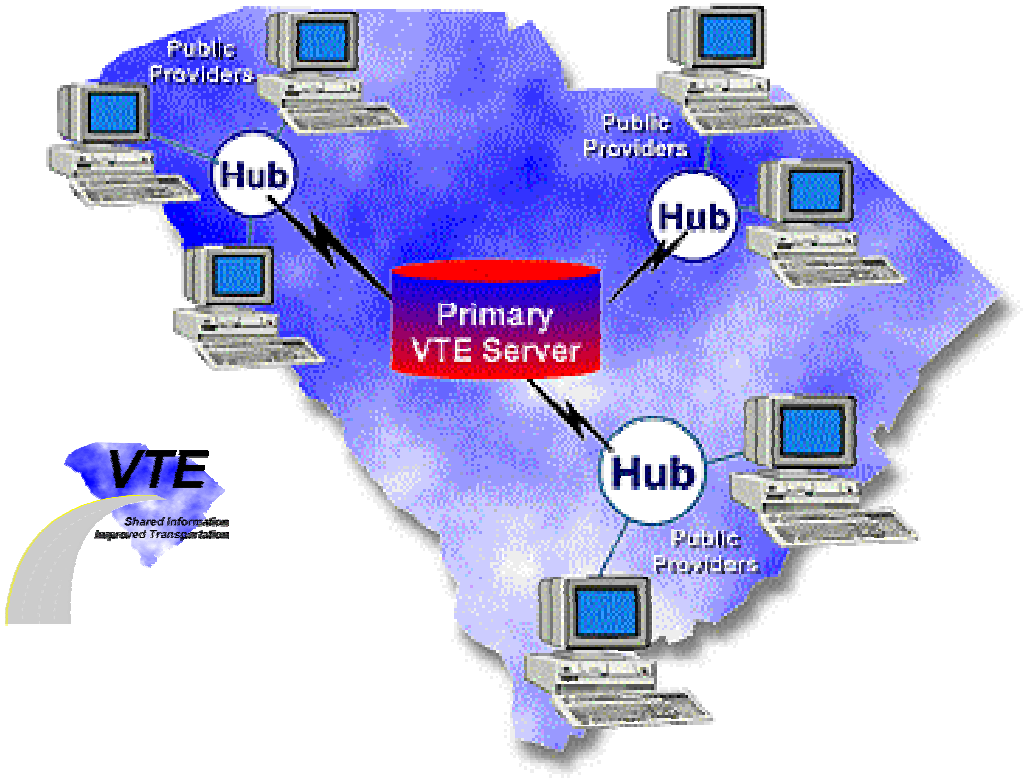
U.S. Department
of Transportation

FTA-SC-03-1002-05.1

Evaluation of South Carolina's Virtual Transit Enterprise



U. S. Department of Transportation
Federal Transit Administration
Office of Research, Demonstration, and Innovation

NOTICE

This document is disseminated under the sponsorship of the Department of Transportation in the interest of information exchange. The United State Government assumes no liability for its content or use thereof.

NOTICE

The United States Government does not endorse products or manufacturers. Trade or manufacturers' names appear herein solely because they are considered essential to the object of this report.

Evaluation of South Carolina's Virtual Transit Enterprise

Prepared by:

U. S. Department of Transportation

Research and Innovative Technology Administration

John A. Volpe National Transportation Systems Center

Cambridge, MA

Prepared for:

U. S. Department of Transportation

Federal Transit Administration

Office of Research, Demonstration, and Innovation

Washington, D. C.

REPORT DOCUMENTATION PAGE

Form Approved
OMB No. 0704-0188

PLEASE DO NOT RETURN YOUR FORM TO THE ABOVE ADDRESS.

1. REPORT DATE *(DD-MM-YYYY)*	2. REPORT TYPE	3. DATES COVERED *(From - To)*
09-09-2005	Final Report	1996 - 2005

4. TITLE AND SUBTITLE

Evaluation of South Carolina's Virtual Transit Enterprise

5a. CONTRACT NUMBER

NA

5b. GRANT NUMBER

NA

5c. PROGRAM ELEMENT NUMBER

NA

6. AUTHOR(S)

Judith C. Schwenk, DTS-49

5d. PROJECT NUMBER

NA

5e. TASK NUMBER

NA

5f. WORK UNIT NUMBER

NA

7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)

U. S. Department of Transportation
Research and Special Programs Administration
John A. Volpe National Transportation Systems Center
55 Broadway, Cambridge, MA 02142

8. PERFORMING ORGANIZATION REPORT NUMBER

DOT-VNTSC-FTA-05-09

9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)

U. S. Department of Transportation
Federal Transit Administration
Office of Research, Demonstration, and Innovation
400 7th Street, SW
Washington, D. C. 20590

10. SPONSOR/MONITOR'S ACRONYM(S)

FTA/TRI-12

11. SPONSOR/MONITOR'S REPORT NUMBER(S)

FTA-SC-03-1002-05.1

12. DISTRIBUTION/AVAILABILITY STATEMENT

Public distribution/availability.

13. SUPPLEMENTARY NOTES

14. ABSTRACT

The evaluation presents an assessment of South Carolina's Virtual Transit Enterprise (VTE) project up to February 2005. The VTE is a shared technology solution to bring the state's public transit providers together to solve mutual problems. The cornerstone of the project is a Web-based communication network through which transit providers and South Carolina Department of Transportation (SCDOT) access standardized software resources located in a central location. The VTE offers a variety of products to users: electronic invoicing, email, automated scheduling and dispatching, reporting, and vehicle maintenance management. The evaluation is being conducted as a requirement of the VTE grants that FTA awarded to SCDOT in FY1998 through FY2000. It tells the story of the VTE project implementation, determines how well the project meets the objectives of the sponsors and users, examines the effects of the projects on participants, determines how well the technology is performing, and enumerates lessons learned.

15. SUBJECT TERMS

Virtual Transit Enterprise, information technology, evaluation, public transit, technology sharing

16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT	18. NUMBER OF PAGES	19a. NAME OF RESPONSIBLE PERSON
a. REPORT	b. ABSTRACT	c. THIS PAGE			19b. TELEPHONE NUMBER *(Include area code)*
None	None	None	NA	72	

Reset

Table of Contents

Acknowledgements

A vast number of people contributed their time and knowledge to this report. Special thanks go to Helen Tann, the Federal Transit Administration's Project Manager, for her support and guidance throughout the study, to Bill Doyle, of PeJas, Inc., for sharing his insights into the Virtual Transit Enterprise project, and to the enthusiastic and dedicated employees of Generations Unlimited and the Santee Wateree Regional Transportation Authority: they all made the author's site visit to South Carolina memorable.

The author would like to acknowledge the following individuals for their assistance in the creation of this report:

Federal Transit Administration

Helen Tann, VTE Project Manager

South Carolina Department of Transportation

Glennith Johnson, Deputy Director of Mass Transportation

Steven Collins, Information Technology Manager

Michelle Rayford, Program Coordinator

Bill Doyle (PeJas, Inc.), VTE Project Manager

RouteMatch Software, Inc.

Joseph Hewes, Vice President

Wayne Stevens, Director of Implementation Services

Todd Allen, Business Development

Kurt Dossin, Massachusetts Representative

South Carolina Research Associates

Kathe Hansen, VTE Program Manager

Richard Rentz, Director Business Development

Linda Thomas, Director Contracts and Program Support

Tammy Simpo, VTE Technical Support

Santee Wateree Regional Transportation Authority
Ann August, Executive Director
Lottie Jones, Finance Director
Michelle Davis, Data Entry Supervisor
Sandy Jenkins, Operations Director
Florence Thomas, Account Manager
Pat Blanding, Scheduling Manager
Michael Jones, Customer Service Manager

Generations Unlimited
Edwina Creech, Financial Manager
Joyce Williams, Driver Manager

Spartanburg Regional Healthcare System
Jimmy Riley, Transportation Coordinator

B-C-D RTMA
William Hutto, Executive Director

Edgefield Senior Citizens Council
James Griffith

Bamberg Council on Aging
Carolyn Kinard, Executive Director
Kim Felder, Finance Director

Lowcountry Regional Transportation Authority
Rochelle Fergusen

Aiken Area Council on Aging
Scott Murphy, Executive Director

List of Acronyms

ABSS	Automated Business Systems and Services
AFC	Automated Fare Collection
AVL	Automatic Vehicle Location
CA	Computer Associates
COTS	Commercial-off-the-shelf
DHHS	Department of Health and Human Services
FOIA	Freedom of Information Act
FTA	Federal Transit Administration
FY	Fiscal Year
GIS	Geographical Information System
ISG	Integrated Solutions Group
ISTEA	Intermodal Surface Transportation Efficiency Act
IT	Information Technology
ITMO	Information Technology Management Office
MTO	Mass Transit Office
RFP	Request for Proposals
RTA	Regional Transportation Authority
RTR	Research, Trade-off and Recommendation Report
S&D	Scheduling and Dispatching
SC	South Carolina
SCDOT	South Carolina Department of Transportation
SCMTTC	South Carolina Mass Transportation Technology Committee
SCRA	South Carolina Research Authority
TASC	Transportation Association of South Carolina
TEA-21	Transportation Equity Act for the 21st Century
TRI-12	Service Innovation Team
US	United States
Volpe Center	John A. Volpe National Transportation Systems Center
VTE	Virtual Transit Enterprise

1. Introduction

Beginning in Fiscal Year 1998, the Intermodal Surface Transportation Efficiency Act (ISTEA) and its successor, the Transportation Equity Act for the 21st Century (TEA-21), authorized the Federal Transit Administration (FTA) to award capital grants to South Carolina Department of Transportation (SCDOT) for the development of the Virtual Transit Enterprise (VTE) project, a shared technology solution to bring the state's public transit providers together to solve mutual problems. As part of the grant requirements, the FTA is administering on behalf of SCDOT an evaluation of the VTE project to provide the lessons learned in South Carolina to other states considering such an undertaking.

