

Torrance Transit System Line-By-Line Analysis

Final Report



Prepared by:



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Torrance Transit System - Line-by-Line Analysis Final Report

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1 Introduction

Torrance Transit System is a municipally operated transit system in the South Bay region of Los Angeles County. Torrance Transit System directly operates a network of eight fixed-route bus routes serving primarily the City of Torrance with portions of routes also serving the neighboring cities of Carson, Compton, El Segundo, Gardena, Hawthorne, Lawndale, Lomita, Long Beach, Los Angeles, Manhattan Beach, Redondo Beach, and unincorporated areas of Los Angeles County. In addition, Torrance Transit acts as the lead agency for the Municipal Area Express (MAX), a commuter bus system designed specifically to meet the commuting needs of South Bay residents working in the El Segundo employment centers. The MAX services were not evaluated as part of this Line-By-Line Analysis.

As the Torrance Transit route network map (Figure 1.1) shows, two Torrance Transit routes provide direct service to Downtown Los Angeles, Route 2 operating there at all times and Route 1 operating there during weekday peak periods (Routes 1 and 2 also connect with the MTA Metro Green Line Light Rail). Route 6 provides weekday access to Los Angeles through a connection with the MTA Metro Blue Line Light Rail. Another two routes provide east-west service between Redondo Beach and either Wilmington (Route 7) or Long Beach (Route 3). Routes 5 and 9 provide internal circulation within the City of Torrance as well as a link to the adjoining communities of Gardena and Lomita. Finally, Route 8 provides north-south service from the southwestern portion of Torrance to the LAX City Bus Center, serving the MTA Metro Green Line en route.

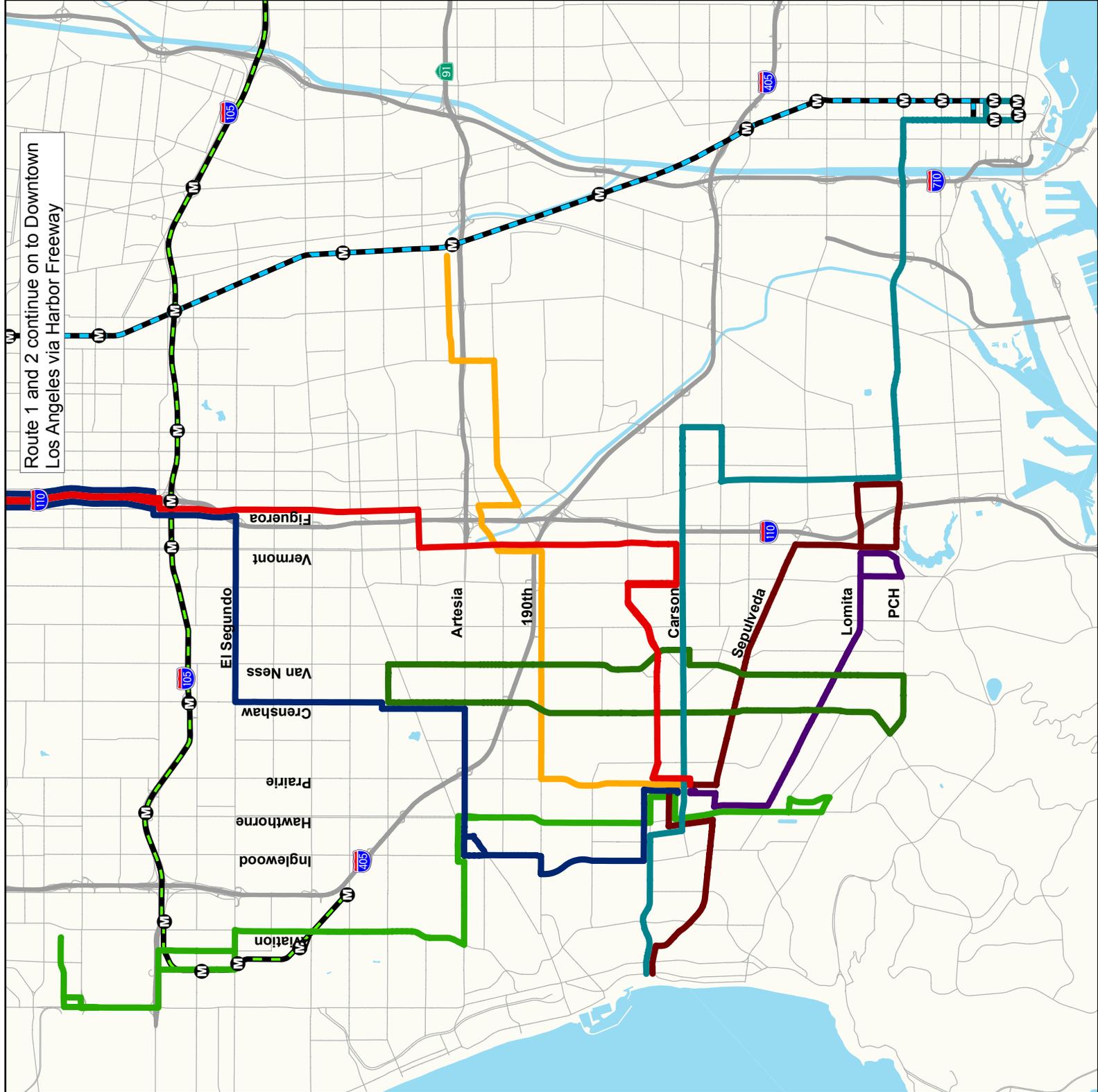
Torrance Transit System has undergone both route alignment and service changes since the last Line-by-Line Analysis was performed. The most noteworthy change was the realignment of bus routes from a central transfer location in the center of the Del Amo Fashion Center to a number of bus stops around the mall perimeter. Additionally, Route 4, which was the least productive route in the previous Line-By-Line Analysis, was discontinued (service operation has been taken over by the City of Redondo Beach). Route 9, which had operated as a bidirectional loop between Del Amo Fashion Center and the City of Lomita, was reconfigured into a more linear alignment. There has also been some minor shuffling of route segments between Routes 1 and 3.

Service levels have not changed dramatically, exceptions being the addition of weekday midday service on Route 6 and the addition of weekend service to the LAX City Bus Center on Route 8.

The following Line-by-Line Analysis summarizes current service and patronage data to describe the current operating environment and current performance of the Torrance Transit routes both individually and as a network.

Figure 1.1

System Network Torrance Transit System



- Legend**
- Line 1
 - Line 2
 - Line 3
 - Line 5
 - Line 6
 - Line 7
 - Line 8
 - Line 9
 - Freeways
 - Major Streets

- Metro Rail**
- Green Line
 - Blue Line
 - Green Line Stations
 - Blue Line Stations

Data Sources
 Torrance Transit, Census 2000,
 Southern California Association of Government (SCAG)

Date Prepared
 December 2005

0 1 2 Miles
 1 inch equals 1.73 miles

2 Service Analysis

2.1 Torrance Transit

As mentioned previously, Torrance Transit directly operates 8 fixed routes. Of these 8 fixed routes, all are operated on weekdays, 7 are operated on Saturdays, and only 3 are operated on Sundays. Torrance Transit operates no service on New Years Day, Thanksgiving Day, or Christmas Day. Table 2.1 shows the days of service, daily service span and headways for each of the routes.

Torrance Transit fixed routes serve a variety of activity centers both within the City of Torrance and in neighboring communities. Major retail shopping centers served are Del Amo Fashion Center, the Galleria at South Bay, Torrance Promenade Center, Rolling Hills Plaza, Airport Plaza, and Torrance Crossroads Center.

Major hospitals served are the Harbor/UCLA Medical Center, Kaiser Foundation Medical Center, Torrance Memorial Hospital, and Little Company of Mary Hospital. Educational facilities served include El Camino College, California State University Dominguez Hills Campus, Torrance High School, Banning High School (Los Angeles Co.), and Long Beach West High School.

Transportation facilities served include Metro’s Green Line Harbor Freeway station and Blue Line Artesia station, Long Beach Transit Mall, LAX City Bus Center, Artesia Transit Center, Galleria at South Bay Transit Center, and the Torrance Municipal Airport.

Table 2.1 – Daily Service Parameter for TTS routes

Route	Service Span			Headways				
	Weekday	Saturday	Sunday	Weekday			Saturday	Sunday
				Peak	Midday	Off-Peak		
1	04:45-23:10	05:30-22:00	05:20-20:20	30	35	60	60	60
2	05:35-20:13	06:00-19:13	--	60	60	--	60	--
3	04:30-22:40	05:50-22:25	06:10-21:10	15	15	30	30	30
5	06:00-22:35	07:35-20:35	--	51	51	60	60	--
6	05:00-19:52	--	--	30	90	--	--	--
7	06:25-20:49	06:55-19:40	--	30	30	30	30	--
8	05:00-23:15	07:30-18:59	08:00-18:29	20	30	30	30	60
9	06:00-18:50	8:00-18:50	--	60	60	--	60	--

2.2 Other Service Providers

Torrance Transit is one of a number of service providers serving the South Bay area. Other transit agencies serving portions of the City of Torrance include LACMTA (Metro), Long Beach Transit, Municipal Area Express (MAX), Gardena Municipal Bus Line, Beach Cities Transit, Carson Circuit, and Palos Verdes Peninsula Transit Authority. Table 2.2 shows, by agency, the routes operated, daily service spans, and service frequencies for these routes.

Table 2.2 – Other Transit Provider Services Serving South Bay

Transit Agency	Route	Streets Served	Service Span			Headways		
			Weekday	Saturday	Sunday	Weekday	Saturday	Sunday
Beach Cities	104	Calle de Arboles, Calles Mayor, Anza, Sepulveda, Hawthorne, Fashion Way, Madrona, Carson	07:06 – 18:00	10:11 - 17:54	--	65	70	--
Gardena Municipal Bus Line	2	Western	05:02 - 19:30	05:02 - 19:30	05:02 - 19:30	30	30	30
	3	Redondo Beach, Hawthorne	05:30 - 19:45	05:30 - 19:45	05:30 - 19:45	30	30	30
Municipal Area Express (MAX)	2	Anza, Inglewood	06:10 - 08:42 15:38 - 19:24	--	--	AM - 25 PM - 43	--	--
	3	Crenshaw	05:19 - 08:17 15:41 - 19:01	--	--	AM - 32 PM - 37	--	--
LACMTA	130	Artesia, 190 th , Victoria, Central, Walnut				30 - 40 peak 40 - 60 base	60	60
	210	Crenshaw, Artesia	04:24 - 26:37	04:28 - 26:37	05:59 - 26:37	8 - 10 peak 12 - 15 base	15 - 16	16
	225/226	Palos Verdes	06:05 - 10:03 13:48 - 19:14	--	--	60 peak 60 base	--	--
	232	Pacific Coast Hwy.	03:46 - 24:31	05:00 - 24:31	05:00 - 24:31	10 - 15 peak 20 - 30 base	30	30
	444	Artesia, Hawthorne	04:49 - 21:25	06:05 - 21:42	06:05 - 21:42	12 - 30 peak 30 - 60 base	60	60
	710	Redondo Beach	05:34 - 20:30	06:19 - 20:29	--	10 peak 20 base	20	--
LB Transit	171	Pacific Coast Hwy.	04:56 – 20:30	--	--	30	--	--
LA DOT	574	Aviation, El Segundo, Sepulveda	05:21 – 08:45 15:35 – 19:35	--	--	30	--	--
Palos Verses Peninsula Transportation Authority	Green	Palos Verdes Dr., Crenshaw, Rolling Hills	06:02 - 18:14	--	--	90	--	--
Carson Circuit	A	Avalon, University, Victoria, Wilmington	05:20 - 18:34	10:40- 17:14	--	40	40	--
	B	Avalon, Carson, Figueroa, Main, Moneta,	05:20 - 18:37	10:40 - 17:17	--	40	40	--
	C	Avalon, 223rd, Sepulveda	05:20 - 18:36	10:40 - 17:16	--	40	40	--
	D	Carson, Avalon	05:20 - 18:31	10:40 - 17:11	--	40	40	--
	E	Avalon, Victoria	05:20 - 18:32	10:40 - 17:12	--	40	40	--
	F	223rd	05:20 - 18:35	10:40 - 17:15	--	40	40	--
	G	Carson, Avalon	05:20 - 18:35	10:40 - 17:15	--	40	40	--
	H	Avalon	05:20 - 18:32	10:40 - 17:12	--	40	40	--

Figure 2.1

Transit Services of Other Agencies

Route Name	Route Description
Beach Cities Route 104	Redondo Beach Pier - Del Amo Mall
Gardena Line Route 1	Gardena - Los Angeles
Gardena Line Route 2	Western Ave. - Vermont Ave.
LADOT Express Route 574	Sylmar - El Segundo
L.B. Transit Route 171	Pacific Coast Hwy. - Seal Beach
MAX Route 2	Palos Verdes - Torrance - El Segundo
MAX Route 3	San Pedro - Torrance - El Segundo
Metro Route 130	Artesia Blvd.
Metro Route 210	Vine St. - South Bay Galleria
Metro Route 225	Palos Verdes - El Segundo
Metro Route 226	Palos Verdes - Palos Verdes Dr. West
Metro Route 232	Long Beach - Pac. Coast Hwy. - LAX
Metro Route 444	Rancho Palos Verdes - Union Station
Metro Route 710	Crenshaw Blvd. - Rossmore - Vine

Metro Rail

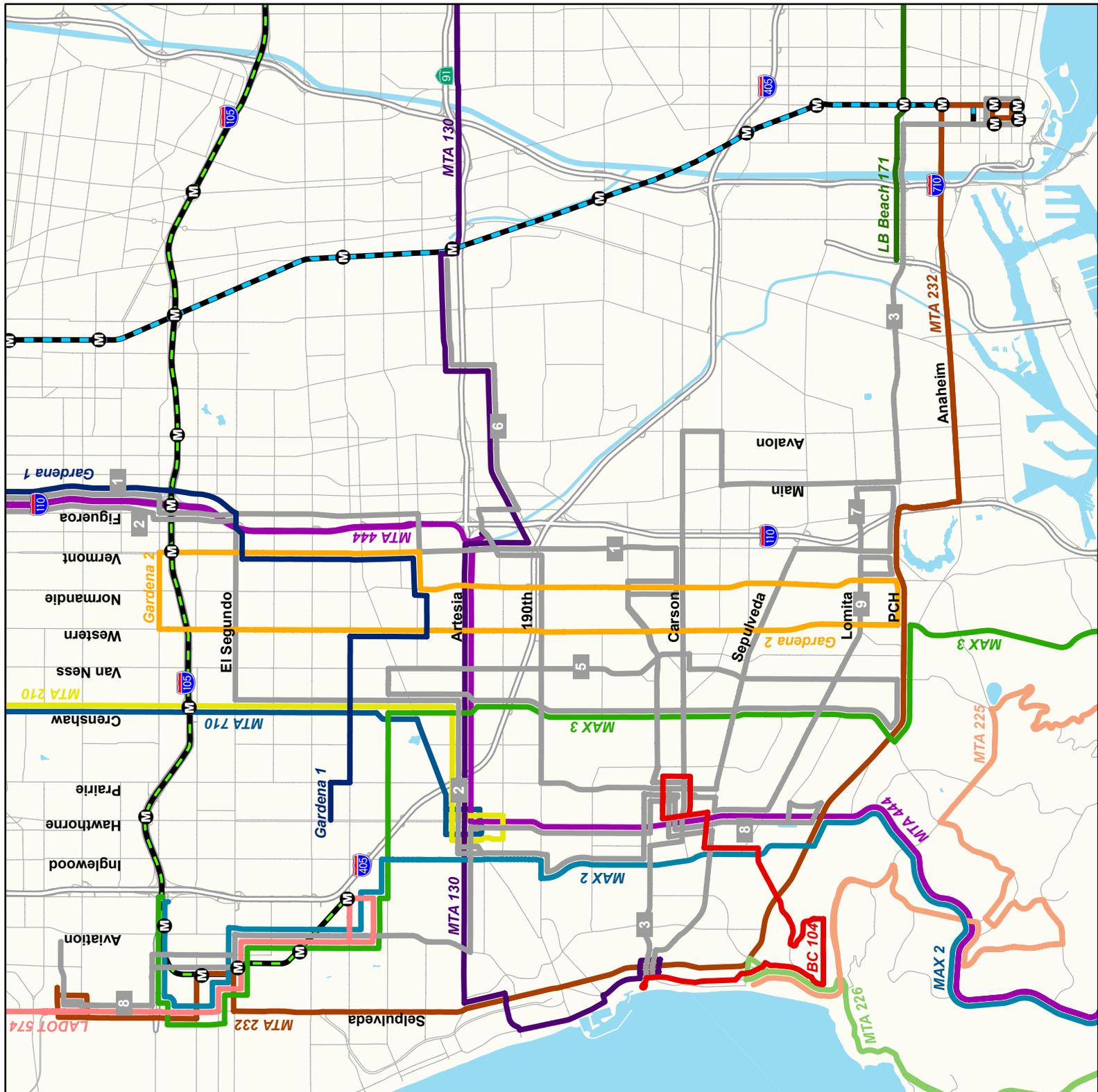
-  Green Line
-  Blue Line
-  Green Line Stations
-  Blue Line Stations
-  TTS Network
-  Freeways
-  Major Streets

Data Sources

Torrance Transit, Census 2000, Southern California Association of Government (SCAG)

Date Prepared

December 2005



3 System Efficiency and Productivity

3.1 Data Collection

A system-wide survey of ridership and schedule adherence (ridecheck) was conducted from November 12 through November 19. Surveyors rode all scheduled TTS trips, recording boardings, alightings, and on-board load, as well as recording arrival and departure times at the official route schedule timepoints. This data was recorded on pre-printed sheets for each assigned trip which listed all trip bus stops in sequence.

To the extent possible, routes were surveyed in their entirety in one day in order to produce consistent running time and schedule adherence analysis of route timepoints. Weekday service was surveyed from Tuesday November 15 through Thursday November 17, Saturday service was surveyed on November 12 and November 19, and Sunday service was completed on November 13.

The ridecheck data was entered into TMD's Service Analysis System (SAS) and validated to correct any checker or data entry errors. A complete line-by-line set of performance indicators reports, activity tables/graphs, loading analyses, and running time, and schedule adherence analyses is included in the Technical Appendix volume under separate cover. The system-wide and route-level analysis that follows is based upon the findings of the SAS statistical summary reports.

3.2 Service Operating Data

3.2.1 Service Hours and Miles

Table 3.1 – Weekday Operating Statistics

Route	Revenue Hours	Revenue Miles	One-Way Trips	Operating Speed	Passenger Miles	Passenger Boardings	Operating Revenue	Operating Cost	Operating Subsidy
1	60.8	992	66	16.3	9,010	2,004	\$962	\$6,815	(\$5,853)
2	35.0	596	30	17.0	5,756	899	\$432	\$3,966	(\$3,534)
3	153.5	2,236	130	14.6	34,503	7,905	\$3,794	\$16,705	(\$12,911)
5	35.3	563	39	15.9	4,051	1,076	\$516	\$3,927	(\$3,411)
6	24.3	396	40	16.3	2,341	614	\$295	\$2,724	(\$2,429)
7	35.5	529	56	14.9	2,816	897	\$431	\$3,886	(\$3,455)
8	75.6	1,080	79	14.3	9,353	2,227	\$1,069	\$8,185	(\$7,116)
9	10.8	147	26	13.6	552	213	\$102	\$1,159	(\$1,057)
Total	430.8	6,539	466	15.2	68,382	15,835	\$7,601	\$47,367	(\$39,766)

Torrance Transit System operates approximately 430 revenue hours, 6,540 miles, and 466 one-way trips on weekdays (see Table 3.1); approximately one-half the weekday level on Saturdays (214 hours/3,290 miles/260 trips) as shown in Table 3.2, and slightly less than one-half of the Saturday service level on Sundays (97 hours/1,480 miles/104 trips miles) as shown in Table 3.3.

Most of the difference between weekday and Saturday service levels is accounted for by significant reductions in service frequency on the core routes 1, 3, and 8, as well as route 6 not operating on the weekends. Most of the difference between Saturday and Sunday service levels is accounted for by the non-operation of routes 2, 5, 7, and 9 on Sundays.

Table 3.2 – Saturday Operating Statistics

Route	Revenue Hours	Revenue Miles	One-Way Trips	Operating Speed	Passenger Miles	Passenger Boardings	Operating Revenue	Operating Cost	Operating Subsidy
1	21.3	325	32	15.2	3,791	1,002	\$481	\$2,347	(\$1,866)
2	33.4	559	27	16.7	4,189	585	\$281	\$3,766	(\$3,485)
3	68.5	982	57	14.3	21,633	4,272	\$2,051	\$7,426	(\$5,375)
5	21.0	380	28	18.1	1,229	336	\$161	\$2,421	(\$2,260)
7	31.2	470	50	15.1	2,349	728	\$349	\$3,420	(\$3,071)
8	29.5	450	44	15.3	4,036	1,104	\$530	\$3,249	(\$2,719)
9	9.2	124	22	13.5	319	98	\$47	\$981	(\$934)
Total	214.1	3,290	260	15.4	37,546	8,125	\$3,900	\$23,610	(\$19,710)

Table 3.3 – Sunday Operating Statistics

Route	Revenue Hours	Revenue Miles	One-Way Trips	Operating Speed	Passenger Miles	Passenger Boardings	Operating Revenue	Operating Cost	Operating Subsidy
1	20.0	305	30	15.2	1,787	452	\$217	\$2,201	(\$1,984)
3	58.0	888	53	15.3	15,739	3,358	\$1,612	\$6,390	(\$4,778)
8	18.5	287	21	15.5	1,835	505	\$242	\$2,044	(\$1,802)
Total	96.5	1,479	104	15.3	19,361	4,315	\$2,071	\$10,635	(\$8,564)

3.2.2 Daily Passenger Boardings

Based on November 2005 ridecheck data, TTS carries 15,385 daily boardings on an average weekday. Saturday boardings (8,125) are slightly greater than 50 percent of weekday boardings, and Sunday boardings (4,315) are slightly greater than 50 percent of Saturday boardings, or about 25 percent of weekday.

The 15,385 weekday boardings compare to 14,293 in the 2002 Line-By-Line Analysis, when Route 4 was in operation. Discounting Route 4 ridership, this represents a net increase of 1,627 weekday boardings, or an 11.4 percent increase since year 2002. All routes showed an increase in weekday ridership with the exception of Route 9, which decreased from 325 daily boardings in 2002 to 213 in 2005, most likely due to the reconfiguration of the route from a loop to a linear alignment.

