800, from 115,600 to 109,800 in 2031. Morning peak hour, peak direction, peak point ridership fell by about 1,100 from 13,700 to 12,600 riders (i.e. westbound approaching Kennedy Station).

The drop in SSE ridership was greater assuming 5-minute SmartTrack services. Daily SSE users fell by about 27,400, from 115,600 to 88,200 in 2031. Morning peak hour, peak direction, peak point ridership fell by about 3,900 from 13,700 to 9,800 riders (i.e. westbound approaching Kennedy Station). Notwithstanding the observed drop in ridership, the resulting morning peak hour, peak point, peak direction ridership would be comparable or higher than that observed today near the terminal points of existing subway lines, with the exception of the Yonge line in the vicinity of Finch station.

These forecasts represent a moment in time. They will change as the Scarborough Subway Extension and SmartTrack service concepts are refined, and the recommended Rapid Transit Network for Scarborough and the rest of the City are further developed.

As noted earlier, further work is currently underway to analyze the ridership implications of an optimized Rapid Transit Network for Scarborough, including an Express Subway option terminating at Scarborough Centre in conjunction with an easterly extension of the Crosstown LRT to the University of Toronto Scarborough Campus and further refinements to SmartTrack.

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City Planning Division



MEMORANDUM

To: City of Toronto Planning
From: Eric J. Miller, Ph.D.
Report: 2016-03
Database: Release 2 Forecast Runs
Subject: **SmartTrack and Scarborough Subway Extension Ridership Forecasts, Summary Report**
Date: February 25, 2016

1. INTRODUCTION

This memorandum is the third report presenting summary ridership results from the SmartTrack ridership forecasts prepared by UTTRI in collaboration with City of Toronto Planning staff using the GTAModel V4.0 travel demand forecasting system. This report presents overall ridership estimates for the various Scarborough Subway Extension (SSE) options, with and without implementation of the SmartTrack service.

In the previous two reports in this series presenting forecast results for alternative SmartTrack and Relief Line options, respectively, it was assumed in all alternatives considered that the SSE “McCowan3”¹ alignment had been implemented as part of the “base” future year network. In this report, the ridership impacts of different SSE alignments are examined relative to a base that does not include the SSE, with and without SmartTrack implementation.

“Release 2” ridership numbers are used in this report, where “Release 2” represents minor updates of the future year networks relative to the networks used to generate the “Release 1” forecasts.

Full documentation of the demand model system, its base year validation and its assessment by an independent peer review panel will be provided in other reports.

Forecasts have been prepared for two future years: 2031 and 2041. In each case a base year forecast has been prepared which includes known committed major transit² and “RER” upgrades to the GO Rail system as defined by the Metrolinx RER Service Concept.

The base SmartTrack scenario is used in all the model runs presented in this report. As described in more detail in Report 1 of this report series, this base scenario consists of the full alignment from Unionville in the north-east, running along the Stouffville line, with through service at Union

¹ See definitions of SSE alignments in Section 2.1 and Appendix I.

² These include: Eglinton Crosstown, Finch West LRT, Sheppard East LRT and Toronto-York Spadina Subway Extension.

Table 2.6: 2031 SSE Sensitivity Test Results

		(a) Low/Low Land Use: SSE Users without SmartTrack			Westbound into Kennedy	Westbound out of Kennedy
Alignment #	Alignment Description	AM Peak Hour Users	AM Peak Period Users	All Day Users	Peak Hour Volume	Peak Hour Volume
McCowan4	McCowan with 4 stops	22,800	46,400	142,200	16,700	18,500
McCowan3	McCowan with 3 stops	18,100	36,800	112,200	13,200	18,300
Midland	Midland with 3 stops	19,400	39,600	121,300	13,900	18,500
Bellamy	Bellamy with 4 stops	23,200	47,300	143,400	17,000	19,200
Change relative to Low/Med Land Use Case						
McCowan4	McCowan with 4 stops	-600	-1,400	-3,900	-700	-600
McCowan3	McCowan with 3 stops	-500	-1,200	-3,400	-500	-500
Midland	Midland with 3 stops	-600	-1,200	-3,400	-500	-500
Bellamy	Bellamy with 4 stops	-600	-1,300	-3,900	-700	-600