This report presents an assessment of the VTE project up to February 2005. Section 2. Background describes the VTE concept and its evolution, the environment in which it is being implemented, and the participants. Section 3. Evaluation gives an overview of the evaluation methodology, tells the story of the VTE project development, examines its impacts on the public transit providers, transit users and the SCDOT, and identifies lessons learned.

2. Background

2.1 The VTE Vision

2.1.1 Definition of a "Virtual Enterprise"[1]

The virtual enterprise concept takes advantage of the economies of scale that result when a group of independent, self-sufficient organizations with common purposes share information technology (IT) resources rather than duplicating high-cost technological investments at numerous locations. A virtual enterprise works best when the individual organizations have a common type of business, are geographically dispersed with limited competition with each other, have mutual respect for each other, and are motivated to reduce IT infrastructure costs through standardization and increase revenue through integrated services among members. The enterprise is virtual because the organizations communicate and share information with each other and conduct their business from remote sites using Web-based communications with standardized software and hardware infrastructure resources located in a central location.

2.1.2 Evolution of VTE from Concept to Project

In February 1996 South Carolina formed the South Carolina Mass Transit Technology Committee (SCMTTC) with representatives from the SC Division of Mass Transit, several regional transportation authorities, a social service transportation provider, and the South Carolina Research Authority (SCRA), a not-for-profit research organization. The committee's goal was to "enhance the awareness of information technology in South Carolina's mass transit agencies and to effectively implement the appropriate systems to benefit the users of public transportation."[2] During 1996 the SCMTTC conducted a survey of urbanized and rural mass transit providers to determine their IT capabilities, resources, desires and concerns. This survey made it apparent that the providers lacked the resources to research the IT market and evaluate products, lacked the funds to invest in these resources, and lacked the technical expertise to implement the IT solutions.

The committee drafted the concept for the South Carolina Virtual Transit Enterprise. Throughout 1997 the SCMTTC briefed FTA representatives, Congressional staffers, and elected SC representatives to the US Congress on the need for support for the IT-related endeavors embodied in VTE. As a result, $1 million for the VTE project was included in Fiscal Year (FY) 1998 ISTEA appropriations. Later that year, two additional VTE grants for FY 1999 and FY 2000 were included in the TEA-21 legislation, bringing the total federal support to $3.31 million. The grants stipulated an additional 20 percent SCDOT match, resulting in a total budget for the VTE project of $3.97 million.

[1] Primary source of information for this section: http://isg-scra.org/transit/srts/srts-VTEProject.html.
[2] Source: Slides from January 21, 1998 briefing to the SCMTTC.

2.1.3 VTE Goals

The main goal of the VTE project was to improve the efficiency and effectiveness of rural public transit providers through the use of state-of-the-art information technology. In particular, VTE was to:

- make available to smaller public providers the same modern resources as large providers;
- provide more timely and accurate planning and reporting via electronic means to reduce overhead and turnaround time;
- minimize cost of implementing computer technology as well as total cost of ownership over the product life cycle; and
- optimize transportation runs and routes to make transit more flexible and responsive.

As a result, VTE would increase transit ridership through increased rider satisfaction, and improve mobility particularly for transit-dependent people, disabled persons, and Welfare-to-work participants.

SCDOT expected the VTE system to serve as a working model for other states and transit agencies with transportation problems similar to those of South Carolina. They intended to market the proven VTE concept to produce royalties as a return on the VTE development investment.

2.1.4 VTE Project Elements[3]

The cornerstone of the VTE project was to be a centralized computer hardware and software system that would be shared by many satellite users, that is, the transit public providers and SCDOT. The means of linking the satellite sites and the central server would be the Internet. The centralized system would allow SCDOT to access the operating and vehicle statistics of all the public providers in a common format for ease of reporting, thereby saving time and money for all involved. The candidate applications to be considered for the VTE are listed below:

- Enabling Technology Categories
    - networking and communications
    - electronic mail (email)
    - Internet access and browsers
    - groupware
    - database management
    - development and system administration tools
    - firewalls and security
    - VTE Internet interface
- Functional Categories
    - vehicle maintenance management
    - vehicle and parts marketplace
    - accounting and invoicing
    - reporting
    - procurement management

[3] Presentation slides from SCMTCC meeting, January 21, 1998.

- inventory/material management
- electronic commerce and electronic data interchange
- electronic grant making
- automatic vehicle location (AVL)/global positioning
- scheduling and dispatching
- transportation operations management

The computer hardware and software design would have the following traits:

- "Plug and Play" architecture, that is, the ability to add commercial off-the-shelf (COTS) application components as needed
- unrestricted access, that is, the capability for system users to access the system at any time
- scalability, that is, the ability to add users without undue expense
- Year 2000 compliance
- user friendly and easy to use
- firewall and security of data
- capability to incorporate "legacy" data, that is, data from former systems
- return on investment / payback
- disaster recovery functionality
- provide for private or for-profit providers to pay for VTE access
- remote access
- speed, performance and consistency

The original plan was for the VTE system to be developed and implemented in three phases, each of one year's duration. The first phase would encompass the assessment of the transit public providers' requirements and the system design. The second phase would install the central hardware and software, establish the communications network, and test the system on several public providers and SCDOT. The third stage would roll the system out to the remaining public providers.

2.2 Site Description

2.2.1 Geographic Setting

The State of South Carolina with an area of approximately 31,000 square miles is the 40th largest state in the US. As shown in Figure 1, its southeastern coastal plain on the Atlantic Ocean gives way to rolling hills in the central part of the state and the Blue Ridge Mountains in the northwest.

Major population centers include Greenville County in the northwest, Richland County in the center of the state including the state capital of Columbia, and Charleston County on the southern coast. The largest cities are Columbia with a 2000 population of 116,278, Charleston with a population of 96,650, North Charleston with a population of 79,641, and Greenville with a population of 56,002. Over half of the state's 46 counties have population densities of fewer than 75 people per square mile.

Figure 1. Map of South Carolina[4]

2.2.2 Demographics

South Carolina's approximately 4 million inhabitants have a higher home ownership rate than the rest of the US (72 percent vs. 66 percent), but also have a higher poverty rate (14 percent vs. 12 percent) and a lower high school graduation rate (76 percent vs. 80 percent). In this largely rural state, many workers have named transportation as one of the top problems in getting to their jobs.

2.2.3 Transit Profile[5]

The Mass Transit Office of SCDOT provides statewide transportation planning, research, technical assistance and training, coordinates mass transit projects statewide, administers state and federal assistance programs, and evaluates existing and proposed programs. The office works with county and local governments to meet the mobility needs of citizens dependent on mass transit.

Eighteen general public transportation coordinators operate at varying levels in 33 of the state's 46 counties and receive some form of funding from SCDOT.[6] Some of these coordinators operate as rural service systems under the Non-urbanized Area Formula Grant Program. However, many of the transportation systems also operate as regional

[4] Source: http://en.wikipedia.org/wiki/Image:National-atlas-south-carolina.PNG
[5] See Appendix A for a more detailed profile of South Carolina mass transit, including its history and funding.
[6] Primary source: http://www.dot.state.sc.us/getting/MT_coordinators.html

transportation authorities under South Carolina's Regional Transportation Authority (RTA) Law. RTAs operate across multiple counties, while other public operators generally operate in more limited areas. Together the public providers operate over 1500 vehicles and employ over 800 people.

Services offered by these public coordinators include commuter, fixed route, or demand response services, or some combination these. Commuter services in South Carolina are generally in the form of transporting workers from rural communities to locations having tourist-based economies. Fixed route services involve public transportation vehicles following an established schedule for a route with designated locations for passenger pick up and delivery. Demand response transportation services generally require advance contact to arrange pick up times and location, which may include door-to-door service.

Several of the mass transit providers are making plans to provide intermodal and linked trip services in the future. The intermodal services will require coordinated scheduling and dispatching of fixed route and paratransit services within a provider's service area. Linked trip services will require coordination of services among service areas.