The systemwide distribution of weekday boardings by time period is comparable to that in 2002 (see Table 3.4). AM Peak boardings are 25.8 percent of total boardings in 2005 versus 27.4 percent in 2002; Midday boardings are 40.3 percent in 2005 vs. 40.8 percent in 2002; PM Peak boardings are 27.4 percent in 2005 vs. 24.3 in 2002, and Off-Peak/Evening boardings are 6.5 percent in 2005 vs. 7.5 percent in 2002.

On weekdays Route 3 (49.9% of daily boardings), Route 8 (14.1%), and Route 1 (12.7%) collectively account for more than $\frac{3}{4}$ of daily boardings (76.7%), which is an increase over the 75.3 percent that these routes accounted for in 2002. These same 3 routes

account for 78.5 percent of Saturday boardings. On Sundays, these core routes are the only Torrance Transit services operated (see Table 3.5).

Table 3.4 – Weekday Passenger Boardings by Route and Time Period

Route	AM Peak	Midday	PM Peak	Off-Peak	Total	Percent
1	688	618	602	96	2,004	12.7%
2	234	359	283	23	899	5.7%
3	1,860	3,513	1,902	630	7,905	49.9%
5	316	450	270	40	1,076	6.8%
6	239	83	246	46	614	3.9%
7	191	419	269	18	897	5.7%
8	507	839	707	174	2,227	14.1%
9	54	107	52		213	1.3%
Total	4,089	6,388	4,331	1,027	15,835	100.0%
Percent	25.8%	40.3%	27.4%	6.5%	100.0%	

Table 3.5 – Weekend Passenger Boardings by Route

Route	Saturday	Percent	Sunday	Percent
1	1,002	12.3%	452	10.5%
2	585	7.2%		
3	4,272	52.6%	3,358	77.8%
5	336	4.1%		
6				
7	728	9.0%		
8	1,104	13.6%	505	11.7%
9	98	1.2%		
Total	8,125	100.0%	4,315	100.0%

3.2.3 Passenger Miles and Average Trip Lengths

Table 3.6 shows, by service day and route, the daily passenger miles and average trip lengths. Weekday passenger trips tend to be shorter than weekend trips, with Saturday trips lengths averaging 0.1 miles longer than on Sundays.

The only notable exceptions to this pattern appear to be Routes 1 and 8. For Route 1, the longer weekday trip length is most likely due to the fact that express service to Downtown Los Angeles exists on weekdays and not on the weekends.

For Route 8, the longer weekday trip length may be explained by the fact that on Saturdays, half of the service operates only as far north as Galleria at South Bay.

Table 3.6 – Total Passenger Miles and Average Trip Lengths

Route	Weekday		Saturday		Sunday	
	Passenger Miles	Average Trip Length	Passenger Miles	Average Trip Length	Passenger Miles	Average Trip Length
1	9,010	4.5	3,791	3.8	1,787	4.0
2	5,756	6.4	4,189	7.2		
3	34,503	4.4	21,633	5.1	15,739	4.7
5	4,051	3.8	1,229	3.7		
6	2,341	3.8				
7	2,816	3.1	2,349	3.2		
8	9,353	4.2	4,036	3.7	1,835	3.6
9	552	2.6	319	3.3		
Total	68,382	4.3	37,546	4.6	19,361	4.5

3.2.4 Operating Revenue, Cost and Subsidy

Operating revenue is calculated by multiplying the passenger boardings by an average FY2005 passenger fare of \$0.48. This average fare is based on Torrance Transit's FY2005 National Transit Database submittal, and was calculated by dividing total passenger fare revenue by total unlinked passenger trips.

Table 3.7 – Operating Revenue, Cost, and Subsidy by Route and Day Type

Route	Weekday			Saturday			Sunday		
	Operating Revenue	Operating Cost	Operating Subsidy	Operating Revenue	Operating Cost	Operating Subsidy	Operating Revenue	Operating Cost	Operating Subsidy
1	\$962	\$6,815	(\$5,853)	\$481	\$2,347	(\$1,866)	\$217	\$2,201	(\$1,984)
2	\$432	\$3,966	(\$3,534)	\$281	\$3,766	(\$3,485)			
3	\$3,794	\$16,705	(\$12,911)	\$2,051	\$7,426	(\$5,375)	\$1,612	\$6,390	(\$4,778)
5	\$516	\$3,927	(\$3,411)	\$161	\$2,421	(\$2,260)			
6	\$295	\$2,724	(\$2,429)						
7	\$431	\$3,886	(\$3,455)	\$349	\$3,420	(\$3,071)			
8	\$1,069	\$8,185	(\$7,116)	\$530	\$3,249	(\$2,719)	\$242	\$2,044	(\$1,802)
9	\$102	\$1,159	(\$1,057)	\$47	\$981	(\$934)			
Total	\$7,601	\$47,367	(\$39,766)	\$3,900	\$23,610	(\$19,710)	\$2,071	\$10,635	(\$8,564)

Operating cost is also a calculated value. Using FY2005 NTD data, annual operating costs were attributed either to revenue hours or revenue miles, based upon which cost factor they more directly influenced. For example, operator labor and fringe benefit costs are directly correlated to the level of revenue hours operated, so operator labor and fringe costs were attributed to revenue hours. Fuel costs and mechanic labor/fringe costs are more directly related to the amount revenue miles operated so these cost were attributed to revenue miles. Administrative and overhead costs were attributed to vehicle hours. Once all the operating costs were allocated to revenue miles or revenue hours, then these two cost categories were totaled and divided by the annual number of revenue miles or revenue hours to arrive at the unit cost factors.

Table 3.8 shows the allocation of operating costs to either revenue hours or revenue miles. This cost allocation process resulted in a calculated cost per revenue hour of \$82.02 and a cost per revenue mile of \$1.85.

Table 3.8 – Operating Costs to Revenue Mile/Hour Allocation

Expense Category	Revenue Hours	Revenue Miles
Vehicle Operations--Operator wages	\$ 3,772,973	
Vehicle Operations--other salaries, wages	\$ 733,241	
Vehicle Operations--Fringe benefits	\$ 3,554,019	
Vehicle Operations--Services	\$ 169,598	
Vehicle Operations--Fuel, lubricants		\$ 1,068,489
Vehicle Operations--other materials, supplies	\$ 17,543	
Vehicle Operations--misc. expenses	\$ 36,343	
Vehicle Maintenance--other salaries, wages		\$ 954,344
Vehicle Maintenance--Fringe benefits		\$ 652,257
Vehicle Maintenance--Services		\$ 559,830
Vehicle Maintenance--Fuel, lubricants		\$ 1,988
Vehicle Maintenance--other materials, supplies		\$ 113,321
Vehicle Maintenance--misc. expenses		\$ 157,200
Non-vehicle maintenance--other salaries, wages	\$ 41,795	
Non-vehicle maintenance--Fringe benefits	\$ 17,794	
Non-vehicle maintenance--Services	\$ 3,513	
Non-vehicle maintenance--other materials, supplies	\$ 14,669	
Non-vehicle maintenance--Casualty/liability costs	\$ 11,300	
General Administration--other salaries, wages	\$ 670,507	
General Administration--Fringe benefits	\$ 432,840	
General Administration--Services	\$ 161,794	
General Administration--Fuel, lubricants	\$ 31,272	
General Administration--other materials, supplies	\$ 84,412	
General Administration--Utilities	\$ 90,413	
General Administration--Casualty/liability costs	\$ 349,923	
General Administration--misc. expenses	\$ 2,310,278	
Total FY 2005 Operating Expenses	\$ 12,504,227	\$ 3,507,429

	Hours	Miles
FY2005 Annual Revenue Units	\$ 152,455	\$ 1,896,981
Unit Costs	\$82.02	\$1.85

To determine a given route's daily in-service cost, the daily revenue hours were multiplied by \$82.02 and added to the product of the daily revenue miles and \$1.85. It should be noted that these calculated costs reflect the actual cost of the time that the vehicle is in passenger carrying mode, and does not reflect any time or mileage expended traveling to and from the garage.

3.3 Service Effectiveness Indicators

Tables 3.9, 3.10, and 3.11 below present a complete set of service effectiveness indicators for the Torrance Transit routes for weekday, Saturday, and Sunday.

Table 3.9 – Weekday Service Effectiveness Indicators

Route	Boardings	Boardings / Revenue Hour	Boardings / Revenue Mile	Seat Utilization	Farebox Recovery Ratio	Cost / Revenue Hour	Cost / Revenue Mile
1	2,004	33.0	2.0	21.1%	14.1%	\$112.1	\$6.87
2	899	25.7	1.5	22.5%	10.9%	\$113.3	\$6.65
3	7,905	51.5	3.5	35.9%	22.7%	\$108.8	\$7.47
5	1,076	30.5	1.9	16.7%	13.1%	\$111.3	\$6.98
6	614	25.3	1.6	13.7%	10.8%	\$112.1	\$6.88
7	897	25.3	1.7	12.4%	11.1%	\$109.5	\$7.35
8	2,227	29.5	2.1	20.1%	13.1%	\$108.3	\$7.58
9	213	19.7	1.4	8.7%	8.8%	\$107.3	\$7.89
Total	15,835	36.8	2.4	24.3%	16.0%	\$110.0	\$7.24

Table 3.10 – Saturday Service Effectiveness Indicators

Route	Boardings	Boardings / Revenue Hour	Boardings / Revenue Mile	Seat Utilization	Farebox Recovery Ratio	Cost / Revenue Hour	Cost / Revenue Mile
1	1,002	47	3.1	27.10%	20.50%	\$110.19	\$7.23
2	585	17.5	1	17.40%	7.50%	\$112.75	\$6.73
3	4,272	62.4	4.3	51.20%	27.60%	\$108.41	\$7.56
5	336	16	0.9	7.50%	6.70%	\$115.29	\$6.38
7	728	23.3	1.5	11.60%	10.20%	\$109.62	\$7.27
8	1,104	37.4	2.5	20.90%	16.30%	\$110.14	\$7.22
9	98	10.7	0.8	6.00%	4.80%	\$106.63	\$7.89
Total	8,125	37.9	2.5	26.50%	16.50%	\$110.28	\$7.18

Table 3.11 – Sunday Service Effectiveness Indicators

Route	Boardings	Boardings / Revenue Hour	Boardings / Revenue Mile	Seat Utilization	Farebox Recovery Ratio	Cost / Revenue Hour	Cost / Revenue Mile
1	452	22.6	1.5	13.60%	9.90%	\$110.05	\$7.23
3	3,358	57.9	3.8	41.20%	25.20%	\$110.17	\$7.20
8	505	27.3	1.8	14.90%	11.80%	\$110.49	\$7.12
Total	4,315	44.7	2.9	30.40%	19.50%	\$110.21	\$7.19

Figure 3.1

Torrance Transit System Passengers Per Revenue Hour Weekday A.M. Peak

- ### Route Performance
- Far Above Average
 - Above Average
 - Average
 - Below Average
 - Far Below Average

- ### Legend
- Freeways
 - Major Streets

- ### Metro Rail
- Green Line
 - Blue Line
 - Green Line Stations
 - Blue Line Stations

Data Sources

Torrance Transit, Census 2000,
Southern California Association of Government (SCAG)

Date Prepared

December 2005

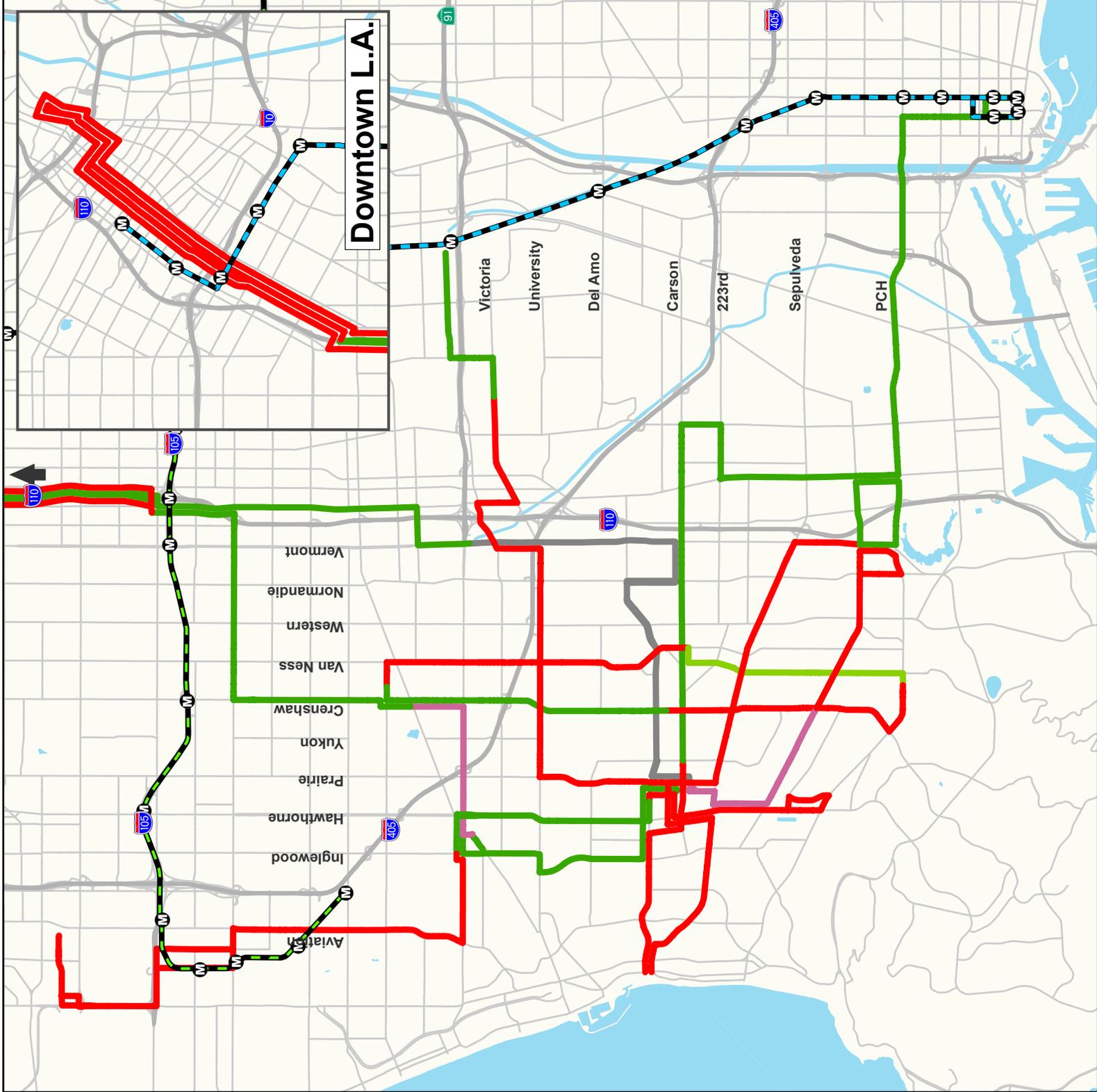


Figure 3.2

Torrance Transit System Seat Utilization Weekday A.M. Peak

- Route Performance**
- █ Far Above Average
 - █ Above Average
 - █ Average
 - █ Below Average
 - █ Far Below Average

- Legend**
- Freeways
 - Major Streets

- Metro Rail**
- █ Green Line
 - █ Blue Line
 - M Green Line Stations
 - M Blue Line Stations

Data Sources

Torrance Transit, Census 2000,
Southern California Association of Government (SCAG)

Date Prepared

December 2005

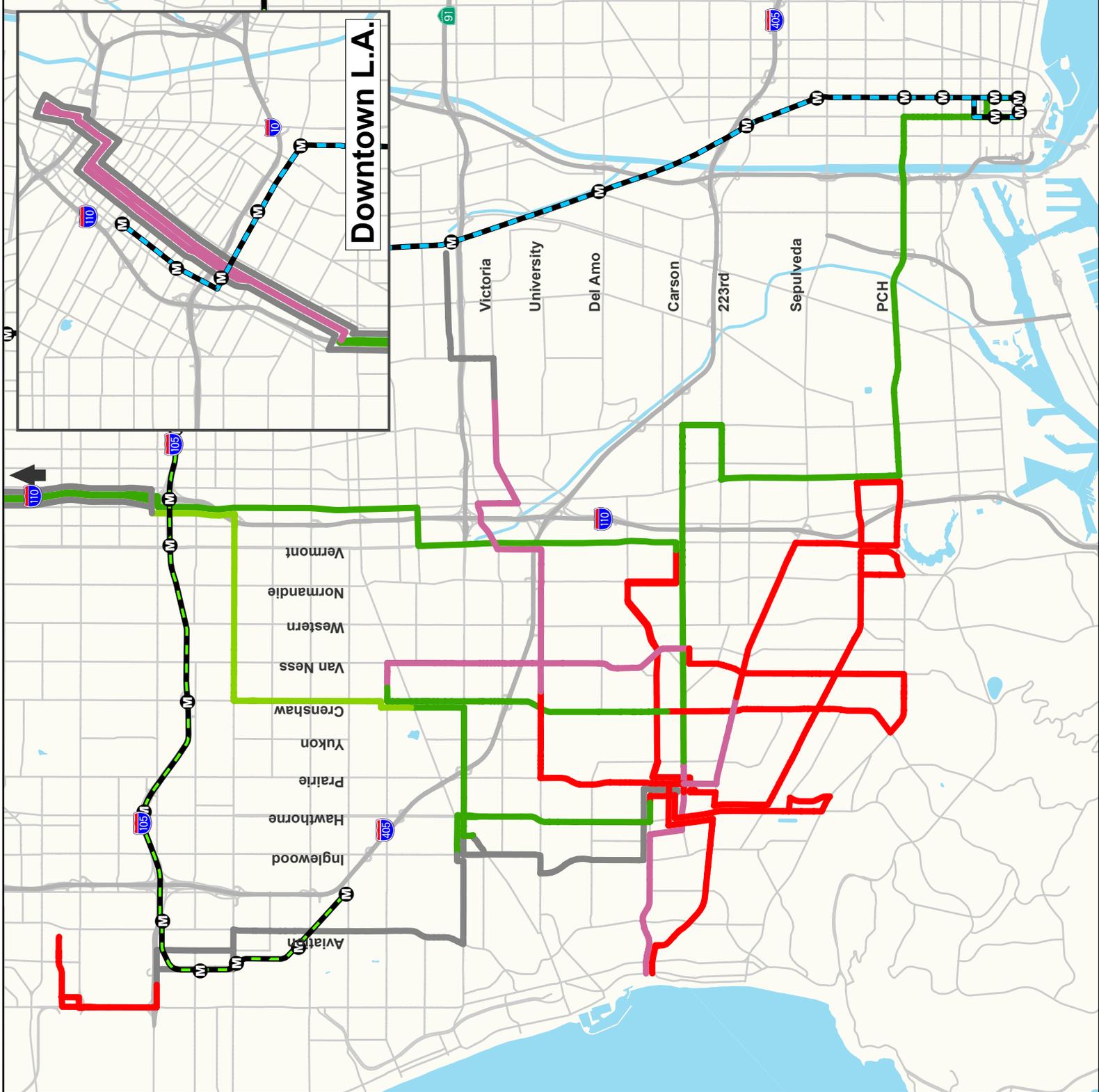


Figure 3.3

Torrance Transit System Passenger Boarding Subsidy Per Weekday A.M. Peak

- ### Route Performance
- Far Below Average
 - Below Average
 - Average
 - Above Average
 - Far Above Average

- ### Legend
- Freeways
 - Major Streets

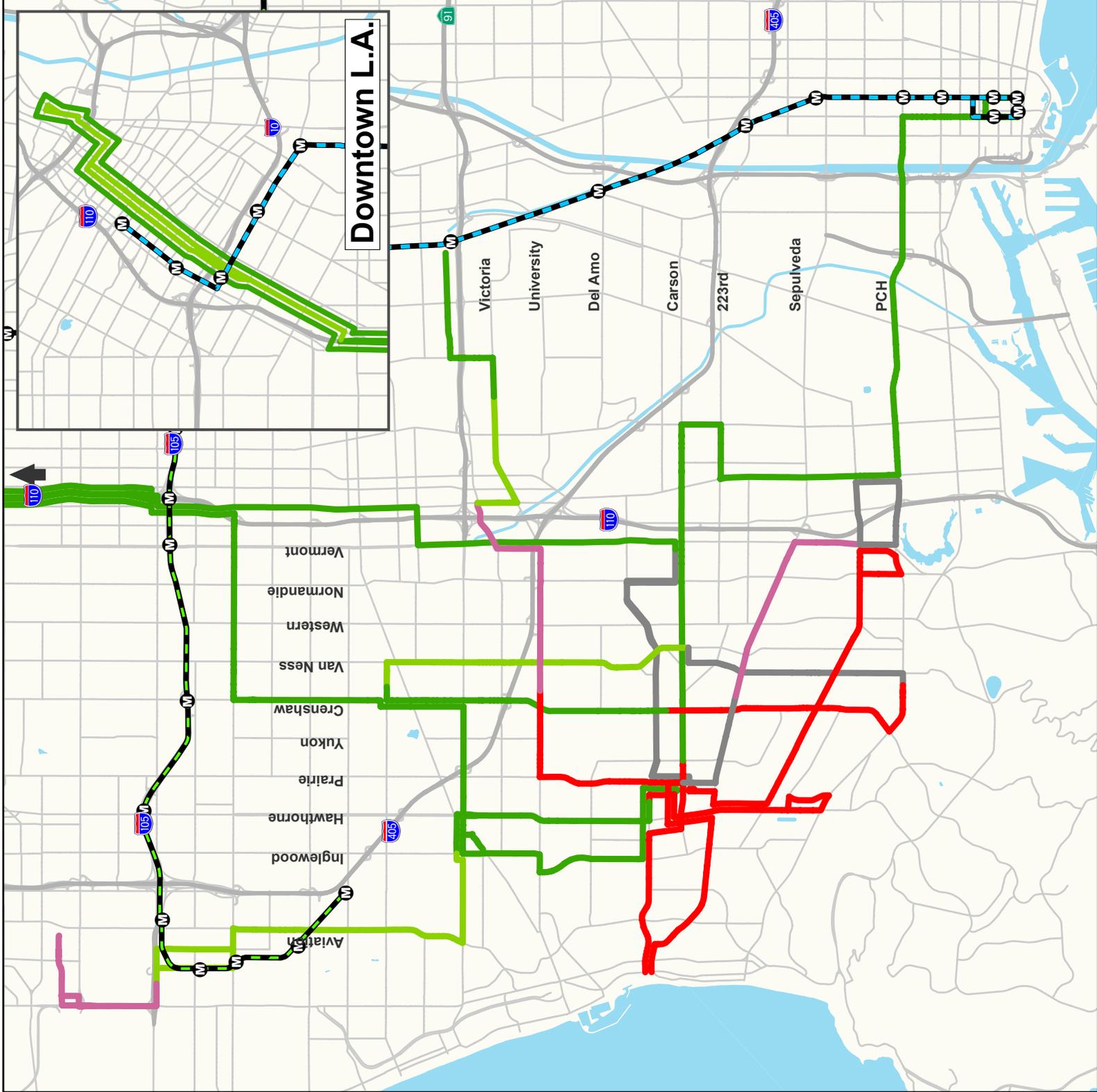
- ### Metro Rail
- Green Line
 - Blue Line
 - Green Line Stations
 - Blue Line Stations

Data Sources

Torrance Transit, Census 2000,
Southern California Association of Government (SCAG)

Date Prepared

December 2005



3.3.1 Boardings per Revenue Hour

Passenger boardings per revenue hour (pph) is a performance measure that relates the level of passenger activity to revenue hours, which strongly impacts driver labor costs, a major transit operating cost component. Figure 3.1 above shows passenger boardings per revenue hour performance for TTS routes at the route segment level for weekdays.

