Northeast Florida Rural Transit
Intelligent Transportation System (ITS)

Evaluation Plan

To

Volpe National Transportation Systems Center

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. . . Putting Technology To Work
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EXECUTIVE SUMMARY

The Northeast Florida Rural Transportation Intelligent Transportation System (ITS) project is a demonstration of ITS deployment in five rural Community Transportation Coordinator (CTC) agencies. The objective of the project is to test and evaluate the effectiveness of technologies including Geographical Information Systems (GIS), Global Positioning Satellite (GPS)–based Automatic Vehicle Location (AVL) systems, mobility management software applications (RouteLogic, MapInfo, etc), Mobile Data Terminals (MDTs), and electronic applications (e-mail, web-based information) for rural transportation operations. Specific problems to be addressed by the project are:

- Low productivity of paratransit services
- Need for increased administrative efficiencies
- Lack of inter-county trip coordination
- Lack of intra-county trip coordination
- High cost of long-distance, out-of-county trips.

The Florida Commission for the Transportation Disadvantaged is administering the project. Phase I, involving the Flagler, Putnam, and St. Johns CTCs, was initiated in 1998. In late 1999, Phase II was launched with the addition of the Marion and Alachua/Levy CTCs and Ocala/Marion's Metropolitan Planning Organization (MPO).

This report describes the approach to evaluating the success of the rural transportation ITS demonstration project. This evaluation is being conducted by Battelle under the direction of the Volpe National Transportation Systems Center with funding provided by the U.S. Department of Transportation Federal Highway Administration's Joint Program Office for ITS.

The evaluation goals, measures, and hypotheses to be tested are displayed in Table ES–1.

The evaluation will cover the timeframe prior to Phase I deployment through the end of Phase II, since most of the benefits will not be fully realized until after Phase II is complete. The evaluation will be based on data collection and analysis from the monthly, quarterly, and annual reports submitted by the five CTCs to the Commission. A second evaluation method will be to conduct interviews with operational personnel and to observe the paratransit systems. The primary components of the evaluation will include the staff interviews, a cost analysis, a transit operations analysis, and a review of institutional issues and lessons learned that may be applicable to other rural transit operations. Focus groups and a passenger survey are proposed as optional tasks.

Table ES-1. Northeast Florida Goals, Evaluation Measures, and Hypotheses

Goal Area	National ITS "Few Good Measures"	Surrogate or Alternative Measures	Hypotheses
Mobility	• Reduction in delay • Reduction in travel time variability • Improvement in customer satisfaction	• Average travel time or speed per trip • Advance time required to schedule trip • Pick-up window • Wait time for pick-up • Customers/trips served • Customer complaints	• Scheduling/routing efficiency will increase, thus: - Reducing trip times - Allowing trips to be scheduled with less advance notice - Decreasing the size of the pick-up window - Reducing pick-up wait time • More customers can be served (for a given cost) as a result of increased operating efficiencies • Improved level of service will reduce customer complaints
Efficiency	• Increases in throughput or effective capacity	• Coordination of out-of-county trips • Coordination of intra-county trips • Passenger trips per vehicle-hour • Passenger trips per vehicle-mile	• Coordination of out-of-county trips will reduce out-of-county vehicle trips, thereby freeing up vehicles for other service • CAD software will produce more efficient route designs for intra-county trips • Improved operating efficiencies will increase system throughput/capacity
Productivity	• Cost savings • Job satisfaction	• Staff time per task (calls, scheduling, etc.) • Cost per passenger-trip or passenger-mile • Cost per vehicle-hour • Number of trips shifted to fixed-route transit • Number of service routes • Reimbursement for human service contracted service • Staff acceptance	• Through more effective scheduling, dispatching, and fleet control, the overall staff time requirements and hence cost per unit of service provided will decrease • Because of better coordination, some trips or trip segments can be shifted to fixed-route transit, thus reducing system-wide costs • New software can show where additional service routes can be developed • New software can facilitate the billing and reimbursement for contracted trips • The APTS technologies will be viewed as beneficial by agency staff in assisting them with their jobs

1.0 INTRODUCTION

In March 1997, the Florida Commission for the Transportation Disadvantaged (Commission) submitted an application to the Federal Transit Administration (FTA) Office of Research, Demonstration and Innovation for a grant to oversee the installation and operation of a paratransit Intelligent Transportation System (ITS) in three northeast Florida rural Community Transportation Coordinator (CTC) agencies: Flagler, Saint Johns, and Putnam. The Commission was awarded a $200,000 grant in September 1997. The project entailed that the Commission facilitate the installation of ITS mobility management software and hardware in the CTCs and evaluate the impacts of the technology. The CTC in each County received start-up funding to purchase personal computers and to test ITS technologies including:

- Geographical Information Systems (GIS)
- Global Positioning Satellite (GPS)–based Automatic Vehicle Location (AVL) systems
- Mobility management software applications (RouteLogic, MapInfo, etc)
- Mobile Data Terminals (MDT)
- Electronic applications (e-mail, web-based information) for rural transportation operations.