Capital assistance is also provided from SCDOT for specialized human service agencies that provide transit service to their particular clients. These types of service are not open to the general public; rather they are intended for that segment of the state's population who are more often than not, unable to utilize general public transportation, such as the elderly and disabled.

2.3.4 Suitability of VTE for South Carolina

RTAs and other public providers in South Carolina face large demands on their resources and cannot fulfill all the state's ridership needs.[7] Increasingly, they are facing an environment of diminishing resources against escalating demands. As organizations look to technology to improve efficiency, SC providers were found to lack the resources to research the IT market and evaluate products, the funds to invest in these resources, and the technical expertise to implement the IT solutions.

The providers in South Carolina have the ideal attributes to obtain the maximum benefit from a virtual enterprise. They:

- have a common type of business
- are geographically dispersed with limited competition with each other
- have mutual respect for each other
- are motivated to reduce IT infrastructure costs through standardization and increase revenue through integrated services between members

Together, they would benefit from a network of transit providers to share information to help them plan, operate and respond to everyday needs and crises.

[7] Source: "'Virtual Transit' Offers Real Technology Advancements to Local Transit Providers," Chris C. Carter, Senior Legislative Assistant, Kinghorn and Associates, L.L.C., Spring 1997.

2.4 VTE Participants and Their Roles

South Carolina Department of Transportation (SCDOT): Not only does the SCDOT Office of Mass Transit have overall responsibility for the VTE program management, development and implementation, it is also an active user of the VTE system as recipient of electronic submissions of invoices and grant requests from the public providers. As program manager, SCDOT:

- is the strategic decision maker for VTE program
- sets the program tone, goals, and objectives
- performs funding and task order approval
- is the final mediator and authority for the VTE program
- provides general oversight of the VTE program progress and deliverables

SCDOT has contributed a 20 percent match for the VTE grant monies received from the federal government, and oversees its disbursement to contractors for project-related work.

The VTE Steering Committee and the VTE Development Partners: These committees supported SCDOT in the initial stages of the project. The Steering Committee was composed of representatives from SCDOT, SCRA, the Transportation Association of South Carolina (TASC), Health and Human Services, Department of Social Services, and the Governor's Office. It directed the development of the VTE project, and monitored its progress. The Development Partners consisted of representatives from all the public providers, as well as SCDOT and SCRA representatives. They met to review project developments and provide input to insure the VTE project addressed their needs.

South Carolina Research Authority (SCRA): SCRA is a not-for-profit research and development organization established in 1983 with offices throughout South Carolina. One of their specialties of particular relevance to VTE is their ability to integrate people, process and technology, assuring the design and development of IT solutions meet the demands of the customer.

SCRA was part of the SCMTTC that conducted the original survey of mass transit providers in South Carolina. SCRA spent considerable time prior to the commencement of their contract with SCDOT in conducting a survey of public providers to obtain the baseline IT capabilities (1996), conceiving of the VTE concept in response to the survey results, and lobbying to obtain federal funding for VTE development.

SCRA became the prime contractor for the development and implementation for Phase 1 of the VTE system. Integrated Solutions Group (ISG), an affiliate of SCRA performed most of the work on the VTE project. Their responsibilities included:

- executing Task Order(s) and meeting budget objectives.
- taking the VTE technical lead and serving as implementer
- working with the Steering Committee for critical program decisions
- working very closely with the Development Partners to survey and develop requirements, design and implement the VTE system
- providing support to the Steering Committee and Development Partners as needed
- accomplishing vendor and subcontractor negotiations and contractual agreements

RouteMatch Software: RouteMatch Software is an Atlanta, GA-based software company that was awarded the contract by SCDOT to provide scheduling and dispatching software, training, and technical support to the VTE public providers. RouteMatch was founded in 1999 specializing in transportation and logistics technology with an emphasis on demand-response systems. Their products address routing, scheduling, dispatching, billing, reporting and transportation coordination.

Federal Transit Administration (FTA): The FTA provided the federal grant to SCDOT for the VTE project. The Service Innovation Division (TRI-12) within the Office of Research, Demonstration, and Innovation has oversight responsibilities for the project on behalf of SCDOT, and is conducting this project evaluation.

Public Providers: The eighteen public transit operators from South Carolina initially agreed to participate in the VTE project. Since the project inception, the interest of several of the public operators in later VTE applications has waned, but VTE has added one human service agency transportation provider. These agencies are the primary beneficiaries and users of the VTE system. As participants, they agreed to assume the following responsibilities:

- provide a point of contact available to work with SCDOT during VTE program, particularly in the survey, design, and implementation phases of the program
- work with SCRA to develop requirements
- provide input to and review of the VTE design and specification
- prioritize VTE application requirements
- participate in VTE meetings
- participate in demonstrations and test phases
- provide support of VTE program

The initial participating public providers varied widely by type of service area, size, and services offered. Although there was some overlapping, they were divided into three groups: Urban, Rural, and Council on Aging. Urban operators focus on providing both fixed route and demand-responsive transportation services to their core cities and surrounding communities. Rural operators have wider service areas that often include more than one county. They typically provide fixed route service in the form of commuter runs from rural areas to job centers, as well as demand-responsive service. Councils on Aging operators focus on demand-responsive services. Typically they offer some service to the general public, but also contract transportation for human service organizations and Medicaid users, seniors and disabled patrons.

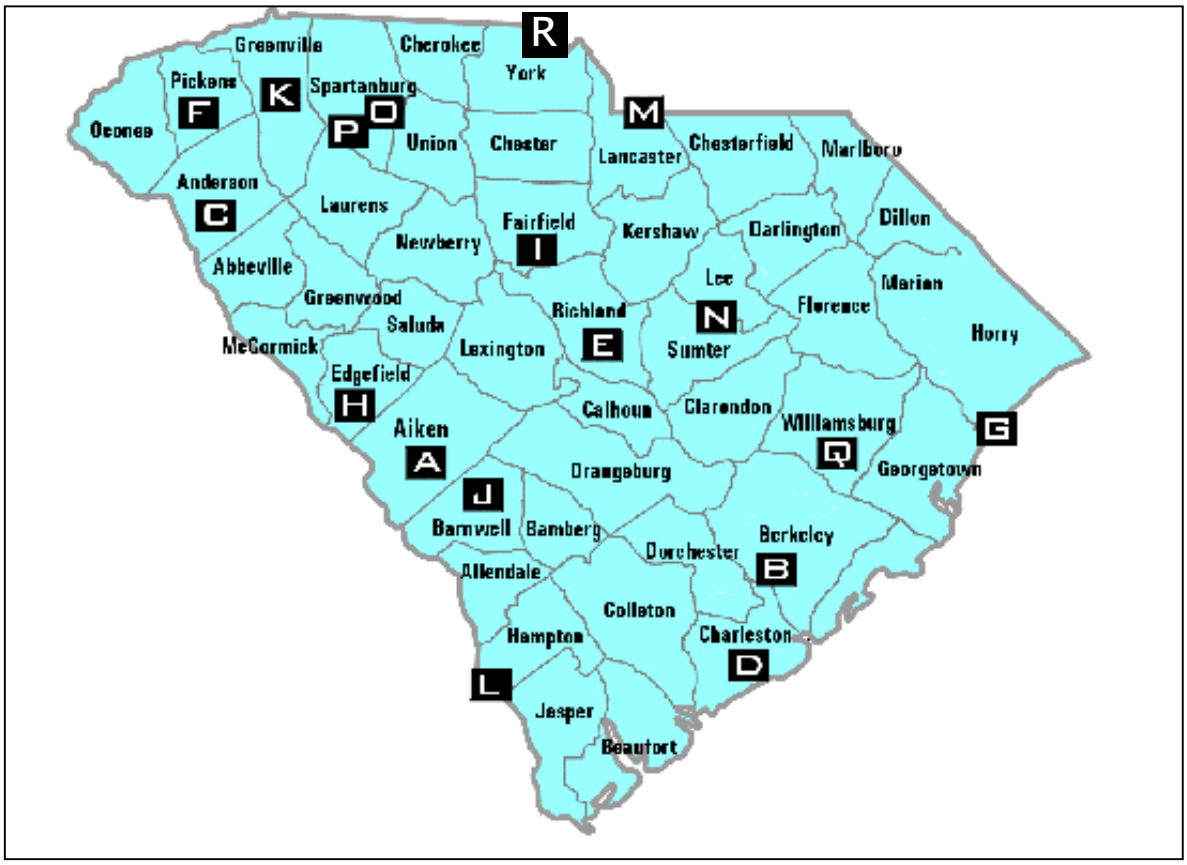
Table 1 lists the original public providers by classification, and Figure 2 shows their locations in South Carolina.