As with most of the TTS effectiveness indicators, Route 3 skews the mean values in such a way that only Route 3 performs above the average. On weekdays, for all TTS routes, the average boardings per revenue hour are 36.8. As Table 3.9 shows, only Route 3 is above this average. For all routes excluding Route 3, the weekday average is 28.6 pph. In this case Routes 1, 5, and 8 exceed the average.

On Saturday (Table 3.10), for all TTS routes, the average boardings per revenue hour are 37.9, with Routes 1 and 3 exceeding the average. If Route 3 is excluded, the average is 26.6 boardings per revenue hour with Routes 1 and 8 exceeding the average.

On Sunday (Table 3.11), the average boardings per revenue hour are 44.7, with just the core routes 1, 3, and 8 operating. These same three routes collectively perform at 41.9 pph on weekdays and 53.5 pph on Saturdays.

Looking at boardings per revenue hour by time of day, on weekdays, the AM Peak is the most productive period (43.5 pph), followed by Midday (40.1 pph), PM Peak (36.7 pph), and Off-Peak (17.3 pph). The morning peak may be the dominant period because of the coincidence of the morning work commute with the morning school commute.

3.3.2 Boardings per Revenue Mile

Boardings per revenue mile relates passenger activity to service miles operated, which in turn influences transit operating costs such as fuel, tires, and vehicle maintenance costs.

For all routes, boardings per revenue mile are 2.4 on weekday, 2.5 on Saturdays, and 2.9 on Sundays, following the pattern that weekday productivity is the lowest and Sunday is the highest. On each service day, Route 3 consistently had the highest boardings per revenue mile, while Route 9 had the poorest performance on weekdays and Saturdays.

3.3.3 Seat Utilization

Seat utilization is calculated by dividing seat miles operated (revenue miles x average vehicle capacity) by the actual passenger miles traveled. It is a measure of how much available transit capacity is actually utilized and of how full the vehicles are over the entire time span they are in service. Figure 3.2 above shows the seat utilization performance for TTS routes at the route segment level for weekdays.

Torrance Transit fixed-routes have an average seat utilization of 24.3 percent on weekdays, 26.5 percent on Saturdays, and 30.4 percent on Sundays. The seat utilization in Route 3 again skews up the system average with 36, 51, and 41 percent respectively for weekday, Saturday, and Sunday.

3.3.4 Farebox Recovery Ratio

This indicator represents passenger fare revenue divided by fully-allocated operating cost. As discussed in section 3.1.4, the passenger fare revenue per route was calculated by multiplying the route's passenger boardings by \$0.48 per boarding, and the fully-allocated operating cost was calculated using the sum of revenue hours x \$82.02 per revenue hour + revenue miles x \$1.849 per revenue mile. These cost factors were developed using TTS's FY2005 National Transit Database submittal.

Using this methodology, TTS fixed-route service has an average farebox recovery ratio of 16.0 percent on weekdays, 16.5 percent on Saturdays, and 19.5 percent on Sundays. Route 3 has the highest farebox recovery ratio on each service day, ranging from a low of 22.7 percent on weekdays to a high of 27.6 percent on Saturdays. Route 9 has the lowest farebox recovery on weekdays (8.8%) and on Saturdays (4.8%). Route 5 on Saturdays also has a very low farebox recovery ratio (6.7%).

3.4 Financial Performance Indicators

Tables 3.12, 3.13, and 3.14 below present a complete set of financial performance indicators by service day type for the Torrance Transit routes. An average revenue per boarding of \$0.48 was used uniformly for all Torrance Transit routes.

3.4.1 Revenue per Passenger Mile

Revenue per passenger mile relates total passenger revenue collected to the passenger miles traveled. Torrance Transit routes average between \$0.10 and \$0.11 per passenger mile throughout the week. This is a financial indicator that is indicative of relative trip lengths that passengers are making. On weekdays, Routes 9 and 7, which have the highest revenue per passenger mile (\$0.15 per passenger mile) have the shortest average trip lengths (2.6 and 3.1 miles per boarding), while Route 2, which has the lowest revenue per passenger mile, has the highest average trip length (6.4 miles).

Table 3.12 – Weekday Financial Performance Indicators

Route	Revenue / Passenger Mile	Cost / Boarding	Cost / Passenger Mile	Subsidy / Boarding	Subsidy / Passenger Mile
1	\$0.11	\$3.40	\$0.76	(\$2.92)	(\$0.65)
2	\$0.08	\$4.41	\$0.69	(\$3.93)	(\$0.61)
3	\$0.11	\$2.11	\$0.48	(\$1.63)	(\$0.37)
5	\$0.13	\$3.65	\$0.97	(\$3.17)	(\$0.84)
6	\$0.13	\$4.44	\$1.16	(\$3.96)	(\$1.04)
7	\$0.15	\$4.33	\$1.38	(\$3.85)	(\$1.23)
8	\$0.11	\$3.68	\$0.88	(\$3.20)	(\$0.76)
9	\$0.18	\$5.44	\$2.10	(\$4.96)	(\$1.91)
Total	\$0.11	\$2.99	\$0.69	(\$2.51)	(\$0.58)

Table 3.13 – Saturday Financial Performance Indicators

Route	Revenue / Passenger Mile	Cost / Boarding	Cost / Passenger Mile	Subsidy / Boarding	Subsidy / Passenger Mile
1	\$0.13	\$2.34	\$0.62	(\$1.86)	(\$0.49)
2	\$0.07	\$6.44	\$0.90	(\$5.96)	(\$0.83)
3	\$0.09	\$1.74	\$0.34	(\$1.26)	(\$0.25)
5	\$0.13	\$7.21	\$1.97	(\$6.73)	(\$1.84)
7	\$0.15	\$4.70	\$1.46	(\$4.22)	(\$1.31)
8	\$0.13	\$2.94	\$0.81	(\$2.46)	(\$0.67)
9	\$0.15	\$10.01	\$3.08	(\$9.53)	(\$2.93)
Total	\$0.10	\$2.91	\$0.63	(\$2.43)	(\$0.52)

Table 3.14 – Sunday Financial Performance Indicators

Route	Revenue / Passenger Mile	Cost / Boarding	Cost / Passenger Mile	Subsidy / Boarding	Subsidy / Passenger Mile
1	\$0.12	\$4.87	\$1.23	(\$4.39)	(\$1.11)
3	\$0.10	\$1.90	\$0.41	(\$1.42)	(\$0.30)
8	\$0.13	\$4.05	\$1.11	(\$3.57)	(\$0.98)
Total	\$0.11	\$2.46	\$0.55	(\$1.98)	(\$0.44)

3.4.2 Cost per Passenger Boarding

Cost per passenger boarding relates a route's total operating costs to its total passenger boardings. For a fixed amount of operating cost, lower costs per boarding indicate greater rates of seat turnover.

As with a number of other Torrance Transit performance indicators, this indicator is weakest for weekday service and strongest for Sunday service, with the weekday, Saturday, and Sunday indicators being \$2.99, \$2.91, and 2.46, respectively. The extremes for this indicator are on Saturday, when Route 3 has the lowest cost per boarding of \$1.74 and Route 9 has the highest cost per boarding of \$10.01.

3.4.3 Cost per Passenger Mile

Cost per passenger mile relates a route's total operating costs to its total passenger miles traveled. For a fixed amount of operating expense, lower costs per passenger mile indicate higher rates of seat utilization (i.e., less empty seats).

Following the pattern of many other performance indicators, Torrance Transit service performs best for this indicator on Sunday (\$0.55 per passenger mile), followed by Saturday (\$0.63 per passenger mile), and weekday (\$0.69 per passenger mile).

3.4.4 Subsidy per Passenger Boarding

Subsidy per passenger boarding represents the net cost to TTS per passenger carried. This is a key indicator for comparing the relative effectiveness of TTS' investment

among the various services it operates. It is a useful indicator for TTS to justify service changes because the indicator measures the net cost TTS must contribute per person boarding the service. Figure 3.3 in page 14 shows TTS routes subsidy per passenger boarding performance at the route segment level for weekdays.

TTS has an average subsidy of \$2.51 per passenger boarding on weekdays, \$2.43 on Saturdays, and \$1.98 on Sundays.

3.4.5 Subsidy per Passenger Mile

Subsidy per passenger mile represents the net cost to TTS per passenger mile traveled. It is also a key indicator for comparing the relative effectiveness of TTS' investment among transit services. Lower subsidies per passenger mile are indicative of a higher seat utilization rate (i.e., fewer empty seat miles being operated).

TTS' average subsidy per passenger mile is \$0.58 on weekdays, \$0.52 on Saturdays, and \$0.44 on Sundays.

3.4.6 Special Fare Categories

As part of the ridecheck, Torrance Transit requested that a separate tally be recorded of the following fare/boarding categories:

- Access ID Card
- Metrolink Pass
- EZ Pass
- Wheelchair Boardings

The first three categories were requested to compare against driver counts from the farebox data. Wheelchair boardings were requested because Torrance Transit has not historically monitored them, and drivers are increasingly reporting that wheelchair boardings are impacting their schedule adherence.

Tables 3.15, 3.16, and 3.17 below show respectively the weekday, Saturday, and Sunday route-level counts for these special categories.

Table 3.15 – Weekday Special Boarding Categories

Route	Special Fare Category			Wheelchair Passengers
	Access ID	Metrolink Pass	EZ Pass	
1	58	39	126	2
2	25	9	41	
3	163	88	306	29
5	21	2	76	2
6	2	8	114	
7	30	4	32	4
8	58	50	93	4
9	1	19	3	
Total	358	219	791	41

Table 3.16 – Saturday Special Boarding Categories

Route	Special Fare Category			Wheelchair Passengers
	Access ID	Metrolink Pass	EZ Pass	
1	63	33	30	4
2	17	2	20	1
3	78	42	165	13
5	15	15	18	3
7	32	26	38	5
8	83	51	86	4
9		1		
Total	288	170	357	30

Table 3.17 – Sunday Special Boarding Categories

Route	Special Fare Category			Wheelchair Passengers
	Access ID	Metrolink Pass	EZ Pass	
1	12		13	
3	66	11	124	6
8	8	18	20	3
Total	86	29	157	9

Wheelchair Boardings

Per the ridecheck counts, Torrance Transit carried 41 wheelchair boardings on weekday, 30 on Saturday, and 9 on Sunday. Route 3 carries the majority of the wheelchair boardings on any given day. On weekdays, Route 3 accounted for over 70 percent of the wheelchair boardings. Given the existence of overcrowding at certain times of day on Route 3, wheelchair boardings may further exacerbate overcrowding and running times.

As part of the Service Plan development, the temporal distribution of these boardings will be checked to determine if the impacts are occurring randomly or at certain times of day.

Table 3.18 – Weekday Special Fare Manual Counts Vs. Farebox Counts

Route	Date Checked	Metrolink Pass			Access ID			EZ Pass		
		Ridecheck Count	Farebox Count	Ridecheck vs. Farebox	Ridecheck Count	Farebox Count	Ridecheck vs. Farebox	Ridecheck Count	Farebox Count	Ridecheck vs. Farebox
1	11/16/2005	39	6	85%	58	9	84%	126	127	-1%
2	11/16/2005	9	1	89%	25	9	64%	41	45	-10%
3	11/15/2005	88	1	99%	163	2	99%	306	233	24%
5	11/16/2005	2	3	-50%	21	22	-5%	76	92	-21%
6	11/17/2005	8	8	0%	2	1	50%	114	60	47%
7	11/16/2005	4		100%	30	26	13%	32	40	-25%
8	11/17/2005	50	6	88%	58	40	31%	93	188	-102%
9	11/15/2005	19		100%	1		100%	3	9	-200%
Total		219	25	89%	358	109	70%	791	794	0%

Access ID, EZ Pass, and Metrolink Pass

Tables 3.18, 3.19, and 3.20 show the daily counts by route for Access ID, EZ Pass, and Metrolink Pass compared to daily farebox totals for these categories.

Table 3.19 – Saturday Special Fare Manual Counts Vs. Farebox Counts

Route	Date Checked	Metrolink Pass			Access ID			EZ Pass		
		Ridecheck Count	Farebox Count	Ridecheck vs. Farebox	Ridecheck Count	Farebox Count	Ridecheck vs. Farebox	Ridecheck Count	Farebox Count	Ridecheck vs. Farebox
1	11/12/2005	33	11	67%	63	4	94%	30	29	3%
2	11/19/2005	2		100%	17	19	-12%	20	30	-50%
3	11/12/2005	42	40	5%	78	40	49%	165	160	3%
5	11/12/2005	15	2	87%	15	15	0%	18	46	-156%
7	11/12/2005	26		100%	32	10	69%	38	29	24%
8	11/19/2005	51		100%	83	3	96%	86	86	0%
9	11/12/2005	1		100%			0%		13	-100%
Total		170	53	69%	288	91	68%	357	393	-10%

Table 3.20 – Sunday Special Fare Manual Counts Vs. Farebox Counts

Route	Date Checked	Metrolink Pass			Access ID			EZ Pass		
		Ridecheck Count	Farebox Count	Ridecheck vs. Farebox	Ridecheck Count	Farebox Count	Ridecheck vs. Farebox	Ridecheck Count	Farebox Count	Ridecheck vs. Farebox
1	11/13/2005	0	7	-100%	12		100%	13	34	-162%
3	11/13/2005	11	1	91%	66	12	82%	124	90	27%
8	11/13/2005	18		100%	8		100%	20		100%
Total		11	8	27%	78	12	85%	137	124	9%

Some cautionary comments about comparing the manual counts from the ridecheck to the farebox totals supplied by Torrance Transit are as follows:

- Comparison of the daily farebox key count totals to the manual counts assumes that all the buses out in service for the day were probed that day and that no vehicles in service on previous days from a previous day are included in the counts.
- In the course of the ridecheck, surveyors reported that there was some confusion in discriminating between the Metrolink Pass and the Torrance Monthly Pass, which are similar in appearance. This may explain the overcounting of Metrolink passes, as well as the appearance of Metrolink pass counts on routes where they were not expected.
- TMD's instructions to the ridecheck surveyors were to give highest priority to the boardings/alightings counts followed by the passenger survey.

It is difficult to come to any definite conclusions about the pattern of over or undercounting of these categories by Torrance Transit operators. There were numerous driver count totals that varied from the manual count totals by more than ten percent. It appears that the EZ Pass driver count totals are exceeding manual count totals in more instances than is the case for Access ID counts. To reach any definite conclusions about the accuracy of driver counts for special fare categories, it may be necessary for Torrance Transit to perform a separate audit focused specifically on these counts.

4 Systemwide Route Profiles

4.1 Systemwide Passenger Boardings

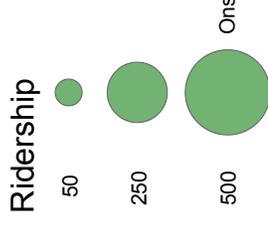
Figures 4.1, 4.2, and 4.3 depict, respectively, TTS passenger boardings for weekday, Saturday, and Sunday based upon the November 2005 ridecheck. Individual route boarding and alighting maps are included in Appendix A under this cover.

Weekday passenger boardings and alightings reveal that Carson Street, served by Route 3, has the most boarding activity, especially east of the Del Amo Fashion Center. The remainder of Route 3, which serves Main Street as well as Pacific Coast Highway, also has significantly high boardings especially on Avalon and Wilmington (250-500). Boardings and Alightings are also prominent along Vermont and Figueroa, which are served by Route 1, with the stop at Figueroa and Imperial having nearly 500 boardings and alightings. Hawthorne and Artesia, which are served by Route 8, have slightly lower boardings and alightings, which range from 90 to 250. The corner of Hawthorne and Artesia is dominantly a boarding stop and has approximately 250 boardings. Another stop that is predominately boardings is Pacific and PCH, which are served by Route 3. Route 6, which serves 190th and Victoria had less than 90 boardings and alightings throughout the majority of the route. Route 9 serves Lomita and Normandie but appears to have very little boarding and alighting in the areas outside the Del Amo Fashion Center.

Torrance Transit System operates less Saturday service, with no Route 6 operation, and the other routes providing either a shorter span of service and/or less frequency. Saturday system boardings are slightly greater than half of the weekday system boardings. However, the geographic distribution of Saturday systemwide boardings appears to follow the patterns displayed on weekdays. Route 3 has the highest boardings and alightings along Carson and Pacific Coast Highway (250-500), with PCH Pacific Coast Highway and Pacific being predominately a boarding stop. Route 1, along Vermont and Figueroa, also has strong boardings and alightings (90-200), and Route 8 along Hawthorne has consistent boardings and alightings (90) with the corner of Artesia and Hawthorne being predominantly a stop for boardings (200). Routes 8 and 9 both appear to have very little boarding and alighting occurring throughout the route.

Figure 4.1

Torrance Transit System Weekday Boardings (Both Directions)



Legend

- Freeways
- Major Streets
- TTS Route Network

Metro Rail

- Green Line
- Blue Line
- Green Line Stations
- Blue Line Stations

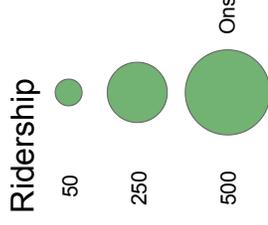
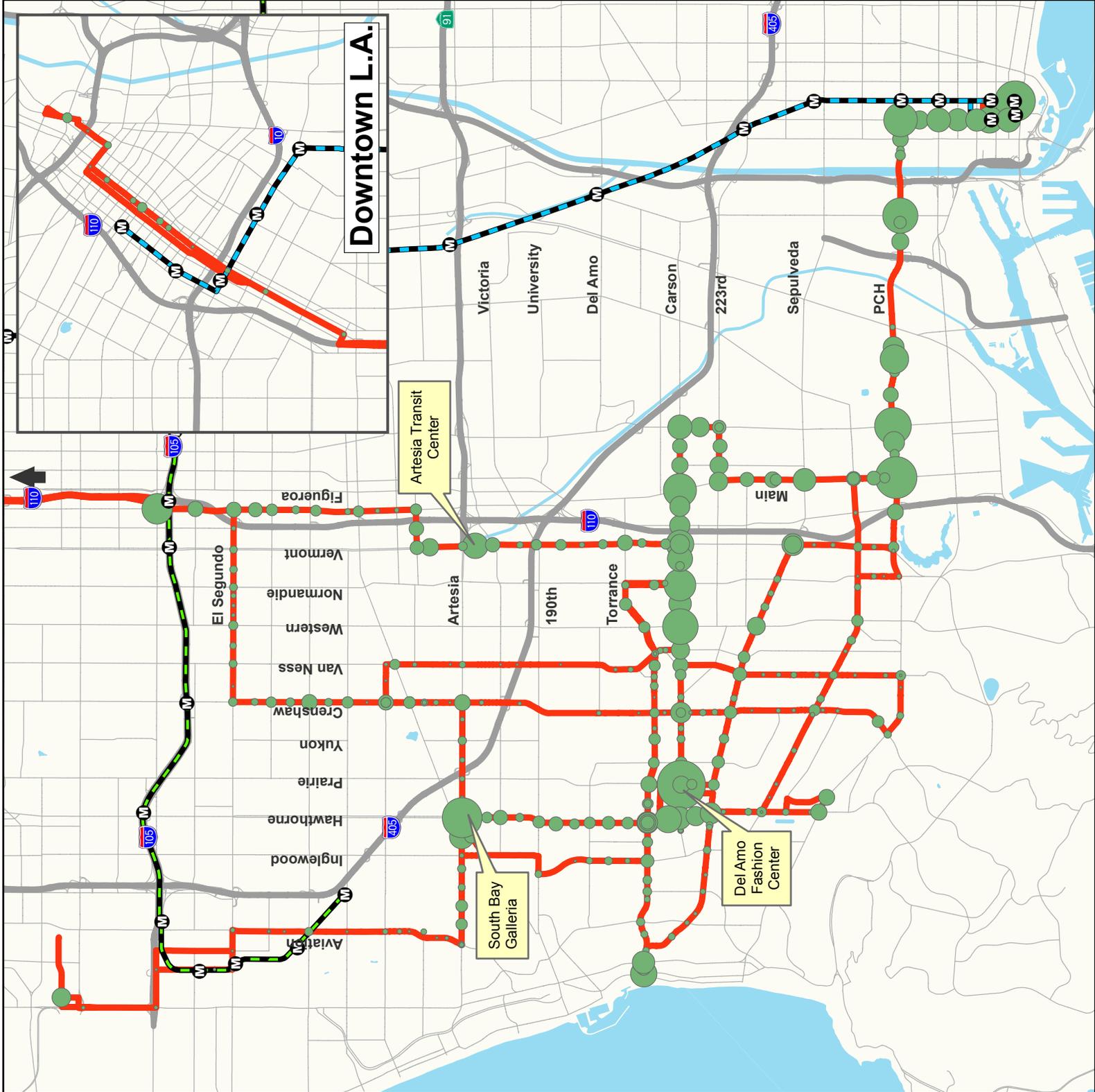
Data Sources

