

## 8. Operating Plans

The following Section presents the operating plans for the Short-List Alternatives. The modern streetcar operating plans are presented for Alternatives 2 and 3, followed by bus rapid transit (BRT)/premium bus operating plans for Alternatives 2A and 3A.

### 8.1 Modern Streetcar – Alternatives 2 and 3

#### 8.1.1 Hours of Service and Service Frequency

The proposed transit services with Alternatives 2 and 3 would operate from 5:30 AM to Midnight, 7 days per week. The most frequent service would be operated during the morning and the evening, reflecting journey-to-work travel patterns, with proposed service frequency every 10 minutes during the weekday peak periods. Given the high concentration of retail uses in the Study Area, the weekday off-peak and weekend periods are likely to generate significant travel demand, as well; therefore, a robust service frequency of every 15 minutes is proposed during weekday off-peak periods and on weekends. Table 8-1 presents the proposed service frequencies by day of the week and time of day.

It is anticipated that departure times at the Village of Mineola and Village of Hempstead termini would be coordinated with Long Island Rail Road (LIRR) and Nassau Inter County Express (NICE) Bus arrival times at the Mineola Intermodal Center and Rosa Parks–Hempstead Transit Center stations. In case of special events at the Nassau Veterans Memorial Coliseum, additional service could be provided.

As part of the Nassau Hub Study, ridership forecasts were developed and a fare structure was assumed based on the existing NICE Bus fares, including free transfers between modern streetcar or BRT/premium bus vehicles and NICE Bus services. No free transfers are proposed between the LIRR and the proposed new transit service.

**Table 8-1: Service Frequencies for All Short-List Alternatives by Day of Week and Time of Day**

Day of Week	Time of Day	Time Period	Frequency (minutes)
Monday to Friday	Early AM	5:30 AM to 6:59 AM	15
	AM Peak	7:00 AM to 8:59 AM	10
	Midday	9:00 AM to 3:59 PM	15
	PM Peak	4:00 PM to 5:59 PM	10
	Evening	6:00 PM to 12:00 AM	15
Saturday, Sunday, and Holidays	All Day	5:30 AM to 12:00 AM	15

Source: Jacobs, 2012.

#### 8.1.2 Operating Policies

Vehicle loading standards assumed for purposes of the Short-List Alternatives' operations planning are based on guidelines from the Transportation Research Board's (TRB) Transit Cooperative Research Program<sup>1</sup> (TCRP) *Report 100: Transit Capacity and Quality of Service Manual*, 2<sup>nd</sup> Edition. Transit-vehicle-load levels of service (LOS) are a set of measures used to reflect, from the passenger's point of

<sup>1</sup> The Transit Cooperative Research Program is a program of the National Academies in which research is conducted by transportation industry experts on a variety of transportation issues to provide solutions to operating problems, to adapt new technologies from other industries, and to introduce innovations to the transit industry.

view, the comfort level while on board a transit vehicle. This measure considers the passenger's ability to find a seat and overall crowding levels within the vehicle. For planning purposes, it was assumed that the modern streetcar would have a passenger load corresponding to LOS D (LOS D indicates that all seats are filled and some passengers must stand but can do so comfortably) and a load factor of 1.25 during the peak period.<sup>2</sup> Table 8-2 summarizes the modern streetcar's vehicle capacity.

**Table 8-2: Modern Streetcar Vehicle Capacity**

Number of Seats in Modern Streetcar Vehicle	74 <sup>1</sup>
Level of Service for Passenger Load Level	D
Peak Load Factor	1.25
Additional Standing Passengers Possible	93
Total Passengers per Vehicle (seated and standing)	167
Crush Load <sup>2</sup>	222

Source: Jacobs, 2012.

Note 1: This is typical capacity for a modern streetcar vehicle.

Note 2: TCRP Report 100: Transit Capacity and Quality of Service Manual, 2<sup>nd</sup> Edition, defines "crush load" as "the maximum feasible passenger capacity of a vehicle, that is, the capacity at which one more passenger cannot enter without causing serious discomfort to the others. Note that the crush load specification for some rail transit vehicles does not relate to an achievable passenger loading level but is an artificial figure representing the additional weight for which the car structure is designed or for which the propulsion and braking system will meet minimum performance criteria."