* Note: SSE Users are riders who have either boarded or alighted at one of the new SSE stations

		(b) Low/Med with Halved Frequency: SSE Users without SmartTrack			Westbound into Kennedy	Westbound out of Kennedy
Alignment #	Alignment Description	AM Peak Hour Users	AM Peak Period Users	All Day Users	Peak Hour Volume	Peak Hour Volume
McCowan4	McCowan with 4 stops	19,500	39,800	136,100	14,800	17,300
McCowan3	McCowan with 3 stops	15,500	31,600	107,700	11,700	17,400
Midland	Midland with 3 stops	16,400	33,600	116,000	12,200	17,400
Bellamy	Bellamy with 4 stops	19,700	40,200	136,900	14,900	17,600
Change relative to Low/Med Land Use Case						
McCowan4	McCowan with 4 stops	-3,900	-8,000	-10,000	-2,600	-1,800
McCowan3	McCowan with 3 stops	-3,100	-6,400	-7,900	-2,000	-1,400
Midland	Midland with 3 stops	-3,600	-7,200	-8,700	-2,200	-1,600
Bellamy	Bellamy with 4 stops	-4,100	-8,400	-10,400	-2,800	-2,200

* Note: SSE Users are riders who have either boarded or alighted at one of the new SSE stations

		(c) Low/Low with Halved Frequency: Users on the SSE			Westbound into Kennedy	Westbound out of Kennedy
Alignment #	Alignment Description	AM Peak Hour Users	AM Peak Period Users	All Day Users	Peak Hour Volume	Peak Hour Volume
McCowan4	McCowan with 4 stops	18,900	38,500	132,400	14,200	16,700
McCowan3	McCowan with 3 stops	15,000	30,600	104,500	11,200	16,800
Midland	Midland with 3 stops	16,000	32,600	112,900	11,800	16,900
Bellamy	Bellamy with 4 stops	19,100	38,900	133,400	14,200	17,000
Change relative to Low/Med Land Use Case						
McCowan4	McCowan with 4 stops	-4,500	-9,300	-13,700	-3,200	-2,400
McCowan3	McCowan with 3 stops	-3,600	-7,400	-11,100	-2,500	-2,000
Midland	Midland with 3 stops	-4,000	-8,200	-11,800	-2,600	-2,100
Bellamy	Bellamy with 4 stops	-4,700	-9,700	-13,900	-3,500	-2,800

* Note: SSE Users are riders who have either boarded or alighted at one of the new SSE stations