Table 1. Public Providers by Classification

Group	Map ID	Public Provider
Urban	D	Charleston Area Regional Transit Authority (CARTA)
	C	City of Anderson (Electric City Transit)
	E	City of Columbia - Trolley System
	F	Clemson Area Transit (CAT)
	K	Greenville Transit Authority (GTA)

	P	Transit Management of Spartanburg (SPARTA)
Rural	B	Berkeley/Charleston/Dorchester (BCD) RTMA
	G	Coastal Rapid Public Transit Authority (CRPTA)
	I	Fairfield County Transit System (FTS)
	L	Lowcountry Regional Transportation Authority (LTA)
	M	Pee Dee Regional Transit Authority (PDRTA)
	N	Santee-Wateree Regional Transit Authority (SWRTA)
	O	Spartanburg County Transportation Services Bureau (TSB) at the Spartanburg Regional Medical Center (SRMC)
	Q	Williamsburg County Transit System (WCTS)
	R	York County Council on Aging
Council on Aging	A	Aiken Area Council on Council on Aging (AACOA)
	A	Aiken County Public Transit System
	H	Edgefield Senior Citizens Council
	J	Generations Unlimited (GU)

Figure 2. Map of South Carolina's Public Providers



3. Evaluation

3.1 Overview

3.1.1 Evaluation Objectives

This evaluation is being conducted as a requirement of the VTE grants that FTA awarded to SCDOT in FY 1998 through 2000. It assesses the development and implementation of the Virtual Transit Enterprise in South Carolina so that other states and organizations embarking on similar systems can learn from the experiences of South Carolina. The evaluation may also help SCDOT to improve its own VTE implementation. The evaluation:

- tells the story of the VTE project: its motivation -- the problems it was meant to solve; the original vs. the actualized concept; how the project implementation evolved; problems encountered along the way; key players in the development; the users; etc.
- determines how well the project meets the goals/objectives/needs of the sponsoring organizations, SCDOT and users
- examines the effects of the project on participants
- determines how well the technology is performing (reliability, availability, responsiveness, flexibility, etc.)
- assesses the influence of site-specific characteristics and external factors on the implementation success
- documents the costs and benefits (benefits may be qualitative)
- enumerates lessons learned

3.1.2 Methodology

According to the evaluation plan developed prior to conducting the evaluation, the evaluation did not undertake major new data collection efforts, but relied on existing sources of information, reports and records maintained by participants, on interviews with representatives of the key parties, and on other available data sources. Organizations contacted included:

- SCDOT
- SCRA/ISG
- RouteMatch Software
- FTA
- Several participating public providers
- Several public providers that dropped out of the project

The questions and issues to be discussed in the interviews and a list of the information and data sought were mailed to the interviewees prior to the interviews. The evaluators visited South Carolina in November 2004, conducting in person interviews with SCDOT and RouteMatch, and on site visits to two public providers, Generations Unlimited and the Santee Wateree Regional Transportation Authority. The types of information obtained from each organization are outlined below.

- **SCDOT** – For VTE: overall project background and history; goals; need for VTE; process to obtain federal funding; funding level; how SCRA was chosen; how RouteMatch Software was chosen; route matching contractor dispute and its effects on schedule; actual vs. budgeted costs; staffing levels; role of SCDOT; problems encountered and their resolution; reasons for change in scope of project; public provider profiles; reasons for changes in public providers participating; RouteMatch licensing issues; planned vs. actual time line for project tasks; expected completion date; assessment of SCRA and RouteMatch Software performance. For South Carolina: overview of mass transit in SC; trends; exogenous factors affecting transit usage; need for transit in SC; transit programs that VTE will affect.
- **SCRA/ISG** – Past experience with similar projects; contract with SCDOT; project plan; project staffing and resources; progress reports; deliverables/final reports; problems encountered and resolution; computer hardware and software decisions; implementation issues; assessment of technical capability of public providers; communications with SCDOT, public providers; feedback from public providers.
- **RouteMatch Software** – Overview of company's products; agreement with SCDOT for software and technical support; user training provided; problems encountered and resolution; assessment of technical capability of public providers; cooperation of public providers; issues with integration of historical data into new system; adequacy of newly installed computer hardware and networks for RouteMatch software.
- **FTA** – Background and history of VTE project; FTA involvement with project development and implementation; how does project fit into FTA goals.
- **Several participating public providers** – Characteristics of operations and service; degree of technical competency prior to/after project; ridership data before/after project; customer satisfaction before/after project; user profiles before/after project (new program participants being served?); benefits of VTE for their operation (cost savings, improved efficiency and effectiveness, other); negatives; problems encountered and resolution; assessment of RouteMatch software and services; assessment of electronic reporting; assessment of computer hardware and software; assessment of Web site; assessment of vehicle maintenance software; ease of use of software; functionality of software.
- **Several public providers that dropped out of the project** – Reasons for dropping out of project.

To the extent permitted by existing data, the evaluation performed before-after comparisons of the effects of the VTE project on the evaluation criteria. Quantitative measures of effectiveness were developed where possible, but were extremely limited because public providers generally did not collect the desired data as a normal part of their system. Additionally, the full effects of the VTE project were not realized by the time the evaluation took place, so that, for example, changes in ridership due to the VTE system were not detectable on an aggregate level. Anecdotal evidence was often the best available. Even if changes could have been measured, a true cause-and-effect relationship might have been difficult to prove, given other exogenous factors in the transit agency service area. In this evaluation, the effects of the VTE project were

discernable most easily using a "bottom up" approach, from information provided by participating organizations.

3.2 The VTE Story

3.2.1 The VTE Timeline

The Groundwork: February 1996 – March 1999

As described in Section 2.1.2, the groundwork for the project began in February 1996 with the formation of the South Carolina Mass Transit Technology Committee. The South Carolina Research Authority, a member of the SCMTTC, was the force behind the project's conception and ultimate funding through ISTEA and TEA-21, spending considerable time and resources in these efforts for the SCMTTC.

Between February and April 1996 SCRA contacted through a mail survey and limited site visits the majority of SC's public and private transportation providers to determine their IT capabilities, resources, issues and modernization objectives. The survey revealed that many providers were using outdated hardware and software, and that among them they used at least ten different accounting packages. They lacked the resources to research the IT market and evaluate products, the funds to invest in these resources, and the technical expertise to implement the IT solutions. Most providers expressed interest in participating with the SCMTTC in a joint project to improve their IT systems.[8]

Later in 1996 SCRA conceived the Virtual Transit Enterprise concept and its three-phase development approach to address the needs revealed in the survey. With the corroboration of the concept by SCMTTC and SCDOT, SCRA proceeded to brief FTA on VTE and obtain their buy-in. Most of 1997 was spent in briefing Congressional staffers and elected South Carolina representatives on VTE in an effort to gain funding for the project in Congress' ISTEA reauthorization. The effort paid off with an award of almost $1 million for VTE in the FY 1998 ISTEA budget. VTE was also included in the FY 1999 and 2000 TEA-21 budgets. Total funding available for VTE with the 20 percent match by SCDOT was $3.97 million.

With funding assured, in November 1997 SCDOT began to discuss a contract to have SCRA perform the development and implementation of VTE. The technical details of how the VTE concept would be designed and implemented were developed and fine tuned in early 1998. The next year was spent in the process of applying for the FTA grant and in the awarding of the VTE contract to SCRA. SCRA received $70,000 in November 1998 under a Technical Support Services Agreement to cover their expenditures for the past year in support of VTE-related activities. In March 1999 SCDOT issued a purchase order to SCRA for $1.17 million to execute Phase I of the VTE project. The contract between SCDOT and SCRA was for a one-year program with the following two phases/years as options.

[8] Presentation slides from SCMTCC meeting, January 21, 1998.

