

## **APPENDIX III**

### **Vehicle Requirements**

Vehicle requirements for each option are presented herein, based on 75 foot (H or M type) cars only. The present Y/U/S fleet is assumed to be 302 cars, based on 45 trains (270 cars) in service plus 32 spare cars (12%).

#### **Yard Capacities**

The operational capacities of the existing yards at Davisville and Wilson are as follows:

Davisville Yard capacity	86
Wilson Yard capacity	<u>278</u>
Total Present capacity	364
Expansion at Wilson	<u>82</u>
Total Possible capacity	446
Spadina Line Extension	<u>-24</u>
	422

As noted above, expansion capability for up to 82 additional cars was provided in the design of Wilson Yard. However, if the Spadina Line is extended past Wilson Station through Wilson Yard, then Wilson Yard capacity would be reduced by 24 cars.

#### **Option 1A**

i) Operation at a 122 second headway with short turn operation at St. Clair W. utilizing standard rate.

	Service Trains	Cars	Headway	Round Trip Time
Finch to St. Clair W.	21	126	244"	85'24"
Finch to Wilson	<u>27</u>	<u>162</u>	244"	109'48"
	48	288	122"	
12% Spare Cars		<u>34</u>		
Total Fleet Required		322		
Present Fleet		<u>302</u>		
Additional Cars Required		20		

ii) Operation at a 122 second headway, Finch to Wilson, utilizing standard rate.

	Service Trains	Cars	Headway	Round Trip Time
Finch to Wilson	53	318	122"	107'46"
12% Spare Cars		<u>38</u>		
Total Fleet Required		356		
Present Fleet		<u>302</u>		
Additional Cars Required		54		

Option 1B

i) Operation at 112 second headway (with modified Finch terminal) and short turn operation at St. Clair W. utilizing high rate.

	Service Trains	Cars	Headway	Round Trip Time
Finch to St. Clair W.	23	138	224"	85'52"
Finch to Wilson	<u>29</u>	<u>174</u>	224"	108'16"
	52	312	112"	
12% Spare Cars		<u>38</u>		
Total Fleet Required		350		
Present Fleet		<u>302</u>		
Additional Cars Required		48		
Option 1A		<u>20</u>		
Net Cars Required		28		

ii) Operation at 112 second headway, Finch to Wilson utilizing high rate and modified terminals.

	Service Trains	Cars	Headway	Round Trip Time
Finch to Wilson	59	354	112"	110'08"
12% Spare Cars		<u>44</u>		
Total Fleet Required		394		
Present Fleet		<u>302</u>		
Additional Cars Required		96		
Option 1A		<u>20</u>		
Net Cars Required		76		

A total fleet of 398 cars could not be accommodated within the existing yards at Davisville and Wilson:

Davisville Yard capacity	86
Wilson Yard capacity	<u>278</u>
Total Present capacity	364
Proposed Fleet	<u>398</u>
Additional storage space required	34

The additional 34 cars could be accommodated by expanding Wilson Yard. As previously noted, expansion capability for up to 82 additional cars was provided in the design of Wilson Yard.

iii) Operation at 112 second headway (with modified Finch terminal) and short turn operation at St. Clair W. utilizing standard rate.

	Service Trains	Cars	Headway	Round Trip Time
Finch to St. Clair W.	24	144	224"	89'36"
Finch to Wilson	<u>30</u>	<u>180</u>	224"	112'00"
	54	324	112"	
12% Spare Cars		<u>38</u>		
Total Fleet Required		362		
Present Fleet		<u>302</u>		
Additional Cars Required		60		
Option 1A		<u>20</u>		
Net Cars Required		40		

An additional 12 cars would be required, compared to high rate operation. A total fleet of 362 cars could theoretically be accommodated within the existing yards, but the yards would be fully occupied. In order to provide operational flexibility in the yards, expansion of Wilson Yard is proposed. Specifically, it is proposed that 3 extra tracks be provided in the west area of Wilson Yard in order to accommodate up to 28 additional cars, and to provide flexibility. This expansion proposal is estimated to cost \$5,000,000 and could be completed within about 4 years from approval.

iv) Operation at 112 second headway, Finch to Wilson, utilizing standard rate and modified terminals.