APPENDIX I: SCARBOROUGH SUBWAY EXTENSION LINE ALIGNMENT OPTIONS

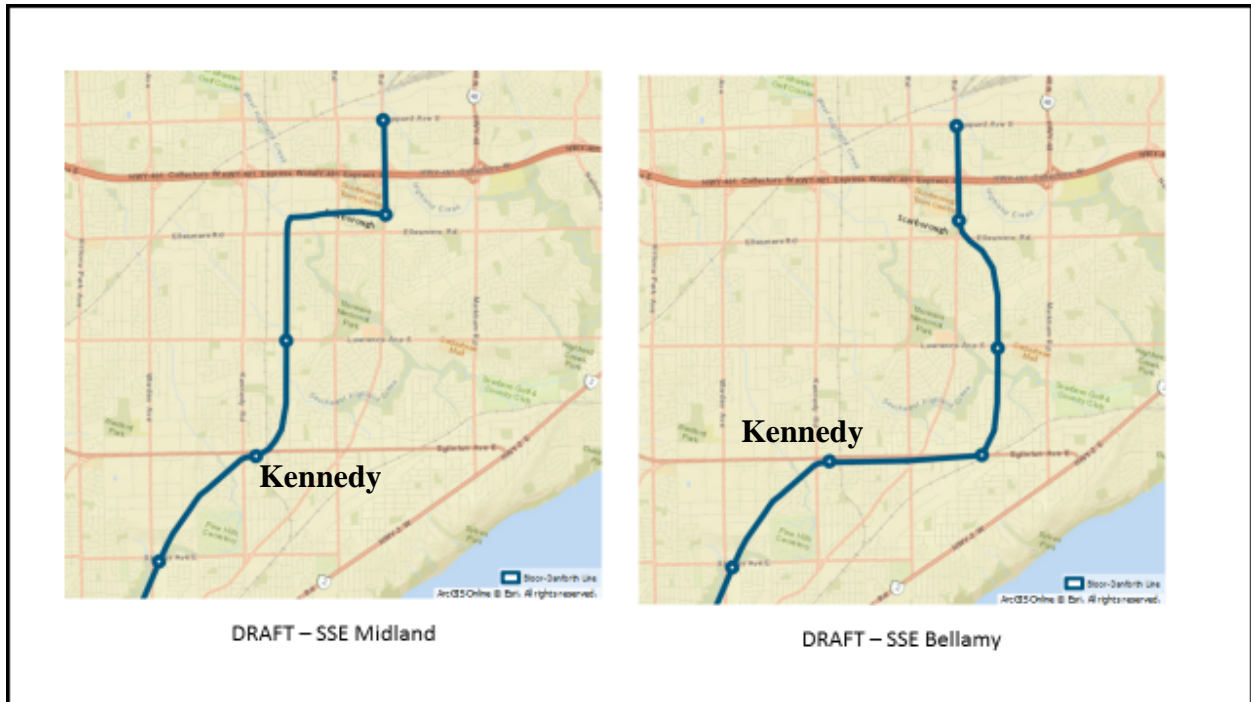


Figure I.1: Midland & Bellamy Options

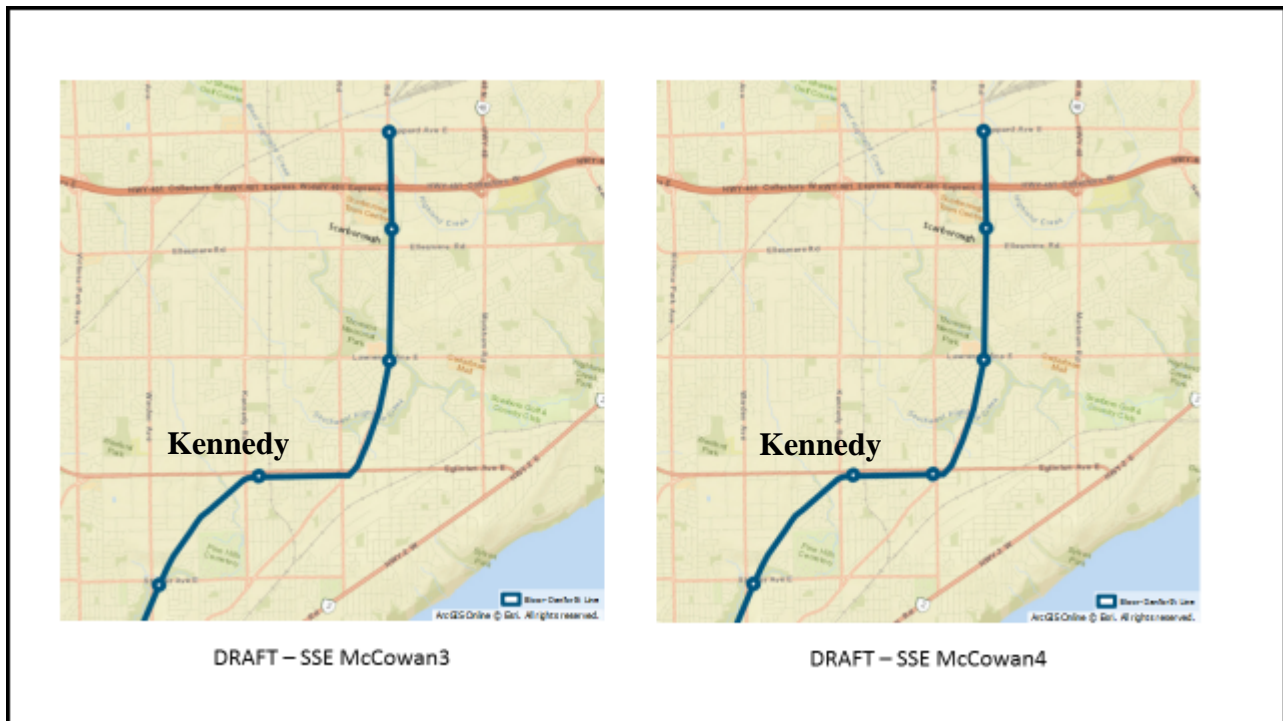


Figure I.2: “McCowan3” & “McCowan4” Options

APPENDIX II: 2041 RESULTS

Table II.1: 2041 SSE Users by Alignment, without SmartTrack, Low Population, Medium Employment

Alignment #	Alignment Description	SSE Users without SmartTrack			Westbound into Kennedy	Westbound out of Kennedy
		AM Peak Hour Users	AM Peak Period Users	All Day Users	Peak Hour Volume	Peak Hour Volume
McCowan4	McCowan with 4 stops	25,900	52,800	160,100	19,500	21,300
McCowan3	McCowan with 3 stops	20,500	41,800	126,700	15,400	21,000
Midland	Midland with 3 stops	21,800	44,400	136,300	16,100	21,100
Bellamy	Bellamy with 4 stops	26,600	54,300	163,200	20,100	22,200

* Note: SSE Users are riders who have either boarded or alighted at one of the new SSE stations

Table II.2 (a): 2041 SSE Users by Alignment, with SmartTrack and Low Population, Medium Employment

Alignment #	SmartTrack Frequency	SSE Users with SmartTrack, Low Population, Medium Employment			Westbound into Kennedy	Westbound out of Kennedy
		AM Peak Hour Users	AM Peak Period Users	All Day Users	Peak Hour Volume	Peak Hour Volume
McCowan3	5 mins	15,300	31,200	94,100	10,700	14,600
McCowan3	15 mins	19,300	39,500	119,500	14,000	19,700

* Note: SSE Users are riders who have either boarded or alighted at one of the new SSE stations

