Transit Quality of Service Evaluation

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Prepared for:

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1.0 Introduction

The Florida Department of Transportation (FDOT) requires Metropolitan Planning Organizations (MPOs) that contain fixed-route transit within their jurisdiction evaluate the fixed-route service with respect to the six transit service measures identified in the Transit Capacity and Quality of Service Manual (TCQSM). The transit service measures to be evaluated include:

- Service Frequency
- Hours of Service
- Service Coverage
- Passenger Loading
- Reliability (with respect to on-time performance and headway adherence)
- Transit v. Auto Travel Time

For each of the six service measures, transit quality of service is expressed on an A through F scale (similar to highway level of service), with A representing the best service from the passenger's point of view, and F representing the worst service. A detailed discussion of each of the service measures is included in Section 4.0. The results of the analysis will assist the transit service provider in future system planning efforts.

2.0 Agencies Involved in Evaluation

The study area for this report is Hillsborough County. The agencies involved in producing the report are the Hillsborough County MPO, acting as the lead agency for this evaluation, the FDOT and the Hillsborough Area Regional Transit Authority (HART). All were involved in providing information and direction towards the completion of this evaluation.

3.0 Activity Centers Chosen for Analysis

The analysis focused on trips between key activity centers in Hillsborough County, and the transit quality of service provided for those trips. This approach was used to:

- Allow the quality of service framework to be applied on a large scale;
- Provide results for a variety of trip purposes and geographic locations, while avoiding the need to analyze all HART routes; and
- Generate results that can help the Hillsborough MPO and HART assess whether the quality of service for particular trips matches the demand for these trips.

As a large MPO (serving an area with 200,000 people or more), the Hillsborough MPO evaluation is required to evaluate at least 10 activity centers.

The selection of activity centers was based on guidance from the FDOT. The guidance recommends that the MPO select a group of activity centers that have the following attributes:

- At least one location in the CBD of the largest city within the MPO's jurisdiction;
- Major intermodal terminals, such as passenger airports and AMTRAK stations – if present;
- At least one regional shopping center;
- At least one university or community college;
- At least one major park and ride facility;
- One large office development outside the CBD; and
- A geographically diverse set of suburbs, neighborhoods, and/or tourist attractions.

The ten activity centers chosen for this analysis are listed in Table 1 and illustrated in Figure 1. Table 1 also lists all of the Traffic Analysis Zones (TAZs) associated with each activity center. The TAZ groupings are used to generate travel demand estimates and are consistent with the activity center definitions used in the Tampa Bay Regional Planning Model.

The calculation for the Transit v. Auto Travel Time measure requires that the origin and destination of each trip be identified as a transit access point. HART bus stops were used for this purpose. For each activity center, the TAZ that houses the bus stop is identified as the "trip-end TAZ" in Table 1.

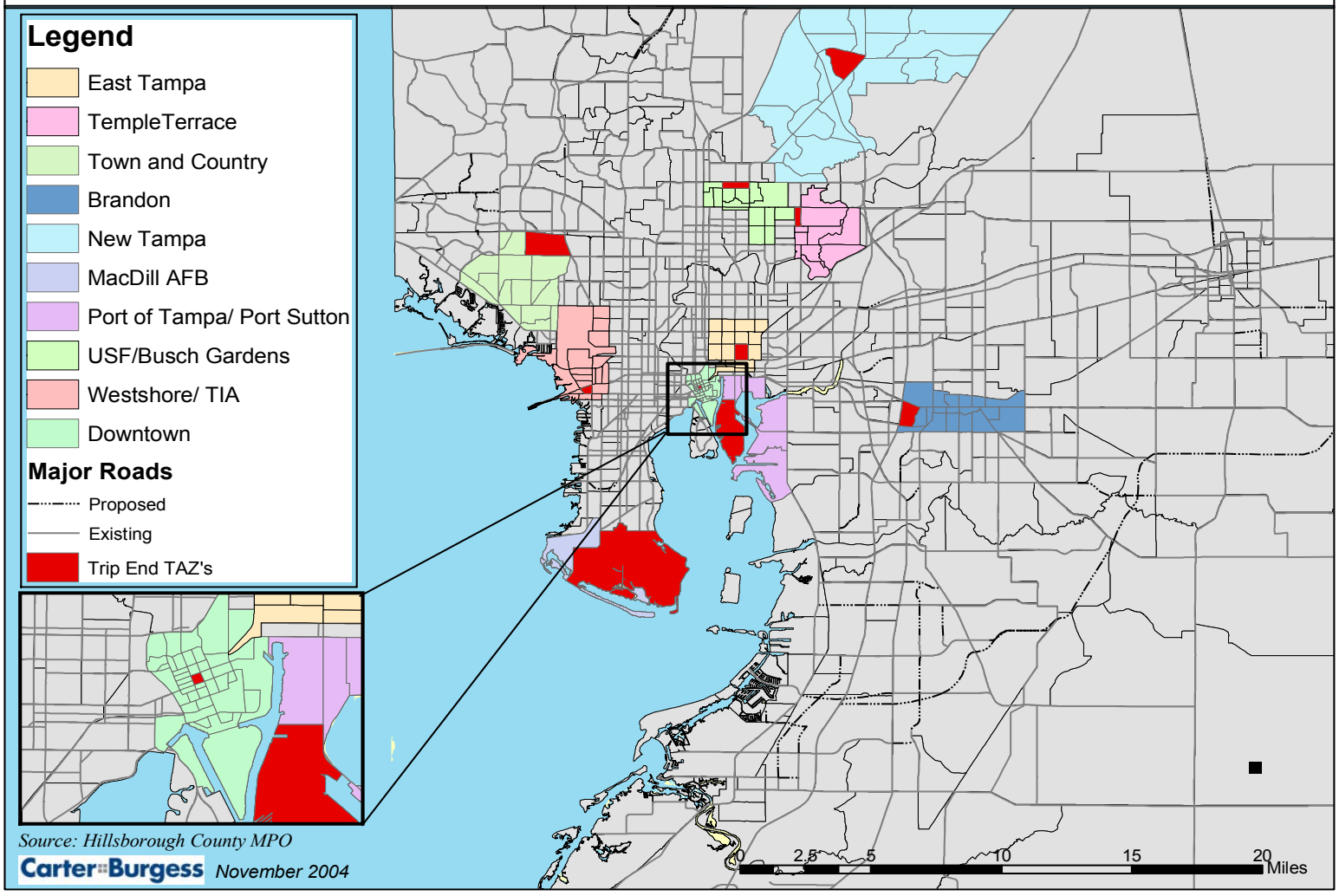
TABLE 1 – Activity Centers

ID	Activity Center Name	Activity Center Type	Travel Demand Analysis Area TAZ(s)	Trip End TAZ
A	Downtown Tampa	Non-residential	362-401, 406, 425, 436	380
B	Westshore Business District /Tampa International Airport	Non-residential	254-6, 266, 277-80, 289-95, 297-9, 411-3	298
C	University of South Florida/Busch Gardens	Non-residential	82-3, 121-7, 182, 185-7, 195-6	122
D	Port of Tampa/Port Sutton	Non-residential	356-9, 656, 663, 667	357
E	MacDill Air Force Base	Non-residential	465, 469	469
F	New Tampa	Residential	62-79, 470-3	68
G	Brandon	Residential	603, 605-7, 609, 611, 616-22, 624-9	616
H	Town & Country	Residential	131-3, 143-5, 157-62, 172-5	133
I	Temple Terrace	Residential	238, 241-50	241
J	East Tampa	Residential	321-4, 332-9, 403-5, 407-8	337

Source: Tampa Bay Regional Planning Model, Carter & Burgess, Inc. and URS Corp. October 2004.

Figure 1: Hillsborough County MPO Transit Quality of Service Evaluation

Activity Centers and Trip-End Traffic Analysis Zones (TAZs)



Source: Hillsborough County MPO

Carter Burgess *November 2004*

4.0 Evaluation of Service Measures

This section describes the measures used to evaluate transit service in Hillsborough County between the ten designated activity centers; this included an analysis of 90 origin-destination (O-D) pairs. All 90 O-D pairs were considered in the evaluations of the service frequency; hours of service; and transit v. auto travel time measures. For service frequency, hours of service, and travel time, all routes (or combinations of routes) that could serve a particular O-D pair were evaluated -- the combination of routes demonstrating the highest level of service for a particular measure was used. The connecting route(s) for each O-D pair are catalogued in Table A-2 in Appendix A. The fifteen origin-destination pairs with the highest travel demand were used to derive the sample of routes to be examined for passenger loading and reliability.

HART initiated a Comprehensive Operational Analysis (COA) in 2003 to review the operational effectiveness and efficiency of the fixed-route system and the quality of service provided to customers. The study commenced in April 2003, with the final report completed in April 2004. A series of service changes arose from this COA, to be implemented in three phases. Phase I changes were implemented in April 2004, and Phase II changes are scheduled to become effective on December 5, 2004. In order to account for the Phase II service enhancements, the improved HART system was used to evaluate the service frequency, hours of service and transit v. auto travel time measures. Since this analysis was completed prior to the Phase II implementation, the current HART system (November 2004) was used to evaluate those measures that were assessed through field review – passenger loading and reliability. The purpose, data sources, methodology and results for each measure are discussed.

4.1 *Service Frequency*

For this analysis, service frequency is defined as the number of transit trip opportunities available between each O-D pair, expressed in vehicles per hour. Bus frequencies were collected manually using the HART schedules that will become effective on December 5, 2004. The level of service (LOS) standard for service frequency and the summary of results are included in Table 2 and illustrated in Figure 2.

TABLE 2 – Service Frequency LOS Results for Hillsborough County

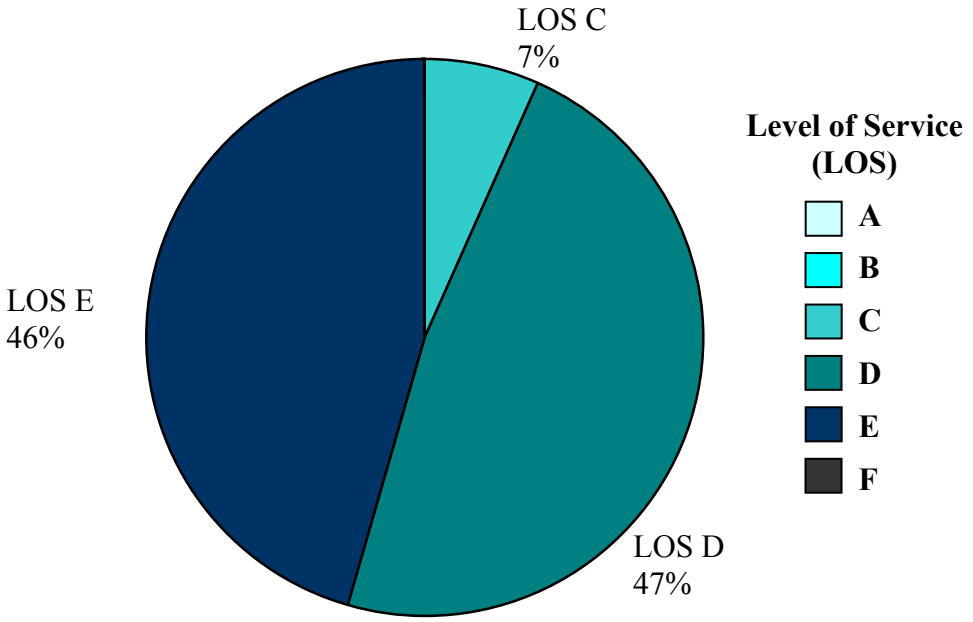
LOS	Headway (min.)	Veh/ Hr.	Comments†	Number of O-D Pairs	Percentage of O-D pairs Evaluated*
A	<10	>6	Passengers do not need schedules	0	0%
B	10-14	5-6	Frequent service, passengers use schedules	0	0%
C	15-20	3-4	Maximum desirable wait time if bus missed	6	6.7%
D	21-30	2	Service unattractive to choice riders	43	47.8%
E	31-60	1	Service available during hour	41	45.5%
F	>60	<1	Service unattractive to all riders	0	0%

Source: FDOT and Carter & Burgess, Inc. November 2004.

† The comment column denotes how passengers perceive the particular level of service.

* Expressed as a percentage of the 90 total O-D pairs.

FIGURE 2 – Service Frequency LOS Results for Hillsborough County



More than 45 percent of the evaluated trips operate at LOS E or worse. The service frequencies for each O-D pair are listed in *Mobility Measures Worksheets A-J*, located in Appendix B.

4.2 Hours of Service

The hours of service measure evaluates the number of hours per day that service is available between each O-D pair. This measure is calculated by determining the number of hours between the earliest departure in the morning when a trip could be made (by any combination of routes) and the latest departure in the evening when the trip could be made (by any combination of routes). Bus hours of service were collected manually using the HART schedules that will become effective on December 5, 2004. The LOS standards and summary of results for hours of service are depicted in Table 3.

TABLE 3 – Hours of Service LOS Results for Hillsborough County

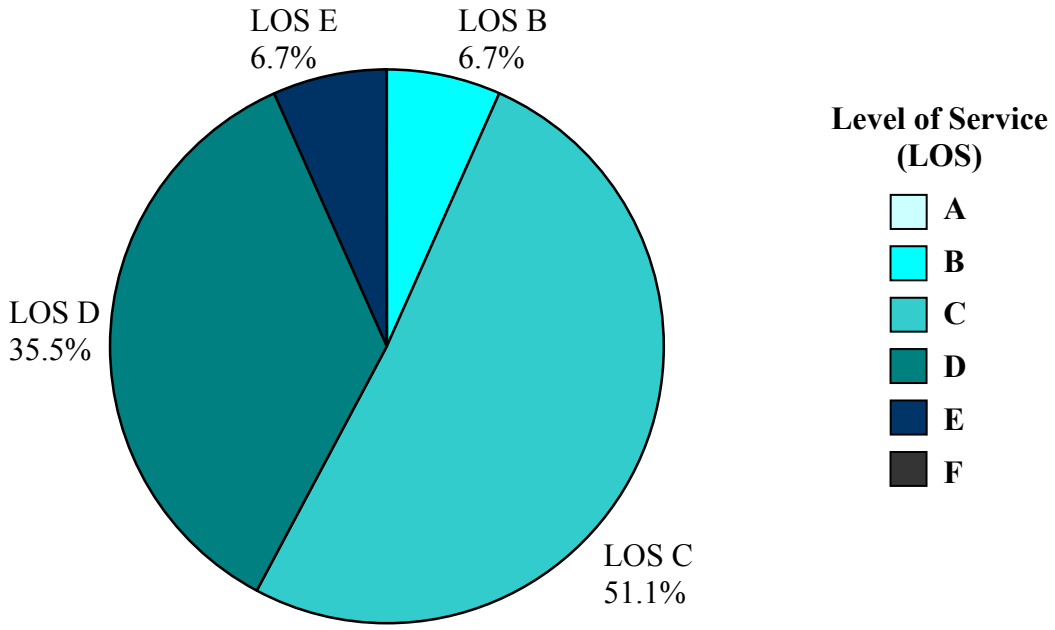
LOS	Hours per Day	Comments†	Number of O-D Pairs	Percentage of O-D Pairs Evaluated*
A	19-24	Night or owl service provided	0	0%
B	17-18	Late evening service provided	6	6.7%
C	14-16	Early evening service provided	46	51.1%
D	12-13	Daytime service provided	32	35.5%
E	4-11	Peak hour service/limited midday service	6	6.7%
F	0-3	Very limited or no service	0	0%

Source: FDOT and Carter & Burgess, Inc. November 2004.