Approximately two years into the project, FTA awarded the Commission expansion funding of an additional $200,000. The Commission chose to increase participation by including two CTCs in contiguous counties (Marion and Alachua/Levy) and to include welfare to work trips, connections to existing fixed routes in adjacent major employment and medical centers (Daytona, Gainesville, Jacksonville), and connection to other urban fixed routes that may be close by or in the same counties. Alachua/Levy chose to end its participation in the demonstration project in early 2001, and two additional CTCs may be added later this year. As other CTCs are added to or dropped from the project, the evaluators will analyze their progress to the extent possible.

Specific problems to be addressed by the project are:

- Low productivity of paratransit services
- Need for increased administrative efficiencies
- Lack of inter-county trip coordination
- Lack of intra-county trip coordination
- High cost of long-distance, out-of-county trips.

This report describes the approach to evaluating the results of the rural ITS demonstration project. Of evaluation interest is the impact of ITS features on mobility, efficiency, and productivity of rural paratransit service. It is hoped that by automating scheduling, dispatching, and fleet control, customer satisfaction will increase and costs per unit of service will decrease. In addition, through coordination of inter- and intra-county trips, these rural counties can better utilize vehicles and operators. Coordination with other counties can enable transfers at scheduled meeting points, and an earlier return to in-county service for some paratransit vehicles.

While achieving the evaluation objectives of assessing impacts of ITS on paratransit service delivery, the technical approach will also provide valuable information on the mechanisms for achieving these objectives. The evaluation study will answer such questions as "Which components of the systems being deployed are the most successful? What worked? What didn't work? How do the systems change traveler and operator behavior? Do these technologies improve service delivery to paratransit clients?"

These questions will be answered by examining trip data before and after implementation and interviewing the users of the ITS software (i.e., the schedulers, dispatchers, intake telephone operators, and drivers). Objective and subjective results will be studied and will be evaluated for each property. (It should be noted that some properties were semi-automated prior to the commencement of this project.) The evaluation strategy combines primary and secondary data collection and analyses for evaluating benefits and outcomes of this demonstration project. Of primary interest are the changes in ridership, productivity, and the cost per passenger trip. Analysis of the data and of the successes and challenges of this effort should provide valuable lessons for similar deployments elsewhere.

Included in this report is an overview of the paratransit ITS demonstration project in Chapter 2. Chapter 3 describes the evaluation goals and measures, and Chapter 4 outlines the technical approach to performing this evaluation. The work plan and responsibilities are described in Chapter 5. Chapter 6 includes the evaluation management plan.

The evaluation of the project is being conducted by Battelle under the direction of the Volpe National Transportation Systems Center with funding provided by the U.S. Department of Transportation Federal Highway Administration's Joint Program Office for ITS.

2.0 PROJECT OVERVIEW

2.1 Pre-Deployment Systems

The Florida Commission for the Transportation Disadvantaged coordinates human service transportation services in all 67 Florida counties. Each county has a designated Community Transportation Coordinator (CTC). The CTC is responsible for the actual arrangement or delivery of transportation services, which are funded in part through the state's Transportation Disadvantaged Trust Fund. The CTC, through a competitive procurement process, may contract with local transportation operators to serve transportation disadvantaged persons. While all counties have been successful in using the available funding sources to provide service, the funds are inadequate to meet all potential user needs, and each CTC must deny trips. The deployment of ITS is one innovative approach to increasing passenger trips and vehicle productivity.

All CTCs are required to submit an Annual Operating Report to the Commission, which produces an Annual Performance Report summarizing operating and financial information statewide and for each county. Performance measures related to cost, number of trips, vehicle operation, system safety, and local financial support are reported on a multi–year basis. The Commission reviews the data to ensure quality services are provided by the local CTC and to identify areas where technical assistance may be necessary.

The CTCs in each of the counties involved in this project are private non-profit organizations. Tables 1, 2, and 3 give examples of the types of summary data available for each CTC.

Table 1. Annual Passenger Trips by Type, 1998

County	Demand Response	Advance Reservation	Stretcher	School Board	Total
Alachua	7,410	171,453	6,400	4,400	189,663
Flagler	24,109	56,255	0	0	80,364
Marion	543	168,826	1,084	4,286	174,739
Putnam	45,652	72,891	614	640	119,797
Saint Johns	3,880	94,694	3,064	0	101,638
Total	81,594	564,119	11,162	9,326	666,201

Table 2. Annual Passenger Trips by Purpose, 1998

County	Medical	Education, Training, Daycare	Nutritional	Employ-ment	Life Sustaining	Other	Total
Alachua	79,658	62,589	7,587	22,760	17,070	0	189,664
Flagler	30,538	6,429	16,073	8,036	2,411	16,876	80,363
Marion	82,302	50,674	10,484	3,495	10,484	17,299	174,738
Putnam	34,253	33,712	1,512	24,067	7,405	18,848	119,797
Saint Johns	38,622	34,557	22,360	1,016	5,082	0	101,637
Total	265,373	187,961	58,016	59,374	42,452	53,023	666,199
Distribution	40%	28%	9%	9%	6%	8%	100%

Table 3. System Information, 1998

County	County Population	Annual Passengers	Vehicles	Com-plaints	Denials	No-Shows
Alachua	208,125	14,100	56	925	734	1,013
Flagler	41,190	2,145	20	0	0	1,663
Marion	237,204	6,235	68	67	26	12,957*
Putnam	70,243	4,546	35	2	3	1,362
Saint Johns	105,965	2,634	35	2	52	1,264

*This figure includes riders who cancelled in advance of a trip as well as true "no-shows."