Torrance Transit, Census 2000,
Southern California Association of Government (SCAG)

Date Prepared

December 2005

Figure 4.2
Torrance Transit System
 Saturday Boardings
 (Both Directions)



Legend

- Freeways
- Major Streets
- TTS Route Network

Metro Rail

- Green Line
- Blue Line
- Green Line Stations
- Blue Line Stations

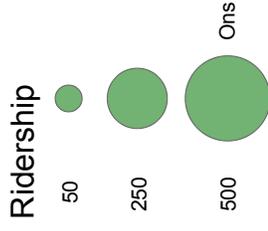
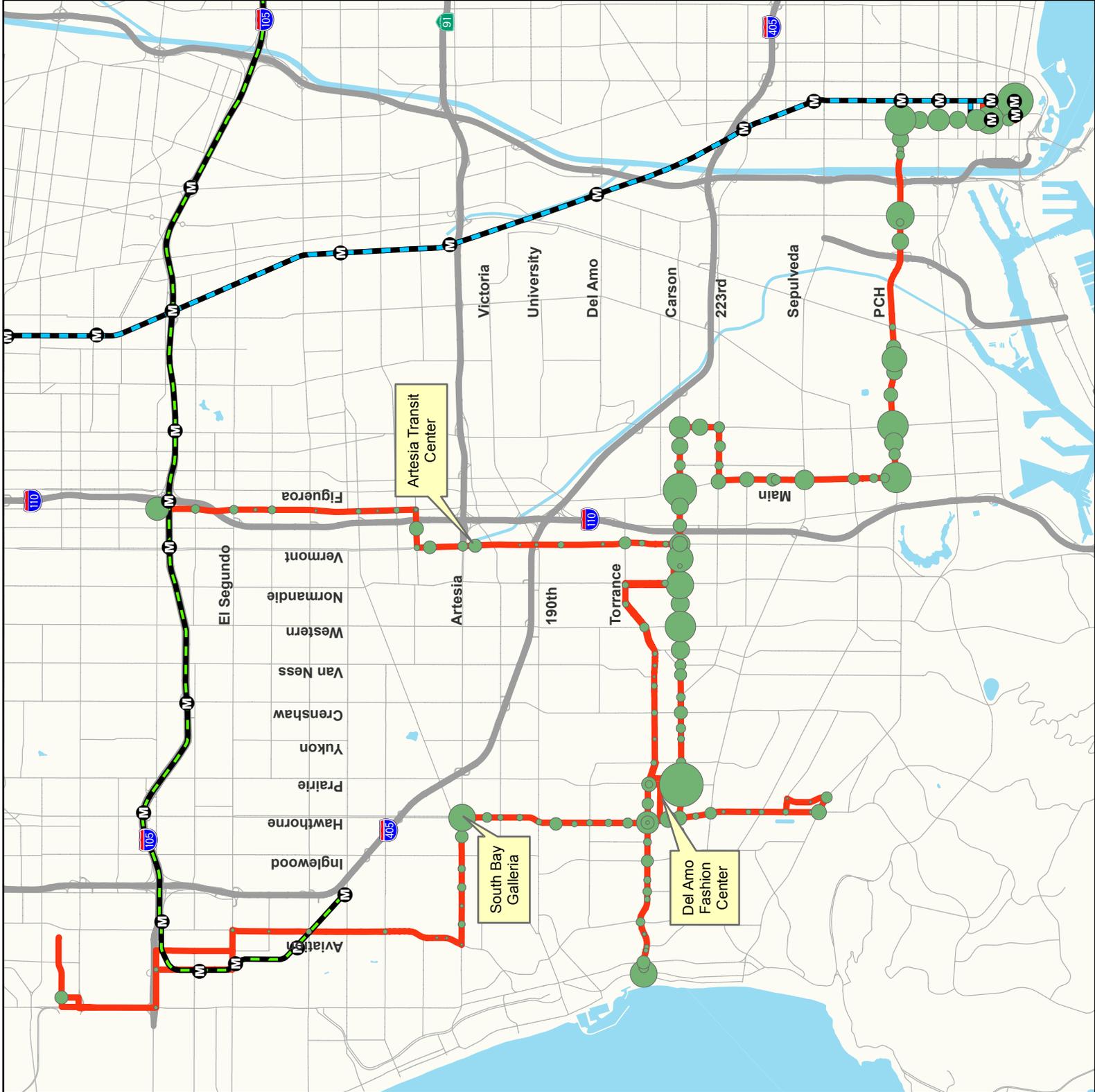
Data Sources

Torrance Transit, Census 2000,
 Southern California Association of Government (SCAG)

Date Prepared

December 2005

Figure 4.3
Torrance Transit System
 Sunday Boardings
 (Both Directions)



Legend

- Freeways
- Major Streets
- TTS Route Network

Metro Rail

- Green Line
- Blue Line
- Green Line Stations
- Blue Line Stations

Data Sources

Torrance Transit, Census 2000,
 Southern California Association of Government (SCAG)

Date Prepared

December 2005



Routes 1, 3, and 8 are the only Torrance Transit System operating on Sunday. Route 3 has the highest boardings and alightings with Carson and Madrona (Del Amo Fashion Center) having the most boardings and alightings in the entire system (500). Other intersections that produce significant boardings and alightings are PCH and Avalon, PCH and Wilmington, Carson and Main, and the Long Beach Transit Center. These intersections produce approximately 250 boardings and alightings each, with boardings accounting for approximately three quarters of the activity occurring within the Long Beach Service Area. Route 1 has minimal activity occurring along Vermont and Figueroa with the Harbor Freeway Green Line station accounting for its highest boardings and alightings (150). Route 8 also has minimal activity along Hawthorne and Artesia, with its strongest activity occurring on Hawthorne and Artesia (vicinity of Galleria at South Bay), with almost the entire activity belonging to boardings (100).

4.2 Line-By-Line Findings

This section will describe the route-level findings, which will guide the development of service proposals to be incorporated into the Service Plan. In addition, this section also includes a discussion of network issues, such as market and demographic characteristics, travel patterns, operational characteristics, and service levels, which will also impact potential service proposals.

Appendix B, under this cover, contains route profile maps and summaries for each of the eight TTS routes depicting the route alignment, a graphic depiction of the residential and employment densities within 0.25 mile of bus stops, the number of people residing within and number of jobs within the 0.25 mile buffer, a summary of key service statistics for the route, and the daily ridership as determined by the November 2005 ridecheck.

In addition to the route profile maps, for each route there is a map showing the location and amount of weekday boardings by stop for each direction of the route (Appendix A).

Finally, there is a narrative analysis of the route describing: the routes alignment and operation; daily ridership, major stops, and key transfer locations; service effectiveness indicators; capacity and loading analysis; financial performance indicators, and an assessment of schedule adherence (Appendix B).

Route 1

- The segment between the Metro Green Line station and Downtown Los Angeles, served during weekday peak periods, has the lowest passenger boardings per revenue hour. This low productivity reduces the overall weekday route productivity.
- The weekday midday 35-minute headway is awkward and not conducive to establishing convenient transfers to other Torrance Transit routes which are operating 15-, 30-, 60-, or 90- minute headways.

Route 2

- The segment between the Metro Green Line station and Downtown Los Angeles, served for the entire service span, has the lowest passenger boardings per revenue hour on the route. This low productivity reduces the overall weekday route productivity.
- There does not appear to be enough demand to justify operating both Routes 1 and 2 to downtown in the weekday peak periods. Route 2 appears to have higher average loads to Downtown Los Angeles.

Route 3

- Route 3 has the highest productivities of any of the Torrance Transit routes, and also utilizes the most resources.
- The route segment from Del Amo Fashion Center to Redondo Beach has the lowest passenger boardings per revenue hour consistently across all time periods. Consideration should be given to turning back some service at Del Amo Fashion Center.
- Route 3 has a number of weekday trips which experience loads in excess of 110 percent of seated capacity. Westbound trips in the 6:15-7:30 a.m. period departing the Long Beach Transit Center have extremely high maximum loads. There are similar loading problems in early weekday afternoon eastbound trips. This may be related to student travel. Consideration should be given to addition of school trippers to reduce passenger loads.
- There are a number of Saturday trips with loads exceeding 110 percent. The earliest westbound trip from Long Beach TC and a number of eastbound midday and late afternoon trips have high loads. Possible consideration should be given to starting Saturday service earlier and improving the headways during the midday and afternoon.

Route 5

- Route 5 appears to perform well on weekdays when El Camino College is in session. The highest segment passenger boardings are between El Camino College and Carson-Crenshaw, indicating passenger transfers between Routes 3 and 5.
- In the weekday AM Peak, there are high passenger boardings per revenue hour between Narbonne/Pacific Coast Highway and Cabrillo-Carson, most likely due to school travel to Torrance High School.
- The service levels on weekday are unbalanced. The counterclockwise direction has 40-minute headways for most of the day, while the clockwise direction has 60-minute headways. Consideration should be given to balancing the service in both directions.

Route 6

- The route segment from Cal State Dominguez Hills Campus to Artesia Blue Line Station is two to three times as productive, in terms of boardings per revenue hour as the other segments. This segment duplicates MTA Route 130.
- The 90-minute midday headways may be too infrequent to be attractive to riders.

Route 7

- Route 7's highest passenger generation is in the Vermont/Lomita/Main/Pacific Coast Highway Loop, with the other segments generating about half as many boardings per hour. This is consistent for weekdays and Saturdays
- Ridership generation on this segment is constant throughout the day.
- The Wilmington Loop has the route's highest boarding's per hour in the AM Peak, which may reflect student travel.

Route 8

- Route 8's most productive segment is between Del Amo Fashion Center and the Galleria at South Bay, followed by the southernmost segment from Pacific Coast Highway to Del Amo Fashion Center. The segments of the route north of Galleria at South Bay are functioning at about one-half of the productivity of the southern portion of the route. Route 8 already operates a short line on Saturdays, with only half the service operating to LAX City Bus Center. Consideration should be given to operating short-line service on weekdays.
- Route 8's current alignment between El Segundo Blvd. and Imperial Hwy. utilizes the Douglas/Nash couplet, serving the Mariposa and El Segundo Metro Green Line stations, but bypassing the Aviation/LAX Station, which offers more connections to other bus routes, as well as a more direct trip to the Metro Green Line.

Route 9

- Route 9 has the lowest passengers per revenue hour of any Torrance Transit route both on weekdays and on Saturdays, with the Saturday productivity being the lowest of any route/service day. This does not seem to be significantly different from the 2002 Line-By-Line Analysis.

4.3 Network Considerations

4.3.1 Route Coverage

Within the City of Torrance, given the constraints of the roadway network, Torrance Transit provides reasonable service coverage on the main north-south and east-west

arteries on weekdays and to a lesser degree on Saturdays. On Sundays, the core service basically bisects the city both north-south and east-west.

4.3.2 Service Spans

The core routes (1, 3, and 8) operate longer service spans than the other routes on weekdays, and routes 1 and 3 operate a greater service span than the other routes on Saturdays, with Route 8 operating a shorter span. Given the observed transfer activity (per the Del Amo Fashion center intercept survey) between routes 3 and 8, consideration should be given to operating these two routes over a comparable service span on all days. Route 8 may deserve longer hours of service on Saturday given the fact that it serves South Bay Galleria (service currently ends at 7:00 pm). Given the observed capacity problems on early Saturday morning Route 3 trips, consideration should be given to providing service one trip earlier.

4.3.3 Headways

On weekdays, consideration should be given to operating routes (other than Route 3) at headways that will allow for establishing consistent transfer possibilities with Route 3, which operates every 15 minutes during the weekday peaks and midday. The 35-minute midday headway on Route 1 and the 40-minute counterclockwise headway on Route 5 should be adjusted to synchronize better with Route 3. Route 5 shows high passenger productivities between El Camino College and Crenshaw-Carson, indicating that transfers between route 1 and 3 are important for travel to the college.

4.3.4 Service to Downtown Los Angeles

There will likely be continued demand for a direct service between Torrance and Downtown Los Angeles. Torrance Transit currently operates both Routes 1 and 2 to Downtown Los Angeles in the weekday peak periods and Route 2 in the weekday day base and on weekends. Consideration should be given to operating only one of the two routes downtown in the weekday peaks.

5 On-Board Passenger Survey

The following section discusses the results of the on-board passenger survey. The survey was conducted between November 12th and November 19th of 2005. The surveys were handed out to gather information regarding passenger travel patterns and demographics. Surveyors were assigned to all vehicle runs with the objective of gathering information that represents the typical Torrance Transit ridership across all routes, directions, and times of day. The survey was self-administered and all passengers traveling on the bus were given the opportunity to complete the survey. Passenger response decreased as the week continued since passengers claimed to have filled out a survey previously and it was harder to encourage them to fill out a second survey. Surveyors reported increasing difficulty getting passengers to fill out a survey on those routes surveyed on the second and third day of weekday surveying, which may be due to the fact that a significant number of Torrance Transit riders use more than one Torrance route to complete their trip.

The survey (included in Appendix C under this cover) requested information regarding trip purpose, trip origin, transfer movements, fare category, fare media, transit dependency, transit improvements, and passenger demographics. A pre-determined goal of 100 complete surveys per direction per route was employed when validating surveys to be analyzed (in order to meet a reasonable margin of error and a 95 percent confidence interval). For routes that did not reach the 100 surveys per direction per route a more flexible selection criteria was used to allow for semi-complete surveys to be eligible for data entry. Table 5.1 below shows the number of surveys validated for use by route, the weekday boardings, and the correspondent sample size. It is important to note that riders are in average boarding TTS buses more than once during the day and therefore the sample size of TTS riders will be larger than shown in Table 5.1.

Table 5.1: Validated Surveys and Boardings Sample Size by TTS Route

Routes	Validated Surveys	Weekday Boardings	Sample Size
1	200	2,004	20.0%
2	135	899	30.0%
3	200	7,905	5.1%
5	107	1,076	19.8%
6	30	614	9.8%
7	121	897	26.9%
8	200	2,227	18.0%
9	34	213	31.8%
Total	1,027	15,835	13.0%

There were 1,027 surveys that were eligible for data entry, which make a sample size of 13 percent of all boardings. Route 3 has the highest boardings and lowest sample size (5%), while Route 9 has the lowest boardings and highest sample size (32%).

5.1 Systemwide Findings

5.1.1 Language

Passengers had the opportunity to complete the survey in either English or Spanish. Of the 1,027 surveys utilized, 82.3 percent were answered in English and 17.7 percent were answered in Spanish.

5.1.2 Trip Purpose

Of the 1,027 total surveys used, only one survey did not state a trip purpose. Of the surveys that did respond, 55 percent said they used TTS for work trips (comparable to the 52% recorded in 2002), 15 percent for school trips (comparable to the 14.9% recorded in 2002), and seven percent for personal trips. Shopping, medical/dental, and “other” trips each had approximately five percent, with social/recreation having the least, at approximately three percent. Five percent of the respondents marked multiple answers. The impact of excluding the multiple answer trips from the table is negligible.

Table 5.2 – Trip Purpose

Trip Purpose	Frequency	Percent
Work	563	54.9%
School	153	14.9%
Personal	72	7.0%
Other	52	5.1%
Shopping	50	4.9%
Medical	49	4.8%
Social/Recreation	27	2.6%
Childcare	5	0.5%
Multiple	55	5.4%
Total	1,026	100.0%

5.1.3 Fare Category

Passengers were given a choice between Regular/Adult and Senior/Disabled/Medicare Card Holder. Approximately 89 percent of the people who responded to this question claimed to have a Regular/Adult fare, and only 11 percent indicated they had the reduced fare category. Less than three percent of the total respondents did not state what fare they paid.

Table 5.3 – Fare Category

Fare Category	Frequency	Percent
Regular/Adult	889	89%
Senior/Disabled	110	11%
Total	999	100%

5.1.4 Trip Purpose by Fare Category

Within the Regular/Adult fare category, 60 percent of the trips were work-related, 17 percent school-related, six percent were for personal business, and approximately five percent were for shopping as well as for “Other” trip purpose (see Table 5.4).

Within the Senior/Disabled fare category, 40 percent of respondents claimed their main trip purpose was for work, while medical/dental and personal trips each accounted for 16 percent, and shopping and other each account for about 8 percent of the respondents’ trip purpose. Social and Recreational trips accounted for 7 percent, while school-related trips only accounted for 3 percent.

Table 5.4 – Distribution of Trip Purpose within Fare Category

Fare Category	Trip Purpose								Total
	Work	Shopping	School	Medical/Dental	Childcare	Social/Rec.	Personal	Other	
Regular	60.2%	4.8%	17.1%	3.9%	0.4%	2.3%	6.4%	4.9%	100.0%
Senior	39.8%	8.2%	3.1%	16.3%	1.0%	7.1%	16.3%	8.2%	100.0%
Total	58.1%	5.1%	15.7%	5.1%	0.4%	2.8%	7.5%	5.3%	100.0%

Table 5.5 – Type of Fare Paid

Fare Paid	Frequency	Percent
Cash	776	75.9%
EZ Pass	82	8.0%
Transfer - Interagency	54	5.3%
Transfer - Torrance	44	4.3%
ACCESS	22	2.2%
Metro Pass	20	2.0%
Metrolink	7	0.7%
Downtown	2	0.2%
Multiple	15	1.5%
Total	1,022	100.0%

5.1.5 Type of Fare Paid

Passengers were asked to indicate what type of fare they paid. The options provided were Cash, Torrance Transfer, Interagency Transfer, Metro Pass, EZ Pass, Access Services ID, Downtown Zone Fare, and Metrolink Pass.

From Table 5.5 above, approximately 76 percent of the respondents paid with cash, followed by eight percent who used the EZ Pass, five percent using interagency transfers, and four percent using Torrance transit fare. The Access ID Card and the Metro Pass each only accounted for two percent of the fare media paid by the respondents.

5.1.6 Type of Fare Paid by Fare Category

Of the passengers who answered both questions (Fare Category and Fare Media), approximately 78 percent of those paying cash classified themselves under the “regular” fare category. The second most popular fare media among adults was the EZ Pass (8%), which was followed by Interagency Transfers (6%), Torrance (4%) and the Metro Pass (1.5%). The Access ID Card, Metrolink Pass, and those paying a Downtown Zone accounted for less than one percent each.

Within the Senior/Disabled fare category cash accounted for approximately 63 percent of the fare paid, followed by the Access ID Card (15%), the EZ Pass (9%), the Metro Pass (6%), the Torrance Transfer (3%), and the Interagency Transfer and Metrolink Pass with about two percent each.

It appears that the use of cash and transfers is more common among passengers paying the Regular/Adult fare (78% and 10% respectively) than those paying the Senior/Disabled fare (63% and 5% respectively). Conversely, Seniors/Disabled use passes more often than Regular/Adults (5.5% vs. 1.5% for the Metro Pass and 9% vs. 8% for the EZ Pass). Seniors/Disabled comprise also the majority of Access ID Card holders. All these may be indicative of lower income levels among seniors/disabled users. The table below shows the cross-tabulation between Fare Category and Fare Paid.

Table 5.6 – Fare Category by Fare Paid

Fare Category	Fare Paid								Total
	Cash	Torrance Transfer	Interagency Transfer	Metro Pass	EZ Pass	ACCESS ID	Downtn. Zone	Metrolink Pass	
Regular	77.8%	4.3%	5.8%	1.5%	8.0%	0.4%	0.2%	0.6%	100.0%
Senior	62.7%	2.7%	1.8%	5.5%	9.1%	14.5%	0.0%	1.8%	100.0%
Total	76.1%	4.1%	5.4%	1.9%	8.1%	2.0%	0.2%	0.7%	100.0%

5.1.7 Passengers Weekly Use of Buses

Passengers were asked how many days per week they rode the bus. The results of the survey indicate that 70 percent of Torrance Transit riders take a bus at least five days a week, which corresponds with earlier data that conveyed that the majority of respondents’ trip purpose is work or school related (70 percent). This appears to be an

increase from the 56 percent of respondents who claimed to use Torrance Transit five days or more per week in 2002. 17 percent of the respondents claimed they rode a bus seven days a week, followed by 12 percent who rode the bus six days a week. Approximately ten percent of the respondents said they rode the bus four days a week, eight percent claimed they rode the bus three days a week and approximately 11 percent said they rode the bus either two or three times a week, and approximately one percent did not respond to this question.

The percentage of respondents claiming to use the bus two to four days per week in 2005 (24.7%) appears to be comparable to the percentage in 2002 (24.9%). The percentage of respondents answering that they use the bus once or less per week appears to have substantially dropped (from 19.1% to 4.2%).

Table 5.7 – Passengers Weekly Use of Buses

TTS Weekly Use	Frequency	Percent
1	43	4.2%
2	70	6.9%
3	83	8.2%
4	97	9.6%
5	426	42.1%
6	124	12.2%
7	170	16.8%
Total	1,013	100.0%

5.1.8 Transit Dependency

The survey asked whether passengers had a car available to make the trip. The vast majority of the respondents said they did not have a car available for the trip (83 percent). This percentage appears to be up slightly from 2002, when it was 81 percent.

Table 5.8 – Cars Available to Make Trip

Car Available for Trip	Frequency	Percent
Yes	163	16%
No	854	84%
Total	1,017	100%

5.1.9 Travel Modes to/from Buses

Passengers were asked how they got to the bus stop before boarding the bus and what they would do at the bus stop once they got off the bus. Their options were to transfer to another Torrance Transit bus line, transfer to another transit agency bus, transfer to MTA Metro Rail/Metrolink, walk, get a ride, bicycle, or other. They were given the same choices for when they alighted the bus.

Based on the previous car availability data it is no surprise that 87 percent walk, or rely on public transport to reach the bus stop. More specifically, 56 percent of people walked to catch the bus, 13 percent transferred from a different agency, nine percent transferred from a Torrance line, and nine percent used Metro Rail. Only six percent got a ride to the bus stop, four percent marked other, and 3 percent used a bicycle.

Similar to the arrival to bus stop data, the departure from bus data shows that 90 percent of the respondents either walk or rely on public transport when they depart from the bus. Taking a closer look, 59 percent of the respondents claimed to walk after departing the bus, 12 percent transferred to a different agency bus, ten percent transferred to a Torrance line and approximately eight percent took Metro Rail. The three public transport answers differ at most by only one percentage point, the percentage point difference between the two walking answers only differed by 3 percent. However, the percentage of responses that get a ride dropped by more than half between those who received a ride to the bus stop and those who received a ride from the bus stop.