† The comment column denotes how passengers perceive the particular level of service.

* Expressed as a percentage of the 90 total O-D pairs.

FIGURE 3 – Hours of Service LOS Results for Hillsborough County



As shown in Figure 3, Limited midday service (LOS E) is provided for 35.5 percent of the evaluated O-D pairs. Daytime (LOS D) and extended service (LOS B or C) is provided for approximately 65 percent of the evaluated trips. The hours of service scores for each O-D pair are listed in *Mobility Measures Worksheets A-J*, located in Appendix B.

4.3 Service Coverage

The service coverage measure evaluates how completely the transit system serves areas with densities that can typically support transit. The transit service coverage area is defined as a ¼-mile radius around all bus routes. A ¼ to ½-mile distance is considered the accepted "walking distance" as defined by the Federal Transit Administration (FTA). The area to be served, referred to as the "transit supportive area," is defined as areas with a population density of at least three (3) households per gross acre, or an employment density of at least four (4) employees per gross acre.

The population and employment data are 2000 U.S. Census socioeconomic data employed by the MPO for its 2025 Long Range Transportation Plan (LRTP) update, and are aggregated to the TAZ level. To determine the quantity of countywide, transit-supportive area that is actually served by transit, the HART routes were overlaid on the population and employment data. The service coverage analysis was performed using ArcGIS 8.x – Geographic Information Systems (GIS) software.

The number of households and jobs served by transit was calculated by allocating households and jobs to the portion of each TAZ that fell within the transit service area. This allocation was based on the ratio of the size of each TAZ that is within a transit service area to the size of the overall TAZ. This calculation assumes a uniform distribution of jobs and households across each TAZ. This methodology is consistent with service area analyses conducted for the FTA.

Over seventy-five percent (75.6 percent) of the transit-supportive area in Hillsborough County is served by transit. This translates to LOS C. Service coverage LOS standards are included in Table 4. The service coverage results are summarized in the *Service Coverage Worksheet* located in Appendix B. Appendix C contains a series of service coverage analysis maps that depict the *Transit Service Coverage Area*, the *Transit-Supportive Area* and the *Transit-Supportive Area Served by Transit* (Figures C1-C3) for Hillsborough County.

TABLE 4 – Service Coverage LOS

LOS	Percentage of Transit-Supportive Area Served by Transit
A	90.0-99.9%
B	80.0-89.9%
C	70.0-79.9%
D	60.0-69.9%
E	50.0-59.9%
F	<50.0%

Source: FDOT, 2004.

4.4 Transit v. Auto Travel Time

The transit v. auto travel time measure compares travel times by transit to travel times by automobile between each pair of activity centers. Transit travel time is the time between when a passenger boards the transit vehicle at the origin activity center and when the same passenger alights at the destination activity center, including all transfer and wait times, based on printed bus schedule information. Auto travel time was calculated using the Tampa Bay Regional Planning Model and represents the congested travel times between the two activity centers' trip-end TAZs, as depicted in Table 1 and Figure 1. Transit v. auto travel time LOS results are depicted in Table 5 and Figure 4.

TABLE 5 – Transit v. Auto Travel Time LOS Results for Hillsborough County

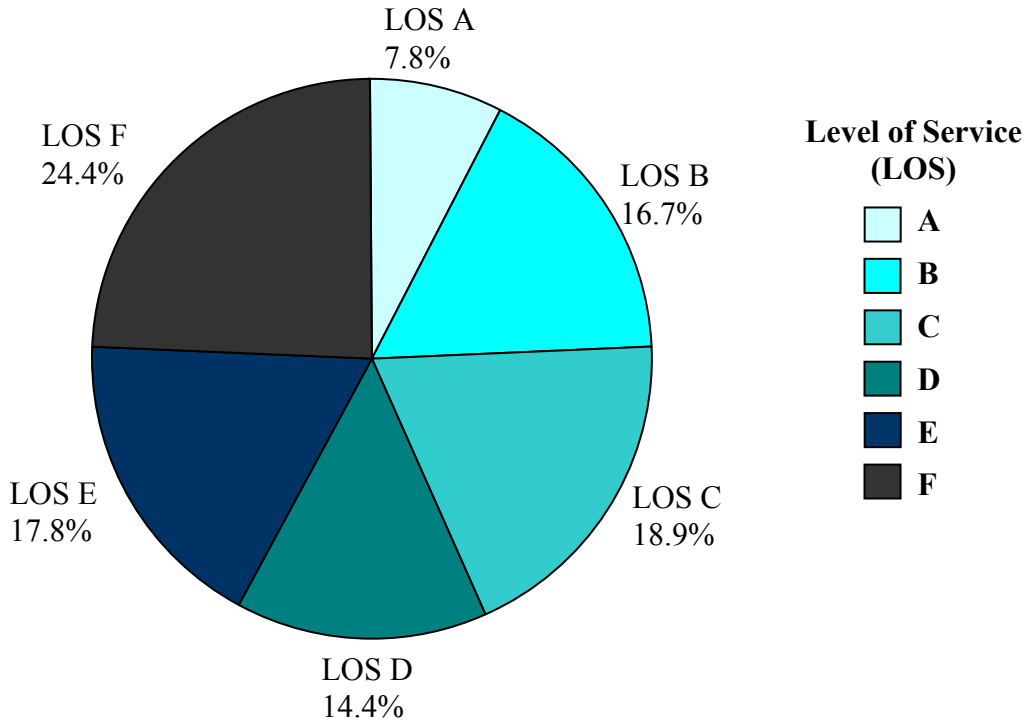
LOS	Travel Time Difference (min.)	Comments†	Number of O-D Pairs	Percentage of O-D Pairs Evaluated*
A	≤ 0	Faster by transit than by auto	7	7.8%
B	1-15	About as fast by transit as by auto	15	16.7%
C	16-30	Tolerable for choice riders	17	18.9%
D	31-45	Round-trip at least an hour longer by transit	13	14.4%
E	46-60	Tedious for all riders; most possible in small cities	16	17.8%
F	>60	Unacceptable to most riders	22	24.4%

Source: FDOT and Carter & Burgess, Inc. November 2004.

† The comment column denotes how passengers perceive the particular level of service.

* Expressed as a percentage of the 90 total O-D pairs.

FIGURE 4 – Transit v. Auto Travel Time LOS Results for Hillsborough County



Approximately 43 percent of the evaluated trips maintain a travel time difference LOS C or better; at this level of service, transit is still considered to be a viable option for choice riders[1].

[1] The term "choice rider" refers to an individual who has other transportation options, usually a personal automobile, but chooses to use transit. Since choice riders have options for travel, the decision to use transit is often based on a quantifiable benefit such as time or money savings.

However, with more than 42 percent of the trips operating at LOS E or worse, there are still significant improvements to be made.

The results for each individual O-D pair are included in *Mobility Measures Worksheets A-J* located in Appendix B.

4.5 Passenger Loading and Reliability

FDOT guidelines mandate that the passenger loading LOS and reliability LOS be calculated only for the 15 directional combinations of origins and destinations (O-D) with the highest travel demands. Travel demand was calculated for the O-D pairs between each activity center and the other nine activity centers (90 total) using the Florida Standard Urban Transportation Model Structure (FSUTMS) modeling software. Based on the travel demands computed by FSUTMS, the top 15 directional O-D pairs were identified for evaluation of their passenger loading and reliability. The top 15 O-D pairs are shown in Table 6.

TABLE 6 – Top 15 Directional O-D Pairs by Travel Demand

No.	Origin	Destination	Evaluated Route
1	Town & Country	Westshore/Tampa Int'l. Airport	30
2	Westshore/Tampa Int'l. Airport	Town & Country	30
3	USF/Busch Gardens	Temple Terrace	6
4	Temple Terrace	USF/Busch Gardens	6
5	USF/Busch Gardens	New Tampa*	18
6	New Tampa*	USF/Busch Gardens	18
7	East Tampa	Downtown Tampa	12
8	Downtown Tampa	East Tampa	12
9	Downtown Tampa	Westshore/Tampa Int'l. Airport	58
10	Westshore/Tampa Int'l. Airport	Downtown Tampa	30
11	Downtown Tampa	USF/Busch Gardens	12
12	USF/Busch Gardens	Downtown Tampa	12
13	New Tampa*	Temple Terrace	18
14	Temple Terrace	New Tampa*	6
15	East Tampa	Westshore/Tampa Int'l. Airport	12

Source: Carter & Burgess, Inc. November, 2004.

*Currently there is no fixed-route transit directly serving the New Tampa area (although an express route to New Tampa was recently approved). The northernmost stop on HART Route 18 comes within ½-mile of serving the New Tampa area and was used in this evaluation to assess the six transit service measures. A bus stop on the corner of Bruce B. Downs Boulevard and Bearss Avenue (just outside the identified "New Tampa" area) was used to estimate transit travel time and hours of service. The trip end TAZ (68) used to calculate auto travel times associated with the New Tampa area was chosen because it houses a central neighborhood in the New Tampa area, and its trip activity is likely representative of trip activity to the New Tampa area as a whole.

In collecting data for passenger loading and reliability, FDOT guidelines require the following:

- Data should be collected on a typical mid-week day (Tuesday, Wednesday or Thursday), when passenger volumes are most consistent;

- A minimum of 10 observations should be made for the reliability evaluation;

- The fastest route, or combination of routes, between each of the 15 O-D pairs must be identified, and data should be collected from the first route one would board to complete a given trip. The routes corresponding to each O-D pair are included in Table 6;

- Data should be collected at the maximum load point along the designated route;

- To measure passenger loading - at each maximum load point, the number of passengers on board should be counted for each trip during the weekday p.m. peak period (approximately 4:00 p.m. – 6:00 p.m.). Additionally vehicle data (length, width, number of seats, and vehicle type) should be recorded; and

- To measure reliability – the actual arrival time of a bus at the identified maximum load point should be recorded and compared to the scheduled arrival time of that bus. Buses arriving within 5 minutes of the scheduled time are considered "on-time."

Field reviews of the designated routes were conducted from Tuesday, November 2, 2004 through Thursday, November 4, 2004[2] during the peak period. The maximum load points were chosen along the portion of routes that are utilized to complete one or more of the top 15 travel demand trips. The maximum load points were chosen using a Bus Stop Activity study completed by HART between October 2003 and September 2004. Data was collected at the printed schedule time-point closest to the identified maximum load point that also had a printed time point in the schedule for that route. Data was collected at the time point rather than the actual maximum load point in order to accurately measure the reliability of buses along the evaluated routes. The reliability of transit service for the evaluated trips operates at LOS E or worse. Approximately 70 percent of the evaluated trips exhibit a reliability level of two or more late transit vehicles per week.

The results of the field survey indicate that the currently available transit service can adequately serve the passenger loads on those routes with highest travel demand. Only one of the evaluated trips operates at capacity, with no trips above capacity. The LOS for passenger loading and reliability are included in Tables 7 and 8 and Figures 5 and 6, respectively.

NOTE: The observations taken for the Route 30 in November 2004 were inconclusive due to the interlining of Route 30 with Route 6 at the chosen observation point. Surveyors were instructed to observe the Route 18 at this location, rather than the Route 6. Route 30 was re-surveyed for reliability by HART staff in January 2005 using the TQSE methodology.

[2] Route 58LX westbound, which only runs three times during each weekday peak period, was observed on Monday 11/1/04 through Thursday 11/4/04 in order to collect the necessary number of observations to satisfy the reliability evaluation guidelines.

TABLE 7 – Passenger Loading LOS Results for Hillsborough County

LOS	Sq. Ft./ Passenger	Passenger /Seat	Comments†	Number of O-D Pairs	Percentage of O-D Pairs Evaluated*
A	>12.9	0.00-0.50	No passenger must sit next to another	2	16.7%
B	8.6-12.9	0.51-0.75	Passengers can choose where to sit	2	16.7%
C	6.5-8.5	0.76-1.00	All passengers can sit	5	41.7%
D	5.4-6.4	1.01-1.25	Comfortable standee load for design	2	16.7%
E	4.3-5.3	1.25-1.50	Maximum schedule load	1	8.3%
F	<4.3	>1.50	Crush loads	0	0%

Source: FDOT and Carter & Burgess, Inc. November 2004.

† The comment column denotes how passengers perceive the particular level of service.

* Expressed as a percentage of 12 surveyed O-D pairs. The observations (3 observations) taken for the Route 30 in November 2004 were inconclusive due to the interlining of Route 30 with Route 6 at the chosen observation point. Surveyors were instructed to observe the Route 18 at this location, rather than the Route 6. Route 30 was re-surveyed for reliability by HART staff in January 2005 using the TQSE methodology. Route 30 was not re-surveyed for passenger loading.

FIGURE 5- Passenger Loading LOS Results for Hillsborough County

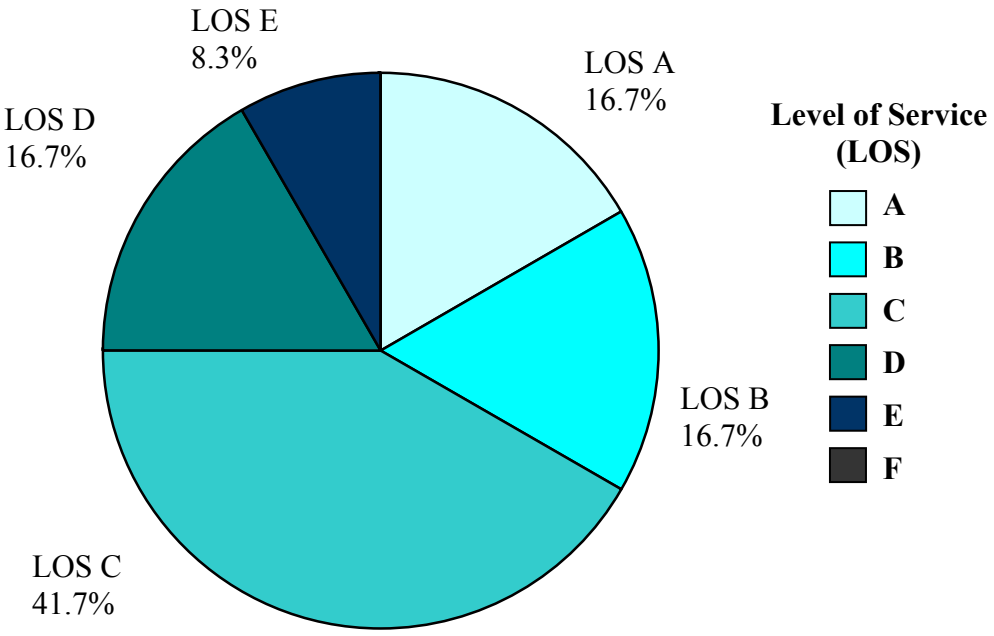


TABLE 8 – Reliability LOS Results for Hillsborough County

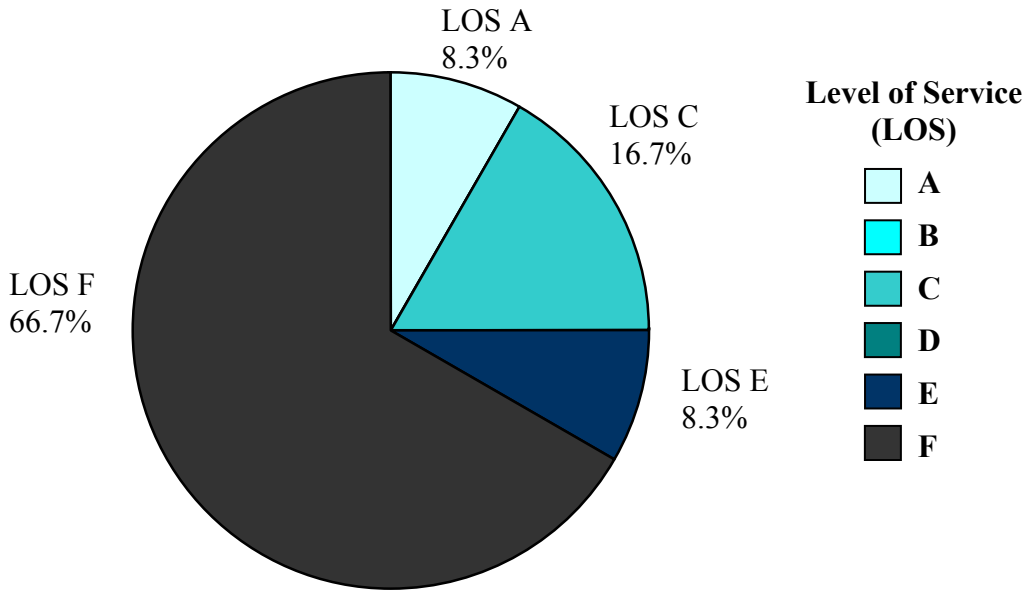
LOS	On-Time Percentage	Comments†	Number of O-D Pairs	Percentage of O-D Pairs Evaluated*
A	97.5-100%	1 transit vehicle per month not on time	1	8.3%
B	95.0-97.4%	2 transit vehicles per month not on time	0	0.0%
C	90.0-94.9%	1 transit vehicle per week not on time	2	16.7%
D	85.0-89.9%	> 1 transit vehicle per week not on time	0	0.0%
E	80.0-84.9%	2 transit vehicles per week not on time	1	8.3%
F	<80.0%	> 2 transit vehicles per week not on time	8	66.7%

Source: FDOT and Carter & Burgess, Inc. November 2004.