Figure 3. Timeline of VTE Activities

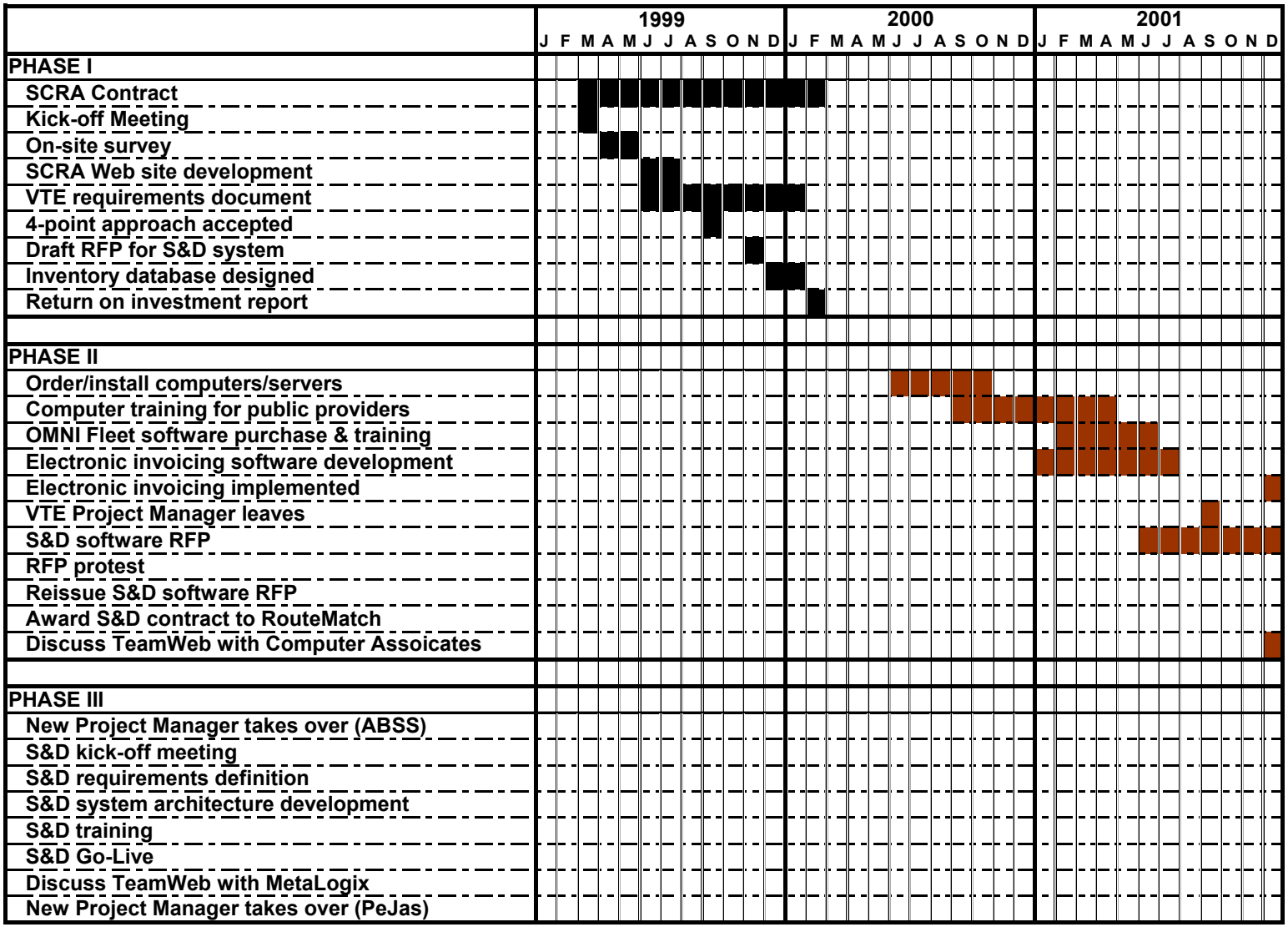
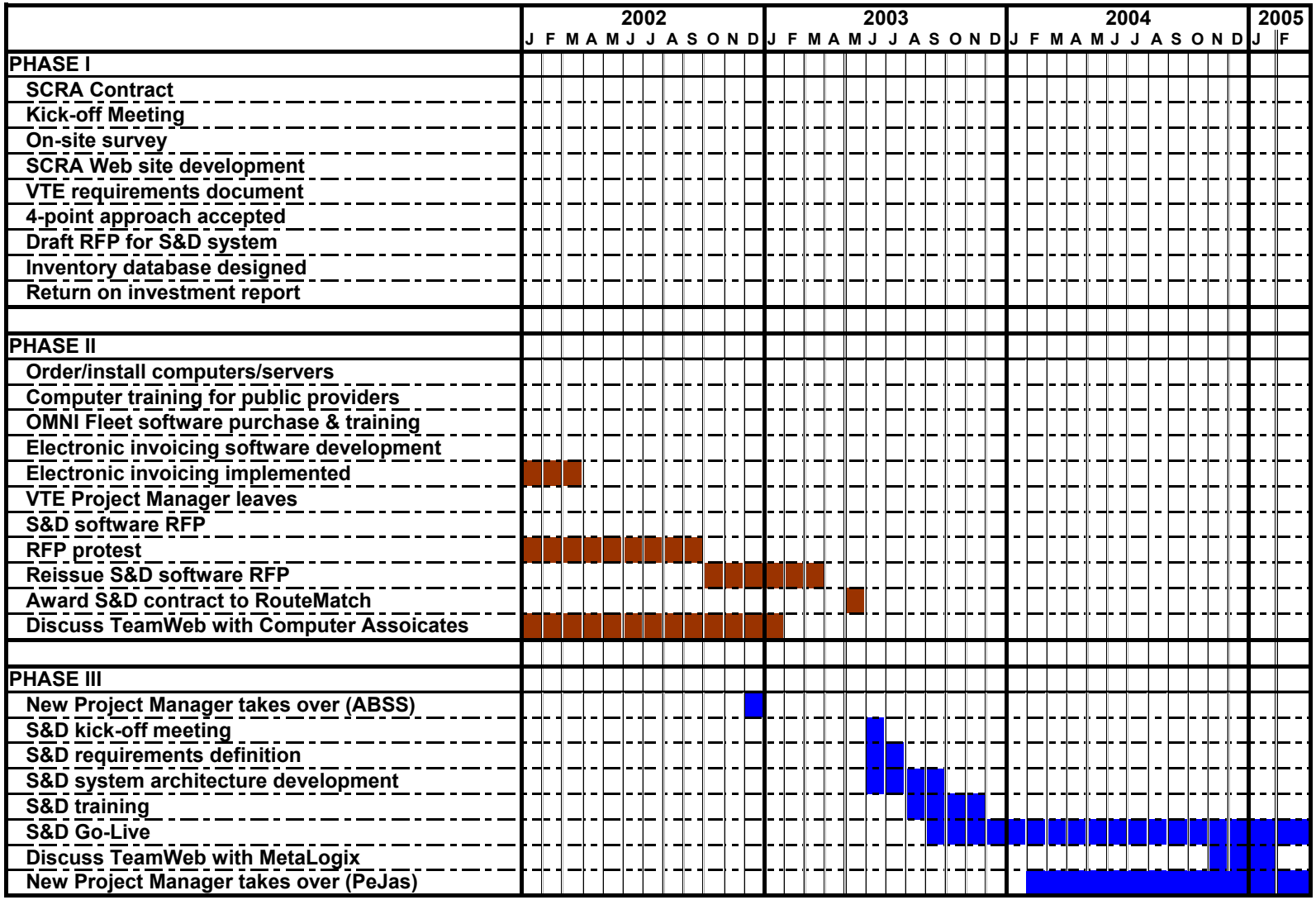


Figure 3. Timeline of VTE Activities (continued)



The Original Plan: March 1999 – February 2002

The VTE was originally conceived as a three-year, three-phase project, once the requirements stage began. The three phases were laid out as follows:

Phase I – Year 1 (1999-2000): Phase I of the VTE project was the most important project phase because it established what the VTE system would become based on the needs and priorities established by the SC mass transit providers and SCDOT.

Phase II – Year 2 (2000-2001): Phase II involved the development, migration, installation, integration, testing, training, support, and daily use of the specified technology solutions and VTE architecture (existing and new) by a subset of public providers and SCDOT. The VTE system to be implemented would be based on the prioritized requirements, detailed designs, and interface designs from Phase I.

Phase III – Year 3 (2001-2002): Phase III involved the establishment of the remaining public provider sites that were not incorporated into the Phase II effort. This would allow the state's mass transit infrastructure to become completely incorporated within the VTE framework. At the conclusion of this phase, the VTE concept would be successfully demonstrated within South Carolina such that the VTE concept could be duplicated and applied to other states in a low-risk, low-cost manner.

Phase I: March 1999 – February 2000

On-site public provider survey. With the signing of the contract and purchase order, SCRA officially began work on the VTE project in March 1999. The first task was to conduct an on-site survey of the stakeholders in the VTE system. Questions were asked of SCDOT and each public provider to develop a comprehensive picture of their operations, management, reporting and data needs, in-house information technology, functions, goals, and investments.

Internet accessibility. SCRA teams spent several days at each site to obtain this extensive information. The visits were very enlightening and revealed a wide range of public provider familiarity and expertise with computers. In four instances, SCRA teams were able to perform "quick hits" wherein they trouble shot computer problems or purchased inexpensive, but nevertheless essential, items that rendered a previously unusable computer system useable. SCRA believed that by the time their site visits had been completed, all public providers were able to access the Internet and email with their existing computer equipment.

VTE Web site. With the Internet available to all public providers and SCDOT, SCRA developed and hosted a VTE Web site with groupware on their own server to enhance the ability of participants to stay current on VTE activities and communicate with each other. The Web site was a useful resource to participants and offered visitors to the site links to VTE-related events, participants, description of the VTE concept and system, overview of project, VTE development logistics, outside resources, project status, presentations, and white papers. The Web site was an integral part of the VTE Technology Transfer Plan designed to communicate the availability and success of the program to the transit industry and other providers of mass transit nationwide. In addition to the Web site, the

plan relied on brochures, white papers, tear sheets, and trade shows, conferences, symposiums and workshops to get the message out about VTE.

4-point VTE approach. The survey enabled SCRA to understand the nature of the various public providers in the state, their operations and requirements, determine which of the many possible software applications (listed in 2.1.4) the public providers and SCDOT thought would be most beneficial to their operations, and focus on these applications in the VTE project. The SCRA Team developed and recommended a 4-Point approach to address the greatest and highest priority needs of the public providers and SCDOT Office of Mass Transit. The four points (refer to Table 2) constituted the main thrust of what the implemented VTE system would include. This 4-point proposal was accepted by SCDOT in September 1999.