### 8.1.3 Running Time Estimates

The following assumptions were used to develop station-to-station running times for Alternatives 2 and 3:

- A typical acceleration rate of 3.61 feet per second squared (ft/sec<sup>2</sup>) was de-rated to an 80 percent value, or 2.89 ft/sec<sup>2</sup>, while the service braking rate of 3.94 ft/sec<sup>2</sup> was de-rated by 60 percent to get a value of 2.36 ft/sec<sup>2</sup>. These more conservative acceleration and braking rates were used to adjust the vehicle's speeds for traffic conditions and variations in streetcar-operator driving styles.
- Dwell times at stations were assumed to be 15 seconds. Dwell time represents the time the streetcar spends stopped at a station while passengers board and alight from the vehicle.
- The maximum operating speed in mixed-traffic portions of the alignments was assumed to be consistent with posted speed limits of 30 miles per hour (mph) on local roads. On semi-exclusive right-of-way, the maximum operating speed would be 30 mph where the alignment is directly opposite an arterial roadway (such as on Hempstead Turnpike). The exception is on the fully exclusive right-of-way on the western portion of the landscaped strip of the Meadowbrook State Parkway and the viaduct over Old Country Road to Roosevelt Field, where the maximum operating speed was assumed to be 40 mph. Average operating speeds are assumed to be lower than posted speeds due to traffic congestion and vehicle acceleration and deceleration for station stops.
- All signalized intersections would have transit signal priority.<sup>3</sup>
- Off-board fare collection technology would be used (i.e., via ticket vending machines located at the stations).

<sup>2</sup> The load factor is the ratio of passengers actually carried versus the total passenger seating capacity of a vehicle. A load factor of greater than 1.0 indicates that there are standees on that vehicle.

<sup>3</sup> Transit Signal Priority (TSP) is the preferential treatment of a transit vehicle class (such as a modern streetcar) over a non-transit vehicle class (such as automobiles) at a signalized intersection without causing the traffic signal controllers to drop from coordinated operations.

Station-to-station and end-to-end running times were estimated using a spreadsheet-based model. The model uses inputs for route characteristics (street running, semi-exclusive, and exclusive right-of-way), vehicle acceleration and deceleration rates, distances between stations, curve radii, and grade crossings. Based on the results of the running-time estimation, the one-way running time<sup>4</sup> for Alternative 2 would be 33 minutes. For Alternative 3, the one-way running time would be 28 minutes.

Tables 8-3 and 8-4 present station-to-station distances, one-way running times, and average operating speeds for Alternatives 2 and 3, respectively.

**Table 8-3: Running Time Estimates – Alternative 2**

<b>From Passenger Station</b>	<b>To Passenger Station</b>	<b>Distance (Miles)</b>	<b>Run Time Without Dwell Time (Min.)</b>	<b>Average Operating Speed (mph)</b>
Rosa Parks–Hempstead Transit Center	Clinton Street	0.4	2.3	9.6
Clinton Street	Warner Avenue	0.5	2.4	12.2
Warner Avenue	Oak Street	0.4	2.3	11.8
Oak Street	Hofstra University	0.3	1.1	14.3
Hofstra University	Nassau Veterans Memorial Coliseum	0.7	2.2	18.8
Nassau Veterans Memorial Coliseum	Mitchel Field	0.2	0.8	15.5
Mitchel Field	Nassau Community College-Museum Row	0.3	1.1	17.6
Nassau Community College - Museum Row	Nassau Community College North	0.4	1.5	17.4
Nassau Community College North	Stewart Avenue	0.3	1.4	14.9
Stewart Avenue	Merchants Concourse	0.5	1.9	15.2
Merchants Concourse	Source Mall	0.3	1.1	14.8
Source Mall	Zeckendorf Boulevard	0.3	0.7	24.3
Zeckendorf Boulevard	East Gate Boulevard	0.3	1.1	16.4
East Gate Boulevard	Roosevelt Field	0.3	1.4	13.3
Roosevelt Field	Voice Road	0.6	2.0	18.9
Voice Road	East 2nd Street	0.6	1.9	19.1
East 2nd Street	Front Street	0.7	3.7	11.4
<b>Subtotals (without dwell)</b>		<b>7.1</b>	<b>28.8</b>	<b>14.8</b>
<b>Dwell Time</b>			<b>4.0</b>	
<b>Totals (with dwell)</b>		<b>7.1</b>	<b>32.8</b>	<b>13.0</b>

Source: Jacobs, 2012.

<sup>4</sup> Based on the operating plans, running times in the opposite direction would be the same as presented for the one-way running times.