† The comment column denotes how passengers perceive the particular level of service.

* Expressed as a percentage of 12 surveyed O-D pairs. The observations (3 observations) taken for the Route 30 in November 2004 were inconclusive due to the interlining of Route 30 with Route 6 at the chosen observation point. Surveyors were instructed to observe the Route 18 at this location, rather than the Route 6. Route 30 was re-surveyed for reliability by HART staff in January 2005 using the TQSE methodology (see Table 11 for revised results).

FIGURE 6 – Reliability LOS Results for Hillsborough County



The results for each of the O-D pairs are included in the *Passenger Loading and Service Reliability Worksheets* in Appendix B. The field review reports for the observed directional routes are located in Appendix D.

4.6 Agency Concerns

The results of this evaluation were presented at the Hillsborough MPO and HART Board meetings in December and January, respectively. HART staff expressed several concerns about the reliability performance measure findings, discussed in Section 4.5, with respect to the methodology for data collection and specific route issues. HART staff noted:

- Due to the pulse system used by HART *departure* times, not arrivals, are the most accurate way to determine reliability, therefore early arrivals should not be a concern. HART staff requested that routes arriving "not on time" be separated into more "more than 5 minutes early" and "more than 5 minutes late".

- Route 6, in both the northbound and southbound directions, was included in the original surveys conducted November 2-4, 2004 for trips providing service to Temple Terrace, USF/Busch Gardens, and New Tampa. While HART staff was aware that surveyors would be observing these routes, they later realized that this route was and continues to be detoured for roadway construction activities; therefore results for Route 6 may not accurately represent its typical on-time performance.

- The original observations taken for Route 30 eastbound were deemed inconclusive due to the interlining of Route 30 with Route 6 at the chosen observation point. Surveyors were instructed to observe the Route 18 at this location, rather than the Route 6.

HART staff re-surveyed Route 30 in both directions in January 2005. Additionally, alternate observations were made to substitute for those corresponding to Route 6. The O-D pairs with the 16th, 17th and 18th highest travel demand[3] were examined to determine the fastest route between each pairing. Route 15 eastbound and Route 30 in both directions were identified as the corresponding replacement routes. The routes observed during the re-survey exercise were 30 Eastbound and Westbound and 15 Eastbound.

Table 9 illustrates the reliability of each of the surveyed routes, categorizing the observations in terms of on-time, early and late arrivals. Table 9 also shows the results in terms of the percentage of arrivals that were "not late" – this includes both on-time (arriving within 5 minutes of the scheduled arrival time) and early (arriving more than 5 minutes before the scheduled arrival time) buses. This distinction is made to reflect the protocol followed by HART wherein route reliability is affected by late arrivals, but not by early arrivals. To reflect this protocol, LOS is computed[4] in terms of the percentage of "not late" vehicles as opposed to the number of "on-time" vehicles as prescribed in the FDOT Transit Quality of Service Evaluation methodology.

[3] Three new O-D pairs were examined in an attempt to replace the three trips that correspond to Route 6 that were deleted from the original top 15 O-D pairs (see Table 10).
[4] LOS is computed in terms of "not late vehicles" in section 4.6 as well as in Summary Table A-1 in Appendix A and Table B-13 and B-14 in Appendix B.

TABLE 9 – Reliability Results by Route

Route	On-Time Arrivals	Early Arrivals	Late Arrivals	% Not Late	LOS
12 NB	7	0	7	50.0 %	F
12 SB	9	0	5	64.3 %	F
15 EB*	13	0	2	86.7 %	D
18 NB	12	1	2	86.7 %	D
18 SB	14	0	1	93.3 %	C
30 EB*	12	0	3	80.0 %	E
30 WB*	9	0	6	60.0%	F
58LX WB	0	0	12	0.0 %	F
Total	*76*	*1*	*38*		

Source: HART and Carter & Burgess, Inc.
* Route surveyed January 25-27, 2005. All other routes surveyed November 2-4, 2004.

Figure 7 illustrates the percentage of on-time, early and late transit vehicles using the total number of observations (10-15 observations per O-D pair) rather than summarizing the results by O-D pair.

Figure 7 – On-Time Performance by Observation

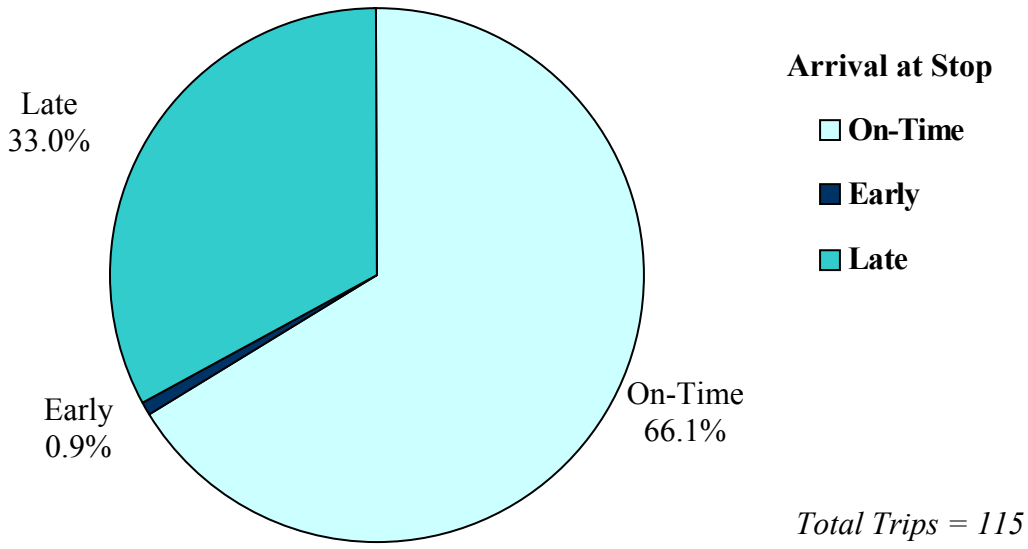


Table 10 displays the top 18 O-D pairs in terms of travel demand. For each O-D pair, the first route a passenger would board to complete the trip (on the fastest combination of routes) is shown. Table 10 also shows the reliability LOS for each pair using the results from the original survey conducted (November 2004) as well as the resurvey results (January 2005). The LOS results from the original survey are computed according to "on-time" arrivals (within 5 minutes of the scheduled arrival); the LOS results corresponding to the final survey observations are computed based on "not late" arrivals (including early and on-time arrivals).

TABLE 10 – Reliability LOS by O-D Pair

Trip Rank	Origin	Destination	Route	LOS Survey #1 & On-Time	LOS Survey #2 & Not Late
1	*Town & Country*	*Westshore/Tampa Int'l. Airport*	*30 WB*	*F*	*F*
2	*Westshore/Tampa Int'l. Airport*	*Town & Country*	*30 EB*	*F*	*E*
~~3~~	~~USF/Busch Gardens~~	~~Temple Terrace~~	~~6 SB~~	~~A~~	
~~4~~	~~Temple Terrace~~	~~USF/Busch Gardens~~	~~6 NB~~	~~F~~	
5	USF/Busch Gardens	New Tampa	18 NB	E	D
6	New Tampa	USF/Busch Gardens	18 SB	C	C
7	East Tampa	Downtown Tampa	12 SB	F	F
8	Downtown Tampa	East Tampa	12 NB	F	F
9	Downtown Tampa	Westshore/Tampa Int'l. Airport	58LX WB	F	F
10	*Westshore/Tampa Int'l. Airport*	*Downtown Tampa*	*30 EB*	*F*	*E*
11	Downtown Tampa	USF/Busch Gardens	12 NB	F	F
12	USF/Busch Gardens	Downtown Tampa	12 SB	F	F
13	New Tampa	Temple Terrace	18 SB	C	C
~~14~~	~~Temple Terrace~~	~~New Tampa~~	~~6 NB~~	~~F~~	
15	East Tampa	Westshore/Tampa Int'l. Airport	12 SB	F	F
16	*Westshore/Tampa Int'l. Airport*	*East Tampa*	*15 EB*		*D*
17	*Downtown Tampa*	*Town & Country*	*30 WB*		*F*
18	*Town & Country*	*Downtown Tampa*	*30 EB*		*E*

Source: HART and Carter & Burgess, Inc.
Italics indicate routes surveyed January 25-27, 2005. All other routes surveyed November 2-4, 2004.
Strikethroughs indicate O-D pairs that have been removed from the analysis due to detours on the connecting route.
Shading indicates O-D pairs that were not included in the respective surveys.

Table 11 includes the summary results for the revised methodology reliability measure. More than 26 percent (26.6) of the observed trips demonstrate LOS D or better. Approximately 53 percent (53.3) of the observed O-D pairs have more than two late transit vehicles per week. The re-survey and requested change in methodology for computing the LOS for reliability modestly improves the overall reliability results (significantly fewer trips exhibiting LOS F); however, the percentage of trips displaying LOS D or higher remained at roughly 25 percent.

Reliability of the HART system is influenced by several factors. Most evident is the fact that buses must operate in the same right-of-way as other peak hour traffic, which sacrifices the reliability of the bus to fluctuations in overall traffic congestion. Additionally, HART staff has indicated that it is agency policy to hold buses for transferring passengers if requested[5]; thereby, sacrificing on-time performance to compensate for low frequency. Additionally, the minimal number of observations collected makes it difficult to generalize about the overall consistency and reliability of the entire HART system.

TABLE 11 – Revised Reliability LOS Results for Hillsborough County

LOS	Not Late Percentage	Comments†	Number of O-D Pairs	Percentage of O-D Pairs Evaluated*
A	97.5-100%	1 late transit vehicle per month	0	0.0%
B	95.0-97.4%	2 late transit vehicles per month	0	0.0%
C	90.0-94.9%	1 late transit vehicle per week	2	13.3%
D	85.0-89.9%	> 1 late transit vehicle per week	2	13.3%
E	80.0-84.9%	2 late transit vehicles per week	3	20.0%
F	<80.0%	> 2 late transit vehicles per week	8	53.3%

Source: FDOT and Carter & Burgess, Inc. January 2005

† The comment column denotes how passengers perceive the particular level of service.

* Expressed as a percentage of the 15 surveyed O-D pairs.

Florida Transit Information Systems (FTIS) data uses National Transit Database (NTD) information submitted to the Federal Transit Administration (FTA). Using FTIS data to compare HART with transit service providers in other large metropolitan areas of Florida, HART operations are comparable to other systems. Figures 9 and 10 demonstrate how HART operations compare to Broward County Mass Transit (BCMT), Jacksonville Transportation Authority (JTA) and Pinellas Suncoast Transit Authority (PSTA) in terms of average headway and average speed respectively. Figure 9 shows that HART has outperformed both PSTA and JTA in terms of headway in three of the past four years. Additionally, HART has operated at a similar average speed (Figure 10) as compared to these other Florida transit agencies.

[5] HART policy dictates a 3-minute holding period.

Figure 8 - Average Headway Comparison of Florida Transit Systems (in minutes)