Source, Tables 1–3: CTD 1999 Annual Performance Report

2.1.1 Alachua/Levy

Alachua County includes the City of Gainesville, the site of the University of Florida and several medical facilities. The CTC is Coordinated Transportation System, Inc. (CTS), which subcontracts to six paratransit service providers. CTS had used a transportation management software product called Dispatch Manager for its data base management. The product had many limitations with regard to scheduling and management. Many aspects of CTS's administration and operations, including scheduling, trip logging and reconciliation, accounting, and billing were performed manually or with outdated systems, with substantial duplicative effort. For example, a technical assistance operational study prepared by the CTD staff in February 1999 noted that the accounting clerk had to enter identical information three times because of stand–alone programs and the lack of an integrated system. All vehicle maintenance was tracked manually. The hardware in use included nine computers with 386 or 486 processors operating Windows 3.1.

CTS contractors operate 17 vehicles. Service is provided primarily Monday through Saturday from 4:30 a.m. to 10:00 p.m., but trips may be reserved at other times if necessary.

Fixed-route transit service in the City of Gainesville is provided by the Regional Transit System (RTS). The CTC cooperates with RTS through a bus pass program that promotes the use of fixed-route service for Medicaid and Transportation Disadvantaged customers instead of paratransit service.

CTS already had some measures in place for intercounty coordination when the ITS demonstration got underway. The Ride Solution, which provides service in neighboring Putnam County, operates as an alternative provider two days per week for Alachua County nursing home residents who require trips to dialysis clinics that are also the destination of Putnam County passengers. Similarly, the operators for Bradford, Dixie, Gilchrist, and Lafayette counties also transport dialysis patients to Alachua County daily, and they provide trips for Alachua passengers. The evaluation will document Alachua/Levy's progress while it participated in the demonstration project.

2.1.2 Flagler County

Flagler County contains no major city and no fixed route service. Parts of the county are rapidly gaining population. This situation has led to the development of service routes. The CTC is the Flagler County Council on Aging, Inc. and its Flagler County Transport (FCT) subsidiary. Through purchase agreements, FCT provides transit services to other human service agencies. Prior to the ITS project, FCT had more than eight administrative employees, accounting for more than 20 percent of labor costs. Although computers were available, functions were very paper intensive due to lack of appropriate software applications.

Flagler County Transport has a 21-vehicle fleet. Service operates Monday through Friday from 7:00 a.m. to 6:00 p.m. Weekend service is scheduled as required. Advance 24–hour reservations are necessary, although same-day service is accommodated if possible.

2.1.3 Marion County

Marion County includes the city of Ocala. The CTC is Marion County Senior Services, Inc. (MCSS). A MCSS subsidiary, Marion Transit, is the primary operator, and there are three subcontractors that provide overflow, evening, weekend, and stretcher trips. MCSS provides services funded by a variety of different sources. Prior to the ITS deployment, MCSS had a computerized system for reservations, but scheduling was manual. The transportation management software MCSS used had administrative and operational limitations that contributed to inefficiency and duplicative recording. The software was not Y2K compliant, and it was not adequate to promote growth in the system.

Fixed route bus service operated by SunTran began in December 1998. MCSS provides the Americans with Disabilities Act (ADA) complementary paratransit for SunTran, and screens

eligible Medicaid recipients for fixed-route system passes. MCSS has a bus pass agreement with SunTran as a way of encouraging passengers with the functional ability to use fixed-route services to do so.

Marion Transit operates a fleet of 35 vehicles. Service is primarily available daily from 9:00 a.m. to 3:00 p.m., although trips can be reserved for other times and on weekends.

2.1.4 Putnam County

The CTC is ARC Transit, Inc., a subsidiary of Putnam County Association for Retarded Citizens (ARC), doing business as Ride Solution. Ride Solution began the ITS project at a different developmental stage and in a different service environment than the other participants. It had a proprietary routing and scheduling software program, and its system was almost exclusively based on a service route delivery model. Ride Solution purchased GIS/GPS mobility management software and AVL and MDT technology for eight of its vehicles prior to this project deployment. It is expanding this program fleetwide as part of participation in the project, with the intent of gathering data and monitoring schedule adherence in order to enhance system productivity.

Ride Solution operates a fleet of approximately 35 vehicles. Service is available Monday through Friday from 8:00 a.m. to 5:00 p.m. Riders may request service until noon the workday prior to the trip requested, although same–day service is worked into the schedule if possible.

2.1.5 St. Johns County

The CTC is the St. Johns County Council on Aging, Inc., providing service as St. Johns County Transit. Prior to deployment of the ITS technology, all scheduling was done manually. The DOS–based transportation management software in use was inefficient and inadequate to do the job. The billing operation was complex and time-consuming. There was an informal and incomplete method of tracking trip denials and complaints.