**Table 8-4: Running Time Estimates – Alternative 3**

<b>From Passenger Station</b>	<b>To Passenger Station</b>	<b>Distance (Miles)</b>	<b>Run Time Without Dwell Time (Min.)</b>	<b>Average Operating Speed (mph)</b>
Rosa Parks–Hempstead Transit Center	Clinton Street	0.4	2.3	9.6
Clinton Street	Warner Avenue	0.5	2.4	12.2
Warner Avenue	Oak Street	0.4	2.3	11.8
Oak Street	Hofstra University	0.3	1.1	14.3
Hofstra University	Nassau Veterans Memorial Coliseum	0.7	2.2	18.8
Nassau Veterans Memorial Coliseum	Nassau Community College -Museum Row	0.5	1.8	18.4
Nassau Community College - Museum Row	Railroad Avenue	0.4	1.3	19.3
Railroad Avenue	South Street	0.6	1.7	21.2
South Street	Roosevelt Field - South	0.3	1.7	12.4
Roosevelt Field - South	Roosevelt Field	0.4	0.7	36.0
Roosevelt Field	Voice Road	0.6	2.0	18.9
Voice Road	East 2nd Street	0.6	1.9	19.1
East 2nd Street	Front Street	0.7	3.7	11.4
<b>Subtotals (without dwell)</b>		<b>6.5</b>	<b>25.1</b>	<b>15.9</b>
<b>Dwell Time</b>			<b>3.0</b>	
<b>Totals (with dwell)</b>		<b>6.5</b>	<b>28.1</b>	<b>14.0</b>

Source: Jacobs, 2012.

#### 8.1.4 Fleet Size Requirements

Based on the operating plans and the estimated ridership, it is anticipated that a single-vehicle train will accommodate the operations for both Alternatives 2 and 3. Using this projected demand, Alternative 2 would need a total of 12 vehicles. This includes 10 vehicles required for peak-period service at 10-minute headways and 2 spare vehicles (using a 15 percent spare ratio). For Alternative 3, a total of 10 vehicles would be needed. This includes 8 vehicles required for peak-period service at 10-minute headways and 2 spare vehicles (using a 15 percent spare ratio.)

#### 8.1.5 Operating Statistics

Operating statistics were calculated based on the proposed operating plans for each alternative. The operating parameters and their corresponding operating statistics for Alternatives 2 and 3 are presented in Tables 8-5 and 8-6, respectively.

**Table 8-5: Operating Statistics – Alternative 2**

<b>Operating Parameter</b>	<b>Operating Statistic</b>
Alignment Length (one-way)	7.1 route miles
Track Miles	14.2 track miles
End-to-End One-Way Run Time	32.8 minutes
Roundtrip Cycle Time during Peak Periods (Weekdays)	100 minutes
Roundtrip Cycle Time <sup>1</sup> during Off-Peak Periods (Weekdays)	120 minutes
Roundtrip Cycle Time during Weekends/Holidays	105 minutes
Peak-Period Headways (Weekdays)	10 minutes
Off-Peak-Period Headways (Weekdays)	15 minutes
Weekend Headways	15 minutes
Number of Days Per Year Service is Operated	365 days per year
Span of Service Weekdays (5:30 AM to 12 AM)	18.5 hours
Span of Service Weekends/Holidays (5:30 AM to 12 AM)	18.5 hours
Number of Peak Vehicles Required	10 vehicles
Spare Ratio (15% of Peak Vehicle Requirement)	2 spare vehicles
Total Fleet Size	12 vehicles
Number of Vehicles per Train for Peak-Period Service	1 vehicle
Number of Vehicles per Train for Off-Peak-Period Service	1 vehicle
Number of Vehicles per Train for Weekend/Holiday Service	1 vehicle
Total Number of Stations	18 stations
Total Revenue Train/ Vehicle Hours (Annual)	53,893 annual revenue train/vehicle hours
Total Revenue Train/ Vehicle Miles (Annual)	411,942 annual revenue train/vehicle miles
Number of Operators Required	29 operators
Spare Operator Ratio (10%)	3 operators
Total Number of Operators Required	32 operators

Source: Jacobs, 2012.

Note 1: Cycle time represents the time required for a transit vehicle to complete one round trip, including recovery time at both ends of the trip in each direction. Round-trip cycle time varies for peak, off-peak and weekend periods due to a variety of factors, including roadway congestion and the number of vehicles in revenue service.