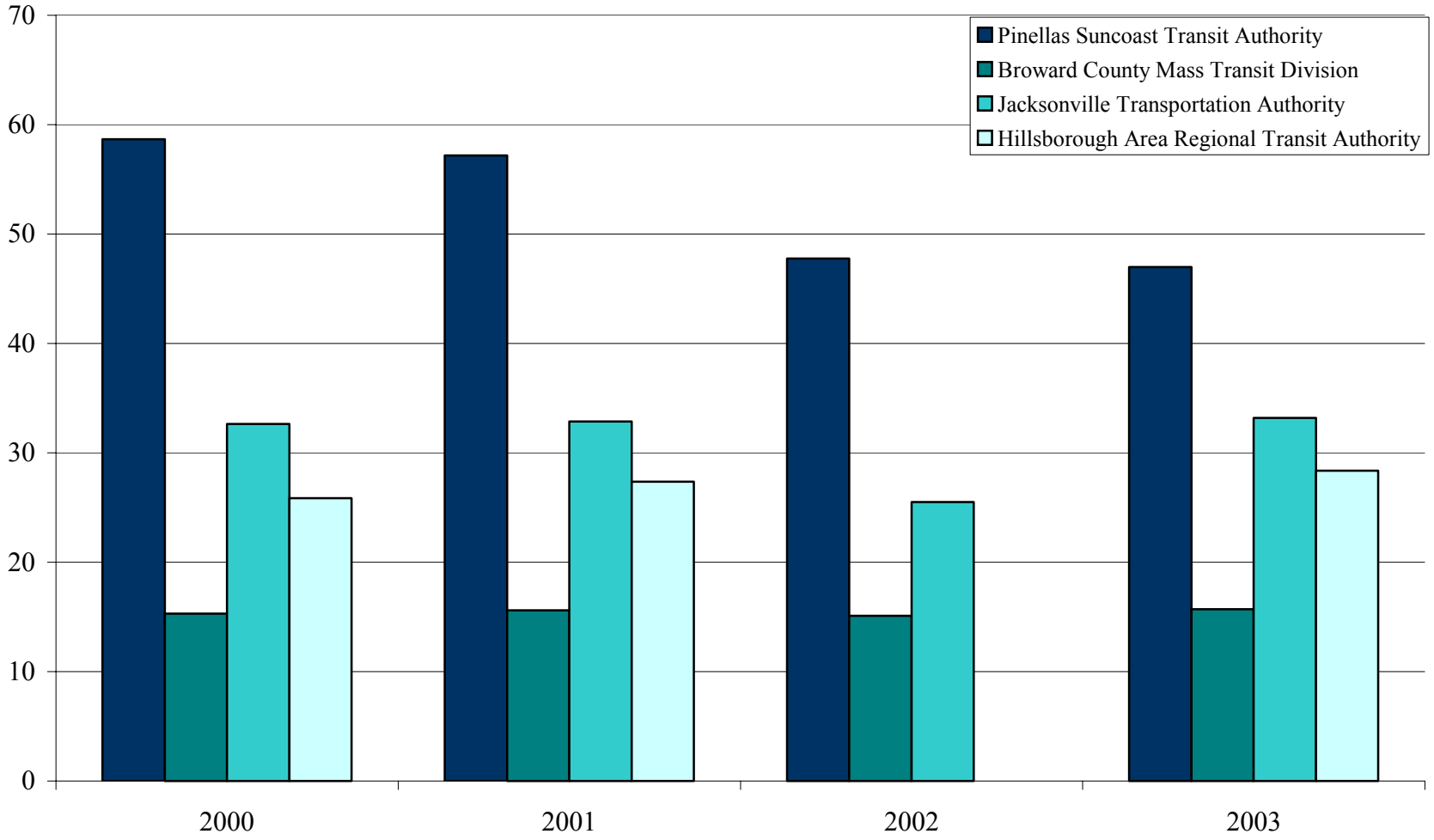
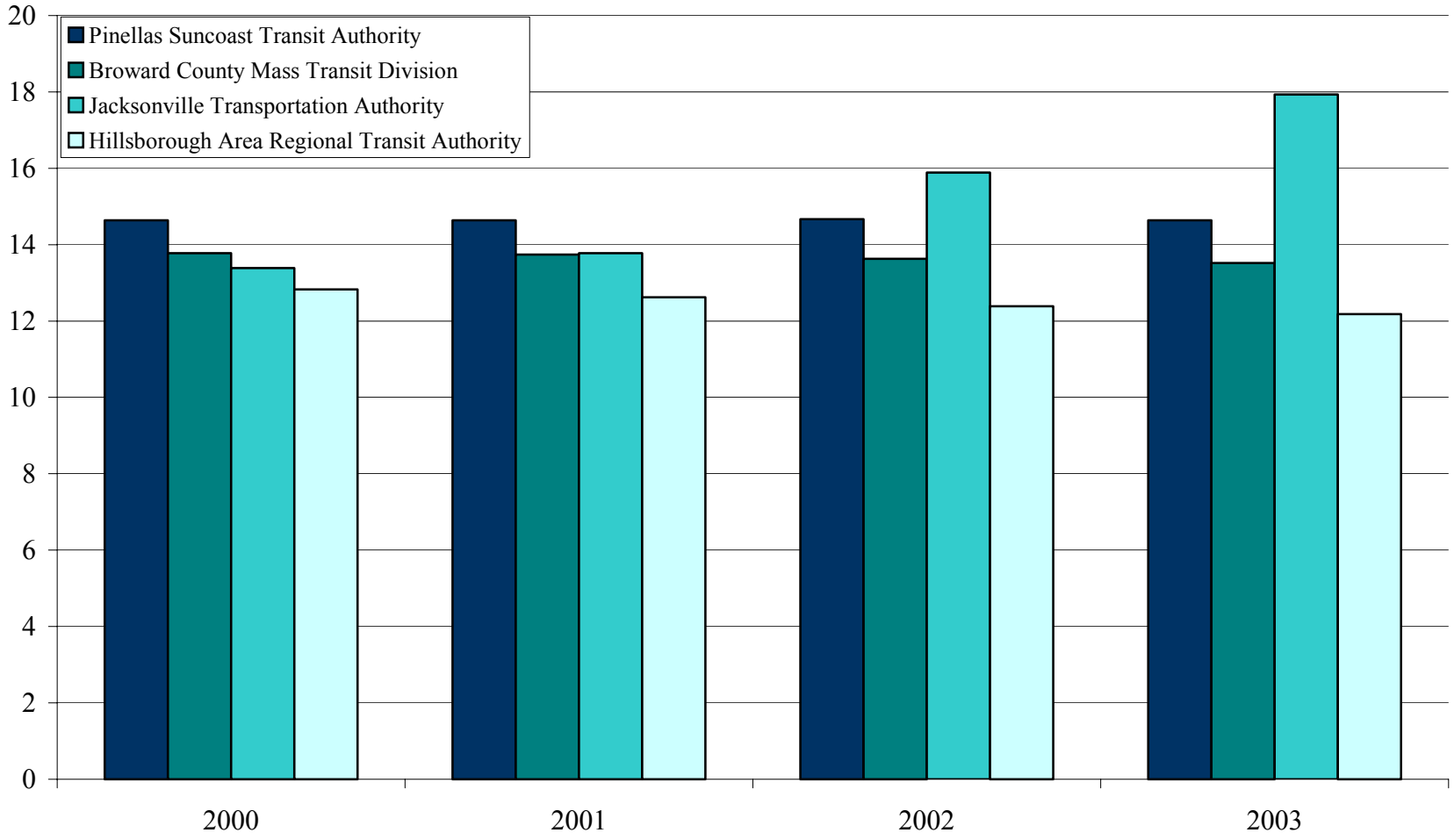


Figure 9 - Average Speed Comparison of Florida Transit Systems (RM/RH)



5.0 Summary Evaluation

This section summarizes the findings of the 2004 Transit Quality of Service Evaluation for Hillsborough County, Florida. Table 12, at the end of this section, presents the number and percentage of O-D pairs within each LOS score for each of the transit evaluation measures, and illustrates the general findings of this analysis.

In terms of service frequency, more than 45 percent (45.5 percent) of the analyzed trips occur with a frequency of one times per hour or less, which results in a LOS of E or worse. None of the analyzed trips had a service frequency LOS A or B (five or more opportunities per hour to complete a trip). This low service frequency limits the available transit options in Hillsborough County. In terms of service span, transit service is provided into the early or late evening (LOS B or C) for nearly 60 percent (57.8) of the analyzed trips. Thirty-five percent of analyzed trips receive daytime service (LOS D), while routes that have limited midday service serve the remaining trips.

Regarding service coverage, HART serves less than one fifth of the total land area of the county; however the coverage area includes 48.6 percent of the population and 60.8 percent of the jobs in the county. Almost 58 percent (57.9) of the area of the principal city (Tampa) is served by transit; this accounts for 67.4 percent of the population and 73.7 percent of the jobs in the City of Tampa. Seventy-five percent of the transit-supportive area in Hillsborough County is served by transit. This translates to LOS C.

As demonstrated in Table 12, level of service for transit travel time as compared to auto travel time is almost evenly distributed from LOS A through F. The analysis showed that transit service provides travel times of LOS D or better for 57.8 percent of the evaluated trips. However, 42.2 percent of transit trips have travel times that are "tedious" or "unacceptable to most riders" (LOS E or F). For the passenger loading measure, the field survey demonstrated all passengers had the option of sitting for 9 of the 12 surveyed trips.

Based on the limited field survey of Routes 12, 18 and 58LX in November 2004 and Routes 30 and 15 in January 2005, 11 of the 15 trips surveyed had an on-time percentage lower than 85 percent (LOS E or F). While the source of the delay should be studied and resolved, some of the differences in scheduled vs. actual arrival times may be rectified through the implementation of new schedules resulting from the HART Comprehensive Operational Analysis (COA).

The evaluation shows both strengths (hours of service, service coverage) and weaknesses (reliability, frequency) in the transit service currently provided in Hillsborough County. The variation in service levels provided for each measure point to the trade-off transit agencies must manage between providing coverage over a broad area with service span (hours of service) and frequency; while operating in mixed traffic (non-exclusive rights-of-way). Due to limited resources, it is challenging for agencies to provide exemplary service over all measures.

The results of the analysis point to a number of opportunities for improvement to the existing transit service in Hillsborough County. Various infrastructure enhancements could enrich the overall transit system and provide service improvements that would affect several of the

measures discussed in this evaluation. While financial constraints preclude a unilateral expansion of service to provide more frequent trips for all routes, enhancements such as transit exclusive rights-of-way, signal pre-emption or prioritization would likely improve the auto v. travel time LOS and the reliability LOS for HART vehicles.

A summary of results for all LOS measures ranked in order of the travel demand between each origin and destination pair is provided in Appendix A.

TABLE 12 – Summary of O-D Pairs at Each LOS Level

LOS	Frequency		Hours of Service		Transit v. Auto Travel Time		Service Reliability		Passenger Loading	
	No. Of O-D Pairs	Percent[1]	No. Of O-D Pairs	Percent[1]	No. Of O-D Pairs	Percent[1]	No. Of O-D Pairs	Percent[2]	No. Of O-D Pairs	Percent[3]
A	0	0%	0	0%	7	7.8%	0	0.0%	2	16.7%
B	0	0%	6	6.7%	15	16.7%	0	0.0%	2	16.7%
C	6	6.7%	46	51.1%	17	18.9%	2	13.3%	5	41.7%
D	43	47.8%	32	35.5%	13	14.4%	2	13.3%	2	16.7%
E	41	45.5%	6	6.7%	16	17.8%	3	20.0%	1	8.3%
F	0	0%	0	0%	22	24.4%	8	53.3%	0	0%

Source: Carter & Burgess, Inc. November 2004.

1 Expressed as a percentage of the 90 total O-D pairs

2 Expressed as a percentage of 15 surveyed O-D pairs. Includes surveys of Routes 12, 18 and 58LX (conducted November 2004); and Routes 15 and 30 (conducted January 2005).

3 Expressed as a percentage of 12 surveyed O-D pairs. The observations (3 observations) taken for the Route 30 in November 2004 were inconclusive due to the interlining of Route 30 with Route 6 at the chosen observation point. Surveyors were instructed to observe the Route 18 at this location, rather than the Route 6. Route 30 was re-surveyed for reliability by HART staff in January 2005 using the TQSE methodology. Route 30 was not re-surveyed for passenger loading.

Appendix A

Summary Results

TABLE A-1: SUMMARY RESULTS

Trip Rank	Origin	Destination	Daily Trips	Frequency	Hours of Service	Travel Time	Average Loading	Reliability
1	Town & Country	Westshore/Tampa Int'l. Airport	10,009	D	C	C		F
2	Westshore/Tampa Int'l. Airport	Town & Country	10,000	D	C	C		E
3	USF/Busch Gardens	Temple Terrace	7,143	C	C	B	B	
4	Temple Terrace	USF/Busch Gardens	7,133	D	C	A	A	
5	USF/Busch Gardens	New Tampa	5,703	D	C	A	A	D
6	New Tampa	USF/Busch Gardens	5,700	D	C	A	A	C
7	East Tampa	Downtown Tampa	4,338	C	B	B	A	F
8	Downtown Tampa	East Tampa	4,329	D	B	B	A	F
9	Downtown Tampa	Westshore/Tampa Int'l. Airport	3,566	D	C	B	A	F
10	Westshore/Tampa Int'l. Airport	Downtown Tampa	3,557	D	C	B		E
11	Downtown Tampa	USF/Busch Gardens	2,271	C	B	C	A	F
12	USF/Busch Gardens	Downtown Tampa	2,266	C	B	C	A	F
13	New Tampa	Temple Terrace	1,890	D	C	B	A	C
14	Temple Terrace	New Tampa	1,882	D	C	A	A	
15	East Tampa	Westshore/Tampa Int'l. Airport	1,860	D	C	D	A	F
16	Westshore/Tampa Int'l. Airport	East Tampa	1,853	D	C	C		D
17	Downtown Tampa	Town & Country	1,745	D	C	D		F
18	Town & Country	Downtown Tampa	1,722	D	C	D		E
19	East Tampa	USF/Busch Gardens	1,692	C	B	B		
20	USF/Busch Gardens	East Tampa	1,686	C	B	B		
21	Town & Country	USF/Busch Gardens	1,632	D	C	C		
22	USF/Busch Gardens	Town & Country	1,626	D	C	C		
23	USF/Busch Gardens	Westshore/Tampa Int'l. Airport	1,267	D	C	D		
24	Westshore/Tampa Int'l. Airport	USF/Busch Gardens	1,257	D	C	D		
25	Brandon	Temple Terrace	1,105	E	C	F		
26	Temple Terrace	Brandon	1,100	E	D	F		
27	USF/Busch Gardens	Brandon	1,077	D	D	F		
28	Brandon	USF/Busch Gardens	1,077	D	C	F		
29	Downtown Tampa	Brandon	1,057	E	C	B		

TABLE A-1: SUMMARY RESULTS (cont.)

Trip Rank	Origin	Destination	Daily Trips	Frequency	Hours of Service	Travel Time	Average Loading	Reliability
30	Brandon	Downtown Tampa	1,056	E	C	B		
31	Temple Terrace	East Tampa	983	D	C	D		
32	East Tampa	Temple Terrace	977	D	C	F		
33	East Tampa	Brandon	950	E	C	E		
34	Brandon	East Tampa	945	E	C	D		
35	Port of Tampa/Port Sutton	Downtown Tampa	918	E	D	A		
36	Town & Country	East Tampa	915	D	C	F		
37	East Tampa	Town & Country	909	D	C	E		
38	Downtown Tampa	Port of Tampa/Port Sutton	900	E	D	A		
39	Brandon	New Tampa	856	E	D	F		
40	New Tampa	Brandon	855	D	D	F		
41	Brandon	Westshore/Tampa Int'l. Airport	824	E	D	C		
42	Temple Terrace	Downtown Tampa	822	D	C	B		
43	Westshore/Tampa Int'l. Airport	Brandon	818	E	D	E		
44	Downtown Tampa	Temple Terrace	815	D	C	B		
45	Westshore/Tampa Int'l. Airport	Temple Terrace	774	D	C	E		
46	Temple Terrace	Westshore/Tampa Int'l. Airport	769	D	C	E		
47	Westshore/Tampa Int'l. Airport	MacDill Air Force Base	731	D	C	B		
48	MacDill Air Force Base	Westshore/Tampa Int'l. Airport	731	D	C	C		
49	Westshore/Tampa Int'l. Airport	New Tampa	676	D	C	D		
50	New Tampa	Westshore/Tampa Int'l. Airport	664	D	C	D		
51	Downtown Tampa	New Tampa	632	D	C	C		
52	New Tampa	Downtown Tampa	627	D	C	C		
53	Temple Terrace	Town & Country	591	D	C	F		
54	Town & Country	Temple Terrace	588	D	C	F		
55	East Tampa	Port of Tampa/Port Sutton	571	E	D	F		

TABLE A-1: SUMMARY RESULTS (cont.)

Trip Rank	Origin	Destination	Daily Trips	Frequency	Hours of Service	Travel Time	Average Loading	Reliability
56	Port of Tampa/Port Sutton	East Tampa	568	E	D	C		
57	Port of Tampa/Port Sutton	Brandon	498	E	D	B		
58	Brandon	Port of Tampa/Port Sutton	488	E	D	A		
59	Town & Country	New Tampa	456	D	C	E		
60	New Tampa	Town & Country	452	D	D	E		
61	New Tampa	East Tampa	430	D	C	C		
62	East Tampa	New Tampa	425	D	C	C		
63	Downtown Tampa	MacDill Air Force Base	413	E	D	C		
64	MacDill Air Force Base	Downtown Tampa	412	E	D	D		
65	Port of Tampa/Port Sutton	Westshore/Tampa Int'l. Airport	370	E	D	B		
66	Westshore/Tampa Int'l. Airport	Port of Tampa/Port Sutton	360	E	D	C		
67	MacDill Air Force Base	Town & Country	314	D	C	E		
68	Town & Country	MacDill Air Force Base	313	E	D	F		
69	Town & Country	Brandon	285	E	E	E		
70	Brandon	Town & Country	283	D	C	F		
71	Port of Tampa/Port Sutton	USF/Busch Gardens	211	E	D	D		
72	USF/Busch Gardens	Port of Tampa/Port Sutton	204	E	D	E		
73	Temple Terrace	Port of Tampa/Port Sutton	183	E	D	D		
74	Port of Tampa/Port Sutton	Temple Terrace	178	E	D	E		
75	MacDill Air Force Base	East Tampa	161	E	D	D		
76	East Tampa	MacDill Air Force Base	159	E	D	E		
77	Port of Tampa/Port Sutton	Town & Country	158	E	D	E		
78	Town & Country	Port of Tampa/Port Sutton	158	E	E	F		
79	MacDill Air Force Base	USF/Busch Gardens	152	E	D	F		
80	USF/Busch Gardens	MacDill Air Force Base	151	E	C	F		
81	New Tampa	Port of Tampa/Port Sutton	114	E	E	F		
82	Port of Tampa/Port Sutton	New Tampa	102	E	D	E		
83	MacDill Air Force Base	Brandon	83	E	D	E		
84	Brandon	MacDill Air Force Base	81	E	D	F		

TABLE A-1: SUMMARY RESULTS (cont.)