St. Johns County Transit operates a 35–vehicle fleet and is the sole provider of transportation disadvantaged service. Service operates daily 24 hours a day, although the reservation line is available between 7:00 a.m. and 5:00 p.m.

2.2 ITS Deployment

2.2.1 Phase I

The first phase of the rural transit ITS demonstration project extended from October 1997, when the Commission was notified of the FTA grant award, through October 1999. During this phase, the project managers initiated start–up activities as follows:

- Conducted operational studies of the participating CTCs to review each system's strengths and weaknesses and to identify changes that needed to be made prior to the ITS technology deployments.

- Formalized the institutional arrangements among the project participants, evaluators, and Commission project managers. This effort resulted in a Memorandum of Understanding (MOU) established in October 1998 that defined the roles of the Commission, the three CTCs, and an independent evaluator.

- Identified needed reporting and billing enhancements to RouteLogic, the off–the–shelf routing and scheduling software, that would enable the participants to comply with the Commission's reporting requirements.

- Installed RouteLogic software at all three CTCs. One early objective of the demonstration was to determine the feasibility of inter–operability in the areas of scheduling, dispatching, and routing to facilitate inter–county coordinated trips among all participants. Flagler County had the software fully installed and operational by September 1998. St. Johns converted to RouteLogic in December 1998. Putnam County installed RouteLogic on a workstation by October 1998, in order to interface with the other participants. This focus shifted due to changes in Medicaid reimbursement requirements and other factors, but the evaluation will look into the project's effect on coordination of inter-county trips to the extent possible.

- Installed hardware and servers configured with Windows NT operating systems and upgrades to workstations as required.

- Facilitated training on RouteLogic software and on enhancements in new releases.

- Initiated procurement and installation of AVL units in Flagler and St. Johns Counties and of new AVLs in Putnam County. The deployment in Flagler and St. Johns is limited to a few vehicles used for out-of-county trips.

2.2.2 Phase II

Phase II of the ITS demonstration project was inaugurated in October 1999 with award of an additional $200,000 FTA grant to the existing participants and two new CTCs, Marion and Alachua/Levy. The scope of the project was expanded to encompass welfare–to–work trips and service links to existing fixed routes in adjacent urban centers (Daytona, Gainsville, Jacksonville, and other medical or employment centers). In this phase, the project advanced to full implementation. For the original participants, Flagler, St. Johns, and Putnam Counties, the funding was directed at additional hardware procurement and software upgrades. Flagler and St. Johns Counties also planned for the procurement of upgraded AVL/MDT units. (Putnam County initiated the procurement of AVL/MDT fleet-wide under Phase I, and the equipment was installed late in 2000).

Alachua/Levy and Marion Counties completed the procurement and installation of RouteLogic software and required hardware, including computers, monitors, back–up battery devices for all workstations, servers, printers and updated networking (to Windows NT). In addition, vendor training on RouteLogic took place in November and December 1999. Both counties began full implementation under the new system in January 2000. Flagler, St. Johns, and Putnam Counties provided a substantial amount of peer training and technical assistance on operation of the RouteLogic software and troubleshooting.

2.2.3 System Functionality

2.2.3.1 Communications. A variety of communication systems including radio, cell phone, e–mail, and web–based communications are being deployed by the participants in this project.

2.2.3.2 Computer Assisted Dispatching. Computer Assisted Dispatching (CAD) software makes it possible to display information such as vehicle status, condition, position, schedule adherence, operator, and incident information at the dispatcher's workstation. This software also can manage communications, assist the dispatcher in making operational decisions, and archive operational data for service planning or other transit agency needs. Putnam County is the only participant that is using CAD to the fullest. The other participants are using the RouteLogic software for mobility management functions such as scheduling, routing, and mapping.

2.2.3.3 Automatic Vehicle Location. Automatic vehicle location systems are computer–based vehicle tracking systems that use a positioning system (typically GPS) to monitor vehicle locations in real time. Vehicle location is determined by the AVL system and transmitted at regular intervals to the transit dispatch center. AVL systems minimize voice transmissions by providing data messages regarding vehicle status, operating condition, and location. During standard route operations, information is transmitted via a data channel. If the driver or dispatcher wishes to speak, the radio is switched to a voice channel. The systems allow paratransit operators to more efficiently plan schedules and routes and make real–time changes if necessary. As noted above, Putnam County was the one participant that had invested in AVL technology prior to the beginning of the transit ITS demonstration.

2.2.3.4 Geographical Information Systems. A Geographical Information System is a special type of computerized database management system that uses an electronic map and a relational database to make queries and selections of records based on both geographic proximity and attribute values. In transit, GIS can be used to display and analyze routes, on–time performance data, and origin and destination of paratransit clients. It can provide useful data for route planning, particularly for new services to link former welfare recipients with employers. MapInfo is the GIS partner to RouteLogic.