**Table 8-6: Operating Statistics – Alternative 3**

<b>Operating Parameter</b>	<b>Operating Statistic</b>
Alignment Length (one-way)	6.5 route miles
Track Miles	13.0 track miles
End-to-End One-Way Run Time	28.1 minutes
Roundtrip Cycle Time <sup>1</sup> during Peak Periods (Weekdays)	80 minutes
Roundtrip Cycle Time during Off-Peak Periods (Weekdays)	90 minutes
Roundtrip Cycle Time during Weekends/Holidays	90 minutes
Peak-Period Headways (Weekdays)	10 minutes
Off-Peak-Period Headways (Weekdays)	15 minutes
Weekend Headways	15 minutes
Number of Days Per Year Service is Operated	365 days per year
Span of Service Weekdays (5:30 AM to 12 AM)	18.5 hours
Span of Service Weekends/Holidays (5:30 AM to 12 AM)	18.5 hours
Number of Weekday Peak-Period Trains Required	8
Number of Weekday Off-Peak-Period Trains Required	6
Number of Weekend Trains Required	6
Number of Peak Vehicles Required	8 vehicles
Spare Ratio (15% of Peak Vehicle Requirement)	2 spare vehicles
Total Fleet Size	10 vehicle
Number of Vehicles per Train for Peak-Period Service	1 vehicle
Number of Vehicles per Train for Off-Peak-Period Service	1 vehicle
Number of Vehicles per Train for Weekend/Holiday Service	1 vehicle
Total Number of Stations	14 stations
Total Revenue Train/ Vehicle Hours (Annual)	42,515 annual revenue train/ vehicle hours
Total Revenue Train/ Vehicle Miles (Annual)	377,130 annual revenue train/ vehicle miles
Number of Operators Required	23 operators
Spare Operator Ratio (10%)	2 operators
Total Number of Operators Required	25 operators

Source: Jacobs, 2012.

Note 1: Cycle time represents the time required for a transit vehicle to complete one round trip, including recovery time at both ends of the trip in each direction. Round-trip cycle time varies for peak, off-peak and weekend periods due to a variety of factors, including roadway congestion and the number of vehicles in revenue service.

## 8.2 BRT/Premium Bus – Alternatives 2A and 3A

### 8.2.1 Hours of Service and Service Frequency

The proposed hours of service and service frequency for Alternatives 2A and 3A would be the same as presented for Alternatives 2 and 3 in Section 8.1.1.

### 8.2.2 Operating Policies

Vehicle loading standards for Alternatives 2A and 3A were assumed to be the same as for Alternatives 2 and 3 (see Section 8.1.2). As for Alternatives 2 and 3, it was assumed for planning purposes that Alternative 2A's and Alternative 3A's passenger loads would not exceed LOS D and a load factor of 1.25 during the peak period. Table 8-7 summarizes the BRT/premium bus' vehicle capacity.

*Table 8-7: BRT/Premium Bus Vehicle Capacity*

Number of Seats in a Standard Articulated Bus	62
Level of Service for Passenger Load Level (not-to-exceed for planning purposes)	D
Peak Load Factor	1.25
Additional Standing Passengers	50
Total Passengers per Vehicle (seated and standing)	112

Source: Jacobs, 2012.

### 8.2.3 Running Time Estimates

The following assumptions were utilized to develop station-to-station running times for Alternatives 2A and 3A.

- Running times were developed by conducting speed runs along the proposed routing on multiple weekdays and Saturdays to determine the average travel time for general traffic. During the speed runs, an effort was made to drive at the speed of prevailing traffic. The average speed-run times, by time of day, were used as the basis for the listed running times. Dwell times were added and travel-time discounts were applied where priority bus treatments are proposed.
- Dwell times at stations were assumed to be 30 seconds.<sup>5</sup> Dwell time represents the time the BRT/premium bus spends stopped at a station while passengers board and alight from the vehicle.
- Where the BRT/premium bus service is proposed to travel through parking lots on the existing roadway adjacent to Michel Field and on the proposed transitway through Nassau Community College, the average travel speed was assumed to be 15 mph. On the proposed transitway adjacent to Transverse Drive, the speed-run time was used and a travel-time discount was applied.
- Proposed running times were verified against those on existing NICE Bus schedules for routes traveling along similar alignments.
- While it was assumed that all signalized intersections would have TSP, the running times did not include estimated discounts for the application of TSP because the detailed analysis of time savings for traffic signals necessary to do so was not performed during this phase of study; this analysis will be performed for the Locally Preferred Alternative (LPA) when it advances into engineering.