Trip Rank	Origin	Destination	Daily Trips	Frequency	Hours of Service	Travel Time	Average Loading	Reliability
85	Temple Terrace	MacDill Air Force Base	79	E	E	F		
86	MacDill Air Force Base	Temple Terrace	78	E	D	E		
87	New Tampa	MacDill Air Force Base	72	E	E	F		
88	MacDill Air Force Base	New Tampa	71	E	D	F		
89	Port of Tampa/Port Sutton	MacDill Air Force Base	48	E	E	F		
90	MacDill Air Force Base	Port of Tampa/Port Sutton	44	E	D	C		

TABLE A-2: CONNECTING ROUTES

ID	Origin	Destination	Connecting Route(s)	ID	Origin	Destination	Connecting Route(s)
1	Town & Country	Westshore/Tampa Int'l. Airport	30	*46*	Temple Terrace	Westshore/Tampa Int'l. Airport	57, 44
2	Westshore/Tampa Int'l. Airport	Town & Country	30	*47*	Westshore/Tampa Int'l. Airport	MacDill Air Force Base	89, 36
3	USF/Busch Gardens	Temple Terrace	6	*48*	MacDill Air Force Base	Westshore/Tampa Int'l. Airport	36, 30
4	Temple Terrace	USF/Busch Gardens	6	*49*	Westshore/Tampa Int'l. Airport	New Tampa	44, 18
5	USF/Busch Gardens	New Tampa	18	*50*	New Tampa	Westshore/Tampa Int'l. Airport	18, 44
6	New Tampa	USF/Busch Gardens	18	*51*	Downtown Tampa	New Tampa	18
7	East Tampa	Downtown Tampa	12	*52*	New Tampa	Downtown Tampa	18
8	Downtown Tampa	East Tampa	12	*53*	Temple Terrace	Town & Country	57, 41
9	Downtown Tampa	Westshore/Tampa Int'l. Airport	58	*54*	Town & Country	Temple Terrace	41, 57
10	Westshore/Tampa Int'l. Airport	Downtown Tampa	30	*55*	East Tampa	Port of Tampa/Port Sutton	12, 46
11	Downtown Tampa	USF/Busch Gardens	12	*56*	Port of Tampa/Port Sutton	East Tampa	46, 12
12	USF/Busch Gardens	Downtown Tampa	12	*57*	Port of Tampa/Port Sutton	Brandon	46
13	New Tampa	Temple Terrace	18, 57	*58*	Brandon	Port of Tampa/Port Sutton	46
14	Temple Terrace	New Tampa	57, 18	*59*	Town & Country	New Tampa	41, 18
15	East Tampa	Westshore/Tampa Int'l. Airport	12, 200X	*60*	New Tampa	Town & Country	18, 41
16	Westshore/Tampa Int'l. Airport	East Tampa	200X, 12	*61*	New Tampa	East Tampa	18, 12
17	Downtown Tampa	Town & Country	30	*62*	East Tampa	New Tampa	12, 18
18	Town & Country	Downtown Tampa	30	*63*	Downtown Tampa	MacDill Air Force Base	4
19	East Tampa	USF/Busch Gardens	12	*64*	MacDill Air Force Base	Downtown Tampa	4
20	USF/Busch Gardens	East Tampa	12	*65*	Port of Tampa/Port Sutton	Westshore/Tampa Int'l. Airport	46, 30
21	Town & Country	USF/Busch Gardens	16, 9	*66*	Westshore/Tampa Int'l. Airport	Port of Tampa/Port Sutton	30, 46
22	USF/Busch Gardens	Town & Country	9, 16	*67*	MacDill Air Force Base	Town & Country	36, 30
23	USF/Busch Gardens	Westshore/Tampa Int'l. Airport	44	*68*	Town & Country	MacDill Air Force Base	30, 36
24	Westshore/Tampa Int'l. Airport	USF/Busch Gardens	44	*69*	Town & Country	Brandon	30, 46
25	Brandon	Temple Terrace	31, 6	*70*	Brandon	Town & Country	46, 30
26	Temple Terrace	Brandon	6, 46	*71*	Port of Tampa/Port Sutton	USF/Busch Gardens	46, 12
27	USF/Busch Gardens	Brandon	12, 8	*72*	USF/Busch Gardens	Port of Tampa/Port Sutton	12, 46
28	Brandon	USF/Busch Gardens	46, 12	*73*	Temple Terrace	Port of Tampa/Port Sutton	6, 46
29	Downtown Tampa	Brandon	46	*74*	Port of Tampa/Port Sutton	Temple Terrace	46, 6

TABLE A-2: CONNECTING ROUTES cont.

ID	Origin	Destination	Connecting Route(s)	ID	Origin	Destination	Connecting Route(s)
30	Brandon	Downtown Tampa	46	*75*	MacDill Air Force Base	East Tampa	4, 12
31	Temple Terrace	East Tampa	6, 12	*76*	East Tampa	MacDill Air Force Base	12, 4
32	East Tampa	Temple Terrace	12, 6	*77*	Port of Tampa/Port Sutton	Town & Country	46, 30
33	East Tampa	Brandon	12, 31	*78*	Town & Country	Port of Tampa/Port Sutton	30, 46
34	Brandon	East Tampa	46, 12	*79*	MacDill Air Force Base	USF/Busch Gardens	4, 12
35	Port of Tampa/Port Sutton	Downtown Tampa	46	*80*	USF/Busch Gardens	MacDill Air Force Base	44, 36
36	Town & Country	East Tampa	34, 12	*81*	New Tampa	Port of Tampa/Port Sutton	18, 46
37	East Tampa	Town & Country	12, 34	*82*	Port of Tampa/Port Sutton	New Tampa	46, 18
38	Downtown Tampa	Port of Tampa/Port Sutton	46	*83*	MacDill Air Force Base	Brandon	4, 46
39	Brandon	New Tampa	31, 18	*84*	Brandon	MacDill Air Force Base	31, 4
40	New Tampa	Brandon	18, 8	*85*	Temple Terrace	MacDill Air Force Base	6, 4
41	Brandon	Westshore/Tampa Int'l. Airport	46, 30	*86*	MacDill Air Force Base	Temple Terrace	4, 23X
42	Temple Terrace	Downtown Tampa	6	*87*	New Tampa	MacDill Air Force Base	18, 4
43	Westshore/Tampa Int'l. Airport	Brandon	10, 46	*88*	MacDill Air Force Base	New Tampa	4, 18
44	Downtown Tampa	Temple Terrace	23X	*89*	Port of Tampa/Port Sutton	MacDill Air Force Base	46, 4
45	Westshore/Tampa Int'l. Airport	Temple Terrace	44, 57	*90*	MacDill Air Force Base	Port of Tampa/Port Sutton	4, 46

Appendix B
Transit Service Reporting Worksheets

MPO Name: Hillsborough County MPO
Fixed-Route Transit Provider(s) Name(s): HARTline
Staff Name: Phyllis Pacyna-Fleming
Staff Contact Telephone Number: (813) 272-5940
Report Title: Transit Quality of Service Evaluation
Data Collection Dates: October-November 2004

TABLE B-1
Activity Centers and Corresponding Trip-End Traffic Analysis Zones (TAZs)

Activity Center Name	TAZ
Downtown Tampa	380
Westshore/Tampa Int'l. Airport	298
USF/Busch Gardens	122
Port of Tampa/Port Sutton	357
MacDill Air Force Base	469
New Tampa	68
Brandon	616
Town & Country	133
Temple Terrace	241
East Tampa	337

TABLE B-2
Service Coverage Worksheet

	Percentage of Area Served	Percentage of Population Served	Percentage of Jobs Served
County	15.6%	47.4%	60.8%
Principal City	57.9%	67.4%	73.7%
Transit-Supportive Area	75.6%		
Service Coverage LOS	C		

TABLE B-3
Mobility Measures Worksheet A – Origin: Downtown Tampa

		Frequency		Hours of Service		Travel Times			
Destination	**Travel Demand (trips/h)**	**Travel Opps/h**	**LOS**	**Hours**	**LOS**	**Transit (min)**	**Auto (min)**	**Difference (min)**	**LOS**
Downtown Tampa									
Westshore/Tampa Int'l. Airport	346	2	D	15	C	21	18	3	B
USF/Busch Gardens	220	4	C	17	B	50	27	23	C
Port of Tampa/Port Sutton	87	1	E	12	D	15	18	-3	A
MacDill Air Force Base	40	1	E	13	D	51	23	28	C
New Tampa	61	2	D	15	C	60	39	21	C
Brandon	103	1	E	15	C	36	27	9	B
Town & Country	169	2	D	15	C	68	31	37	D
Temple Terrace	79	2	D	16	C	40	30	10	B
East Tampa	420	2	D	17	B	26	15	11	B

TABLE B-4
Mobility Measures Worksheet B – Origin: Westshore/Tampa International. Airport

		Frequency		Hours of Service		Travel Times			
Destination	**Travel Demand (trips/h)**	**Travel Opps/h**	**LOS**	**Hours**	**LOS**	**Transit (min)**	**Auto (min)**	**Difference (min)**	**LOS**
Downtown Tampa	345	2	D	15	C	21	18	3	B
Westshore/Tampa Int'l. Airport									
USF/Busch Gardens	122	2	D	16	C	71	30	41	D
Port of Tampa/Port Sutton	35	1	E	13	D	41	25	16	C
MacDill Air Force Base	71	2	D	15	C	37	22	15	B
New Tampa	66	2	D	15	C	85	42	43	D
Brandon	79	1	E	12	D	92	34	58	E
Town & Country	970	2	D	15	C	43	20	23	C
Temple Terrace	75	2	D	15	C	90	33	57	E
East Tampa	180	2	D	15	C	41	18	23	C

TABLE B-5
Mobility Measures Worksheet C – Origin: USF/Busch Gardens

		Frequency		Hours of Service		Travel Times			
Destination	**Travel Demand (trips/h)**	**Travel Opps/h**	**LOS**	**Hours**	**LOS**	**Transit (min)**	**Auto (min)**	**Difference (min)**	**LOS**
Downtown Tampa	220	4	C	18	B	55	28	27	C
Westshore/Tampa Int'l. Airport	123	2	D	16	C	70	31	39	D
USF/Busch Gardens									
Port of Tampa/Port Sutton	20	1	E	12	D	78	32	46	E
MacDill Air Force Base	15	1	E	14	C	108	40	68	F
New Tampa	553	2	D	15	C	10	20	-10	A
Brandon	104	2	D	13	D	105	30	75	F
Town & Country	158	2	D	14	C	58	28	30	C
Temple Terrace	693	3	C	16	C	15	12	3	B
East Tampa	164	3	C	17	B	35	23	12	B

TABLE B-6
Mobility Measures Worksheet D – Origin: Port of Tampa/Port Sutton

		Frequency		Hours of Service		Travel Times			
Destination	**Travel Demand (trips/h)**	**Travel Opps/h**	**LOS**	**Hours**	**LOS**	**Transit (min)**	**Auto (min)**	**Difference (min)**	**LOS**
Downtown Tampa	89	1	E	12	D	13	18	-5	A
Westshore/Tampa Int'l. Airport	36	1	E	12	D	39	26	13	B
USF/Busch Gardens	20	1	E	12	D	68	32	36	D
Port of Tampa/Port Sutton									
MacDill Air Force Base	5	1	E	11	E	114	30	84	F
New Tampa	10	1	E	12	D	91	39	52	E
Brandon	48	1	E	12	D	27	24	3	B
Town & Country	15	1	E	12	D	86	37	49	E
Temple Terrace	17	1	E	12	D	90	30	60	E
East Tampa	55	1	E	12	D	32	15	17	C

TABLE B-7
Mobility Measures Worksheet E – Origin: MacDill Air Force Base

		Frequency		Hours of Service		Travel Times			
Destination	**Travel Demand (trips/h)**	**Travel Opps/h**	**LOS**	**Hours**	**LOS**	**Transit (min)**	**Auto (min)**	**Difference (min)**	**LOS**
Downtown Tampa	40	1	E	13	D	56	23	33	D
Westshore/Tampa Int'l. Airport	71	2	D	14	C	43	22	21	C
USF/Busch Gardens	15	1	E	13	D	105	39	66	F
Port of Tampa/Port Sutton	4	1	E	12	D	58	30	28	C
MacDill Air Force Base									
New Tampa	7	1	E	13	D	115	51	64	F
Brandon	8	1	E	13	D	85	38	47	E
Town & Country	30	2	D	14	C	90	36	54	E
Temple Terrace	8	1	E	13	D	90	42	48	E
East Tampa	16	1	E	13	D	71	27	44	D

TABLE B-8
Mobility Measures Worksheet F – Origin: New Tampa

		Frequency		Hours of Service		Travel Times			
Destination	**Travel Demand (trips/h)**	**Travel Opps/h**	**LOS**	**Hours**	**LOS**	**Transit (min)**	**Auto (min)**	**Difference (min)**	**LOS**
Downtown Tampa	61	2	D	15	C	70	40	30	C
Westshore/Tampa Int'l. Airport	64	2	D	15	C	80	43	37	D
USF/Busch Gardens	553	2	D	15	C	10	20	-10	A
Port of Tampa/Port Sutton	11	1	E	10	E	138	40	98	F
MacDill Air Force Base	7	1	E	11	E	135	52	83	F
New Tampa									
Brandon	83	2	D	12	D	150	28	122	F
Town & Country	44	2	D	12	D	90	42	48	E
Temple Terrace	183	2	D	15	C	25	21	4	B
East Tampa	42	2	D	15	C	55	32	23	C

TABLE B-9
Mobility Measures Worksheet G – Origin: Brandon

		Frequency		Hours of Service		Travel Times			
Destination	**Travel Demand (trips/h)**	**Travel Opps/h**	**LOS**	**Hours**	**LOS**	**Transit (min)**	**Auto (min)**	**Difference (min)**	**LOS**
Downtown Tampa	102	1	E	16	C	37	27	10	B
Westshore/Tampa Int'l. Airport	80	1	E	12	D	63	34	29	C
USF/Busch Gardens	104	2	D	15	C	92	30	62	F
Port of Tampa/Port Sutton	47	1	E	12	D	24	24	0	A
MacDill Air Force Base	8	1	E	12	D	100	39	61	F
New Tampa	83	1	E	13	D	100	27	73	F
Brandon									
Town & Country	27	2	D	14	C	110	47	63	F
Temple Terrace	107	1	E	14	C	120	26	94	F
East Tampa	92	1	E	15	C	56	23	33	D