2.2.3.5 Mobile Data Terminals. A Mobile Data Terminal is a device installed on vehicles that displays short written dispatch messages. Mobile Data Terminals replace voice radio communication between the driver and the dispatcher except in emergencies or other exceptional cases. They can automatically send vehicle location, passenger counts, engine performance, mileage, and other information to the dispatch center. The driver can use function keys to send pre-recorded digital messages regarding vehicle and passenger status or to respond to questions or prompts displayed on the MDT screen. Thus, the MDT can virtually replace note-taking and written manifests and can transmit data for system-wide accounting and vehicle performance analysis. Only Putnam County has deployed this technology so far in the ITS demonstration project. Flagler and St. Johns Counties were still exploring MDT deployment.

3.0 EVALUATION GOALS AND MEASURES

The rural transit ITS demonstration project is an element of the U.S. Department of Transportation's national ITS program. As such, there are both national and local evaluation goals for the evaluation of the Rural ITS Project. National ITS evaluation guidelines specify a "few good measures" that can form a common basis for evaluating projects. At the local level, additional goals have been identified. The following sections describe these various goals.

3.1 National ITS Program Goals

The National ITS Program identifies five goal areas that ITS projects might address:

1. Improve the *safety* of the nation's surface transportation system
2. Enhance the personal *mobility* and the convenience and comfort of the surface transportation system
3. Increase the operational *efficiency* and capacity of the surface transportation system
4. Enhance present and future transportation *productivity*
5. Reduce *energy and environmental costs* associated with traffic congestion.

Three of these goal areas – mobility, efficiency, and productivity – are directly relevant to the rural transit ITS Project. Increased public transportation use may have impacts on safety and on energy and environmental costs, but these goals are not of primary concern in this evaluation.

The purpose of the "few good measures" identified in the National ITS program is to establish consistency and focus across evaluations of a wide range of ITS projects. Alternative or surrogate measures may also be defined based on the available data and expected benefits for a specific project. In the current evaluation, alternative measures are defined that relate specifically to the rural transit ITS Project.

3.2 Northeast Florida Rural ITS Project Goals

At project meetings on January 25, 1999 and July 19, 1999 participating agency representatives reviewed the experience of the three counties participating in Phase I and discussed the parameters of Phase II. In addition, the participants identified goals, measures, and benefits expected from Phases I and II and reviewed the proposed evaluation strategy. The following original goals for the project were identified:

- Increase the coordination of out-of-county trips
- Improve trip and labor productivity through the use of up-to-date management, dispatch, and scheduling software
- Reduce demand-response trips
- Increase trip capacity
- Reduce pick-up and wait time
- Reduce in-vehicle time

- Minimize customer complaints
- Identify lessons that may apply to other rural ITS deployments.

Prior to deployment, the counties had different operating circumstances and levels of automation. Local rules differed with respect to run cutting, route deviations, and demand response. All participants agreed that the addition of routing software would greatly increase their ability to control and forecast daily operations and to enable realistic estimates of coordinated out-of-county trips. The following potential project benefits were identified:

- Decreased out-of-county vehicle trips
- Increased service level of intra-county trips
- Decreased response time (smaller response window)
- Increased operating hours (added service where needed)
- Decreased administrative costs
- Increased riders per vehicle
- Better coordination of CTC routes with fixed routes (increase in transfers)
- Increased attractiveness of service to "choice" riders (increase in farebox revenues)
- More accurate and timely billing.

Table 4 combines the national and local objectives, the strategies to achieve them, and the measures that will be used in the evaluation to determine if the objectives have been met. The evaluation will also address changes in the project's objectives over time, such as the decreased emphasis on out-of-county trip coordination.

Table 4. Northeast Florida Goals, Evaluation Measures, and Hypotheses

Goal Area	National ITS "Few Good Measures"	Surrogate or Alternative Measures	Hypotheses
Mobility	• Reduction in delay • Reduction in travel time variability • Improvement in customer satisfaction	• Average travel time or speed per trip • Advance time required to schedule trip • Pick-up window • Wait time for pick-up • Customers/trips served • Customer complaints	• Scheduling/routing efficiency will increase, thus: - Reducing trip times - Allowing trips to be scheduled with less advance notice - Decreasing the size of the pick-up window - Reducing pick-up wait time • More customers can be served (for a given cost) as a result of increased operating efficiencies • Improved level of service will reduce customer complaints
Efficiency	• Increases in throughput or effective capacity	• Coordination of out-of-county trips • Coordination of intra-county trips • Passenger trips per vehicle-hour • Passenger trips per vehicle-mile	• Coordination of out-of-county trips will reduce out-of-county vehicle trips, thereby freeing up vehicles for other service • CAD software will produce more efficient route designs for intra-county trips • Improved operating efficiencies will increase system throughput/capacity
Productivity	• Cost savings • Job satisfaction	• Staff time per task (calls, scheduling, etc.) • Cost per passenger-trip or passenger-mile • Cost per vehicle-hour • Number of trips shifted to fixed-route transit • Number of service routes • Reimbursement for human service contracted service • Staff acceptance	• Through more effective scheduling, dispatching, and fleet control, the overall staff time requirements and hence cost per unit of service provided will decrease • Because of better coordination, some trips or trip segments can be shifted to fixed-route transit, thus reducing system-wide costs • New software can show where additional service routes can be developed • New software can facilitate the billing and reimbursement for contracted trips • The APTS technologies will be viewed as beneficial by agency staff in assisting them with their jobs

4.0 TECHNICAL APPROACH

4.1 General

The primary method of evaluation will be data collection and analysis from the monthly, quarterly, and annual reports submitted by the five CTCs to the Commission. The Commission also receives special reports for this project compiled by Flagler County Transit (FCT). A second evaluation method will be to conduct interviews with operational personnel and to observe the paratransit system. As an option, focus groups and surveys of passengers may be conducted. The primary components of the evaluation will include a cost analysis, a transit operations analysis, and a review of institutional issues and lessons learned.