Table 5.9 – Means of Access/Departure to/from Bus Stop

Mode of Access to TTS	Frequency	Percent
Walked	571	55.9%
Other Agency Bus	135	13.2%
TTS Bus	95	9.3%
Metro Rail	87	8.5%
Get a Ride	57	5.6%
Other	36	3.5%
Bicycle	27	2.6%
Multiple	14	1.4%
Total	1,022	100.0%

Mode of Exit from TTS	Frequency	Percent
Walked	609	59.8%
Other Agency Bus	126	12.4%
TTS Bus	106	10.4%
Metro Rail	80	7.9%
Other	38	3.7%
Get a Ride	26	2.6%
Bicycle	19	1.9%
Multiple	14	1.4%
Total	1,018	100.0%

5.2 Market Segmentation by Route

5.2.1 Trip Purposes by Route

The two most popular trip purposes were work (58 percent) and school (16 percent). All other trips made up only 25 percent of the responses, with Personal Business trips representing a third of these (8%). See Table 5.10 totals below.

Work was the most popular trip purpose on all the routes, with the exception of Route 5. Its highest response was 78 percent in Route 9, followed by 67 percent in routes 1 and 8. The lowest response was Route 5 with only 37 percent.

School was the second highest trip purpose response, with Route 5 having the highest percentage (45 percent), followed by Route 2 with 23 percent. On the other hand, routes 1, 8 and 9 scored the lowest school trip percentages with 8, 6, and 3 percent respectively.

Table 5.10 – Trip Purpose Distribution by TTS Route

Trip Purpose	Route								
	1	2	3	5	6	7	8	9	Total
Work	66.5%	57.1%	49.5%	37.0%	62.1%	53.6%	66.8%	78.1%	57.8%
Shopping	2.5%	6.3%	4.7%	1.0%	10.3%	10.0%	6.4%	6.3%	5.2%
School	8.1%	23.0%	15.6%	45.0%	13.8%	14.5%	6.4%	3.1%	15.7%
Medical/Dental	8.6%	1.6%	7.3%	1.0%	3.4%	1.8%	5.9%	6.3%	5.1%
Childcare	0.5%	0.8%	1.0%	1.0%	0.0%	0.0%	0.0%	0.0%	0.5%
Social/Rec	3.0%	1.6%	5.2%	2.0%	0.0%	4.5%	1.1%	0.0%	2.8%
Personal	7.1%	4.8%	11.5%	5.0%	3.4%	7.3%	8.6%	3.1%	7.5%
Other	3.6%	4.8%	5.2%	8.0%	6.9%	8.2%	4.8%	3.1%	5.3%
Total	100.0%								

Shopping accounted for only five percent of trip purpose responses. Shopping trips account for a larger percentage of the responses on routes 6 and 7 (10% each). Conversely, they are only 2.5 percent of Route 1 and one percent of Route 5.

Medical/Dental trips only accounted for five percent of the response rate too. Routes 1 and 3 both have a considerable amount of passengers making medical/dental trips (9% and 7% respectively). Routes 2, 5, and 7 have less than 2 percent of trips made for medical and/or dental purposes.

Social/Recreation, Childcare, and Other were the remaining options for main trip purpose. Altogether they account for approximately nine percent of the responses. Routes 3 and 7 have a larger share of social and recreational trips (5% each).

5.2.2 Fare Categories by Route

Table 5.11 – Fare Category by Route

Route	Fare Category		
	Regular	Senior	Total
1	91.0%	9.0%	100.0%
2	92.9%	7.1%	100.0%
3	86.9%	13.1%	100.0%
5	90.6%	9.4%	100.0%
6	93.1%	6.9%	100.0%
7	82.9%	17.1%	100.0%
8	88.0%	12.0%	100.0%
9	93.8%	6.3%	100.0%
Total	89.0%	11.0%	100.0%

There were only two fare categories defined. As stated before, “regular” fare was the most prominent answer picked with an 89 percent average, with the lowest percentage (83 percent) belonging to Route 7.

Looking closely at the senior fare category percentages it should be no surprise that Route 3, and 7 have a higher expected representation of respondents who chose senior fare category (24 and 18 percents respectively), since Route 3 stops at Harbor UCLA Medical Center and Route 7 stops at Kaiser Foundation Medical Center.

5.3 Demographics

Several questions on the surveys pertain to the passenger's demographics. These questions ask about the respondent's gender, age, ethnicity, and household income. The average Torrance Transit passenger is shown to be a Hispanic female between the age of 18 and 44 with an income below \$10,000.

5.3.1 Ethnicity

Hispanics made up 35 percent of the responses, while Whites and African Americans each accounted for approximately 21 percent of the responses. The remainder of the respondents indicated that they were Asian (13 percent), "Other" (five percent), or Native American (one percent). Approximately three percent of the respondents marked several ethnicities. However, this does not significantly change the figures.

Table 5.12 – Ethnicity

Ethnicity	Frequency	Percent
Hispanic	358	35.4%
White	218	21.6%
African American	210	20.8%
Asian	134	13.3%
Other	52	5.1%
Native American	11	1.1%
Multiple	28	2.8%
Total	1,011	100.0%

5.3.2 Gender

Females showed a slight larger representation with 54 percent of the responses. This is the same percentage as in 2002.

Table 5.13 – Gender

Gender	Frequency	Percent
Female	556	56%
Male	436	44%
Total	992	100%

5.3.3 Age

Sixty-five percent of the respondents were between the ages of 18 and 44, while 24 percent were between the age of 45 and 64, eight percent were under 18 years old, and three percent were over the age of 65. This data reinforces the notion that the majority of the respondents are taking the bus to get to work or to school.

Table 5.14 – Age

Age	Frequency	Percent
Under 16	29	2.9%
16 - 17	48	4.7%
18 - 24	211	20.8%
25 - 34	242	23.8%
35 - 44	205	20.2%
45 - 54	163	16.0%
55 - 64	83	8.2%
65+	35	3.4%
Total	1,016	100.0%

5.3.4 Income

The typical Torrance Transit passenger has a very low household income with approximately 55 percent making below \$20,000, with 33 percent making less than \$10,000. 27 percent of riders live in households making between \$20,000 and \$40,000. Only 18 percent of the respondents make above \$40,000.

Table 5.15 – Income

Income	Frequency	Percent
Under \$10K	311	32.7%
\$10 - 19	215	22.6%
\$20 - 29	154	16.2%
\$30 - 39	103	10.8%
\$40 - 49	68	7.1%
\$50 - 99	73	7.7%
\$100+	28	2.9%
Total	952	100.0%

5.3.5 Metro Rapid-Like Service

The passenger survey asked which destinations would be the most important to serve with a Metro Rapid-like service (limited stops). Answers that contained multiple choices were not included in the table because they did not significantly change the percent figures. The area that was picked the most was Downtown Los Angeles (24

percent). LAX was the second highest choice (22 percent) and Long Beach following at 19 percent. Seventeen percent of the responses claimed that South Bay Galleria would benefit from a Metro Rapid-like service. Artesia Transit Center made up seven percent of the responses to this question. The respondents were also given the option of writing their own destination; twelve percent of the respondents picked this option. The most written in answers included Torrance (44 percent), El Camino College (17 percent), Carson City (six percent), and Wilmington and Los Angeles (five percent each).

Table 5.16 – Preferred Destinations for Metro Rapid-Like Service

Destination	Frequency	Percent
Downtown LA	191	23.5%
LAX	175	21.5%
Long Beach	153	18.8%
South Bay Galleria	136	16.7%
Other	99	12.2%
Artesia Transit Center	59	7.3%
Total	813	100.0%

5.4 Survey Suggestions

The last question of the passenger survey asked how Torrance Transit could improve their services. This provided an opportunity for the respondents to express their current concerns. Of the 1,027 surveys that were entered into the database, 695 had suggestions. The highest occurring comment was in regards to the Torrance Transit service frequency (27 percent). The majority felt that the buses did not pass frequently enough and instead suggested 15 and 30 minutes headway. Others commented that more buses are needed so that buses will not be as crowded and thus be able to pickup more passengers. On-time performance was the second highest concern of the respondents (16 percent). Many claimed that the buses would consistently arrive late to their destinations by 10 or 15 minutes, this was especially a problem for those who mentioned it made them arrive late for work. Fifteen percent of the suggestions were compliments to Torrance Transit for the service.

Span of Service accounted for nine percent of the responses; the most frequent request was for later service. Suggestions regarding weekend service accounted for approximately eight percent of the responses, with people mostly asking for more routes with Sunday service, longer hours of operation, and more frequent service. Table 5.7 showed that approximately 30 percent of the respondents take the bus more than five times a week.

Approximately six percent of the comments were directed towards the attitudes of the drivers. Some passengers claimed the drivers were rude, and unhelpful. Six percent of the comments fell under the “general” category. These comments ranged from people requesting to have televisions, radios, and bathrooms on the buses, to accepting tokens, to changing to CNG buses. Alignment was not considered an important issue with only

five percent of the responses asking for routes to be altered to accommodate travel to Orange County, Los Angeles, and Long Beach. Others asked to bring back old routes or stops, while others asked to take out more stops to make the bus travel time shorter.

Transfers and Buses each accounted for only two percent of the responses. These topics included issues regarding smoother transfers, and cleanliness of buses or safety concerns such as seatbelts. Prices and Labeled Info each accounted for only two percent of the responses. These issues pertained to lowering prices and having more route and schedule information available at bus stops as well as on buses. Less than one percent of the respondents asked for a centralized station and commented about wanting shelters for the bus stops.

The 2005 responses are very similar to the 2002 responses. In 2002, a total of 26.1 percent of respondents suggested either “More buses/frequency” or “15-minute service”, compared to 26.9 percent requesting more frequent service in 2005. In 2002, 15.7 percent of respondents suggested that schedule adherence needed to be improved versus 16.0 percent in 2005. More weekend service was suggested by 7.2 percent of respondents in 2002 versus 7.5 percent in 2005. Earlier/later service was a concern for 7.2 percent of respondents in 2002, while it is a concern of 9.3 percent of respondents in 2005.

Table 5.17 – Suggestions for Improving Service

Category	Frequency	Percent
Frequency	238	26.9%
On-Time Performance	142	16.0%
Compliments	132	14.9%
Span of Service	82	9.3%
Weekend	66	7.5%
Drivers	54	6.1%
General	51	5.8%
Alignment	42	4.7%
Transfers	19	2.1%
Buses	18	2.0%
Prices	17	1.9%
Labeled Info	16	1.8%
Centralized Station	5	0.6%
Bus Stops	3	0.3%
Total	885	100.0%

6 Intercept Survey Analysis

An additional survey was conducted on Wednesday November 16, 2005 from 12:00 to 6:00pm at four transfer intersections in the vicinity of Del Amo Fashion Center. This survey was used to gather information regarding the decentralized transfer activity around the Del Amo Fashion Center. Four surveyors were assigned each to a separate intersection to conduct the surveys. These intersections were considered major transfer points and thus the questions revolved around transfer motives and intentions. Each surveyor had approximately 100 survey papers, which had two surveys per page and eight questions per survey (see survey instrument in Appendix C under this cover).

Rather than handing out the surveys to individuals to fill out, the surveyors were asked to read the questions to the commuters and mark the answers accordingly.

The questions in the survey (see Appendix C) encompassed whether the individuals worked at the Mall, whether they were shopping at the Mall, which routes they were taking, to what routes they were transferring, the number of blocks they walked, whether they make their transfers, whether a centralized station would be beneficial, and what suggestions they had. The aim was to spend about a minute per person and to gather as many surveys as possible. All returned surveys were entered into the database and analyzed using a statistical analysis package.

6.1 Methodology

6.1.1 Location

There were a total of 360 surveys gathered during the intercept survey. Of these surveys 45 percent were taken at the intersection of Hawthorne and Torrance. This data is congruent with our boarding data, which shows that of the four intersections, Hawthorne and Torrance had the highest number of boarding and alighting during the Midday and PM Peak periods. The following two intersections, Madrona and Carson and Carson and Del Amo, each accounted for approximately one fifth of the surveys, while Madrona and Torrance only accounted for ten percent of the surveys.

Table 6.1 – Survey Locations

Survey Location	Frequency	Percent
Hawthorne & Torrance	163	45.3%
Madrona & Carson	84	23.3%
Carson & Del Amo	77	21.4%
Madrona & Torrance	36	10.0%
Total	360	100.0%

6.1.2 Time of Day

The surveys fell into two categories: Midday or PM Peak. Thirty-six percent of the surveys were taken during midday hours (12pm – 3pm), and sixty-four percent of the surveys were taken during the PM Peak (3pm – 6pm).

Table 6.2 – Time of Day

Time of Day	Frequency	Percent
Midday	130	36.1%
PM Peak	230	63.9%
Total	360	100.0%

6.2 Survey Analysis

6.2.1 Work

Approximately 82 percent of the respondents said they do not work at the Del Amo Fashion Center. Eighteen percent said they do work at the Fashion Center, and less than two percent did not respond to this question. The percentage of workers from the Fashion Center may be skewed since the time frame the survey was conducted is not necessarily the hours at which workers from the mall are commuting. The Del Amo Fashion Center hours are from 10am until 9pm, while the survey took place from 12pm until 6pm. Both beginning and end times would potentially miss the mall's morning and late night shift hours.

Table 6.3 – Work at Del Amo Fashion Center

Work at Del Amo?	Frequency	Percent
No	289	81.6%
Yes	65	18.4%
Total	354	100.0%

6.2.2 Shopping

Two thirds of the respondents said they were not shopping at the Del Amo Fashion Center that day. One third of the responses claimed they are shopping at the Del Amo Fashion Center that day, and less than two percent did not answer the question.

Table 6.4 – Shop at Del Amo Fashion Center

Shop at Del Amo?	Frequency	Percent
Yes	117	33.0%
No	238	67.0%
Total	355	100.0%

6.2.3 Routes Taken

Not surprisingly Route 3 was said to be the most taken route by the respondents (58 percent). This is justified by the fact that Route 3 is the Torrance Transit route serving the Mall with the most passengers and the highest frequency. Route 1 had the second highest responses with 12 percent, followed by Route 8, which obtained eight percent of the responses, and Route 2, which had approximately six percent. Interestingly Route 444, which is served by MTA, was taken more at these intersections (6 percent) than Routes 6, 7, 9. Also, approximately three percent of the responses said they had not taken a route yet.

Table 6.5 – Route(s) Taken

Route Taken to Del Amo	Frequency	Percent
3	204	57.5%
1	43	12.1%
8	28	7.9%
2	21	5.9%
444	20	5.6%
6	12	3.4%
7	5	1.4%
9	4	1.1%
104	3	0.8%
232	2	0.6%
21	1	0.3%
First Route	12	3.4%
Total	355	100.0%

6.2.4 Routes Transferred

The responses to routes transferred to are in the exact same order as the responses to routes taken. The biggest change was for the people who responded that they were not transferring to a route (44 percent). This could either be because they had just reached their destination (the Fashion Center) or because this was going to be their first route of the day. Not enough information was gathered to be able to determine which respondents did what. Of the people who did say they were transferring, 22 percent claimed they were transferring to Route 3. Routes 1 and 8 each had 18 percent of the responses, while Route 2 had 16 percent. Once again, Route 444 had a higher transfer

percentage (13 percent) than Routes 6, 7, and 9, which only made up approximately 11 percent of the responses.

Table 6.6 – Routes Transferred

Route Transferred To at Del Amo	Frequency	Percent
3	33	21.9%
1	27	17.9%
8	27	17.9%
2	24	15.9%
444	19	12.6%
6	9	6.0%
7	6	4.0%
9	2	1.3%
40	2	1.3%
130	2	1.3%
Total	151	100.0%
Not Transferring	145	

6.2.5 Blocks Walked to Make Transfer

The transfer points around the Del Amo Fashion Center are no longer in a centralized location. Because of this, the survey asked how many blocks the individual has to walk to make a transfer. Surprisingly 55 percent of the respondents claimed they did not have to walk any blocks to make their transfer. Twenty-four percent said they only had to walk one block to make a transfer, and 11 percent said they had to walk two blocks. Only nine percent said they had to walk at least three blocks to make their transfers.

Table 6.7 – Blocks Walked to Make Transfer

Blocks Walked to Make Transfer	Frequency	Percent
0	195	55.2%
1	86	24.4%
2	39	11.0%
3	33	9.3%
Total	353	100.0%

6.2.6 Able to Make Transfer

When asked whether they are able to make their transfers, 59 percent of the respondents said yes, but 41 percent of the respondents said no. This is rather unexpected since 80 percent of the respondents said they had to walk one block or less to make their transfer, and the three routes with the most transfers have approximately 15 - 30 minute frequencies. One explanation may be that the bus arrival times do not coincide properly or buses are running late. It could also be the case that people are weighing their

negative experiences more heavily than their positive experiences. A more thorough analysis should be performed to evaluate potential reasons for this occurrence.

Table 6.8 – Able to Make Transfer

Able to Make Transfers?	Frequency	Percent
Yes	205	59.1%
No	142	40.9%
Total	347	100.0%

6.2.7 Centralized Transfer Area

The Del Amo Fashion Center used to have a centralized transfer area for all the routes serving the mall. This area no longer exists; Torrance Transit riders were asked in the survey whether they believed a centralized station could facilitate their travel. Not surprisingly, three-fourths of the respondents said yes, with only one-fourth saying a centralized station would not facilitate their travel. Only two percent of the total respondents did not answer this question.

Table 6.9 – Would a Central Transfer Location be Beneficial

Centralized Transfer Area	Frequency	Percent
Yes	262	74.2%
No	91	25.8%
Total	353	100.0%

6.3 Route Transfer Matrix (Cross-Tabulation)

Table 6.13 – Del Amo Fashion Center Route Matrix

Route To Del Amo Fashion Center	Route From Del Amo Fashion Center									Total
	1	2	3	6	7	8	9	104	444	
1		1	3	2						6
2			4							4
3	11	8		2	5	13	1		16	56
6	4									4
7		1				1				3
8	4		15		2					21
9	1	2								3
104				1						1
444		1	11							12
Total	20	13	33	5	7	14	1	0	17	110

As shown in Table 6.10 above, Route 3 is the route generating and receiving the most transfers. Routes 1, 2, and 8 have the most transfers occurring with Route 3 and thus may need some schedule coordination. Metro Route 444 also has a significant number of transfers occurring with Route 3. Outside of Route 3, several transfers are occurring between routes 1 and 6, as well as between routes 1 and 8.

6.4 Service Suggestions

The last question of the intercept survey asked if the respondents had any suggestions. Twenty-six percent commented that a centralized station would be extremely beneficial and that Torrance Transit should go back to the way it used to be. Service frequency was the next highest remark at 26 percent. People mainly asked that buses arrive every 15 - 30 minutes. Twelve percent of the suggestions also asked that bus drivers be more considerate and friendly. Seven percent of the comments were categorized under "general," with comments ranging from putting a Metro bus on the route, to adding televisions. Span of service was also at seven percent, with people asking for earlier and later buses, especially for weekend service. Six percent of the respondents claimed on-time performance needed to improve. The remainder comments were distributed amongst compliments, wanting better weekend service, having alignment issues and requesting better labeled information and better buses.

Table 6.14 – Intercept Survey Suggestions

Category	Frequency	Percent
Centralized Station	32	26.4%
Frequency	31	25.6%
Drivers	15	12.4%
General	9	7.4%
Span of Service	8	6.6%
On-Time Performance	7	5.8%
Compliments	6	5.0%
Weekend	5	4.1%
Alignment	5	4.1%
Labeled Info	2	1.7%
Buses	1	0.8%
Total	121	100.0%

7 Transfer Analysis

7.1 Methodology

On November 16, Torrance Transit operators were asked to collect all paper transfers that they received during their driving shift. Each operator was given two envelopes, one for each direction, for each route they drove in the course of their run. Drivers were requested to put the transfers in the appropriate envelope. Of the 75 weekday runs, only 1 run was missed (run 30).

Using the collection envelopes to identify the receiving route and direction, the transfers were counted and categorized according to: 1) receiving route; 2) receiving route direction, 3) issuing agency, 4) issuing route (if available), and 5) time period of receipt (5:00-9:00am, 9:00am-3:00pm, 3:00-7:00pm, and 7:00pm-12:00am). The midpoint of the 2-hour transfer window was utilized to determine the transfer time period.

7.2 Analysis

7.2.1 Paper Transfer Received

TTS drivers collected a total of 1,735 paper transfers for a weekday. Table 7.1 shows the distribution of transfers received by receiving route. The greatest numbers of transfers were received on Route 3 (686), Route 8 (394), and Route 1 (227), which collectively account for 75 percent of the paper transfers collected.

Table 7.1 – Distribution of Paper Transfers Collected by TTS Receiving Route

Route	Transfers	Percent
1	227	13.1%
2	74	4.3%
3	686	39.5%
5	165	9.5%
6	72	4.1%
7	84	4.8%
8	394	22.7%
9	33	1.9%
Total	1,735	100.0%

Table 7.2 shows the distribution of paper transfers received by time of day. Looking at temporal distribution of the transfers collected, nearly one-half (47.7%) were collected in the midday period, followed by the off-peak/evening period (23.4%) and the PM Peak (22.7%). Relatively few transfers (6.2%) were received in the AM Peak period.

Table 7.2 – Distribution of Paper Transfers Received by Time Period

Time Period	Transfers	Percent
AM Peak	108	6.2%
Midday	827	47.7%
PM Peak	394	22.7%
Off-Peak	406	23.4%
Total	1,735	100.0%

Table 7.3 details the distribution of paper transfers receiving by issuing agency. Looking at the originating agency for the paper transfers, slightly more than one-third (34.7) of the transfers received were from other Torrance Transit bus routes, with another third (33.7%) coming from MTA Bus or Rail. Of the remainder, nearly one half (15.9%) were from Gardena Municipal Bus Line. The only other significant issuing agency was Long Beach Transit, which accounted for 5.9 percent of the transfers.