TABLE B-10
Mobility Measures Worksheet H – Origin: Town & Country

		Frequency		Hours of Service		Travel Times			
Destination	**Travel Demand (trips/h)**	**Travel Opps/h**	**LOS**	**Hours**	**LOS**	**Transit (min)**	**Auto (min)**	**Difference (min)**	**LOS**
Downtown Tampa	167	2	D	15	C	66	31	35	D
Westshore/Tampa Int'l. Airport	971	2	D	15	C	41	20	21	C
USF/Busch Gardens	158	2	D	16	C	55	28	27	C
Port of Tampa/Port Sutton	15	1	E	11	E	135	37	98	F
MacDill Air Force Base	30	1	E	12	D	128	36	92	F
New Tampa	44	2	D	15	C	95	42	53	E
Brandon	28	1	E	11	E	100	47	53	E
Town & Country									
Temple Terrace	57	2	D	14	C	117	31	86	F
East Tampa	89	2	D	15	C	100	29	71	F

TABLE B-11
Mobility Measures Worksheet I – Origin: Temple Terrace

		Frequency		Hours of Service		Travel Times			
Destination	**Travel Demand (trips/h)**	**Travel Opps/h**	**LOS**	**Hours**	**LOS**	**Transit (min)**	**Auto (min)**	**Difference (min)**	**LOS**
Downtown Tampa	80	2	D	15	C	37	30	7	B
Westshore/Tampa Int'l. Airport	75	2	D	15	C	85	33	52	E
USF/Busch Gardens	692	2	D	15	C	11	11	0	A
Port of Tampa/Port Sutton	18	1	E	12	D	73	30	43	D
MacDill Air Force Base	8	1	E	11	E	128	42	86	F
New Tampa	183	2	D	15	C	17	22	-5	A
Brandon	107	1	E	13	D	110	25	85	F
Town & Country	57	2	D	14	C	120	31	89	F
Temple Terrace									
East Tampa	95	2	D	15	C	55	21	34	D

TABLE B-12
Mobility Measures Worksheet J – Origin: East Tampa

		Frequency		Hours of Service		Travel Times			
Destination	**Travel Demand (trips/h)**	**Travel Opps/h**	**LOS**	**Hours**	**LOS**	**Transit (min)**	**Auto (min)**	**Difference (min)**	**LOS**
Downtown Tampa	421	3	C	17	B	20	15	5	B
Westshore/Tampa Int'l. Airport	180	2	D	14	C	54	19	35	D
USF/Busch Gardens	164	3	C	17	B	36	23	13	B
Port of Tampa/Port Sutton	55	1	E	12	D	83	15	68	F
MacDill Air Force Base	15	1	E	12	D	80	27	53	E
New Tampa	41	2	D	15	C	59	31	28	C
Brandon	92	1	E	14	C	80	23	57	E
Town & Country	88	2	D	14	C	78	29	49	E
Temple Terrace	95	2	D	15	C	84	21	63	F
East Tampa									

TABLE B-13
Passenger Loading Worksheet

		Vehicle Data				Count Data		Average Load			Maximum Load		
Origin	**Destination**	**Length (ft)**	**Width (ft)**	**Bus/ Rail**	**Number of Seats**	**APC/ Manual**	**Number of Trips Counted**	**Number of Passengers**	**Area per Passenger**	**LOS**	**Number of Passengers**	**Area per Passenger**	**LOS**
Town & Country	Westshore/Tampa Int'l. Airport	40	8.5	Bus	35	Manual	11	~~4.9~~	~~69.39~~	~~A~~	~~10~~	~~34.00~~	~~A~~
Westshore/Tampa Int'l. Airport	Town & Country	40	8.5	Bus	35	Manual	15	~~8.5~~	~~40.00~~	~~A~~	~~14~~	~~24.29~~	~~A~~
USF/Busch Gardens	Temple Terrace	35	8.5	Bus	33	Manual	15	30.4	9.79	B	58	5.13	E
Temple Terrace	USF/Busch Gardens	35	8.5	Bus	33	Manual	14	18.1	16.44	A	32	9.30	D
USF/Busch Gardens	New Tampa	40	8.5	Bus	35	Manual	15	13.7	24.82	A	24	14.17	B
New Tampa	USF/Busch Gardens	40	8.5	Bus	35	Manual	15	8.5	40.00	A	15	22.67	A
East Tampa	Downtown Tampa	40	8.5	Bus	35	Manual	14	16.8	20.24	A	27	12.59	C
Downtown Tampa	East Tampa	40	8.5	Bus	35	Manual	14	17.5	19.43	A	32	10.63	C
Downtown Tampa	Westshore/Tampa Int'l. Airport	35	8.5	Bus	33	Manual	11	10.3	28.88	A	15	19.83	B
Westshore/Tampa Int'l. Airport	Downtown Tampa	40	8.5	Bus	35	Manual	11	~~4.9~~	~~69.39~~	~~A~~	~~10~~	~~34.00~~	~~A~~
Downtown Tampa	USF/Busch Gardens	40	8.5	Bus	35	Manual	14	17.5	19.43	A	32	10.63	C
USF/Busch Gardens	Downtown Tampa	40	8.5	Bus	35	Manual	14	16.8	20.24	A	27	12.59	C
New Tampa	Temple Terrace	40	8.5	Bus	35	Manual	15	8.5	40.00	A	15	22.67	A
Temple Terrace	New Tampa	35	8.5	Bus	33	Manual	14	18.1	16.44	A	32	9.30	D
East Tampa	Westshore/Tampa Int'l. Airport	40	8.5	Bus	35	Manual	14	16.8	20.24	A	27	12.59	C

Strikethroughs indicate O-D pairs whose results were deemed inconclusive.

TABLE B-14
Service Reliability Worksheet

		Route Data	Count Data		On-Time Performance		
Origin	**Destination**	**Frequency (trips/h)**	**AVL/ Manual**	**Number of Trips Counted**	**Number of Not Late Trips**	**Percentage of Not Late Trips**	**LOS**
Town & Country	*Westshore/Tampa Int'l. Airport*	*2*	*Manual*	*11*	*9*	*60.0%*	*F*
Westshore/Tampa Int'l. Airport	*Town & Country*	*2*	*Manual*	*15*	*12*	*80.0%*	*E*
~~USF/Busch Gardens~~	~~Temple Terrace~~	~~2~~	~~Manual~~	~~15~~	~~15~~	~~100.0%~~	~~A~~
~~Temple Terrace~~	~~USF/Busch Gardens~~	~~2~~	~~Manual~~	~~14~~	~~4~~	~~26.7%~~	~~F~~
USF/Busch Gardens	New Tampa	2	Manual	15	13	86.7%	D
New Tampa	USF/Busch Gardens	2	Manual	15	14	93.3%	C
East Tampa	Downtown Tampa	3	Manual	14	9	64.3%	F
Downtown Tampa	East Tampa	3	Manual	14	7	50.0%	F
Downtown Tampa	Westshore/Tampa Int'l. Airport	2	Manual	12	0	0.0%	F
Westshore/Tampa Int'l. Airport	*Downtown Tampa*	*2*	*Manual*	*11*	*12*	*80.0%*	*E*
Downtown Tampa	USF/Busch Gardens	3	Manual	14	7	50.0%	F
USF/Busch Gardens	Downtown Tampa	3	Manual	14	9	64.3%	F
New Tampa	Temple Terrace	2	Manual	15	14	93.3%	C
~~Temple Terrace~~	~~New Tampa~~	~~2~~	~~Manual~~	~~14~~	4	~~26.7%~~	~~F~~
East Tampa	Westshore/Tampa Int'l. Airport	3	Manual	14	9	64.3%	F
Westshore/Tampa Int'l. Airport	*East Tampa*		*Manual*	*15*	*13*	*86.7%*	*D*
Downtown Tampa	*Town & Country*	*2*	*Manual*	*15*	*9*	*60.0%*	*F*
Town & Country	*Downtown Tampa*	*2*	*Manual*	*15*	*12*	*80.0%*	*E*

Strikethroughs indicate O-D pairs that were removed from the analysis due to detours on the connecting route.
Italics indicate routes surveyed January 2005. All other routes surveyed November 2004.