	Service Trains	Cars	Headway	Round Trip Time
Finch to Wilson	61	366	112"	113'52"
12% Spare Cars		<u>44</u>		
Total Fleet Required		410		
Present Fleet		<u>302</u>		
Additional Cars Required		108		
Option 1A		<u>20</u>		
Net Cars Required		88		

Expansion of Wilson Yard would be required to accommodate the increased fleet. An additional 12 cars would be required compared to high rate operation.

#### Option 1C

Operation at 105 second headway Finch to Wilson, with train turnaround behind modified terminal stations.

Gibbs & Hill calculated that 68 trains would be required in service to operate at a 110 second headway utilizing standard rate, 30 second station dwells and train turnaround behind modified terminal stations. This corresponds to a round trip time of  $(68 \times 110") = 124'40"$ . To operate at a 105 second headway with this round trip time, a service fleet of 71 trains would be required. High rate operation would reduce the fleet requirements by 3 trains to 68 trains under the assumptions used by Gibbs & Hill.

Based on standard rate of operation, and the assumption that station dwells at 23 Y/U/S line stations will likely average 20 seconds instead of the 30 seconds allowed by Gibbs & Hill, the total trip time would be reduced by about 460 seconds (i.e.  $46 \times 10$  seconds), which is equivalent to a saving of 4 trains.

The number of trains required for 105 seconds headway would therefore be 67 (71 minus 4) trains. High rate operation with reduced station dwells would reduce the fleet requirements by 3 trains to 64 trains.

Cars in Service (High Rate)	64 x 6 =	384
12% Spare Cars		<u>46</u>
Total Fleet		430
Present Fleet		<u>302</u>
Additional Cars Required		128
Cars in Service (Standard Rate)	67 x 6 =	402
12% Spare Cars		<u>48</u>
Total Fleet		450
Present Fleet		<u>302</u>
Additional Cars Required		148
Cars Purchased under Options 1A and 1B		<u>60</u>
Cars Required under Option 1C		88

A fleet of 450 cars could not be accommodated within the existing Wilson and Davisville Yards. Implementing the 82 car expansion at Wilson would provide storage space for all but 4 cars of the total fleet under this option. The additional 4 cars could probably be accommodated, but the yards would be congested. In addition, 105 second headway operation would further aggravate the operational problems already occurring at Wilson during service build-up and reduction. Expansion of Wilson Yard is estimated to cost \$16,000,000, and could be completed about 5 years from approval. Additional yard storage facilities may be required due to yard congestion and operational problems described above.

## Option 2

Operation at 90 second headway, Finch to Wilson, with train turnaround behind modified terminal stations, and Automatic Train Control technology.

Gibbs & Hill calculated that 88 trains in service would be required to operate at 90 second headways, based on 30 second dwells, standard rate and train turnaround behind modified terminal stations. High rate operation would reduce the fleet requirements by 4 trains to 84 trains under the assumptions used by Gibbs & Hill.

On the basis that station dwells at 23 Y/U/S line stations would likely average 20 seconds instead of the 30 seconds allowed by Gibbs & Hill, the total trip time would be reduced by about 460 seconds (i.e.  $46 \times 10$  seconds) which is equivalent to a saving of 5 trains.

The number of trains required for 90 seconds headway based on standard rate of operation would be 83 trains. High rate operation would reduce the fleet requirement by 4 trains to 79 trains.

Cars in Service (High Rate)	79 x 6 =	474
12% Spare Cars		<u>58</u>
Total Fleet		532
Present Fleet		<u>302</u>
Additional Cars Required		230
Cars in Service (Standard Rate)	83 x 6 =	498
12% Spare Cars		<u>60</u>
Total Fleet		558
Present Fleet		<u>302</u>
Additional Cars Required		256
Cars Purchased under Options 1A and 1B		<u>60</u>
Cars Required under Option 1C		196

The existing fleet would have to be retrofitted with ATC equipment, and all new cars would be ATC equipped.

A fleet of 558 cars could not be accommodated within the existing Wilson and Davisville Yards. Additional yard storage facilities would therefore be required.