Table 7.3 – Distribution of Paper Transfers Received by Issuing Agency

Agency	Transfers	Percent
TTS	597	34.4%
MTA	585	33.7%
GMBL	275	15.9%
LBT	103	5.9%
Other	84	4.8%
CCB	36	2.1%
SMBBB	28	1.6%
LADOT	20	1.2%
FT	3	0.2%
MBL	2	0.1%
AVTA	1	0.1%
NTS	1	0.1%
Total	1,735	100.0%

Table 7.4 shows the distribution of Torrance Transit, MTA, and “other” agency transfers received by Torrance Transit Route. At the route level, the TTS lines that had received the greatest number of TTS transfers were Route 3 (217), Route 8 (129) and Route 5 (75). The routes receiving the greatest number of MTA transfers were Route 3 (166), Route 8 (164) and Route 1 (111). The routes receiving the greatest “other” transfers were Route 3 (303) and Route 8 (101).

Table 7.4 – Distribution of TTS, MTA, Other Agency Transfers by TTS Route

Route 1	Total	Percentage
TTS	55	24.2%
MTA	111	48.9%
Other	61	26.9%
Total	227	100.0%

Route 6	Total	Percentage
TTS	15	20.8%
MTA	18	25.0%
Other	39	54.2%
Total	72	100.0%

Route 2	Total	Percentage
TTS	34	46.0%
MTA	27	36.5%
Other	13	17.6%
Total	74	100.0%

Route 7	Total	Percentage
TTS	49	58.3%
MTA	23	27.4%
Other	12	14.3%
Total	84	100.0%

Route 3	Total	Percentage
TTS	217	31.6%
MTA	166	24.2%
Other	303	44.2%
Total	686	100.0%

Route 8	Total	Percentage
TTS	129	32.7%
MTA	164	41.6%
Other	101	25.6%
Total	394	100.0%

Route 5	Total	Percentage
TTS	75	45.5%
MTA	69	41.8%
Other	21	12.7%
Total	165	100.0%

Route 9	Total	Percentage
TTS	23	69.7%
MTA	7	21.2%
Other	3	9.1%
Total	33	100.0%

7.2.3 Transit Pass Transfers Factoring

Using the on-board passenger survey, a cross tabulation was performed by route and direction within each route to determine how many people said they had transferred and had paid with any of the following—MTA Pass, EZ Pass, Access ID Card, or Metrolink Pass.

Using this cross-tabulation and the survey rates for each route, an expanded number of transfers using non-paper transfers was calculated. The tables below show, by route the number of paper transfers physically collected, the calculated number of pass transfers made, and the total number of transfers for a weekday.

Table 7.5 – Distribution of Paper Transfers and Estimated Pass Transfers by Route

Route	Paper Transfers Collected			Calculated Pass Transfers				Total Transfers		
	TTS Bus	Other Bus/Rail	Total Paper Transfers	Other TTS	MTA Rail/Metrolink	Other Bus	Total Paper Transfers	TTS Bus	Other Bus/Rail	Total
1	55	172	227	0	20	10	30	55	202	257
2	34	40	74	3	3	17	23	37	60	97
3	217	469	686	40	0	60	100	257	529	786
5	75	90	165	0	10	15	25	75	115	190
6	15	57	72	10	81	10	101	25	148	173
7	49	35	84	4	4	7	15	53	46	99
8	129	265	394	11	17	57	85	140	339	479
9	23	10	33	3	3	0	6	26	13	39
Total	597	1,138	1,735	71	138	176	385	668	1,452	2,120

7.2.4 Transfer Patterns for Individual Routes

Closer analysis of the data shows the following transfer patterns:

Route 1:

Route 1 receives its greatest number of transfers from MTA (111), primarily in the southbound direction. The transfer opportunities from MTA are at:

- Green Line Harbor Freeway Station
- El Segundo (Route 120)
- Rosecrans (Route 124)
- Vermont from Artesia to 182nd (Routes 130 and 444)

Route 1 received 55 transfers from other Torrance Transit routes, 31 in the northbound direction and 24 in the southbound direction. Transfer opportunities with other Torrance lines exist at:

- Del Amo Fashion Center (Routes 2, 3, 6, 7, 8, and 9)
- Torrance-Crenshaw and Torrance-Van Ness (Route 5)
- Vermont from Normandie to Carson (Route 3)
- Artesia Transit Center (Route 6)
- El Segundo (Route 2)

Route 1 also shows significant transfers (52) from Gardena Municipal Bus Lines, primarily in the southbound direction (46). This transfer activity could be occurring at one of three locations:

- Vermont-Gardena
- Normandie-Torrance
- Western-Torrance

Route 2

Route 2 receives most of its transfers from other Torrance Transit routes (34), followed by MTA (27), and by “other” agencies (13).

Most of the Torrance Transit transfers were collected on Route 2 northbound trips. Transfers can be made from other Torrance lines to Route 2 at:

- Del Amo Fashion Center (Routes 1, 3, 6, 7, 8, and 9)
- Torrance Hawthorne (Route 8)
- Artesia-Hawthorne (Route 8)
- Crenshaw from Artesia to Manhattan Beach (Route 5)
- Figueroa (Route 1)

Most of the MTA transfers were received in the southbound direction. Transfer opportunities with MTA exist at:

- El Segundo-Figueroa (Route 124)
- El Segundo-Normandie and El Segundo-Van Ness (Route 209)
- El Segundo-Crenshaw (routes 126, 210, and 710)
- Crenshaw-Marine (MTA 126, Gardena 1)
- Crenshaw-Manhattan Beach (MTA 126, Gardena 4)
- Crenshaw-Manhattan Beach (MTA 710, Gardena 3)
- Crenshaw-Artesia (MTA 130, 210, 444)
- Anza-Torrance (MTA 444)

Route 3

Route 3 received 217 transfers from other TTS routes. Apart from Route 5, which connects with Route 3 at Carson-Crenshaw and Carson-Cabrillo, and Route 1, which has transfer opportunities with Route 3 in the vicinity of Harbor/UCLA Medical Center, Route 3’s primary connection point with the other TTS route is at Del Amo Fashion Center.

Route 3 received 166 transfers from MTA routes, 97 in the eastbound direction and 71 in the westbound direction. Possible transfer locations are:

- Redondo Beach Pier (MTA 130 and 232)
- Torrance-Hawthorne (Route 444)
- Carson-Avalon (MTA 446, 447)
- PCH -Avalon (MTA 446, 447)
- PCH-Sanford, PCH-Alameda (MTA 202)
- Pacific-Anaheim (MTA 232)

- Long Beach Transit Mall (MTA 60, 232, and 360)

Route 3 also received 143 transfers from Gardena Municipal Bus Line, with 2/3 of the transfers being received on eastbound Route 3 trips. The possible transfer locations are Carson-Western or Carson-Normandie.

Finally, Route 3 received 69 transfers from Long Beach Transit route. These transfers could have occurred between PCH/Santa Fe and the Long Beach Transit Mall.

Route 5

Route 5 received an almost equal number of transfers from TTS (75) and MTA routes (69).

Possible transfer locations from TTS services are:

- Crenshaw-Lomita and Arlington-Lomita (Route 9)
- Crenshaw-Sepulveda Blvd. and Arlington-Sepulveda (Route 7)
- Crenshaw-Carson and Cabrillo-Carson (Route 3)
- Crenshaw-Torrance and Cabrillo-Torrance (Route 1)
- Crenshaw-190th and Van Ness-190th (Route 6)
- Crenshaw-Artesia or Crenshaw-Manhattan Beach (Route 2)

Possible transfer locations to MTA routes include:

- Crenshaw-Manhattan Beach (MTA 126, 210, and 710)
- Crenshaw-Artesia (MTA 130, 210, and 444)
- PCH-Crenshaw and PCH-Arlington (MTA 232)
- Van Ness-Artesia (MTA 130, 444)

Route 5 also received 20 Gardena Municipal Bus Line transfers, which could have been received at Manhattan Beach (Gardena Line 4) or Redondo Beach (Gardena Line 3)

Route 6

The largest number of paper transfers received on Route 6 were from Long Beach Transit (39), which would have been received at the Metro Blue Line station from Long Beach routes 51 and 61.

Route 6 connects with other Torrance routes at Artesia Transit Center (Route 1), at Crenshaw-190th or Van Ness-190th (Route 5) or at Del Amo Fashion Center (routes 2, 3, 7, 8, and 9).

Route 6 connects with MTA service at a number of locations, including:

- Artesia Blue Line Station (Blue Line, 130, 260, and 361)
- Wilmington Ave. (Route 205)
- Central (Route 53)
- Avalon (Route 52)

- Artesia Transit Center (Routes 52, 130, 204, 352, and 444)
- Artesia-Crenshaw (Route 210)

Route 7

Route 7 received the majority of its transfers (49) from other TTS routes. Route 7 has transfer opportunities to other Torrance Transit services at:

- Del Amo Fashion Center: Routes 1, 2, 3, 6, 8, and 9
- Crenshaw-Sepulveda or Arlington-Sepulveda (Route 5)
- Lomita-Vermont or Vermont/PCH (Route 9)

Transfers from MTA are possible at:

- Redondo Beach Pier (MTA 130 and 232)
- Sepulveda-Hawthorne (MTA 444)
- Pacific Coast Highway (MTA 205 and 232)

Route 8

Route 8 receives the largest amount of its transfers (164) from MTA. Route 8 has a number of connection opportunities with the MTA:

- LAX City Bus Center: routes 42, 111, 117, 220, 232, 439, and 625
- Nash-Mariposa: Green Line, Route 625
- Douglas-El Segundo: Green Line, Route 124
- Aviation-Rosecrans: Route 125
- Aviation-Manhattan Beach: Route 126
- Aviation-Artesia: Route 130
- Galleria at South Bay/Artesia-Hawthorne: Routes 40, 130, 210, 211, 442, 444, 710, 740
- PCH-Hawthorne: Route 232

Route 8 received the next largest amount of transfers (129) from other TTS routes. Transfer opportunities are possible with Route 2 on Artesia Blvd., with Route 7 at Hawthorne-Sepulveda, and at Del Amo Fashion Center with other TTS routes.

Route 8 received 33 transfers from Culver City Bus Line 6 at the LAX City Bus Center, 32 transfers from Gardena Municipal Bus Line 4 (at Artesia-Hawthorne) and 23 transfers from Santa Monica Bus Line 3, also at LAX City Bus Center. The majority of the Culver City and Santa Monica transfers were received in the afternoon, suggesting these are returning workers.

Route 9

Route 9 received most of its transfers (23) from other TTS routes. The opportunities for transferring from TTS services to Route 9 are at:

- Del Amo Fashion Center (all other TTS routes except Route 5)
- Crenshaw-Lomita and Arlington-Lomita (Route 5)
- Lomita-Vermont/PCH-Vermont (Route 7)

8 Title VI Analysis

8.1 Level of Service Analysis

Using U.S. Census 2000 data, TMD was able to identify all minority and non-minority census tracts in the Torrance Transit Service Area. For the purpose of the Title VI analysis, Torrance Transit service area was defined as all those census tracts contained within the City of Torrance plus all census tracts with a 0.25-mile walk distance to Torrance Transit bus stops outside the City of Torrance. Using this data, a “Level of Service Analysis” along with a “Quality of Service Analysis” was performed to see how well the conditions of Torrance Transit are consistent with FTA guidelines outlined in Circular 4720.1 Chapter IV. Although Torrance Transit does not possess official Title VI Service Standards, a relative comparison can be made between the conditions of the minority census tracts versus the non-minority census tracts in order to assess service availability to different demographics served by the system. For the “Level of Service Analysis” 14 census tracts were chosen at random. Eight of the tracts were identified as “Minority” while six were identified as “Non-Minority”. Figure 8.1 (in the next page) depicts all the census tracts within the Torrance Transit Service area, categorizes them as minority or non-minority, and identifies those used for the Level of Service Analysis.

8.1.1 Average Trip Miles per Acre

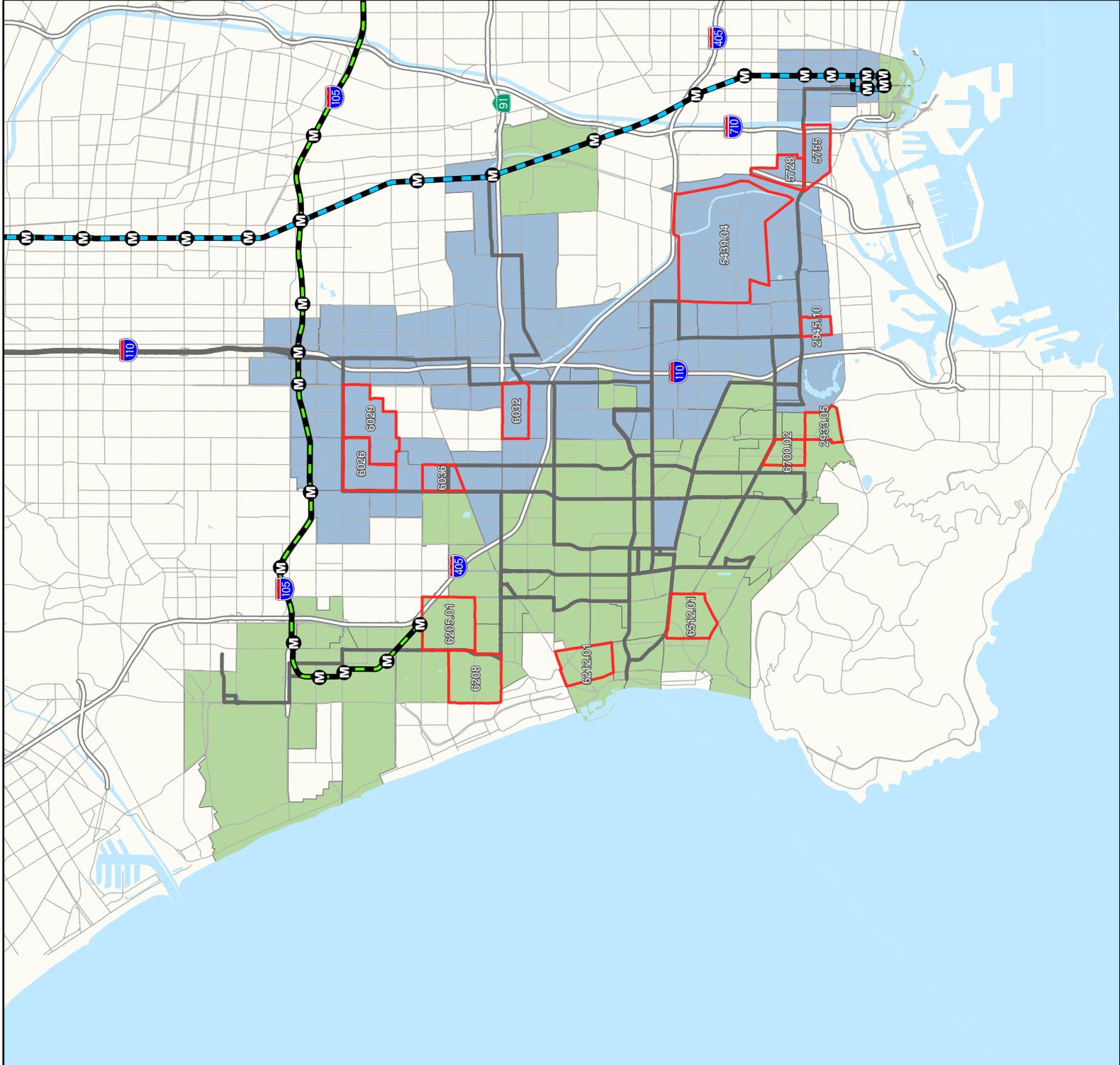
The first indicator calculated by TMD for each census tract was the Average Trip Miles of service. The Trip Miles represents the total trips per day on a given street segment times the total mileage of that street. To assign this mileage per tract, the Total Trip Miles that fell within a quarter mile of a given census tract were located and totaled to give each tract a relative service level. Minority census tracts scored an Average Trip Miles of 65.50 miles while Non-Minority tracts scored an average value of 29.03 miles. Understanding that tract area can play a large role in these values the Average Trip Miles were normalized by the total acres of their respective tracts to give a per acre calculation. The average number for the Minority census tracts was 0.21 Average Trip Miles per Acre, while the Non-Minority census tracts achieved 0.058 Average Trip Miles per Acre.

8.1.2 Average Daily Stop Loads

TMD was also able to calculate the Average Weekday Load per Stop for each census tract being analyzed. Minority census tracts showed average loads of 627 passengers per stop on weekdays while the Non-Minority census tracts showed loads of 170 passengers per stop. It should be noted that the Minority census tracts show a difference in magnitude of over 350 percent when it comes to passenger loads. Torrance Transit has indicated loading issues on certain routes, so this problem will be looked into during service recommendations.

Figure 8.1

Torrance Transit System Title VI Level of Service Analysis



- Minority Census Tract
- Non-Minority Census Tract
- Tract Chosen For Analysis

- ### Legend
- Freeways
 - Major Streets
 - TTS Route Network

- ### Metro Rail
- Green Line
 - Blue Line
 - Green Line Stations
 - Blue Line Stations

Data Sources
Torrance Transit, Census 2000,
Southern California Association of Government (SCAG)

Date Prepared
December 2005

0 1 2 Miles
1 inch equals 2.57 miles



8.1.3 Bus Stop Spacing

Another factor calculated by TMD was the average stop spacing with respect to each census tract. Minority census tracts showed an average mileage between stops of 0.43 miles while Non-Minority census tracts showed an average of 0.30 miles. The higher value corresponding to Minority census tracts may be explained by higher population density levels within minority areas.

Data for all the variables calculated and explained above is presented in the following table.

Table 8.1 – Level of Service Indicators for Sampled Census Tracts

Census Tract	Trip Miles	Acres	Trip Miles Per Acre	Minority Tract?	Total Transit Stops	Stops Load Total	Average Load per Stop	Network Miles (1/4 mile)	Transit Stops (1/4 mile)	Average Stop Spacing (miles)
5439.04	85.5	2,394	0.04	Yes	2	2,337	1,169	1.19	1	1.19
5728	112.6	253	0.44	Yes	5	5,066	1,013	1.57	3	0.52
5755	126.7	345	0.37	Yes	5	6,334	1,267	1.77	4	0.44
6032	53.1	334	0.16	Yes	14	4,313	308	1.42	4	0.35
2945.1	64.7	129	0.50	Yes	11	9,357	851	1.11	4	0.28
6026	39.8	475	0.08	Yes	24	3,421	143	2.76	12	0.23
6029	22.1	688	0.03	Yes	14	1,957	140	1.54	7	0.22
6036	19.5	223	0.09	Yes	34	4,247	125	2.28	12	0.19
2933.05	6.8	234	0.03	No	1	21	21	0.55	1	0.55
6700.02	13.5	215	0.06	No	16	1,022	64	2.31	7	0.33
6512.01	0.0	430	0.00	No	10	951	95	1.50	5	0.30
6205.01	64.0	642	0.10	No	14	4,564	326	1.60	7	0.23
6208	68.0	612	0.11	No	16	5,266	329	1.70	8	0.21
6212.01	22.0	412	0.05	No	6	1,122	187	0.31	2	0.15
Torrance Average Stop Load			317.0 Persons							
Torrance Average Stop Spacing			0.23 Miles							

8.2 Quality of Service Analysis

8.2.1 Quality of Service Analysis

Examining the Torrance Transit system in conjunction with the minority and non-minority census tract reveals that all tracts are able to reach the top three destinations for Torrance with relative ease. (See Figure 8.2) In order to analyze this data fairly, comparisons are made between census tracts of similar distance from the three top destinations. Using main intersections that lie within each census tract, the travel time, fare paid, and routes taken were calculated (see Table 8.2 in the next page). The www.socaltransport.org website was used to calculate the information, however this website contains Torrance as well as other agency buses to plan trips, so while more efficient routes were available for some of the locations, only Torrance buses were used to analyze the quality of service Torrance Transit provides to minority and non-minority census tracts.