Appendix C
Service Coverage Analysis Maps

Figure C1: Transit Service Coverage Area

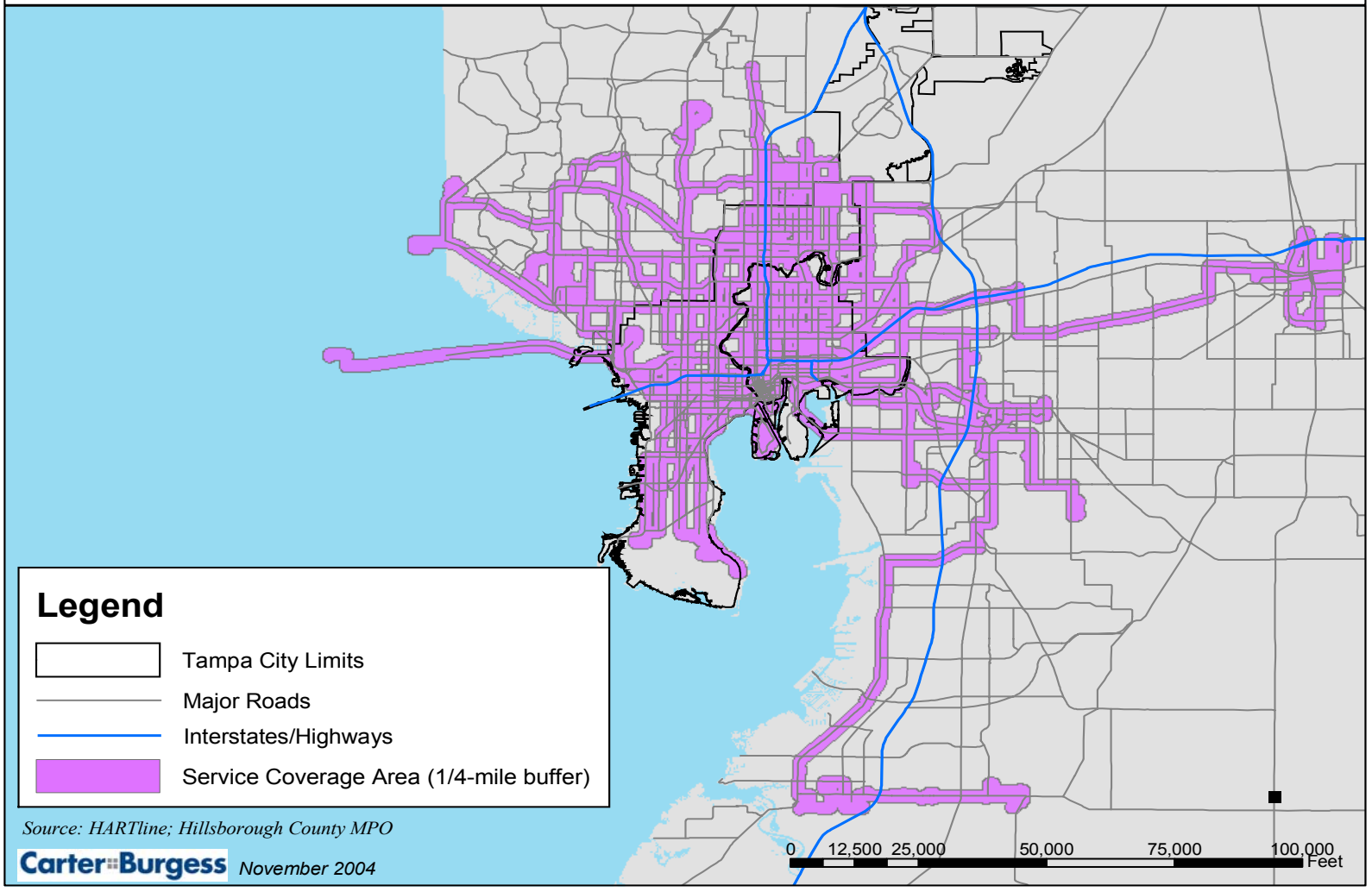


Figure C2: Transit-Supportive Areas

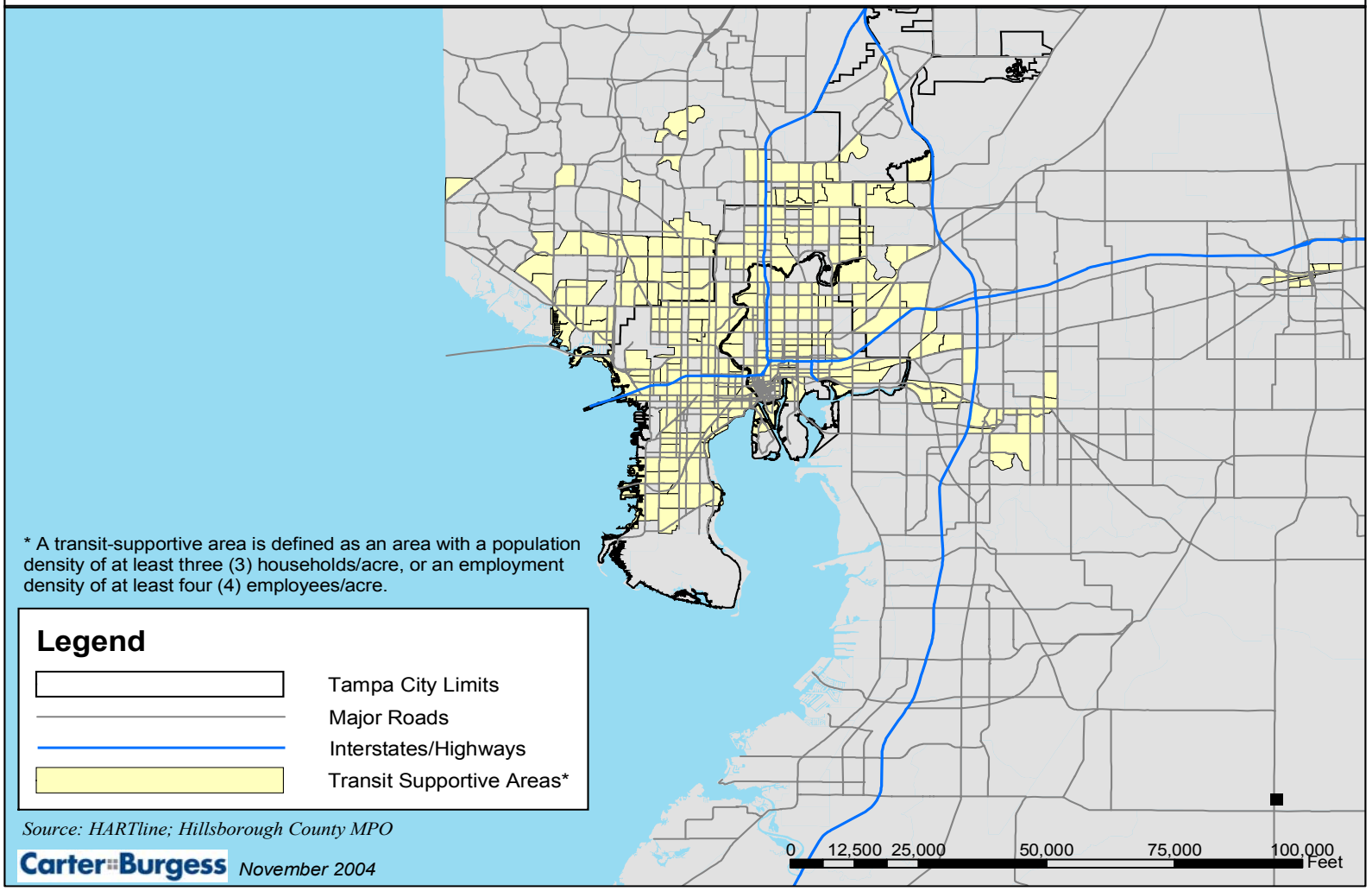
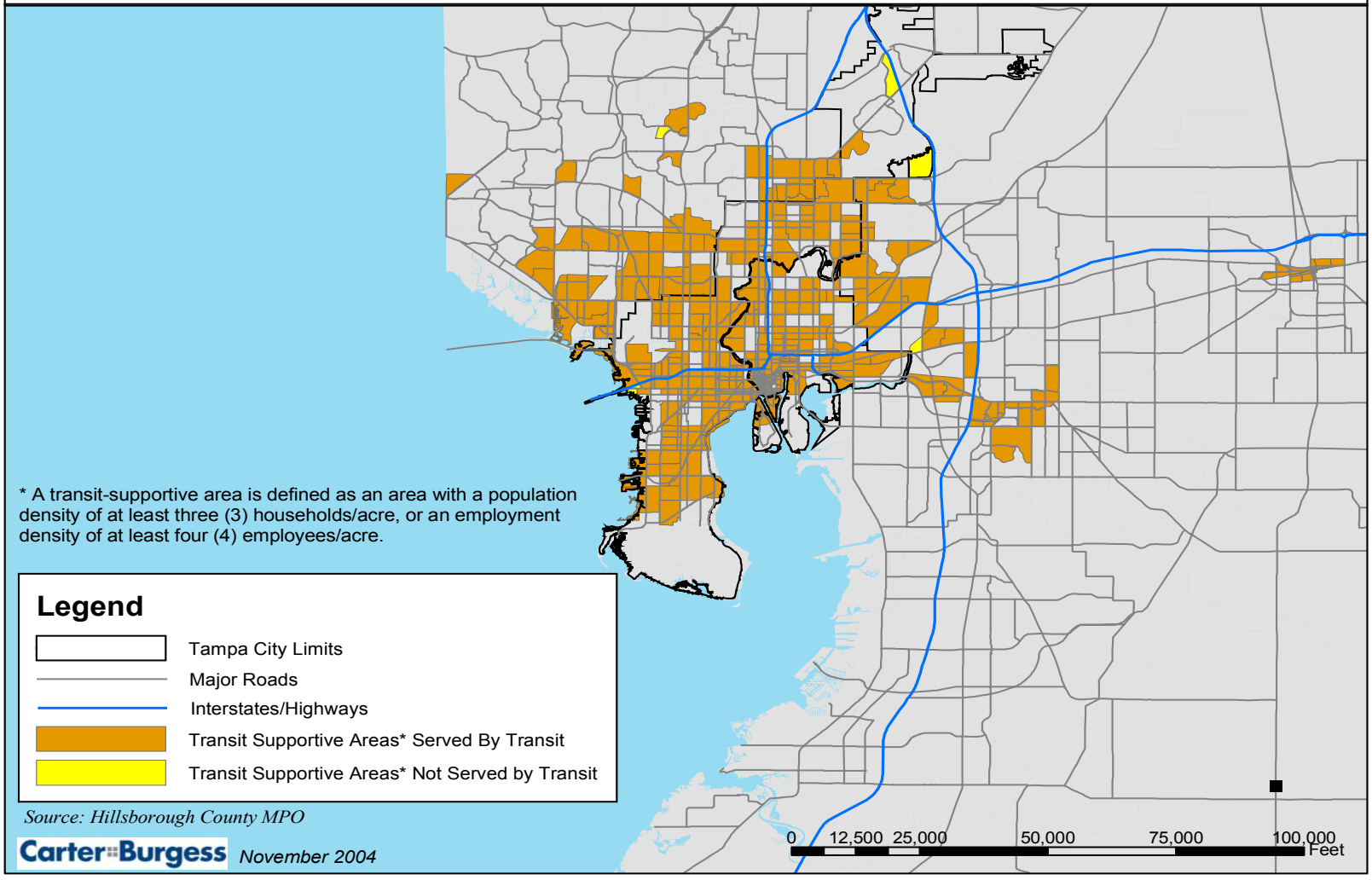


Figure C3: Transit-Supportive Areas Served by Transit



Appendix D
Passenger Loading/Reliability Field Survey Worksheets

FIELD SURVEY WORKSHEET

Route #: 6 NB
From: *Downtown Tampa* To: *UATC*
Max. Load Point: Fowler Ave. & 50th St.

Date	*Observation #*	*# of Passengers*	*Scheduled Arrival Time*	*Actual Arrival Time*
TUE 11/2/04	1	22	4:09	4:18
TUE 11/2/04	2	9	4:39	4:48
TUE 11/2/04	3	29	5:09	5:22
TUE 11/2/04	4	17	5:39	5:54
TUE 11/2/04	5	12	6:09	6:20
WED 11/3/04	6	21	4:09	4:20
WED 11/3/04	7	15	4:39	4:49
WED 11/3/04	8	15	5:09	5:19
WED 11/3/04	9	17	5:39	6:01
WED 11/3/04	10	10	6:09	6:26
THUR 11/4/04	11	-	4:09	No Show
THUR 11/4/04	12	32	4:39	4:22
THUR 11/4/04	13	12	5:09	4:47
THUR 11/4/04	14	26	5:39	5:18
THUR 11/4/04	15	16	6:09	5:54

FIELD SURVEY WORKSHEET

Route #: 6 SB
From: *UATC* To: *Downtown Tampa*
Max. Load Point: UATC

Date	***Observation #***	***# of Passengers***	***Scheduled Arrival Time***	***Actual Arrival Time***
TUE 11/2/04	1	19	4:05	4:07
TUE 11/2/04	2	45	4:35	4:37
TUE 11/2/04	3	16	5:05	5:07
TUE 11/2/04	4	24	5:35	5:39
TUE 11/2/04	5	26	6:05	6:07
WED 11/3/04	6	31	4:05	4:06
WED 11/3/04	7	58	4:35	4:39
WED 11/3/04	8	33	5:05	5:06
WED 11/3/04	9	28	5:35	5:35
WED 11/3/04	10	10	6:05	6:07
THUR 11/4/04	11	24	4:05	4:07
THUR 11/4/04	12	54	4:35	4:39
THUR 11/4/04	13	26	5:05	5:06
THUR 11/4/04	14	40	5:35	5:35
THUR 11/4/04	15	22	6:05	6:10

FIELD SURVEY WORKSHEET

Route #: 12 NB
From: *Downtown Tampa* To: *UATC*
Max. Load Point: 22nd Street and MLK Blvd.

Date	*Observation #*	*# of Passengers*	*Scheduled Arrival Time*	*Actual Arrival Time*
TUE 11/2/04	1	8	4:06	4:03
TUE 11/2/04	2	-	4:26	No Show
TUE 11/2/04	3	28	4:46	4:50
TUE 11/2/04	4	20	5:06	5:14
TUE 11/2/04	5	18	5:26	5:30
WED 11/3/04	6	26	4:06	4:12
WED 11/3/04	7	19	4:26	4:34
WED 11/3/04	8	32	4:46	5:08
WED 11/3/04	9	5	5:06	5:13
WED 11/3/04	10	12	5:26	5:28
THUR 11/4/04	11	5	4:06	4:04
THUR 11/4/04	12	27	4:26	4:33
THUR 11/4/04	13	12	4:46	4:48
THUR 11/4/04	14	10	5:06	5:08
THUR 11/4/04	15	23	5:26	5:33

FIELD SURVEY WORKSHEET

Route #: 12 SB
From: *UATC* To: *Downtown Tampa*
Max. Load Point: 22nd Street and MLK Blvd.

Date	*Observation #*	*# of Passengers*	*Scheduled Arrival Time*	*Actual Arrival Time*
TUE 11/2/04	1	27	4:10	4:30
TUE 11/2/04	2	12	4:30	4:35
TUE 11/2/04	3	17	4:50	4:52
TUE 11/2/04	4	10	5:10	5:15
TUE 11/2/04	5	9	5:30	5:30
WED 11/3/04	6	13	4:10	4:15
WED 11/3/04	7	27	4:30	4:37
WED 11/3/04	8	-	4:50	Bus broke down
WED 11/3/04	9	16	5:10	5:15
WED 11/3/04	10	22	5:30	5:48
THUR 11/4/04	11	24	4:10	4:18
THUR 11/4/04	12	20	4:30	4:43
THUR 11/4/04	13	10	4:50	4:50
THUR 11/4/04	14	10	5:10	5:12
THUR 11/4/04	15	18	5:30	5:32

FIELD SURVEY WORKSHEET

Route #: 18 NB
From: *Downtown Tampa* To: *UATC*
Max. Load Point: UATC

Date	*Observation #*	*# of Passengers*	*Scheduled Arrival Time*	*Actual Arrival Time*
TUE 11/2/04	1	11	4:20	4:20
TUE 11/2/04	2	12	4:50	4:44
TUE 11/2/04	3	10	5:20	5:29
TUE 11/2/04	4	14	5:50	5:56
TUE 11/2/04	5	9	6:20	6:22
WED 11/3/04	6	24	4:20	4:25
WED 11/3/04	7	14	4:50	4:49
WED 11/3/04	8	10	5:20	5:19
WED 11/3/04	9	21	5:50	5:52
WED 11/3/04	10	7	6:20	6:24
THUR 11/4/04	11	23	4:20	4:24
THUR 11/4/04	12	10	4:50	4:48
THUR 11/4/04	13	11	5:20	5:24
THUR 11/4/04	14	13	5:50	5:54
THUR 11/4/04	15	16	6:20	6:21

FIELD SURVEY WORKSHEET

Route #: 18 SB
From: *UATC* To: *Downtown Tampa*
Max. Load Point: UATC

Date	*Observation #*	*# of Passengers*	*Scheduled Arrival Time*	*Actual Arrival Time*
TUE 11/2/04	1	11	4:25	4:23
TUE 11/2/04	2	6	4:55	4:52
TUE 11/2/04	3	6	5:25	5:22
TUE 11/2/04	4	1	5:55	6:04
TUE 11/2/04	5	5	6:25	6:26
WED 11/3/04	6	14	4:25	4:24
WED 11/3/04	7	14	4:55	4:57
WED 11/3/04	8	9	5:25	5:24
WED 11/3/04	9	12	5:55	6:00
WED 11/3/04	10	7	6:25	6:25
THUR 11/4/04	11	15	4:25	4:25
THUR 11/4/04	12	13	4:55	4:54
THUR 11/4/04	13	4	5:25	5:27
THUR 11/4/04	14	6	5:55	5:57
THUR 11/4/04	15	5	6:25	6:24

FIELD SURVEY WORKSHEET

Route #: 30 EB
From: *Town 'N Country* To: *Downtown Tampa*
Max. Load Point: Marion St. @ Whiting St.[6]

Date	*Observation #*	*# of Passengers*	*Scheduled Arrival Time*	*Actual Arrival Time*
TUE 11/9/04	1	8	4:03	3:55
TUE 11/9/04	2	8	4:33	4:39
TUE 11/9/04	3	5	5:03	5:01
TUE 11/9/04	4	1	5:33	5:38
TUE 11/9/04	5	-	6:03	No Show
TUE 11/9/04	6	4	6:33	6:28
WED 11/10/04	7	10	4:03	3:58
WED 11/10/04	8	9	4:33	4:31
WED 11/10/04	9	2	5:03	4:55
WED 11/10/04	10	2	5:33	5:40
WED 11/10/04	11	1	6:03	6:06
WED 11/10/04	12	5	6:33	6:30

[6] Observations for the 30 eastbound route were made at the Marion Transit Center on November 9-10, 2004. An attempt was made to complete the survey at the maximum load point at Marion St. and Whiting St. from November 2-4, 2004; however, the field reviewer reported that the Route 30 eastbound buses never passed by this scheduled stop on these dates.

The above observations taken for the Route 30 are inconclusive due to the interlining of Route 30 with Route 6 at the chosen observation point. Surveyors were instructed to observe the Route 18 at this location, rather than the Route 6. This observation has been removed from the data tables, resulting in 13 observed routes, rather than 15.

FIELD SURVEY WORKSHEET

Route #: 30 WB
From: *Downtown Tampa* To: *Town 'N Country*
Max. Load Point: Marion St. @ Whiting St.[7]

Date	*Observation #*	*# of Passengers*	*Scheduled Arrival Time*	*Actual Arrival Time*
TUE 11/2/04	1	7	4:22	4:22
TUE 11/2/04	2	10	4:52	5:09
TUE 11/2/04	3	9	5:22	5:25
TUE 11/2/04	4	5	5:52	5:54
TUE 11/2/04	5	8	6:22	6:27
WED 11/3/04	6	8	4:22	4:24
WED 11/3/04	7	10	4:52	4:58
WED 11/3/04	8	13	5:22	5:28
WED 11/3/04	9	6	5:52	5:55
WED 11/3/04	10	4	6:22	6:16
THUR 11/4/04	11	6	4:22	4:20
THUR 11/4/04	12	13	4:52	4:54
THUR 11/4/04	13	14	5:22	5:28
THUR 11/4/04	14	11	5:52	6:05
THUR 11/4/04	15	4	6:22	6:24

[7] Observations for the 30 eastbound route were made at the Marion Transit Center on November 9-10, 2004. An attempt was made to complete the survey at the maximum load point at Marion St. and Whiting St. from November 2-4, 2004; however, the field reviewer reported that the Route 30 eastbound buses never passed by this scheduled stop on these dates.

The above observations taken for the Route 30 are inconclusive due to the interlining of Route 30 with Route 6 at the chosen observation point. Surveyors were instructed to observe the Route 18 at this location, rather than the Route 6. This observation has been removed from the data tables, resulting in 13 observed routes, rather than 15.

FIELD SURVEY WORKSHEET

Route #: 58LX WB
From: *Oldsmar Transfer Center* To: *Netp@rk Transfer Center*
Max. Load Point: Westshore Blvd. @ Cypress St.

Date	***Observation #***	***# of Passengers***	***Scheduled Arrival Time***	***Actual Arrival Time***
MON 11/1/04	1	14	4:53	5:01
MON 11/1/04	2	12 (see note)	5:28	5:38
MON 11/1/04	3	4	5:58	6:06
TUE 11/2/04	4	15	4:53	5:07
TUE 11/2/04	5	13	5:28	5:36
TUE 11/2/04	6	3	5:58	6:06
WED 11/3/04	7	14	4:53	5:03
WED 11/3/04	8	15	5:28	5:41
WED 11/3/04	9	3	5:58	6:06
THUR 11/4/04	10	14	4:53	5:04
THUR 11/4/04	11	14	5:28	5:36
THUR 11/4/04	12	4	5:58	6:06

Note: The bus did not stop at the actual stop (it stopped approximately 6 cars away from the stop); therefore an accurate count of passengers was not possible. The field reviewer counted approximately 12 passengers as the bus drove by.