<sup>5</sup> The typical dwell time for bus vehicles is longer than for rail vehicles due to access configuration, the number of doors for boarding and alighting the vehicle, the height of vehicle boarding and, in some instances, on-board fare payment.



Because the BRT/premium bus service would travel mostly in general traffic, running times vary by time of day, weekday or weekend, and by direction. Station-to-station running times in the AM peak period from the Village of Hempstead to the Village of Mineola for Alternatives 2A and 3A, along with average operating speeds, are shown in Tables 8-8 and 8-9. Based on the results of the running-time estimation, the one-way running time for Alternative 2A would be 43 minutes. For Alternative 3A, the one-way running time would be 35 minutes.

**Table 8-8: Running Time Estimates – Alternative 2A**

<b>From Passenger Station</b>	<b>To Passenger Station</b>	<b>Distance (Miles)</b>	<b>Run Time Without Dwell Time (Min)</b>	<b>Average Operating Speed (mph)</b>
Rosa Parks–Hempstead Transit Center	Clinton Street	0.4	2.5	9.5
Clinton Street	Warner Avenue	0.5	2.6	11.4
Warner Avenue	Oak Street/Hofstra University	0.5	2.5	11.9
Oak Street/Hofstra University	Uniondale Avenue	0.5	1.6	19.2
Uniondale Avenue	Nassau Veterans Memorial Coliseum	0.5	1.7	17.9
Nassau Veterans Memorial Coliseum	Mitchel Field	0.2	0.9	13.6
Mitchel Field	Nassau Community College - Museum Row	0.4	1.2	19.8
Nassau Community College - Museum Row	Nassau Community College North	0.5	1.7	18.2
Nassau Community College North	Stewart Avenue	0.4	1.5	15.6
Stewart Avenue	Merchants Concourse	0.4	2.3	10.5
Merchants Concourse	Source Mall	0.3	1.2	14.9
Source Mall	Zeckendorf Boulevard	0.3	0.8	23.4
Zeckendorf Boulevard	East Gate Boulevard	0.4	1.7	14.1
East Gate Boulevard	Roosevelt Field - South	0.3	1.7	10.7
Roosevelt Field - South	Roosevelt Field - North	0.4	0.8	28.6
Roosevelt Field - North	Old Country Road	0.4	2.4	10.0
Old Country Road	Voice Road	0.5	1.3	22.7
Voice Road	East 2nd Street	0.5	2.1	14.3
East 2nd Street	Willis Avenue	0.5	1.5	19.8
Willis Avenue	Mineola Intermodal Center	0.6	1.9	17.4
<b>Subtotals (without dwell)</b>		<b>8.5</b>	<b>33.9</b>	<b>15.0</b>
<b>Dwell Time</b>			<b>9.5</b>	
<b>Totals (with dwell)</b>		<b>8.5</b>	<b>43.4</b>	<b>11.7</b>

Source: Jacobs, 2012.



**Table 8-9: Running Time Estimates – Alternative 3A**

<b>From Passenger Station</b>	<b>To Passenger Station</b>	<b>Distance (Miles)</b>	<b>Run Time Without Dwell Time (Min)</b>	<b>Average Operating Speed (mph)</b>
Rosa Parks–Hempstead Transit Center	Clinton Street	0.4	2.5	9.5
Clinton Street	Warner Avenue	0.5	2.6	11.4
Warner Avenue	Oak Street/Hofstra University	0.5	2.5	11.9
Oak Street/Hofstra University	Uniondale Avenue	0.5	1.6	19.2
Uniondale Avenue	Nassau Veterans Memorial Coliseum	0.5	1.7	17.9
Nassau Veterans Memorial Coliseum	Mitchel Field	0.2	0.9	13.6
Mitchel Field	Nassau Community College – Museum Row	0.4	1.2	19.8
Nassau Community College - Museum Row	Railroad Avenue	0.4	1.4	16.8
Railroad Avenue	South Street	0.6	2.0	17.6
South Street	Roosevelt Field - South	0.4	2.0	11.8
Roosevelt Field – South	Roosevelt Field - North	0.4	0.8	28.6
Roosevelt Field – North	Voice Road	0.4	2.4	10.0
Voice Road	East 2nd Street	0.5	2.1	14.3
East 2nd Street	Willis Avenue	0.5	1.5	19.8
Willis Avenue	Mineola Intermodal Center	0.6	1.9	17.4
<b>Subtotals (without dwell)</b>		<b>6.8</b>	<b>27.3</b>	<b>15.0</b>
<b>Dwell Time</b>			<b>7.5</b>	
<b>Totals (with dwell)</b>		<b>6.8</b>	<b>34.8</b>	<b>11.7</b>

Source: Jacobs, 2012.