Table II.2 (b): 2041 SSE Users by Alignment, with SmartTrack and Low Population, Low Employment

Alignment #	SmartTrack Frequency	SSE Users with SmartTrack, Low population and Low Employment			Westbound into Kennedy	Westbound out of Kennedy
		AM Peak Hour Users	AM Peak Period Users	All Day Users	Peak Hour Volume	Peak Hour Volume
McCowan3	5 mins	14,400	29,300	89,400	10,350	14,310
McCowan3	15 mins	18,200	37,200	113,100	13,550	18,940

*Note: SSE Users are riders who have either boarded or alighted at one of the new SSE stations

Table II.2 (c): 2041 SSE Users by Alignment, with SmartTrack and Additional Regional Growth Land Use

Alignment #	SmartTrack Frequency	SSE Users with SmartTrack, Additional Regional Growth Land Use			Westbound into Kennedy	Westbound out of Kennedy
		AM Peak Hour Users	AM Peak Period Users	All Day Users	Peak Hour Volume	Peak Hour Volume
McCowan3	5 mins	15,400	31,400	94,900	10,810	14,550
McCowan3	15 mins	19,500	39,800	120,700	14,260	19,700

*Note: SSE Users are riders who have either boarded or alighted at one of the new SSE stations

Table II.3: 2041 Extent of Yonge Line Relief

SSE Alignment	SSE Alignment Description	SmartTrack	Volume Southbound @ South of Bloor (Peak Hour)
2041 Low-Med base with SRT			42,080
McCowan4	McCowan with 4 stops	None	42,610
McCowan3	McCowan with 3 stops	None	42,570
Midland	Midland with 3 stops	None	42,610
Bellamy	Bellamy with 4 stops	None	42,620