FIELD SURVEY WORKSHEET

Route #: 30 EB
From: *Town 'N Country* To: *Downtown Tampa*
Max. Load Point: Kennedy Blvd. @ MacDill Ave. [8]

Date	*Observation #*	*# of Passengers*	*Scheduled Arrival Time*	*Actual Arrival Time*
TUE 1/25/05	1	17	4:05	4:06
TUE 1/25/05	2	16	4:35	4:37
TUE 1/25/05	3	12	5:05	5:09
TUE 1/25/05	4	17	5:35	5:43
TUE 1/25/05	5	20	6:05	6:07
WED 1/26/05	6	18	4:05	4:05
WED 1/26/05	7	23	4:35	4:36
WED 1/26/05	8	17	5:05	5:09
WED 1/26/05	9	15	5:35	5:37
WED 1/26/05	10	13	6:05	6:07
THUR 1/27/05	11	21	4:05	4:05
THUR 1/27/05	12	20	4:35	4:36
THUR 1/27/05	13	11	5:05	5:11
THUR 1/27/05	14	11	5:35	5:42
THUR 1/27/05	15	10	6:05	6:10

[8] Observations conducted on January 25-57, 2005.

FIELD SURVEY WORKSHEET

Route #: 30 WB
From: *Downtown Tampa* To: *Town 'N Country*
Max. Load Point: Kennedy Blvd. @ MacDill Ave. [9]

Date	*Observation #*	*# of Passengers*	*Scheduled Arrival Time*	*Actual Arrival Time*
TUE 1/25/05	1		4:03	4:07
TUE 1/25/05	2		4:33	4:38
TUE 1/25/05	3		5:03	5:11
TUE 1/25/05	4		5:33	5:35
TUE 1/25/05	5		6:03	6:12
WED 1/26/05	6		4:03	4:08
WED 1/26/05	7		4:33	4:36
WED 1/26/05	8		5:03	5:10
WED 1/26/05	9		5:33	5:49
WED 1/26/05	10		6:03	6:07
THUR 1/27/05	11		4:03	4:09
THUR 1/27/05	12		4:33	4:35
THUR 1/27/05	13		5:03	5:14
THUR 1/27/05	14		5:33	5:38
THUR 1/27/05	15		6:03	6:08

[9] Observations conducted on January 25-57, 2005. Passenger loading not recorded.

FIELD SURVEY WORKSHEET

Route #: 15 EB
From: *Westshore Plaza* To: *Netp@rk*
Max. Load Point: Columbus Dr. @ Florida Ave. [10]

Date	*Observation #*	*# of Passengers*	*Scheduled Arrival Time*	*Actual Arrival Time*
TUE 1/25/05	1	16	3:56	3:56
TUE 1/25/05	2	20	4:41	4:43
TUE 1/25/05	3	22	5:26	5:32
TUE 1/25/05	4	11	6:11	6:10
TUE 1/25/05	5	8	6:54	6:55
WED 1/26/05	6	15	3:56	3:55
WED 1/26/05	7	10	4:41	4:41
WED 1/26/05	8	15	5:26	5:33
WED 1/26/05	9	12	6:11	6:11
WED 1/26/05	10	13	6:54	6:54
THUR 1/27/05	11	11	3:56	3:55
THUR 1/27/05	12	13	4:41	4:41
THUR 1/27/05	13	12	5:26	5:31
THUR 1/27/05	14	7	6:11	6:10
THUR 1/27/05	15	15	6:54	6:55

[10] Observations conducted on January 25-57, 2005.

Appendix E

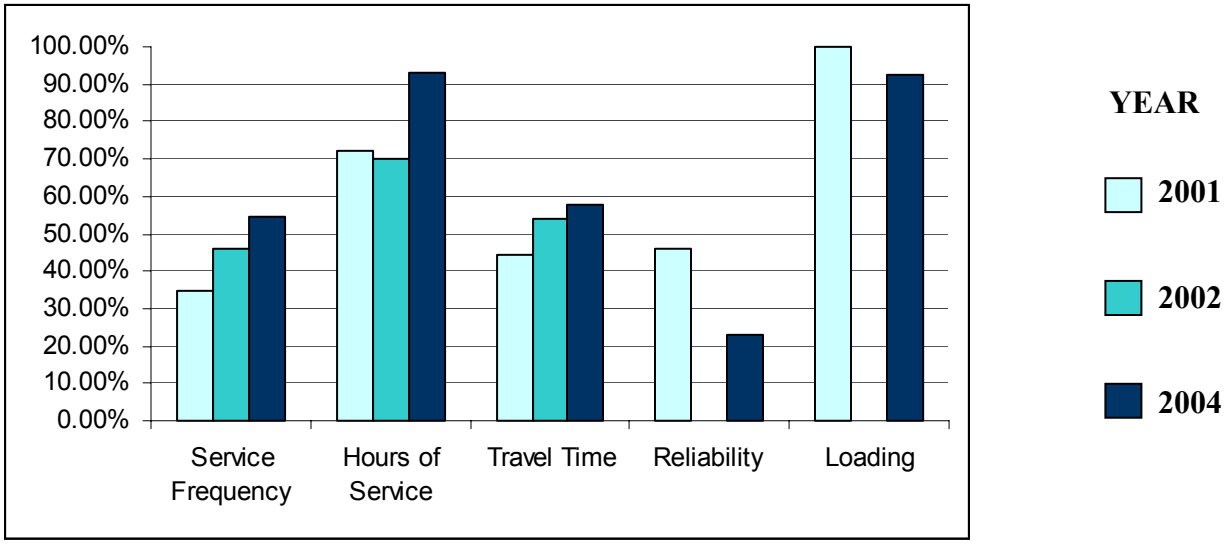
Comparison of Hillsborough County Transit Quality of Service Evaluations (2001-2004)

This section provides a brief comparison of the results of the three Transit Quality of Service evaluations that have been performed for Hillsborough County. The initial evaluation was performed in 2001, subsequent evaluations have been performed in 2002 and 2004. Variations in the evaluation procedure used for each evaluation should be noted:

- The activity centers used in the 2001 evaluation differ from those used in the other two evaluations.
- 90 O-D pairs were evaluated in 2001 and 2004; however, only 50 were evaluated in 2002. One activity center, New Tampa, was not studied in 2002 since it was not directly served by transit. This eliminated 18 O-D pairs from the analysis. Another 22 pairs were eliminated based on FDOT methodology, which called for trips to operate between 4 pm and 6pm.
- The 2002 evaluation did not include a field review assessment of passenger loading or reliability.
- The 2001 field review of passenger loading and reliability assessed 13 O-D pairs; the 2004 evaluation of the same measures assessed 15 pairs.

These differences hinder a full comparison between the three evaluations; however a broad comparison is provided. Figure E-1 graphically summarizes the comparison of the evaluations in for all measures, except for service coverage area, which is shown in Figures E-2 and E-3.

FIGURE E-1 Comparison of Hillsborough County Transit Quality of Service Evaluations Summary



Service Frequency

Table E-1: Service Frequency LOS Results for Hillsborough County

	2001 Evaluation		*2002 Evaluation*		*2004 Evaluation*	
LOS	**Number of O-D Pairs***	**Percentage of O-D pairs Evaluated**	**Number of O-D Pairs***	**Percentage of O-D pairs Evaluated**	**Number of O-D Pairs***	**Percentage of O-D pairs Evaluated**
A	1	1.1 %	0	0 %	0	0 %
B	1	1.1 %	1	2 %	0	0 %
C	14	15.6 %	3	6 %	6	6.7 %
D	15	16.7 %	19	38 %	43	47.8 %
E	41	45.6 %	26	52 %	41	45.5 %
F	18	20 %	1	2 %	0	0 %

Source: FDOT, Carter & Burgess, Inc. November 2004. Gannett Fleming, Inc. March 2002. URS Corp. June 2001.
* Expressed as a percentage of the 90 surveyed O-D pairs in 2001/04 and 50 O-D pairs in 2002.

The transit service frequency provided in Hillsborough County has shown improvement at each evaluation. In 2001, 34.5 percent of the evaluated O-D pairs had a service frequency of LOS D or better. That percentage improved to 46 percent and 54.5 percent in 2002 and 2004, respectively.

Hours of Service

Table E-2: Hours of Service LOS Results for Hillsborough County

	2001 Evaluation		*2002 Evaluation*		*2004 Evaluation*	
LOS	**Number of O-D Pairs***	**Percentage of O-D pairs Evaluated**	**Number of O-D Pairs***	**Percentage of O-D pairs Evaluated**	**Number of O-D Pairs***	**Percentage of O-D pairs Evaluated**
A	0	0 %	0	0 %	0	0 %
B	1	1.1 %	4	8 %	6	6.7 %
C	26	28.9 %	20	40 %	46	51.1 %
D	38	42.2 %	11	22 %	32	35.5 %
E	7	7.8 %	14	28 %	6	6.7 %
F	18	20 %	1	2 %	0	0 %

Source: FDOT, Carter & Burgess, Inc. November 2004. Gannett Fleming, Inc. March 2002. URS Corp. June 2001.
* Expressed as a percentage of the 90 surveyed O-D pairs in 2001/04 and 50 O-D pairs in 2002.

After a small decline in 2002, the hours of transit service has improved since 2001. In 2001, 71.2 percent of the evaluated O-D trips exhibited LOS D or better. The percentage of evaluated trips with hours of service LOS D or better dropped to 70 percent in 2002, and improved to 93.3 percent in 2004.

Service Coverage

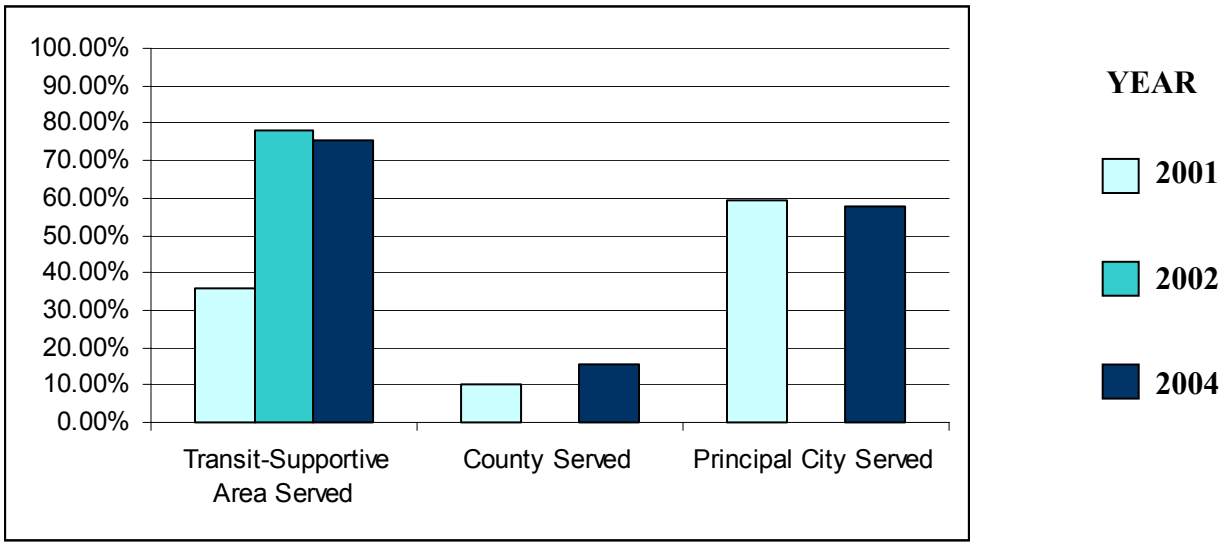
Table E-3: Service Coverage LOS Results for Hillsborough County

	2001 Evaluation	*2002 Evaluation*	*2004 Evaluation*
Transit-Supportive Area Served by Transit	35.7 %	78 %	75.6 %
Percentage of County Served by Transit	10.4 %	n/a	15.6 %
Percentage of Principal City Served by Transit	59.4 %	n/a	57.9 %

*n/a= Not Available
Source: FDOT, Carter & Burgess, Inc. November 2004. Gannett Fleming, Inc. March 2002. URS Corp. June 2001.

The service coverage area has improved since the initial evaluation of transit service in 2001. The percentage of transit-supportive area that is served by transit increased from 35.7 percent in 2001 to 75.6 percent in 2004. This difference improved the LOS for service coverage from LOS F to LOS C. A similar improvement can be observed in the percentage of the county served by transit between 2001 and 2004 – an improvement from 10.4 percent to 15.6 percent. There has been a slight decrease in the percentage of the service coverage area of the principal city (Tampa) between 2001 and 2004 – a drop from 59.4 percent to 57.9 percent. This decline in the percentage of the principal city served by transit may be a consequence of route adjustments designed to improve service to transit dependent populations in Hillsborough County.

FIGURE E-2: Service Coverage LOS Results for Hillsborough County



Transit vs. Auto Travel Time

Table E-4: Travel Time LOS Results for Hillsborough County

	2001 Evaluation		*2002 Evaluation*		*2004 Evaluation*	
LOS	**Number of O-D Pairs***	**Percentage of O-D pairs Evaluated**	**Number of O-D Pairs***	**Percentage of O-D pairs Evaluated**	**Number of O-D Pairs***	**Percentage of O-D pairs Evaluated**
A	4	4.4 %	0	0 %	7	7.8 %
B	8	8.9 %	6	12 %	15	16.7 %
C	14	15.6 %	7	14 %	17	18.9 %
D	14	15.6 %	14	28 %	13	14.4 %
E	11	12.2 %	14	28 %	16	17.8 %
F	39	43.3 %	9	18 %	22	24.4 %

Source: FDOT, Carter & Burgess, Inc. November 2004. Gannett Fleming, Inc. March 2002. URS Corp. June 2001.
** Expressed as a percentage of the 90 surveyed O-D pairs in 2001/04 and 50 O-D pairs in 2002.*

The transit vs. auto travel time provided in Hillsborough County has shown improvement at each evaluation. In 2001, 41.5 percent of the evaluated O-D pairs had a service frequency of LOS D or better. That percentage improved to 54 percent and 57.8 percent in 2002 and 2004 respectively.

Service Reliability

Table E-5: Service Reliability LOS Results for Hillsborough County

	2001 Evaluation		*2004 Evaluation*	
LOS	**Number of O-D Pairs***	**Percentage of O-D pairs Evaluated**	**Number of O-D Pairs***	**Percentage of O-D pairs Evaluated**
A	1	7.7 %	1	7.7%
B	0	0 %	0	0.0%
C	3	23.1 %	2	15.4%
D	2	15.4 %	0	0.0%
E	1	7.7 %	1	7.7%
F	6	46.2 %	9	69.2%

Source: FDOT, Carter & Burgess, Inc. November 2004. URS Corp. June 2001.
* Expressed as a percentage of the 13 surveyed O-D pairs in 2004 and 13 O-D pairs in 2001.

Service reliability has shown a decline since 2001. In 2001, 46.2 percent of the evaluated trips had LOS D or better, this percentage decreased to 23.1 percent in 2004. This issue may be rectified through the HART Comprehensive Operational Analysis (COA), which is currently being implemented in phases.

Passenger Loading

Table E-6: Passenger Loading LOS Results for Hillsborough County

	2001 Evaluation		*2004 Evaluation*	
LOS	**Number of O-D Pairs***	**Percentage of O-D pairs Evaluated**	**Number of O-D Pairs***	**Percentage of O-D pairs Evaluated**
A	13	100 %	3	23.1%
B	0	0 %	2	15.4%
C	0	0 %	5	38.5%
D	0	0 %	2	15.4%
E	0	0 %	1	7.7%
F	0	0 %	0	0.0%

Source: FDOT, Carter & Burgess, Inc. November 2004. URS Corp. June 2001.
* Expressed as a percentage of the 13 surveyed O-D pairs in 2004 and 13 O-D pairs in 2001.

Passenger loading, as shown from a customer perspective, has shown a decline since 2001. In 2001, 100 percent of the evaluated trips were operating at LOS A. In 2004, 92.4% of the trips operated at LOS D or better. From the transit agency's perspective, this means that the busses are operating with fewer empty seats.