Cautions. Cautions were noted in two areas. First, SCRA limited the approach to four points to stay within the VTE funding limits except for equipment purchases, including a commitment to demonstrate the VTE approach at only one or two "Working Proveout" sites (one public provider and/or SCDOT). To implement Points 2 and 4 fully at all participating public providers, outside funding sources, such as earmarks, would be necessary to procure all the equipment needed. Second, the survey results noted the diversity of public provider size, transit service range, and customer needs would present a challenge to VTE development.

Table 2. 4-Point VTE Approach, September 1999

Point	Definition	Goal
Point 1:	**Information Sharing with External Entities**	Develop a structured method for selected public provider functions to interface with external entities electronically, to benefit all 18 public providers.
Point 2:	**Integrated Automated Fare Collection (AFC)**	Integrate AFC technology at one *Working Proveout* site and integrate a shared passenger accounting system to benefit all 18 public providers and to provide SCDOT with more timely ridership data.
Point 3:	**Improve Grants/Contracts Making, Administration, Reporting and Invoicing Processes**	Develop a mechanism to improve the Grant Making, Grants Administration, Reporting, and Invoicing process conducted between SCDOT/DMT and the 18 public providers that receive funding through SCDOT/DMT.
Point 4:	**Scheduling and Dispatching (S&D) Integration with AVL**	Integrate Scheduling & Dispatching (S&D) with an ITS-compliant AVL system. Target one of the public providers as a *Working Proveout* site, and establish standard procurement specifications, which other public providers can use to build their S&D and AVL systems.

VTE Requirements Consensus Meeting. In October 1999 a VTE Requirements Consensus Meeting was held to obtain the buy-in of all the VTE Development Partners to the 4-Point VTE approach. In preparation for this meeting, SCRA completed a VTE

requirements document that developed the requirements for the four points, explaining in more detail the functionality of each point and how it would work in the context of the South Carolina providers. Additionally, four Research, Trade-off and Recommendation (RTR) draft reports were written, outlining the process the VTE Team followed to select the optimal method or IT product for specific sub-points of the VTE system from a set of alternative methods of IT products. The RTR draft report subjects were:

- Statewide Mobile Communications (Point 4)
- Electronic Invoicing and Electronic Funds Transfer (Point 3)
- Onboard Equipment Package and Scheduling and Dispatching (Point 4)
- DSS/DHHS Rider's Eligibility Status Online (Point 4)

VTE System RFP and Phase I scope and budget changes. SCRA was asked to prepare the VTE System RFP as soon as possible. Writing the RFP would require SCRA to develop the design for the VTE system architecture, originally planned for Phase II, in Phase I. The change had schedule and budgetary implications, and SCRA requested an additional 60 to 90 days and approximately $200,000 to complete Phase I, and SCDOT agreed to this change to keep the project on track.

VTE system design activities. During this period SCRA continued to design the VTE system, as well as complete the VTE System RFP. They produced a draft Configuration Management Plan for controlling the development of the VTE computer system, a draft VTE Return on Investment Plan to present the methodology for assessing VTE benefits against the VTE investment, the first VTE issue of a newsletter *The VTE News*, and a Geographical Information System (GIS) and South Carolina's Public Providers: Lessons Learned report to describe the GIS attributes needed by SC providers and how they could implement GIS systems consistent with VTE. In January 2000 they began and completed the design of a web-enabled inventory, procurement, and support/maintenance database created in MS© Access to track all equipment purchases for the VTE project. A complete list of the reports and project documentation for Phase I is included in the Bibliography at the end of this report.

Termination of SCRA contract. As the Phase I performance period winded down, indications were that SCDOT intended to provide the additional $200,000 to SCRA to complete Phase I. However, on February 25, 2000, SCRA received word that the contract would not be extended as the Information Technology Management Office (ITMO) was not willing to approve the scope and budget increases. At this point, funds expended amounted to $1.17 million. SCRA's role in VTE was terminated at this point, and the SCDOT Information Technology Management Office (ITMO) assumed the management and performance responsibilities of the VTE project.

Phase II: July 2000 – January 2003

Re-planning Phase II. With the departure of SCRA, SCDOT took several months to re-plan Phase II, acknowledging that the one-year time frame would not be possible for the in-house IT resources to meet. Phase II officially began in July 2000 with a budget of $1.45 million, including the SC matching 20 percent to the federal grant. Although no documentation of the revised plan was available for this evaluation, it appears that significant changes were made to both the schedule and the scope of Phase II. The four

points that had been decided on in Phase I were changed. Integrated automated fare collection, a high, though expensive, priority among the public providers, was replaced with fleet/vehicle maintenance software, a lower priority and less expensive application. Table 3 reflects the changes.

Table 3. Revised 4-Point VTE Approach, July 2000

Point	Definition	Goal
Point 1:	**Information Sharing with External Entities**	Develop a structured method for selected public provider functions to interface with external entities electronically, to benefit all 18 public providers.
Point 2:	**Improve Grants/Contracts Making, Administration, Reporting and Invoicing Processes**	Develop a mechanism to improve the Grant Making, Grants Administration, Reporting, and Invoicing process conducted between SCDOT/DMT and the 18 public providers that receive funding through SCDOT/DMT.
Point 3:	**Scheduling and Dispatching (S&D) Integration with AVL**	Integrate Scheduling & Dispatching (S&D) with an ITS-compliant AVL system. Target one of the public providers as a *Working Proveout* site, and establish standard procurement specifications, which other public providers can use to build their S&D and AVL systems.
Point 4:	**Fleet/Vehicle Maintenance**	Standardize a method to electronically monitor fleet maintenance and operations.

Computer equipment. The first activity of Phase II was to procure and install new computer equipment for all the public providers. All in all 9 servers, 74 desktop computers, and 32 laser printers were purchased and installed at the 18 public providers, as well as 2 laptop computers and 3 servers for SCDOT at a cost of approximately $370,000. Software consisted of Microsoft© Windows NT, MS© Office-Professional, and Norton 2000 Anti-virus Software. Specifications for the desktop computers and servers are included as Appendix B. Delivered in July 2000, the desktop computers were all installed with public provider data migrated by October 2000. SCDOT and Gateway Computer representatives helped the public providers with installation and troubleshooting.

Computer training. To benefit fully from the new computers, most public providers needed training in basic computer usage. From September 2000 through April 2001, SCDOT hired Microsoft-certified trainers to conduct 563 person-classes in Microsoft© Word 2000, Excel 2000, and Outlook 2000, Internet Explorer, and NT4.0/PC Introduction. Training was conducted in the computer labs of regional SCDOT District Offices to minimize travel for attendees.

Fleet maintenance management software. Despite the determination in Phase I that fleet maintenance management software was not high on the priority list of technology applications desired by the public providers, SCDOT proceeded to purchase OMNIFleet©

Shop by Resolute Solution Corporation[9] for the state's transit agencies. The intent was to have all transit providers operating SCDOT vehicles keep track of vehicle information in a common software application, so that they could transmit the information to SCDOT via the Internet. SCDOT would be able to merge the reports into a central database archive and manipulate them for reporting purposes. In February 2001 SCDOT purchased 19 site licenses for the product at a cost of approximately $16,000. In June 2001 representatives, mainly the maintenance supervisors, from 15 of the 18 public providers attended a one-day hands-on training class in Columbia, conducted by SCDOT and users from Spartanburg County Transportation Services Bureau, the agency that had recommended the software to SCDOT.

Electronic invoicing. In support of Point 3 as set forth in Phase I, in January 2001 SCDOT began to design a software system that would allow public providers to file forms electronically for reimbursement of state subsidies. By July 2001 the system was beta tested and a security algorithm was coded to ensure all VTE users could see only their own records. The Office of Mass Transit, Santee Wateree RTA and Clemson Area Transit participated in the test. This system was to be an interim solution until SCDOT was able to install a more comprehensive grants management and application system. In December 2001 SCDOT conducted comprehensive training for 14 public providers on this system; in January 2002 public providers operated the new system in parallel with their old invoicing systems; and in March 2002 the electronic invoicing system became official and SCDOT would no longer accept paper invoices from the public providers.

Scheduling and dispatching software RFP. Throughout this period the VTE Scheduling and Dispatching Committee was meeting to refine the requirements for scheduling and dispatching software, one of the most complex software applications of the VTE. In June 2001 SCDOT issued the Request for Proposals (RFP) developed by SCRA for a scheduling and dispatching system for the public providers. A committee of eleven members including state agencies and public providers reviewed the proposals. In December 2001 SCDOT tentatively awarded the contract to RouteMatch Software, Inc., an Atlanta, Georgia-based company specializing in transportation and logistics technology.