Table II.4: 2041 Net New Riders

SSE Alignment	SSE Alignment Description	SmartTrack	Net New Riders (Daily)
2041 Low Med Base			* Acts as Base
McCowan4	McCowan with 4 stops	None	10,200
McCowan3	McCowan with 3 stops	None	9,300
Midland	Midland with 3 stops	None	10,600
Bellamy	Bellamy with 4 stops	None	9,700

Table II.5: 2041 SSE Sensitivity Test Results

		(a) Low/Low Land Use: SSE Users without SmartTrack			Westbound into Kennedy	Westbound out of Kennedy
Alignment #	Alignment Description	AM Peak Hour Users	AM Peak Period Users	All Day Users	Peak Hour Volume	Peak Hour Volume
McCowan4	McCowan with 4 stops	24,700	50,300	153,300	18,500	20,400
McCowan3	McCowan with 3 stops	19,400	39,600	121,100	14,600	20,100
Midland	Midland with 3 stops	20,800	42,300	130,900	15,300	20,300
Bellamy	Bellamy with 4 stops	25,500	52,000	156,800	18,900	21,200
Change relative to Low/Med Land Use Case						
McCowan4	McCowan with 4 stops	-1,200	-2,500	-6,800	-1,000	-900
McCowan3	McCowan with 3 stops	-1,100	-2,200	-5,600	-800	-900
Midland	Midland with 3 stops	-1,000	-2,100	-5,400	-800	-800
Bellamy	Bellamy with 4 stops	-1,100	-2,300	-6,400	-1,200	-1,000

* Note: SSE Users are riders who have either boarded or alighted at one of the new SSE stations

		(b) Low/Med with Halved Frequency: Users on the SSE			Westbound into Kennedy	Westbound out of Kennedy
Alignment #	Alignment Description	AM Peak Hour Users	AM Peak Period Users	All Day Users	Peak Hour Volume	Peak Hour Volume
McCowan4	McCowan with 4 stops	22,000	44,800	150,200	16,800	19,500
McCowan3	McCowan with 3 stops	17,200	35,100	118,700	13,200	19,400
Midland	Midland with 3 stops	18,200	37,200	127,600	13,700	19,500
Bellamy	Bellamy with 4 stops	22,200	45,300	152,100	16,900	19,800
Change relative to Low/Med Land Use Case						
McCowan4	McCowan with 4 stops	-3,900	-8,000	-9,900	-2,700	-1,800
McCowan3	McCowan with 3 stops	-3,300	-6,700	-8,000	-2,200	-1,600
Midland	Midland with 3 stops	-3,600	-7,200	-8,700	-2,400	-1,600
Bellamy	Bellamy with 4 stops	-4,400	-9,000	-11,100	-3,200	-2,400

* Note: SSE Users are riders who have either boarded or alighted at one of the new SSE stations

		(c) Low/Low with Halved Frequency: Users on the SSE			Westbound into Kennedy	Westbound out of Kennedy
Alignment #	Alignment Description	AM Peak Hour Users	AM Peak Period Users	All Day Users	Peak Hour Volume	Peak Hour Volume
McCowan4	McCowan with 4 stops	20,900	42,600	143,900	15,900	18,600
McCowan3	McCowan with 3 stops	16,300	33,200	113,200	12,400	18,600
Midland	Midland with 3 stops	17,300	35,400	122,300	13,000	18,700
Bellamy	Bellamy with 4 stops	21,300	43,500	146,300	16,000	18,900
Change relative to Low/Med Land Use Case						
McCowan4	McCowan with 4 stops	-5,000	-10,200	-16,200	-3,600	-2,700
McCowan3	McCowan with 3 stops	-4,200	-8,600	-13,500	-3,000	-2,400
Midland	Midland with 3 stops	-4,500	-9,000	-14,000	-3,100	-2,400
Bellamy	Bellamy with 4 stops	-5,300	-10,800	-16,900	-4,100	-3,300

* Note: SSE Users are riders who have either boarded or alighted at one of the new SSE stations