In addition to the Volpe evaluation team, the Center for Urban Transportation Research (CUTR) at the University of South Florida and Harvard Design and Mapping are participating in evaluation efforts for other purposes. The Volpe team will coordinate with these other evaluations to the extent possible to avoid duplicative data collection efforts and to minimize the intrusion on the participating staff.

4.2 Timeframe

The evaluation will focus on the technologies that were implemented at the participating CTCs during the combined Phase I and Phase II timeframes. To the extent possible, for Flagler, Putnam, and St. Johns Counties (the three Phase I participants), the evaluation will assess conditions at three points: prior to Phase I (pre–1998), following Phase I implementation (basically 1999) and following Phase II implementation (basically 2000). For Alachua/Levy, Marion CTC, and Ocala/Marion MPO, which entered the project at Phase II, the evaluation will focus on conditions prior to January 2000 and following the first year of full implementation. If possible, the evaluation should extend into the 2002 period to assess ongoing trends.

It is recognized that Alachua/Levy and Marion CTCs and Ocala/Marion MPO were unable to make the same gradual transition to ITS deployment as the first three CTCs; therefore institutional and policy issues that affect these measures may be difficult to isolate, and should be taken into account.

4.3 Data Sources

4.3.1 Annual Data Reported to the Commission

Historic data collected and compiled by the Commission will serve as a baseline for this study. Phases I and II span three calendar years (1998–2000). Consideration will be paid to changes in demographics and population that could be confounding factors. User complaints, satisfaction, and perception of the implementing agencies will also be considered, particularly if the optional

focus groups and surveys are conducted. Table 5 gives an example of summary performance measures based on Commission reports covering Phase I of the project.

Table 5. Performance Measures:
Flagler, Putnam, and St. Johns Combined

	1996	1999	% change
Cost per vehicle mile	$0.77	$0.67	-13%
Cost per revenue mile	$0.61	$0.55	-10%
Cost per driver hour	$24.08	$27.44	14%
Trips per driver hour	2.57	3.24	26%
Labor as a % of total cost	45%	38%	-7%

Source: CTD Annual Performance Reports

4.3.2 Progress Reports

For this project, the five CTCs are providing progress reports to the Commission. The information provided in these reports includes ridership and trip characteristics including date, origin, destination, distance, sponsoring agency, and amount billed.

4.3.3 System Data

Each CTC has different service policies, vehicles, and resources. The system data will provide a pre- and post-implementation baseline for comparison of different properties.

4.3.3.1 Fleet Data. The fleet data will consist of a vehicle inventory specifying the ITS components installed on each vehicle.

4.3.3.2 Project Cost Data. Both initial and recurring project costs will be detailed. The initial costs include:

- Vehicle and control center hardware (GPS, servers, communications equipment)
- Software (RouteLogic, mapping, AVL)
- Installation
- Training
- Project coordination.

Recurring costs include:

- Hardware and software upgrades
- System maintenance
- Training.

4.3.3.3 Intra-County Trip Data. The evaluation will also measure changes in intra–county trips and the productivity of these trips. Data to be examined will include:

- Total intra–county trips
- Passenger trips per vehicle hour
- Passenger trips per vehicle mile
- Passenger travel time
- Operating costs.

4.3.3.4 Out-of-County Trip Data. One evaluation measure originally of interest was the coordination of out-of-county trips and the cost of providing these trips. As noted above, changes in the focus of this project and in Medicaid reimbursement policies have diminished the importance of this measure, but the evaluation will take these changes into account to the extent feasible. This part of the evaluation will require data on:

- Total out-of-county trips
- Coordinated out-of-county trips
- Passenger travel time
- Passenger trips per vehicle mile
- Passenger trips per vehicle hour
- Operating costs.

4.3.3.5 Interviews. Interviews will be conducted with key staff at all five agencies. Personnel to be interviewed include call takers, dispatchers, operations supervisors, drivers, project managers, and others as necessary. Questions will focus on operating demands, capabilities of staff, presence of automated scheduling tools before implementation, training, and availability of equipment. Agency staff will be asked to assess the extent to which each agency's expectations for the ITS deployment were met. The Volpe evaluation team will avoid duplicating interview questions asked by the other organizations. To the extent possible, results from those efforts will be used.

4.3.3.6 Optional Focus Groups and Surveys of Passengers. Focus groups, which are small group discussion sessions conducted by a trained facilitator, and passenger opinion surveys may be conducted if, following the agency interviews, the evaluation team determines that these mechanisms would yield sufficient additional information about the effects of the ITS deployment. If these activities are deemed not necessary, analysis of reported data (such as complaints and commendations) and the agency interviews results will be used to discern customer response to the ITS deployment.