Table 8.2 – Quality of Service Analysis

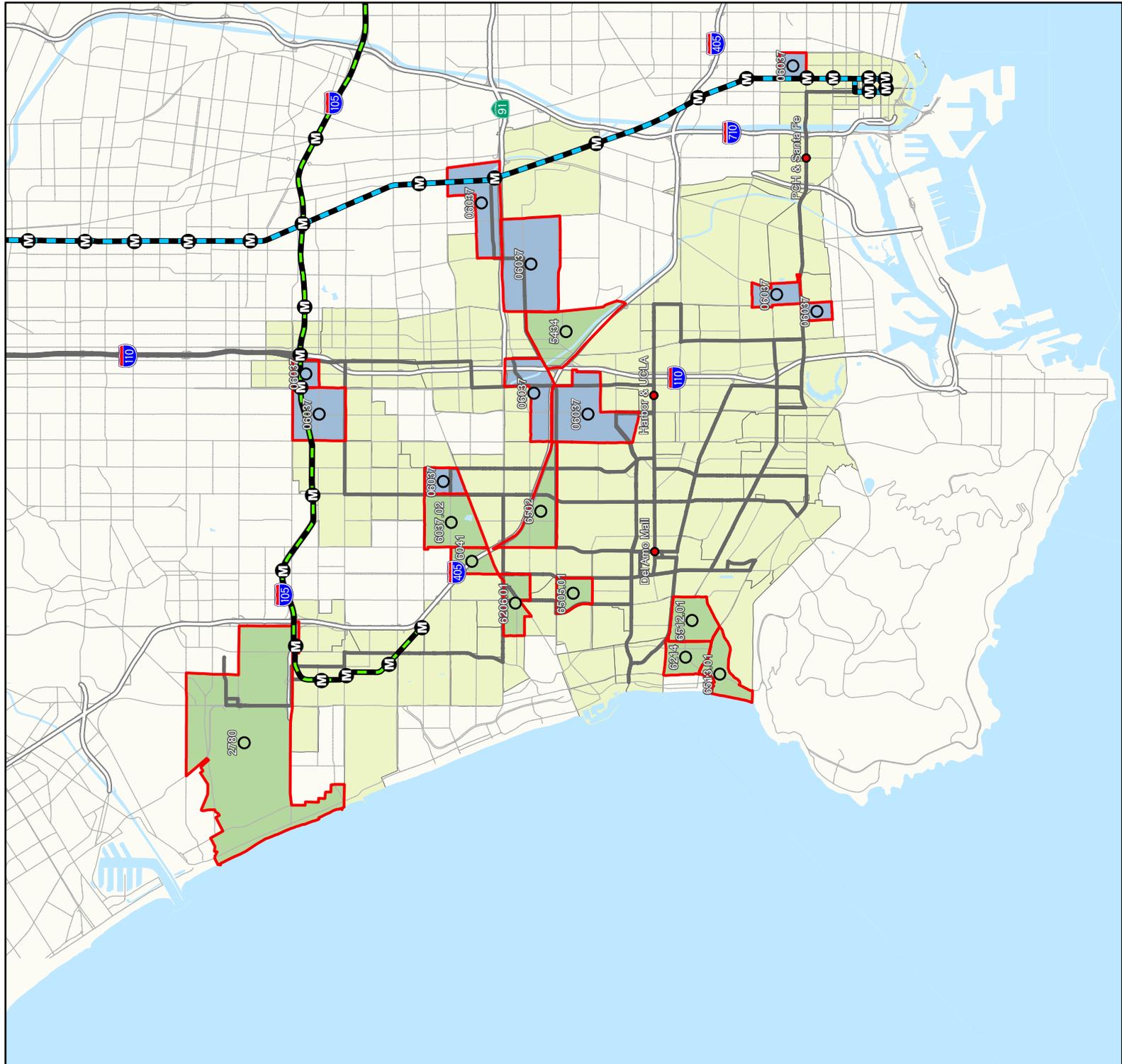
Intersection	Census Tract	Minority	Harbor/UCLA			Del Amo Mall			PCH/Santa Fe		
			Travel Time	Fare Paid	Transfers	Travel Time	Fare Paid	Transfers	Travel Time	Fare Paid	Transfers
Prospect/Camino Real	6214	No	37	0.9	7,1	11	0.5	7	62	0.9	7,3
Prospect/Camino Real	6512.01	No	37	0.9	7,1	11	0.5	7	62	0.9	7,3
Prospect/Camino Real	6513.01	No	37	0.9	7,1	11	0.5	7	62	0.9	7,3
Century/Sepulveda	2780	No	66	0.9	8,1	43	0.5	8	98	0.9	8,3
Vermont/190th	5434	No	7	0.5	1	19	0.5	6	55	0.9	1,3
Van Ness/182nd	6502	No	27	0.9	5,3	46	0.9	5,6	57	0.9	5,3
Grant/Inglewood	6206.01	No	34	0.9	8,1	16	0.5	2	79	0.9	2,3
Hawthorne/190th	6505.01	No	28	0.9	8,1	9	0.5	8	66	0.9	8,3
Praire/Artesia	6041	No	64	0.9	2,1	18	0.5	2	82	0.9	2,3
Manhattan Beach/Crenshaw	6037.02	No	26	0.9	5,1	25	0.5	2	63	0.9	5,3
PCH/Avalon	6037	Yes	24	0.5	3	37	0.5	3	8	0.5	3
PCH/Avalon	6037	Yes	24	0.5	3	37	0.5	3	8	0.5	3
PCH/Pacific	6037	Yes	44	0.5	3	57	0.5	3	8	0.5	3
Normandie/EI Segundo	6037	Yes	31	0.9	2,1	35	0.5	2	98	0.9	2,3
Imperial/Figueroa	6037	Yes	25	0.5	1	40	0.5	1	59	0.9	1,3
Central/Walnut	6037	Yes	25	0.9	6,1	32	0.5	6	88	0.9	6,3
Central/Victoria	6037	Yes	23	0.9	6,1	30	0.5	6	86	0.9	6,3
190th/Vermont	6037	Yes	7	0.5	1	19	0.5	6	55	0.9	1,3
Normandie/Torrance	6037	Yes	5	0.5	1	12	0.5	1	47	0.9	1,3
Crenshaw/Manhattan Beach	6037	Yes	26	0.9	5,1	25	0.5	2	63	0.9	5,3

Table 8.2 reveals that minority census tracts generally pay a lower fare than non-minority census tracts (\$0.50 vs. \$0.90). The minority census tracts that were analyzed were located on or near Route 3, which serves all three major destinations, whereas the other locations required transferring once to reach the major destinations. However, none of the trips required a fare higher than \$0.90, or more than two transfers.

Looking more carefully at the census tracts, a comparison was made between minority census tracts located between Western and Alameda (along Routes 1 and 6) and non-minority census tracts located between Inglewood and Figueroa (along Routes 8 and 2). These census tracts contain similar distances between the major destinations. The average fare paid by minorities is less than the average fare paid by non-minorities (\$0.65 vs. \$0.79). Again this may be explained by minority census tracts being located near Route 3, which serves all three major destinations.

Travel times are similar between the two census tracts groups. To reach the Del Amo Fashion Center on average it takes the non-minority census tracts about 23 minutes, whereas the minority census tract travel time would be 24 minutes. Similarly to reach Pacific Coast Highway and Santa Fe it would take approximately 69 minutes from the non-minority census tract locations versus 68 minutes from the minority census tract locations. The Harbor UCLA Medical Center was the only location with a significant difference, which is due to the minority census tracts generally being closer to the destination (17 minutes) than the non-minority census tracts (36 minutes). The minority census tracts in general required fewer transfers than the non-minority census tracts (1.5 vs. 1.9), however only two minority census tracts did not need to transfer at all, thus bringing the average lower. Therefore it does not appear that minority census tracts are getting less quality of service than non-minority census tracts.

Figure 8.2
Torrance Transit System
Title VI
Level of Quality Analysis



- Minority Census Tract
 - Non-Minority Census Tract
 - Tract Chosen For Analysis
 - Top 3 Destinations for Torrance Transit patrons
- Legend**
- Freeways
 - Major Streets
 - TTS Route Network
- Metro Rail**
- Green Line
 - Blue Line
 - M Green Line Stations
 - M Blue Line Stations

Data Sources
 Torrance Transit, Census 2000,
 Southern California Association of Government (SCAG)

Date Prepared
 December 2005

8.3 Vehicle Assignment Practices

Although not the primary focus of this section, it should be noted that Torrance Transit System adheres to a regular policy of non-discrimination in the deployment of equipment by rotating its buses among all routes and runs.

9 Operational Issues

9.1 Schedule Adherence

As part of the systemwide ridecheck, the surveyors collected departure time at the start of each trip, arrive and leave times at intermediate scheduled timepoints and arrival time at the end of the trip. Using this data and the Torrance schedules, TMD's SAS system generates a variety of reports detailing observed end-to-end runtimes by trip, observed timepoint intervals, and the percentage of timepoint observations that are on-time (0 minutes early up to 5 minutes late), early, or late (more than 5 minutes late).

Torrance Transit, as part of the requested scope of work, requested a documentation of the actual time that any trip is early or late as well as identifying routes by time of day when on-time performance is less than 95 percent.

As previously mentioned the SAS analyzes all timepoint observations and categorizes them as early, late, or on time. Tables 9.2, 9.3, and 9.4 below show the breakdown for early, late, and on-time observations at timepoints for all TTS routes. These percentages reflect all observed timepoints in both directions.

Table 9.1 – Weekday Timepoint Schedule Adherence

Route	Late Percent	On-Time Percent	Early Percent
1	45.9%	45.1%	8.9%
2	44.4%	47.1%	8.5%
3	37.4%	57.5%	5.1%
5	38.6%	51.6%	9.8%
6	22.6%	70.4%	6.9%
7	15.6%	70.6%	13.8%
8	21.3%	65.9%	12.8%
9	16.9%	83.1%	0.0%

Table 9.2 – Saturday Timepoint Schedule Adherence

Route	Late Percent	On-Time Percent	Early Percent
1	12.7%	70.4%	16.9%
2	39.7%	50.0%	10.3%
3	35.7%	55.3%	9.0%
5	19.0%	76.9%	4.1%
7	18.8%	73.7%	7.5%
8	29.8%	56.0%	14.2%
9	5.5%	92.7%	1.8%

Table 9.3 – Sunday Timepoint Schedule Adherence

Route	Late Percent	On-Time Percent	Early Percent
1	8.3%	81.1%	10.6%
3	17.9%	64.7%	17.4%
8	42.7%	45.1%	12.2%

As can be seen from the tables, achieving a 95 percent on-time performance at all timepoints is a nearly impossible task. A more useful analysis may be to examine the on-time performance of trips departing at the start of their trip or arriving at their destination, particularly if it is a rail station or key transfer point.

9.2 Capacity Issues

Table 9.4 lists those Torrance Transit trips on which standees were observed. Most of the standee situations were observed on Route 3. On weekdays, the worst overcrowding is on westbound trips leaving Long Beach Transit Mall between 6:20 and 7:20 am. The 6:35 am and 6:50 am trips in particular experienced long durations of standees. According to driver anecdotal comments, this overcrowding may be due in part to student travel. There is some overcrowding on the pm eastbound trips, but not as severe or as prolonged as in the morning.

There are numerous Saturday Route 3 trips and a smaller number of Sunday Route 3 trips that experience standee situations. For the most part the maximum loads experienced are not extremely high and do not exist for prolonged periods of time. One driver comment was made that the route would benefit on Saturdays by improving the frequency of service to every 20 minutes.

Table 9.4 – Trips with Capacity Problems

TORRANCE TRANSIT TRIPS EXCEEDING 110% SEATED CAPACITY				
ROUTE	DAY	DIRECTION	DEPARTURE TIME	SEGMENT/DURATION OF STANDEES
1	Weekday	South	17:10	Max 47 Stayed above seated capacity from Green Line Sta to Figueroa-Gardena (11 stops)
1	Saturday	North	13:30	Max 55 Stayed above seated capacity from Vermont-DelAmo to Artesia TC (7 stops)
3	Weekday	East	12:45	Max 61 Exceeded seated capacity from PCH-Santa Fe to Pacific-15th (5 stops)
3	Weekday	East	14:05	Max 78 Exceeded seated capacity from Carson-Budlong to Pacific-15th (34 stops)
3	Weekday	East	14:20	Max 48 Exceeded seated capacity from Carson-Vermont to Carson-Main (3 stops)
3	Weekday	East	14:35	Max 48 Exceeded seated capacity from PCH-Watson to PCH-Magnolia (4 stops)
3	Weekday	East	15:05	Max 48 Exceeded seated capacity from Carson-Vermont to Carson-Moneta (2 stops)
3	Weekday	East	15:05	Max 52 Exceeded seated capacity from PCH-Avalon to Pacific-PCH (10 stops)
3	Weekday	East	15:20	Max 54 Exceeded seated capacity from Harbor/UCLA to Carson-Avalon (7 stops)
3	Weekday	East	15:50	Max 54 Exceeded seated capacity from Del Amo Mall to Harbor/UCLA (16 stops)
3	Weekday	East	15:50	Max 50 Exceeded seated capacity from Carson-Main to Carson-Avalon (3 stops)
3	Weekday	East	17:20	Max 53 Exceeded seated capacity from Carson-Vermont to Carson-Avalon (2 stops)
3	Weekday	West	6:20	Max 53 Exceeded seated capacity from PCH-Santa Fe to PCH-Avalon (6 stops)
3	Weekday	West	6:35	Max 71 Exceeded seated capacity from PCH-Pacific to Hawthorne-Carson (48 stops)
3	Weekday	West	6:50	Max 78 Exceeded seated capacity from PCH-Chesnut to Carson-Normandie (34 stops)
3	Weekday	West	7:05	Max 86 Exceeded seated capacity from PCH-15th to PCH-Santa Fe (5 stops)
3	Weekday	West	7:20	Max 64 Exceeded seated capacity from PCH-Chesnut to PCH-Santa Fe (3 stops)
3	Weekday	West	7:20	Max 48 Exceeded seated capacity from Main-Lomita to Carson-Vermont (15 stops)
3	Weekday	West	8:50	Max 50 Exceeded seated capacity from Carson-Main to Carson-Vermont (3 stops)
3	Weekday	West	13:05	Max 61 Exceeded seated capacity from Main-223rd to Carson-Moneta (9 stops)
3	Saturday	East	9:35	Max 47 Exceeded seated capacity from PCH-Watson to Pacific-PCH (4 stops)
3	Saturday	East	10:05	Max 56 Exceeded seated capacity from PCH-Santa Fe to Long Beach-6th (8 stops)
3	Saturday	East	10:05	Max 51 Exceeded seated capacity from PCH-Watson to PCH-Magnolia (5 stops)
3	Saturday	East	12:35	Max 55 Exceeded seated capacity from PCH-Avalon to Pacific-Anaheim (12 stops)
3	Saturday	East	15:05	Max 48 Exceeded seated capacity from Carson-Vermont to Carson-Main (3 stops)
3	Saturday	East	15:05	Max 50 Exceeded seated capacity from PCH-Blinn to PCH-Santa Fe (2 stops)
3	Saturday	East	15:35	Max 54 Exceeded seated capacity from Redondo Pier to PCH-Neptune (49 stops)
3	Saturday	East	15:35	Max 50 Exceeded seated capacity from PCH-Watson to PCH-Magnolia (5 stops)
3	Saturday	East	16:05	Max 59 Exceeded seated capacity from Carson-Western to Wilmington-Q (22 stops)
3	Saturday	East	16:35	Max 49 Exceeded seated capacity from Del Amo Mall to Carson-Western (12 stops)
3	Saturday	East	17:05	Max 57 Exceeded seated capacity from Carson-Cabrillo to PCH-Neptune (27 stops)
3	Saturday	West	6:55	Max 70 Exceeded seated capacity from PCH-Pacific to PCH-Wilmington (15 stops)
3	Saturday	West	7:25	Max 48 Exceeded seated capacity from PCH-Santa Fe to PCH-Watson (4 stops)
3	Saturday	West	11:25	Max 63 Exceeded seated capacity from 223rd-Delores to Hawthorne-Torrance (26 stops)
3	Saturday	West	13:25	Max 50 Exceeded seated capacity from Carson-Main to Carson-Western (8 stops)
3	Saturday	West	13:55	Max 74 Exceeded seated capacity from Pacific-5th to Redondo Pier
3	Sunday	East	14:25	Max 53 Exceeded seated capacity from Carson-Normandie to Main-233rd (16 stops)
3	Sunday	East	15:55	Max 45 Exceeded seated capacity from PCH-Blinn to PCH-Santa Fe (2 stops)
3	Sunday	East	16:25	Max 53 Exceeded seated capacity from Del Amo Mall to Harbor/UCLA (16 stops)
3	Sunday	East	16:25	Max 49 Exceeded seated capacity from Carson-Western to Del Amo Mall (10 stops)
3	Sunday	West	7:15	Max 53 Exceeded seated capacity from PCH-Magnolia to PCH/Avalon (9 stops)
3	Sunday	West	10:45	Max 48 Exceeded seated capacity from Main-233rd to Carson-Vermont (13 stops)
8	Saturday	North	17:00	Max 47 Exceeded seated capacity from Hawthorne-Spencer to Hawthorne-186th (5 stops)

9.3 Driver Interviews

On November 16, driver interviews were conducted in the driver lounge from the start of the service day until approximately 6:00pm. As drivers were given their transfer collection envelopes for the transfer analysis, they were asked for any specific suggestions/comments they had concerning operational issues, including running time problems, traffic signals, overcrowding.

The following is a summary of the operators comments received either directly or through written comments.

9.3.1 Operational Difficulties

- Line 1 - Carson EB @ Vermont needs left turn arrow to go north on Vermont.
- Line 3 EB - Wilmington @ Pacific Coast Highway EB needs an arrow, too many cars making a left from Wilmington onto Pacific Coast Highway.
- Line 3 - Pacific @ Pacific Coast Highway WB. Making a left turn, there are too many cars in the morning around 7:30am - 8:30am; need a left-turn arrow for making a left turn from Pacific onto Pacific Coast Highway.
- Line 3 WB in the A.M. - Hawthorn Blvd @ Torrance Blvd WB left arrow off of Hawthorn onto Torrance Blvd ends too quickly, allows only a few cars at a time.
- For WB Line 3 buses making the left turn from NB Hawthorne to WB Torrance, the green cycle is short.
- Route 5 Counterclockwise - Left turn location: Crenshaw @ Pacific Coast Highway - Cars cross the double yellow lines to enter the left hand turn lane; causing extra delays for the buses trying to make the left turn. On the average, sit through two cycles of the traffic signal. Recommend that police issue traffic citation at this location.
- Route 5 Counterclockwise - 12:28 & 13:48 leaving Pacific Coast Highway @ Crenshaw traffic is heavy trying to make the left turn onto PCH.
- Route 5 Counterclockwise - MTA Rapid bus service use same bus stop at Crenshaw @ Manhattan Beach sometimes it has 2 buses in bus zone and I have to leave layover late so I don't block traffic.
- Line 6 - Traffic signal light Madrona @ Torrance Blvd. is too long in the P.M.
- Line 8 - Hawthorne Blvd @ Artesia Blvd. NB signal light changes fast (short yellow)
- For NB Line 8 trips, the traffic signal 1 block N of Artesia on Hawthorne make it difficult for Line 8 buses making L turn from NB Hawthorne to WB Artesia.
- Line 8 - At Nash @ El Segundo going SB, the left signal light needs adjustment.

9.3.2 Running Time Issues

- Weekday Run 18 – SB trip Line 2 from Green Line Station to Del Amo doesn't have enough running time (32 min. between Green line station and Madrona/Carson vs. 40 for later trips from downtown LA)
- Operator questioned why Line 2 gets 13 minutes to travel between Del Amo Fashion Center and Galleria at South Bay (4.0 miles), while Line 8 gets 15 minutes between Torrance-Madrona and Artesia-Firmona (3.2 miles).
- Operator said that Line 2 trips from downtown Los Angeles do not have sufficient running time between the Green Line Station and Crenshaw-Manhattan Beach.
- Operator for Run 46 (Line 3) suggests that running times on last round trip (8:30 PM departure from Redondo and 9:50 PM departure from Long Beach) could be significantly shortened due to lighter traffic and low ridership.
- Operator said that running time has been reduced on Line 3 in both directions so that bus is always running behind schedule.
- Route 5 Counterclockwise - Hard to make time point sometimes at Crenshaw @ Torrance in 10 minutes due to traffic by college and at Crenshaw @ 182nd near 405 Freeway.

9.3.3 Service Frequency/Loading Issues

- The 7:05 am departing bus out of Long Beach is definitely overcrowded. We could use an extra tripper bus from Pacific @ Pacific Coast Highway up to Pacific Coast Highway @ Wilmington, Monday through Friday during school hours.
- We need a tripper in the afternoon on the Line 3 during the week
- Driver suggest that Line 3 operate on a 20-minute headway on Saturday to alleviate overcrowding
- We need a tripper to help the first bus coming out of Long Beach on Saturdays in the morning.

9.3.4 Span of Service Issues

- Line 6 passengers ask why there isn't Saturday service, especially with the Wal-Mart at 190th/Walnut

9.3.5 Passes/Transfers

- MTA drivers sometimes don't punch their transfers or they punch for full day
- Operator said that 30 percent of Line 6 riders are transfers, 30 percent EZ Pass, 30 percent regular MTA pass, other 10 percent cash

9.3.6 Equipment

- Operators said that they don't see problems noted on pre-trip inspection cards being addressed

9.3.7 Passenger Demographics/Travel Patterns

- Operator said that 50 percent of the Line 6 riders are Hispanic, 25 percent are African-American, rest are Caucasian/ other ethnicities
- Operator said that Line 6 get passengers transferring from Blue Line, Long Beach Transit, and Metrolink.

10 Operational Review

The following section summarizes findings of external reviews of Torrance Transit System's performance, current funding sources, and internal practices with regards to operator and supervisor training, service planning and scheduling, and the handling of customer complaints. The information was obtained through a series of interviews with TTS staff.

10.1 Past FTA and State Reviews

The most recent FTA Triennial review was conducted in June 2005. The most recent State of California TDA review was conducted in April 2004. The FTA Triennial Review identified two issues of concern, both of which have been addressed. Torrance Transit's spare ratio was too high at 21 percent. The fleet has been reduced by one vehicle, bringing the spare ratio within the acceptable 20 percent. Also, a need for regular inspection and preventive maintenance of federally funded equipment was identified. Torrance Transit has developed a program for regular inspection and maintenance of shop equipment, and this program has received accolades and is being held as an example for other agencies to follow.

10.2 TTS Funding Sources

Torrance Transit has revenues of approximately \$18.8 million. Approximately \$5.8 million is formula funding from the State. Approximately \$5.4 million is local return money earmarked for transit from Proposition A. Another \$1 million is local return money from Proposition C. Passenger cash fares from fixed-route services provide \$2 million and advertising revenues from passenger shelters and on-vehicle advertising provide \$160,000. Torrance Transit attempts to capitalize as much as possible of its vehicle maintenance funding sources—currently this amounts to \$2.1 million annually.

10.3 Transit Operator and Supervisor Training

Torrance Transit has a well-documented training program for new bus operators. New operators spend two weeks in the classroom and three weeks in on-the-road training. New operators are provided a training manual and work rules. The training manual, which is the basis for the classroom training, covers:

- Coach Inspection
- Standard Operating Procedures
- Defensive Driving
- Customer Relations
- Disability Awareness
- Accident and Emergency Procedures

- Paddleboards and Driver's Log
- Routes and Information
- Fares and Transfers, and
- System Security Awareness

The classroom curriculum is taught in modules, with a test at the end of each module that must be passed in order to proceed to the next module. For veteran operators, eight hours of refresher training is required each year. If an operator is due for CDL renewal, classroom training is mandatory. Currently, there is no specific training manual for operations supervisors, although it is envisioned that such a manual will be developed.

10.4 Service and Route Planning

Currently Torrance Transit has no guidelines, either formal or informal, for route or service planning. The route network has been fairly stable for the past 15 years. Based upon the 2002 Line-by-Line Analysis, some route segments were redistributed among the routes and Route 4 was eliminated. Also, in response to changes at Del Amo Fashion Center, routes were realigned around the perimeter of the mall.

Past practice has been to focus on internal coordination between Torrance Transit routes. Coordination with other service providers has not been a high priority. There is currently no standard for vehicle loading or for schedule adherence. There is also little scheduled variance in running times during the day to reflect differences in traffic conditions or passenger demand. Torrance Transit is looking to this current Line-by-Line Analysis to provide guidance in these areas.

Concerning labor agreement provisions the Wage Order 9 has a direct impact in service operations, with its requirement that straight runs have at least one uninterrupted 15-minute layover during the day.