Protest. Trapeze Software Group immediately protested the award on the grounds that they were not informed of certain contract requirements in a timely manner and they had an unanswered Freedom of Information Act (FOIA) request. Denied their protest by the State's Chief Procurement Officer, Trapeze escalated the protest to the Procurement Review Panel of the ITMO, who ruled the contract must be re-bid. The re-bid in October 2002 resulted in SCDOT awarding the contract to the original winner, RouteMatch. In May 2003 SCDOT and RouteMatch finally signed a contract. The process of obtaining a contractor to develop the scheduling and dispatching system, from initial RFP to a signed contract, took a full 24 months and critically impacted the VTE schedule.

[9] See http://omnifleet.com/.

Phase III: January 2003 – Present

Re-planning Phase III. In January 2003 the FTA approved an SCDOT proposal to reorganize the remaining work on VTE into three projects, essentially ending Phase II and beginning Phase III. The three projects consisted of:

Project 1: Scheduling and Dispatching System

Project 2: Electronic Grants Management

Project 3: Mass Transit VTE Web Site

New project manager. State revenue shortfalls and Mass Transit Office (MTO) organizational and personnel changes combined to prevent the MTO from being able to staff a VTE project manager from September 2001 through December 2002. A new project manager from Automated Business Systems and Services (ABSS) was contracted to take over the project in December.

Scheduling and dispatching (S&D) kick-off. In June 2003 SCDOT held a stakeholder meeting attended by all public providers to kick off the beginning of the development of the S&D application for VTE. The decision had been made to roll out the S&D application to all the public providers as soon as possible rather than test it on a limited number of providers before full deployment. RouteMatch developed a detailed work plan that called for group training sessions for the public providers through the remainder of 2003, followed by a one-week on-site "Go-Live" period at each public provider to implement the system.

S&D requirements definition. During June and July 2003 RouteMatch developed detailed user requirements to identify the operational needs of each provider, using a combination of questionnaires, actual data exports from existing systems currently used by providers, and conference calls. They sought to identify critical local business processes that must be accommodated during implementation. Arrangements were made to acquire any data currently available in electronic form so that they could attempt to migrate the files into RouteMatch format prior to their "Go-Live" periods.

S&D system architecture development. During the summer of 2003 RouteMatch acquired and set up the central servers they would need in Atlanta to host the S&D software. One of the key features of the RouteMatch system and reasons SCDOT favored it over Trapeze was that RouteMatch would host the application software and provider databases centrally, and serve the remote application to users through the Citrix[10] remote access server software via the Internet. This meant the user had no software to install locally and facilitated remote support and troubleshooting.

RouteMatch licensing. RouteMatch required that each person accessing the S&D application have a client license, with the result that the 17 participating public providers initially required 30 client licenses. This number was later expanded to 75 because several providers had more employees that needed access to the system than the original number of licenses permitted. The RouteMatch contract did not cover the licenses, so these were additional costs to SCDOT.

[10] See http://www.citrix.com/lang/English/home.asp.

RouteMatch training. Training took place in August 2003 for the first group of public providers to implement the S&D system, with the second group of public providers trained in October and November 2003. The first group consisted of representatives from Generations Unlimited, Santee Wateree RTA, Bamberg Council on Aging, Aiken Area Council on Aging, and Lower Savannah Council of Governments. Level 1 training focused on updating and geocoding client databases to be compatible with RouteMatch requirements. Level 2 training covered scheduling and reporting, and automated scheduling and dispatch procedures and trip optimization. In terms of documentation RouteMatch provided a user guide, training manual, and online help for system users.

RouteMatch custom enhancements. Although one of the criteria for the S&D application was that it be a commercial off-the-shelf (COTS) application, SCDOT realized some customization would be necessary. In particular, the reports that public providers had to prepare for the SC Department of Health and Human Services (DHHS) in order to receive payment for transportation provided under Medicaid Title XIX were very exacting as to the information required for auditing purposes. RouteMatch was initially asked to design two custom reports: a Driver Manifest Report (used for all trip input), and a Title XIX Summary Report (listing all Title XIX trips daily). Later it became necessary for RouteMatch to design four other Medicaid control reports and enhance the ad hoc report generator. The initial reports were designed in late 2003, with the additional reports completed in mid-2004.

RouteMatch system testing. SCDOT and RouteMatch developed a comprehensive system acceptance test plan that exercised RouteMatch functions and features, and included tests corresponding to original RFP requirements. When the base RouteMatch system was tested according to the plan, no material problems were encountered which would impact implementation. Additionally, procedures were developed to test the system at each public provider during the Go-Live period. These public provider system acceptance criteria are included as Appendix C.

RouteMatch Go-Live. Beginning in September 2003, RouteMatch began to implement the S&D application at individual transit agencies. The first agencies included Generations Unlimited, Bamberg Council on Aging, Aiken Area Council on Aging, Santee Wateree RTA and the Lower Savannah Council of Governments. Go-Live involved the migration of an agency's customer, vehicle and operational data to the agency's database on the central server in Atlanta, and a one-week period of hands-on coaching by RouteMatch representatives of the agency's users as they became acclimated to using the new S&D system. After the agency signed off on the system acceptance criteria, RouteMatch's role would then become that of customer support rather than implementer. The agency was expected to run their current S&D functions in parallel with the RouteMatch system until they felt confident they could perform the same functions and obtain the information they needed with the RouteMatch system. At that point they would cut the old system and begin using the new one exclusively.

RouteMatch customer support. As required by the RFP, RouteMatch would provide technical support to the licensed users via toll-free telephone Monday through Friday from 8 AM to 6 PM EST. Outside regular business hours, RouteMatch would answer voicemail with one-hour callback support, and would respond to email and fax.

Challenges. The Go-Live process has taken longer than expected. One reason was the difficulty of obtaining operational data (trip distance) needed out of the RouteMatch system for DHHS billing purposes. RouteMatch had to develop four custom reports in addition to the two planned and expand the ad hoc report generator. As the lag time between the initial training and Go-Live increased, refresher training became necessary. The wide variation in initial user skill sets also required added training to bring everyone to RouteMatch competency and additional on site time by RouteMatch technical representatives. As of February 2004, nine agencies had been trained in most RouteMatch functions (Table 4), and had either implemented the system or were about to. By November 2004 many of these public providers were using the RouteMatch system for trip scheduling and dispatching functions, but only a few were able to abandon their cumbersome billing verification processes in favor of the new system. None was using the trip optimization feature of the RouteMatch software, but several were expected to begin in early 2005. Additionally, the original computers given to the public providers in 2000 were found to be insufficient for the RouteMatch software requirements in terms of speed and size, and must be replaced for providers to benefit from the full functionality of the RouteMatch system.

Table 4. Public Provider Training Status as of February 2004

	Data Entry	Scheduling	Manifest	Optimization	Dispatching	Verification	Reporting
Aiken Area COA (2 sites)	☑	☑	☑				
Bamberg COA	☑	☑	☑			☑	☑
Edgefield	☑	☑	☑			☑	☑
Generations Unlimited	☑	☑	☑		☑	☑	☑
Greenville Transit	☑	☑	☑			☑	☑
Lowcountry RTA	☑	☑	☑			☑	☑
Santee Wateree (3 sites)	☑	☑	☑		☑	☑	☑
Spartanburg RHS	☑	☑	☑		☑	☑	☑
York County COA	☑	☑	☑		☑	☑	☑

Other aspects of VTE. Progress on the second two projects of Phase III, electronic grants management and the VTE Web site, has been slow. After learning that Computer Associates, the contractor that developed FTA's TeamWeb grants management system software, had discontinued its software development division, SCDOT has contracted with MetaLogix, Inc. to build a system utilizing SCDOT's Windows SharePoint Services

2003 platform. As of February 2005, however, the system was not yet in place. Although some design aspects of the VTE Web site have been accomplished, as of February 2005 no Web site was available.

3.2.2 Project Management

The VTE project has undergone a series of project manager arrangements throughout its six-year history. For Phase I, SCRA, the VTE development contractor (SCRA), managed the project while reporting and staying in close contact with the SCDOT project coordinator. When the contract was terminated in February 2000, the SCDOT project coordinator assumed the role of project manager until September 2001, when the coordinator was transferred to another position in SCDOT. From then until December 2002, a member of the SCDOT Information Technology Services department, the department involved with developing the VTE applications, filled in as acting project manager. In December 2002 SCDOT brought in an outside consultant to manage the VTE project, Automated Business Systems and Services (ABSS). In February 2004 another contractor, PeJas, Inc., took over from ABSS as project manager.

Table 5. VTE Project Managers

Time Period	VTE Project Manager
March 1999 – February 2000	SCRA and SCDOT Project Coordinator
February 2000 – September 2001	SCDOT Project Coordinator
September 2001 – December 2002	SCDOT Information Technology Services (acting Project Manager)
December 2002 – February 2004	Automated Business Systems and Services
February 2004 – present	PeJas, Inc.

The lack of continuity in project managers (five managers over six years) affected the ability of SCDOT to maintain the momentum required to keep the project moving ahead and the participants involved. For example, SCDOT terminated SCRA, a company clearly invested in the concept and motivated to make it succeed, when they did not appear to have the resources in place to meet the VTE project schedule that the participants had agreed on in Phase I. Following the departure of SCRA, there was a lag of several months before the project resumed in a scaled back form. Then again, the project lacked a manager for over a year, from September 2001 to December 2002. Although that time period roughly coincided with the scheduling and dispatching protest period, clearly other aspects of the VTE project could have been moving along, such as the VTE Web site and the grants management software development, still not completed. Instead, there was little progress made on the VTE project during that time.