4.4 Goal Areas

4.4.1 Mobility

Impacts. The rural transit ITS project is expected to improve mobility by introducing innovations in dispatching, scheduling, route planning, and communications. The use of scheduling and dispatching software is expected to increase the efficiency of passenger scheduling and vehicle routing. By reducing trip times, allowing more real–time scheduling and scheduling with reduced advanced notice, decreasing the size of the pick–up window and reducing pick–up wait times, more customers can be served and customer satisfaction will be improved. To the extent that AVL and MDT devices are deployed, the technology will enable dispatchers to observe real–time operating conditions and quickly communicate scheduling or routing modifications to operators. Over time, the ability of operators to analyze demand response service data can lead to the development of service routes.

Data Sources. It is expected that historical operating data on some mobility measures, such as advance time to schedule a trip, average pick–up window, customer/trip served, and customer complaints, may be available from the participating CTCs. If customer complaints are categorized (e.g. late pick–up, no shows), these data can indicate improvements that may be attributable to the transit ITS deployment. Each CTC reports general data to the Commission on total passengers served and unmet trip requests, which can be analyzed for changes over time. Other data, such as average travel time or speed per trip, are unlikely to be available. Interviews with agency staff will be necessary to obtain information on perceived improvements in this area. For Putnam County, it may be possible to obtain AVL data gathered prior to the Phase I deployment for an evaluation of changes in travel time or trip speed. Because the other participants have installed AVL technology in only a few vehicles, it is unlikely that they will have generated enough data to analyze, but interviews with agency staff can yield anecdotal information on benefits perceived or expected from the deployment in the future.

4.4.2 Efficiency

Impacts. The goal of efficiency is closely related to productivity, discussed below. The factors differentiating the two for these purposes are that efficiency focuses on external or passenger–related measures while productivity focuses more on internal or administrative measures.

The CAD software should produce more efficient route design for intra–county trips and may lead to the development of service routes. Overall operating efficiencies are expected to increase system capacity. Passenger trips per vehicle–mile and per vehicle–hour are expected to increase. The rural transit ITS deployment may also increase efficiency by improving communications and facilitating coordination of out–of–county trips, which should reduce out–of–county vehicle trips, thereby freeing vehicles for other service, although this is not a major focus of the project.

Data Sources. Each CTC records operating data including vehicle miles, hours, and passenger trips that are reported to the Commission. Coordinated out–of–county and intra–county trips

data should also be available from each CTC. Trends in these data can be analyzed over time to assess the impacts of the ITS deployment.

4.4.3 Productivity

Impacts. The ITS deployment is expected to affect capital and operating costs, staffing requirements, service availability (number of routes, number of trips), administrative functions (billing and reimbursement), and staff morale. The use of CAD software should lead to more effective scheduling, dispatching, and fleet control. Overall staff time requirements and cost per unit of service provided should thereby decrease. In addition, the software can facilitate the billing and reimbursements for contracted trips and improve cash flow. For those CTCs that have a fixed route provider in the area, or that provide some fixed route services, some trips or trip segments can be shifted away from demand response vehicles, reducing system wide costs. The GIS software can enhance route planning. Overall, the transit ITS technologies should be viewed as beneficial by agency staff in assisting them with their jobs.

Data Sources. Records of capital costs for all components of the transit ITS deployment and operating costs per passenger trip, per driver hour, and per total miles will be available from the CTCs and the Commission. These data will be analyzed to assess trends attributable to the ITS technology. Staff will be interviewed to obtain information on other costs related to the system, such as data transmission costs. Staff will also be asked to provide qualitative assessments of time spent on various tasks before and after the ITS deployment to determine the impacts of the system. Information on job satisfaction and the staffs' overall impression of the deployment's affect on transit operations will also be collected.

4.5 Other Issues

Other issues that are less directly tied to the ITS program goals, but that may affect the success of the project, will also be analyzed. These issues may include:

- The functionality of the ITS system (reliability, ease of use)
- Agreements and relationships with vendors
- Institutional arrangements among the participants that may have contributed to the successes and shortcomings of the project, and any lessons learned
- Local factors (e.g., seasonal travel variations, staffing changes).

These issues will be explored through quarterly progress reports and interviews and discussions with CTC and Commission staff.

5.0 WORK PLAN AND RESPONSIBILITIES

The work plan is divided into the following tasks:

- Task 1 – initial coordination
- Task 2 – interviews with staff
- Task 3 – analyze operating records
- Task 4 – analyze financial records
- Task 5 (optional) – focus groups and passenger surveys
- Task 6 – prepare draft and final Evaluation Report.

5.1 Initial Coordination

This task consists of meetings including the Volpe Center staff, the Commission staff, and the participants to discuss the current status of the project and to agree on the timeline and tasks to be performed to complete the evaluation. The Volpe evaluation team will travel to Northern Florida to initiate this effort. The outcome of this task is expected to be an agreement on the data available from each participant and the Commission, a list of staff to be interviewed, and a proposed schedule.