#### 8.2.4 Fleet Size Requirements

Based on the operating plans defined for Alternatives 2A and 3A, the number of buses required was calculated. For Alternative 2A, a fleet size of 12 buses would be needed. This includes 10 buses required for peak-period service at 10-minute headways and 2 spare buses (using a 15 percent spare ratio). For Alternative 3A, a fleet size of 10 buses would be needed. This includes 8 buses required for peak-period service at 10-minute headways and 2 spare buses (using a 15 percent spare ratio).

#### 8.2.5 Operating Statistics

Operating statistics have been calculated based on the proposed operating plan for each alternative. The operating parameters and their corresponding operating statistics for Alternatives 2A and 3A are presented in Tables 8-10 and 8-11, respectively.

**Table 8-10: Operating Statistics – Alternative 2A**

Operating Parameter	Operating Statistic
Alignment Length (one-way)	8.5 route miles
End-to-End One-Way Run Time	43.4 minutes
Roundtrip Cycle Time <sup>1</sup> during Peak Periods (Weekdays)	113 minutes
Roundtrip Cycle Time during Off-Peak Periods (Weekdays, Saturday and Sunday)	123 minutes
Peak-Period Headways (Weekdays and Saturday)	10 minutes
Off-Peak-Period Headways (Weekdays, Saturday and Sunday)	15 minutes
Number of Days Per Year Service is Operated	365 days per year
Span of Service Weekdays (5:30 AM to 12 AM)	18.5 hours
Span of Service Weekends/Holidays (5:30 AM to 12 AM)	18.5 hours
Number of Peak-Period Buses Required	10 buses
Number of Off-Peak-Period Buses Required	7 buses
Number of Weekend Buses Required	7 buses
Spare Ratio (15% of Peak Bus Requirement)	2 spare buses
Total Fleet Size	12 buses
Total Number of Stations	21 stations
Total Revenue Vehicle Hours (Annual)	50,268 annual revenue hours
Total Revenue Vehicle Miles (Annual)	493,170 annual revenue miles
Number of Operators Required	27 operators
Spare Operator Ratio (10%)	3 operators
Total Number of Operators Required	30 operators

Source: Jacobs, 2012

Note 1: Cycle time represents the time required for a transit vehicle to complete one round trip, including recovery time at both ends of the trip in each direction. Round-trip cycle time varies for peak, off-peak and weekend periods due to a variety of factors, including roadway congestion and the number of vehicles in revenue service.

**Table 8-11: Operating Statistics – Alternative 3A**

Operating Parameter	Operating Statistic
Alignment Length (one-way)	6.8 route miles
End-to-End One-Way Run Time	34.8 minutes
Roundtrip Cycle Time during Peak Periods (Weekdays)	90 minutes
Roundtrip Cycle Time during Off-Peak Periods (Weekdays, Saturday and Sunday)	110 minutes
Peak-Period Headways (Weekdays and Saturday)	10 minutes
Off-Peak Period Headways (Weekdays, Saturday and Sunday)	15 minutes
Number of Days Per Year Service is Operated	365 days per year
Span of Service Weekdays (5:30 AM to 12 AM)	18.5 hours
Span of Service Weekends/Holidays (5:30 AM to 12 AM)	18.5 hours
Number of Peak-Period Buses Required	8 buses
Number of Off-Peak-Period Buses Required	6 buses
Number of Weekend Buses Required	6 buses
Spare Ratio (15% of Peak Bus Requirement)	2 spare buses
Total Fleet Size	10 buses
Total Number of Stations	16 stations
Total Revenue Vehicle Hours (Annual)	42,515 annual revenue hours
Total Revenue Vehicle Miles (Annual)	394,536 annual revenue miles
Number of Operators Required	23 operators
Spare Operator Ratio (10%)	2 operators
Total Number of Operators Required	25 operators

Source: Jacobs, 2012.