10.5 Passenger Complaints

Torrance Transit has a well-documented procedure for recording and investigating operator-related complaints. All pertinent information regarding a complaint is recorded into a database. All such complaints are given equal weight and are investigated. The operator who is the subject of a complaint is given an opportunity to respond. Corroborating materials, such as on-board camera videotapes, are checked if necessary. Depending on the results of the follow-up investigation, there are three dispositions for the complaint: a) the operator is counseled, b) it is determined that there is no evidence to substantiate the complaint, or c) the complaint is logged. Torrance Transit responds to the complainant in a timely fashion regarding the outcome of the investigation. Torrance Transit utilizes the database to track patterns of driver behavior and as a basis for performance incentives. Over the last several years, Torrance Transit has averaged approximately 100 operator complaints that get logged into the database. Concerning service-related complaints, these are typically forwarded to a supervisor for immediate follow-up and corrective action.

11 Service Plan

11.1 Community Development Plans

City of Torrance staff members were interviewed regarding development plans that may impact transit demand in the next three to four years. Understanding short-range community development plans is necessary for developing transit service proposals.

- The largest development project in the City continues to be the redevelopment of the Del Amo Fashion Center. Current plans call for the redevelopment of the northeast corner of the mall into a Living Style Wing, including movie theaters and restaurants. A stand-alone Crate and Barrel store is planned at Carson St. and Hawthorne Blvd.
- At Skypark Drive and Crenshaw, a new Lowe's home improvement center is planned. This may have some transit potential for store employees. Route 5 currently serves this area.
- A residential development consisting of townhouses and senior units is planned for the area south of Carson between Oak Street and Crenshaw Boulevard. This area is already well served by Routes 3 and 5
- An industrial/office complex is planned for the vicinity of Columbia and Maple Streets. This area is about a one-half mile walk from Routes 1 and 6.
- A Lexus vehicle service center, open to the public, is planned for Crenshaw Boulevard near Skypark Drive. This does not appear to have significant transit potential.
- Senior housing complexes are planned at three locations: Hawthorne-Rolling Hills Drive, Maricopa - east of Torrance City Hall, and an area east of Hawthorne Boulevard between Torrance Avenue and Carson Street. The Hawthorne-Rolling Hills site, which is slated for upscale senior housing, is at the edge of the Torrance city limits and off the route network. The Maricopa site is approximately 0.3 miles from Route 3. The site east of Hawthorne Boulevard is close to Routes 3 and 8.

In summary, these new developments with the potential to be transit generators, especially the senior residential complexes, are for the most part being developed near existing Torrance Transit services.

11.2 Service Initiatives

The following service-concept themes were considered in the analysis and identification of new service initiatives for the Torrance Transit service network:

- Maximizing ridership and minimizing operating costs, while maintaining service to existing Torrance Transit customers.

- Efficiency and effectiveness of the alternatives. Creation of schedule rotation cycles that will maintain reliable service and allow for reliable transfer patterns between routes (use of 15-, 30-, and 60-minute headways).
- Optimize the bus network for the Torrance Transit service area needs and priorities while maintaining existing links to regional bus and rail services as well as neighboring sub-regional and community bus transit.

11.2.1 Network Design Objectives

Service design recommendations are based upon the following objectives:

- Maintaining route coverage where it currently exists at a level that improves route-level and system level productivity. Adjusting headways to create more reliable transfer opportunities between routes.
- Improve route productivity and increase vehicle loads on service to downtown Los Angeles, designate Route 1 as the route providing service to Union Station, and operate Route 2 between Del Amo Fashion Center and Green Line Harbor Freeway Station only.
- As a short-term strategy to correct overload problems on westbound weekday A.M. Route 3 trips, add an A.M. school tripper between 6:20 a.m. and 7:20 a.m. In addition, start Route 3 service one headway cycle earlier on both Saturday and Sunday mornings to correct heavy loads on the first westbound trips. Finally, because of existing high weekend service productivity, consider improving Saturday and Sunday Route 3 headways to 15 minutes as an incremental step towards eventual implementation of Metro Rapid service.
- Because of the existing heavy ridership in the Route 3 corridor, which has increased since the previous Line-by-Line Analysis, the long-term strategy should be to convert the Route 3 corridor into a Metro Rapid corridor, consisting of a frequent limited-stop service operating in tandem with local service.
- In recognition of the heavier ridership occurring on Crenshaw Boulevard, split Route 5 into two separate routes serving Crenshaw and Van Ness/ Arlington/Narbonne, respectively. Operate 30-minute service on the more productive Crenshaw segment between El Camino College and 60-minute service on the Van Ness/ Arlington/Narbonne segment.
- To provide a more attractive level of service, improve the weekday midday headway on Route 6 to 60 minutes. Continue to operate 30-minute peak headways.
- To augment weekday peak service on Hawthorne Boulevard in the heavily utilized portion between South Bay Galleria and Pacific Coast Highway, operate a long route every 30 minutes between Pacific Coast Highway and LAX and a short route every 30 minutes between Pacific Coast Highway and South Bay Galleria, thus providing a 15-minute trunk headway between PCH and the Galleria.

- Eliminate Route 9, the Torrance Transit route with the lowest productivity, as a separate route. Reallocate the service resources saved to implement the proposed service improvements elsewhere in the network.

11.2.2 Short-Term Line-by-Line Service Recommendations

Descriptions of the proposed short-term service recommendations are as follows. Figure 11.1 shows the proposed Torrance Transit System Route Network. Table 11.1 summarizes the proposed service change recommendations and Table 11.2 compares, by service day, the existing and proposed service spans and service frequencies. Individual route maps for the proposed service changes are included in Appendix D under this cover.

Route 1

- To improve productivity and to increase vehicle loads on downtown trips, Route 1 becomes the Torrance Transit route that operates downtown. During weekday peak periods, Route 1 will continue to operate between Del Amo Fashion Center and Union Station every 30 minutes. During the weekday midday, Route 1 will operate every 30 minutes with trips alternating between Green Line Harbor Freeway Station and Union Station. On weekday evenings, service will operate hourly between Del Amo Fashion Center and Union Station. On Saturday, service will operate hourly between Del Amo Fashion Center and Union Station. On Sundays, Route 1 will continue to operate 60-minute service between Del Amo Fashion Center and Green Line Harbor Freeway Station.

Route 2

- Operate the existing Route 2 alignment between Del Amo Fashion Center and the Green Line Harbor Freeway Station. Operate 60-minute headways during the existing service spans on weekdays and Saturday.

Route 3

- Add a westbound weekday school tripper between 6:20 and 7:20 a.m. departing Long Beach Transit Center and re-accommodate trips to create a 12-minute headway to reduce overcrowding due to student travel.
- Start Saturday and Sunday westbound service 30 minutes earlier to reduce overcrowding on first trips.
- Improve Saturday and Sunday headways to every 15 minutes.

Route 5

- Split Route 5 into two distinct routes. The Crenshaw Boulevard route (5A) will operate between El Camino College (looping using Manhattan Beach Boulevard, Van Ness Avenue, and Redondo Beach Boulevard) and Pacific Coast Highway (looping using Airport Drive, Pacific Coast Highway, and Crenshaw). Route 5A - Crenshaw Boulevard will operate 30-minute

headways. The Van Ness/Arlington/Narbonne route (5B) will operate between El Camino College (looping at the north end using Redondo Beach, Crenshaw, and Manhattan Beach) and Pacific Coast Highway (looping using Pacific Coast Highway, Crenshaw, and Airport Drive). The Van Ness/Arlington/Narbonne branch will operate every 60 minutes. Route 5B could be interlined with 5A when possible to equalize layovers.

Route 6

- Maintain current 30-minute weekday peak headways, and improve weekday midday headways to every 60 minutes from current 90 minutes.

Route 7

- No changes proposed.

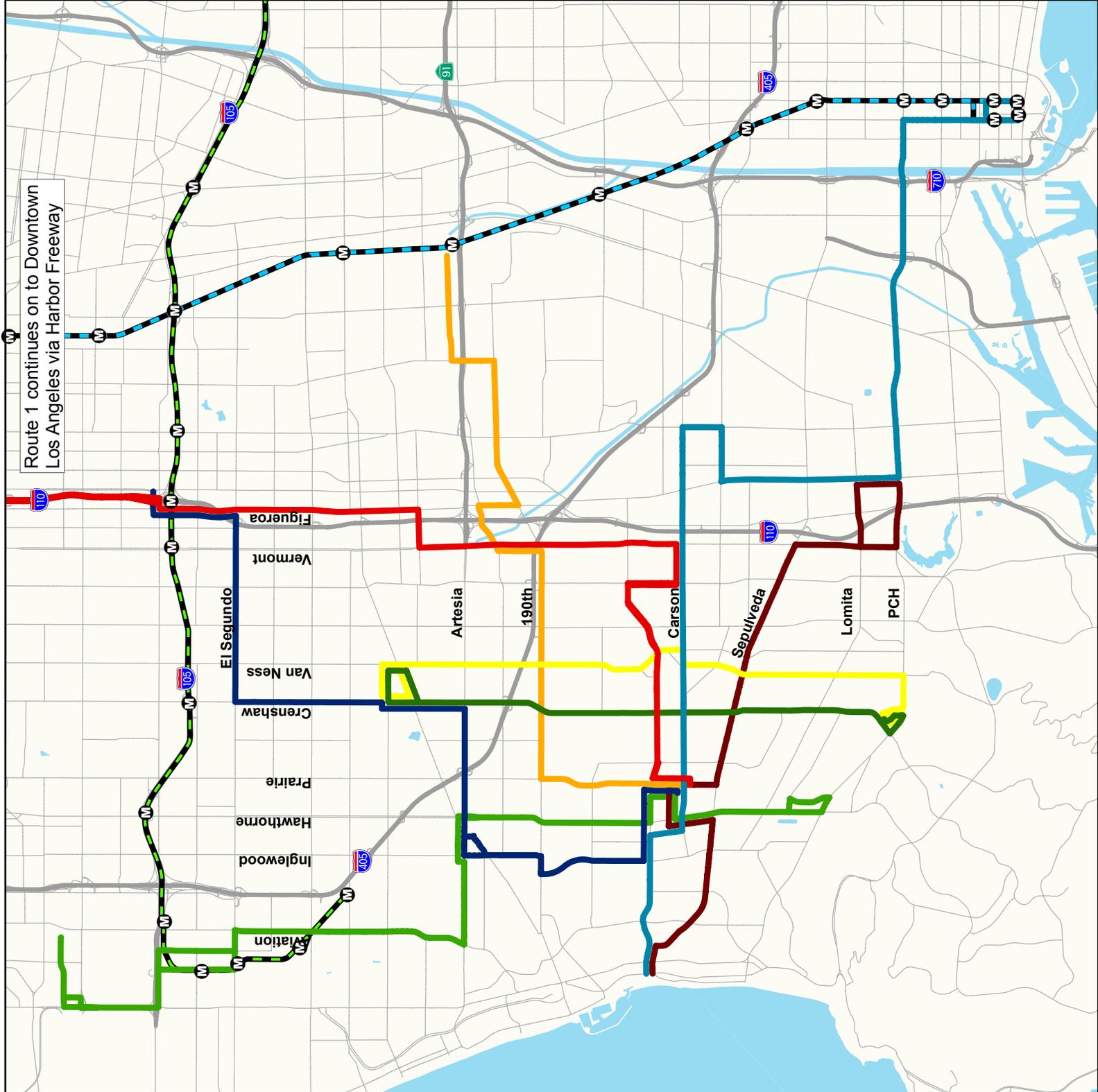
Route 8

- During weekday peak periods, operate a long-route every 30 minutes between Madison-Pacific Coast Highway to South Bay Galleria and a short-route every 30 minutes between Madison-Pacific Coast Highway and LAX City Bus Center. This will provide a 15-minute trunk headway between Madison-Pacific Coast Highway and the South Bay Galleria. In the weekday midday and evening, continue to operate every 30 minutes between Madison-Pacific Coast Highway and LAX City Bus Center. No changes proposed for Saturday. On Sundays, operate the same service pattern as on Saturdays, every 60 minutes between Madison-Pacific Coast Highway to South Bay Galleria and every 60 minutes between Madison-Pacific Coast Highway and LAX City Bus Center for a combined 30 minutes in the trunk.

Route 9

- Discontinue current Route 9 on weekdays and Saturdays because of low productivity and reallocate the service resources elsewhere in the network.

Figure 11.1
Proposed Route Network
Torrance Transit System



- Legend**
- Line 1
 - Line 2
 - Line 3
 - Line 5A
 - Line 5B
 - Line 6
 - Line 7
 - Line 8
 - Freeways
 - Major Streets

- Metro Rail**
- Green Line
 - Blue Line
 - Green Line Stations
 - Blue Line Stations

Data Sources

Torrance Transit, Census 2000,
 Southern California Association of Government (SCAG)

Date Prepared

December 2005

0 1 2 Miles
 1 inch equals 1.73 miles

Table 11.1 – Summary of Torrance Transit Service Proposals

Route No.	Route Description	Alignment Change	Service Frequency Change	Span of Service Change
1	Union Station - Del Amo Fashion Center	No change	<p>Weekday Peak - Operate every 30 minutes between Del Amo Mall and Union Station.</p> <p>Weekday Midday - Operate every 60 minutes between Del Amo Mall and Union Station and every 60 minutes between Del Amo Mall and Green Line Harbor Fwy. Station.</p> <p>Saturday - Operate every 60 minutes between Del Amo Mall and Union Station.</p> <p>Sunday - Operate every 60 minutes between Del Amo Mall and Green Line Harbor Fwy. Station.</p>	No change
2	Del Amo Fashion Center - Green Line Harbor Fwy. Station	Alignment between Del Amo Fashion Center and Green Line remains the same, but service to Union Station is discontinued.	Operate every 60 minutes weekdays and Saturdays	No change
3	Redondo Beach - Long Beach Transit Center	No change	<p>Weekday A.M. Peak - Add 1 school tripper westbound between 6:20am and 7:20am to reduce overloads.</p> <p>Saturday and Sunday - Operate every 15 minutes between Redondo Beach and Long Beach Transit Center</p>	<p>Saturday - start westbound service one trip earlier</p> <p>Sunday - start westbound service one trip earlier</p>
5A	El Camino College - Pacific Coast Hwy. via Crenshaw	Operate from El Camino College via Crenshaw, Airport Dr., Pacific Coast Hwy. back to Crenshaw. Loop at north end using Crenshaw, Manhattan Beach, Van Ness, and Redondo Beach.	Operate every 30 minutes weekdays and Saturdays	Operate from 6 a.m. to 9 p.m. weekdays Operate from 8 a.m. to 8 p.m. Saturdays
5B	El Camino College - PCH/Crenshaw via Van Ness, Arlington, Narbonne	Operate from El Camino College via Manhattan Beach, Van Ness, Cabrillo, Carson, Arlington, Narbonne, Pacific Coast Hwy., Crenshaw, Airport Dr., back to PCH. Loop at north end via Van Ness, Redondo Beach to Crenshaw.	Operate every 60 minutes weekdays and Saturdays	Operate from 6 a.m. to 9 p.m. weekdays Operate from 8 a.m. to 8 p.m. Saturdays
6	Del Amo Fashion Ctr. - Artesia Blue Line Station	No change	Operate weekday midday service every 60 minutes. Maintain existing 30-minute peak period service.	No change
7	PCH/Wilmington - Del Amo Fashion Center - Redondo Beach	No change	No change	No change
8	PCH/Madison - LAX City Bus Center	No change	<p>Weekday Peak - Operate every 30 minutes between PCH/Madison and South Bay Galleria and every 30 minutes between PCH/Madison and LAX Transit Center</p> <p>Weekday Midday - Operate every 30 minutes between PCH/Madison and LAX Transit Center</p> <p>Saturday - Operate every 60 minutes between PCH/Madison and South Bay Galleria and every 60 minutes between PCH/Madison and LAX Transit Center</p> <p>Sunday - Operate every 60 minutes between PCH/Madison and LAX Transit Center</p>	Operate Saturdays between South Bay Galleria and PCH/Madison until major stores close
9	Del Amo Fashion Center - Kaiser Hospital	Discontinue service as separate route.		

Table 11.2 – Existing vs. Proposed TTS Service Spans and Frequencies

Route	Existing							Proposed						
	Service Span			Headway				Service Span			Headway			
	Weekday	Saturday	Sunday	Wkdy		Sat	Sun	Weekday	Saturday	Sunday	Wkdy		Sat	Sun
				Peak	Mid						Peak	Mid		
1	04:45-23:10	05:30-22:00	05:20-20:20	30	35	60	60	04:30-23:00	05:30-22:00	05:30-20:30	30	30	60	60
2	05:35-20:13	06:00-19:13	--	60	60	60	--	05:30-20:30	06:00-20:30	--	60	60	60	--
3	04:30-22:40	05:50-22:25	06:10-21:10	15	15	30	30	04:30-22:30	05:00-22:30	05:30-21:00	15	15	15	15
5A	06:00-22:35	07:35-20:35	--	51	51	60	--	06:00-23:00	07:00-21:00	--	30	30	30	--
5B	--	--	--	--	--	--	--	06:00-23:00	07:00-21:00	--	60	60	60	--
6	05:00-19:52	--	--	30	90	--	--	05:00-20:00	--	--	30	60	--	--
7	06:25-20:49	06:55-19:40	--	30	30	30	--	06:30-21:00	07:00-19:30	--	30	30	30	--
8	05:00-23:15	07:30-18:59	08:00-18:29	20	30	30	60	05:00-23:30	07:30-19:30	08:00-19:00	15	30	30	30
9	06:00-18:50	8:00-18:50	--	60	60	60	--	--	--	--	--	--	--	--

11.2.3 Cost Impacts of Short-Term Recommendations

Tables 11.3, 11.4, and 11.5 show the impacts of the proposed changes upon revenue hours, revenue miles, and vehicle requirements. The weekday proposals would increase revenue hours by approximately 10 percent. The Saturday proposals would increase vehicles by approximately 46 percent. The Saturday proposals would increase vehicles by approximately 77 percent (7 vehicles).

Table 11.3 – Operating Cost Impacts of Proposed Weekday Service Changes

Route	Revenue Hours			Revenue Miles			Peak Vehicles		
	Existing	Proposed	% Diff	Existing	Proposed	% Diff	Existing	Proposed	Diff.
1	74	92	23%	1,081	1,241	15%	7	6	-1
2	41	30	-26%	594	384	-35%	3	2	-1
3	182	195	7%	2,142	2,350	10%	12	12	0
5A	44	51	55%	563	503	41%	3	3	0
5B	0	17	--	0	292	--	0	1	1
6	29	36	24%	298	454	52%	3	3	0
7	40	44	9%	554	592	7%	3	3	0
8	92	105	14%	1,040	1,259	21%	7	7	0
9	13	0	-100%	255	0	-100%	1	0	-1
Total	515	569	10%	6,525	7,074	8%	39	37	-2

Table 11.4 – Operating Cost Impacts of Proposed Saturday Service Changes

Route	Revenue Hours			Revenue Miles			Peak Vehicles		
	Existing	Proposed	% Diff	Existing	Proposed	% Diff	Existing	Proposed	Diff.
1	31	50	59%	358	733	105%	2	3	1
2	39	29	-25%	580	371	-36%	3	2	-1
3	81	165	105%	958	1,958	104%	6	12	6
5A	26	42	120%	376	414	73%	2	3	1
5B	0	14	--	0	238	--	0	1	1
7	36	38	5%	493	510	4%	3	3	0
8	42	48	14%	459	509	11%	4	4	0
9	11	0	-100%	114	0	-100%	1	0	-1
Total	265	385	46%	3,337	4,733	42%	21	28	7

Table 11.5 – Operating Cost Impacts of Proposed Sunday Service Changes

Route	Revenue Hours			Revenue Miles			Peak Vehicles		
	Existing	Proposed	% Diff	Existing	Proposed	% Diff	Existing	Proposed	Diff.
1	29	30	5%	336	360	7%	2	2	0
3	72	141	95%	865	1,673	93%	6	12	6
8	20	44	117%	292	466	60%	2	4	2
Total	121	215	77%	1,493	2,499	67%	10	18	8

11.3 Metro Rapid Service Recommendation

Route 3 is Torrance Transit System's dominant route. Route 3 serves a 18-mile long corridor and clearly is a major regional route, serving not only the City of Torrance, but also the Cities of Redondo Beach, Carson, Long Beach, and portions of Los Angeles. Route 3 serves the major activity centers of Del Amo Fashion Center, Harbor/UCLA Medical Center, and downtown Long Beach. Route 3 connects with numerous regional and community transit providers including Metro, Long Beach Transit, Gardena Municipal Bus Line, and Carson City Circuit. It provides a connection to regional rail services at the Long Beach Transit Mall (Metro Blue Line Light Rail).

Route 3 is currently in Metro's Five-Year Implementation Plan for conversion to a Metro Rapid Bus corridor. Route 3 has close to 8,000 daily riders on weekdays and a service productivity of over 50 passengers per hour weekdays and weekends. Creating a Metro Rapid Bus service on the corridor would require the following service-related changes:

- Simplification of the route for the Metro Rapid Bus line to eliminate turning movements and improve operating speed. The route may need to be simplified using Main or Avalon between Carson and Pacific Coast Highway, and also may need to be simplified around the Del Amo Mall.
- Establishing stops at major arterials and major demand locations only, keeping and average stop-spacing of about 1.0 mile overall. Stops should be established to maximize transfer opportunities with other transit services. A total of 18-20 stations is envisioned for this Metro Rapid service.

- Serving major regional/sub-regional destinations at both ends of the route. In the case of Route 3, operating the Metro Rapid Bus service to South Bay Galleria would not only provide a strong destination but would also permit transfer opportunities to existing Metro Rapid Bus services (Route 710 and 740).
- Metro Rapid Bus operates a minimum headway of 15 minutes. The local Route 3 service frequency may be reduced to every 30 minutes. Together the Metro Rapid and local service would provide an average 10-minute service frequency in the shared corridor.
- The 17-mile Metro Rapid Bus route could be operated every 15 minutes using 10 vehicles within a 150-minute cycle. The current Route 3 could be operated every 30 minutes using 6 buses; service then could be improved by 50 percent in the shared alignment with only 33 percent more vehicles (a proposed total of 16 vehicles for the Metro Rapid and Local service versus the existing 12 vehicles in Route 3 service). Some additional offsetting savings could likely be achieved by adjustments to Route 8, as the new Metro Rapid service would be serving part of the existing Route 8 alignment between the Del Amo Fashion Center and the South Bay Galleria.