5.2 Interviews with Staff

Interviews with CTC and Commission staff will occur at several points during the evaluation and will provide qualitative information on the various benefits and impacts of the ITS deployment. Staff from Volpe and Battelle have already conducted preliminary interviews with staff to collect baseline information on operations prior to Phase I deployment and during the transition to Phase II. The next round of interviews should be conducted in 2001, and follow-up discussions may be required following the analysis of operating and financial records. As noted previously, the interviews will not duplicate work that CUTR and Harvard Design and Mapping have already completed.

The subtasks are to:

- Develop interview questions
- Schedule and conduct interviews and follow-up discussions
- Produce memorandum report documenting results.

5.3 Operating Records

This task entails the review and quantitative analysis of operating records from the participating CTCs. It requires the following subtasks:

- Review data agreed to in Task 1 for each CTC to determine format, contents, potential uses, and level of effort required for analysis.
- Develop a plan for any further data processing that may be required (e.g. geocoding of addresses from a sample of trips), as well as statistical analysis and tests of the data. This plan will be developed in part based on staff interviews indicating the types of benefits observed or expected from the ITS deployment. The appropriate tests and period of analysis will depend on the types of data. Ridership data, for example, should be analyzed for the three year period prior to Phase I, during the Phase I–Phase II three year period, and for at least a full year following Phase II, if possible.
- Perform data analysis.

5.4 Financial Data

This task entails the review and quantitative analysis of cost data from the participating CTCs. These data should be available from the financial records of each CTC, and it is unlikely that additional data processing or extensive statistical analysis should be necessary. This task requires the following subtasks:

- Review the data agreed to in Task 1 for each CTC to determine format, contents, potential uses, and level of effort required for analysis. It is expected that this data will be limited to capital costs, transit operating and maintenance costs, labor costs of specific staff positions, data transmission costs, and any outside labor related to the ITS deployment, such as training.
- Annualize the capital costs, based on assumptions regarding equipment lifecycles and interest rate, and summarize total annual capital and operating costs for Phases I and II of the ITS deployment.

5.5 Optional Focus Groups and Passenger Survey

The evaluation team, in conjunction with the Volpe Center and other participants, will assess the utility of conducting focus groups and a passenger survey on the impacts of the ITS deployment. If the CTC's have sufficient passenger opinion records (complaints and/or commendations, input from citizen advisory groups, etc.) it may not be necessary to expend the additional resources for these tasks. The evaluation team will make this determination following the staff interviews, when the type of passenger data available is better known. If more information is required, focus group sessions may be sufficient, without the follow-up of a widely distributed questionnaire. If both the focus groups and the questionnaire are necessary, the information gained in the focus groups will provide input for developing the survey questions.

5.6 Evaluation Report

The evaluation team will prepare a draft report and a final report. The report will describe the transit ITS demonstration project and summarize the methodologies and key findings of the evaluation tasks. To the extent possible, the report will synthesize the findings to describe the overall benefits and costs of the ITS deployment as a whole, and its individual components. The report will also summarize institutional issues that may have affected the benefits and costs of the project, and highlight lessons learned that may be of value to other rural transit systems contemplating a similar investment. Finally, the report will identify any areas in which continued changes in costs and benefits may be expected as a result of long–term impacts of Phases I and II.

6.0 EVALUATION MANAGEMENT PLAN

6.1 Organization and Responsibilities of the Evaluation Project Team

The evaluation of the Northern Florida Rural ITS Field Operational Test is being conducted by Battelle under the US DOT's Joint Program Office's IPAS contract. The Volpe Center is managing this evaluation for the Joint Program Office. Mr. Robert Casey is the Volpe Center Project Manager. Battelle will support the Volpe Center by gathering and analyzing system data and writing the evaluation report. Battelle's proposed resources for this project, excluding the optional focus groups and surveys, are shown in Table 6.

Table 6. Battelle Resources (excluding optional tasks)

Labor Category	Required Hours
Senior Staff	65
Mid-level Staff	453
Clerical Staff	70
Administrative Support	12
Total Hours	600

An additional 350 hours would be required to conduct approximately 5 focus group sessions and produce a summary report. A brief (approximately 10 questions) passenger survey that would be distributed on board vehicles and returned by mail would require an additional 250 hours for design, processing, and analysis.

6.2 Schedule of Milestones and Deliverables

Evaluation planning began in January of 1999, and will continue, along with baseline data collection, through 2001. A final report including Phases I and II will be published in mid-2002. The Battelle Team will evaluate Phase I and Phase II combined as a single project. A complete schedule is shown in Table 7.

Table 7. Schedule of Milestones and Deliverables

Milestones and Deliverables	1999				2000				2001				2002			
	1st qtr	2nd qtr	3rd qtr	4th qtr	1st qtr	2nd qtr	3rd qtr	4th qtr	1st qtr	2nd qtr	3rd qtr	4th qtr	1st qtr	2nd qtr	3rd qtr	4th qtr
Preliminary Evaluation Strategy	◆															
Evaluation Workshop			◆													
Draft Evaluation Plan						◆										
Final Evaluation Plan										◆						
Phase I	>	>	>	>												
Phase II					>	>	>	>	>	>	>	◆				
Data Collection	>	>	>	>	>	>	>	>	>	>	>	>				
Draft Evaluation Report														◆		
Final Evaluation Report															◆	