While the VTE project as conceived in Phase I may have been somewhat ambitious to accomplish in three years, extending it to over six years has resulted in diminished enthusiasm on the part of the public providers. While waiting for the VTE scheduling and dispatching software, for example, several public providers purchased other software independently.

3.2.3 Financial Timeline

ISTEA and TEA-21 appropriated three grants to the VTE project in the amounts shown in Table 6. With a matching 20 percent from SCDOT, the total funding available for the project came to $3.97 million. Almost 37 percent of the funding, $1.46 million, was remaining as of November 2004.

Table 6. VTE Grants and Expenditures as of November 2004

Project Phase	Federal Grant	SCDOT Grant	Total Available	Amount Expended	Amount Remaining
I	$977,196	$195,439	$1,172,635	$1,172,635	$0
II	$1,210,851	$242,170	$1,453,021	$482,000	$971,020
III	$1,121,936	$224,387	$1,346,323	$855,838	$490,485
Total	$3,309,983	$661,996	$3,971,979	$2,510,473	$1,461,505

Note: The remaining funds from Phase II were rolled into Phase III.

3.2.4 Public Provider Participation

The original 19 public providers participating in the VTE project are shown in Table 1 and include all the general public transportation coordinators that operate in the state. Full participation was a goal of SCDOT for two main reasons. First, it would allow SCDOT easy access to statewide operations and vehicle data via the central VTE database, saving resources for themselves and the public providers. SCDOT could monitor transit activities, and download reports as needed rather than having to request reports from each agency. Second, with all public providers linked to the central server, it would be possible for them to use the RouteMatch software to coordinate and link trips of different providers for transporting passengers long distances across the state.

SCDOT reached out to the public providers from the beginning of the VTE project to give them a sense of ownership, obtain their buy-in on the direction of project development, and ensure their continued involvement in the project. The public providers became part of the VTE Development Partners Committee.

There was a clear delineation in enthusiasm for the project among the types of agencies. The rural and Council on Aging agencies that had the fewest resources believed that VTE would help normalize the disparity between them and the urban agencies. Most of the urban transit agencies that offered both fixed route as well as demand response service and had already invested in some of the computer technology VTE had to offer felt the VTE funds would be better spent if given to them directly. However, their initial reluctance to participate was overcome somewhat as they came to understand more fully the benefits they would receive from participation.

As progress on the VTE project slowed after Phase I, the interest, enthusiasm and awareness of the project by some of the public providers began to wane. Interviews that took place during the evaluation revealed that while some public providers were still actively involved with VTE and aware of its status, others apparently were not aware that the VTE project was still underway and some were not aware that certain applications they were using were actually part of VTE. In particular the large urban public providers (with the exception of Greenville) and some of the rural providers did not participate in the training for the RouteMatch S&D VTE application or dropped out of the application after being trained.

On the other hand, the VTE project expanded its participant base to include one of the private transit providers, Bamberg Council on Aging, that serves Medicaid patients and other contract customers associated with HSS and DHS programs. They are actively using the RouteMatch S&D software.

Appendix D shows the status of public provider participation in the various elements of VTE as of February 2005.

3.2.5 Computer Equipment/Internet/Email

Although all the public providers could access the Internet and email via their existing computer equipment at the conclusion of Phase I, SCDOT believed that many providers' equipment was in need of upgrading and that the VTE project would benefit from standardization of the computer platforms and software to be used to access the various VTE applications. The VTE system architecture called for central servers to host the application software as well as the supporting user databases, and users to access the applications via the Web. This was one of the overriding considerations guiding project decisions in developing or choosing the particular electronic invoicing, vehicle maintenance, grants management and S&D software packages. Public providers would be able to use their new computer equipment to support other agency functions as well as the VTE applications.

SCDOT began an ambitious program to purchase and install desktop computer equipment, software and in many cases servers in the offices of the public providers. As described in the Phase II timeline, 9 servers, 74 desktop computers, and 32 laser printers were purchased and installed at the 18 public providers, as well as 2 laptop computers and 3 servers for SCDOT. Appendix B describes the specifications for the equipment and Appendix E shows how the computer equipment was distributed among the public providers. Following the migration of the public providers' transit data to the new computers, SCDOT conducted an extensive training program of 563 person-classes in the use of office software, email and the Internet. These activities took place between July 2000 and April 2001.

The computer equipment served the public providers well for the most part, but due to the extended development and implementation period of the VTE project, at this point four years after its installation, the equipment life cycle is nearing an end. A number of public providers have replaced it with newer equipment, and others have voiced discontent over its speed and reliability compared to state-of-the-art equipment now available. It is not compatible with the requirements of the RouteMatch software, and the remaining desktop

computers must be replaced before the public providers can realize the full benefits of the RouteMatch software.

3.2.6 Vehicle Maintenance Software

Vehicle maintenance software was one of the candidate applications for VTE from the beginning. The requirements analysis of public providers' needs in Phase I, however, determined that this software was of lower priority than other applications on the table, and it did not appear in the original Phase I four-point approach.

Nevertheless, on the recommendation of Spartanburg Regional Healthcare System, SCDOT decided to include OMNIFleet© Shop vehicle maintenance software by Resolute Solutions Corporation in the revised Phase II VTE project plan. Spartanburg had been using the software for some time and was very enthusiastic about it. OMNIFleet© features included:

- Automatic human language preventative maintenance (PM) service reminders
- Flexible scheduling of PM service reminders
- Record of complete information describing motor vehicles and other types of equipment
- Equipment classification by department, region, and assigned employee
- Record complete repair details, including parts, labor, PM services, and outside services
- Built-in parts inventory
- Smart preventative maintenance analysis determines when PM services are due, and also records PM performed outside of schedule
- Tracking fuel and repair costs by equipment, department, region and vendor
- Record of employee training, and report on training due for renewal
- Built-in cost graphs
- Comprehensive reporting with built-in reports
- Email your reports
- Export your data to ASCII, dBase III and Excel

But the main reason SCDOT was attracted to it was its Web-based application feature. Users would input their vehicle data into their own database on the central database and access the software and data via the Web. SCDOT would also be able to access and merge public provider data on state-owned and -leased vehicles into statewide reports for its own purposes.

The software was purchased and licensed in February 2001 and in June 2001 the public providers were trained in its use. Although the software offered many desirable features, it required the agencies to input a considerable amount of data. Some agencies already had computer programs that performed some of the same functions as OMNIFleet© Shop. As a result, only Lowcountry RTA felt the benefits of the software warranted the effort required to enter the data. They are the only public provider to have used some of OMNIFleet© Shop features. SCDOT was never able to benefit from the ability to access statewide fleet data through OMNIFleet© Shop's central databases.

3.2.7 Electronic Invoicing

The capability for public providers to invoice the state electronically for reimbursement for transportation provided[11] and vehicles purchased[12] under certain programs initially was to be part of a comprehensive grants management computer system. But difficulties in procuring the grants software prompted SCDOT to develop an interim electronic invoicing system. The SCDOT IT Services Division designed and developed the system beginning in late 2000 through early 2001, making use of a COTS forms design package to facilitate the development of the online forms. A number of issues regarding Web security, networking, electronic signatures and electronic funds transfers were addressed in the course of development.

SCDOT followed the standard system development process for the electronic invoicing software. They beta-tested it for several months with a few public providers and the Office of Mass Transit. Following training sessions, the public providers used the new system in parallel with their existing systems to iron out remaining operational problems. In March 2002 the electronic invoicing system became the only official system for public providers to use for invoicing; SCDOT would no longer accept paper invoices.

Forms on the VTE electronic funds system are listed below and shown in Appendix F.

- PP Financial Summary
- PP Financial Supplement 601S
- Property Delivery Receipt
- Request for Payment Invoice Form 600
- Request for Payment Invoice Form 600Jarc
- Tracking Sheet – Budgets and Control Section

This system has been one of the real successes of the VTE project so far. All of the public providers have been consistently using the system since its inception. They must file most of these forms monthly and have realized significant timesaving in both forms preparation (from 1.5 days per month to less than one day) and turnaround of funds (from over one month to two weeks). System down time has been minimal, and has not adversely affected the timeliness of filings.

3.2.8 Electronic Grants Application/Management

In December 2001 SCDOT began discussions with Computer Associates (CA), the company that developed TeamWeb for FTA, to develop a similar system for SC. SCDOT figured that CA would be able to meet their needs more cost effectively than a company that had to develop a system from scratch. Additionally, an adaptation of TeamWeb would make it possible for public providers to interface seamlessly with both the state and the FTA systems. SCDOT determined to issue a sole source contract to CA.

However, in 2003 CA discontinued its software development division and SCDOT was forced to look elsewhere for support in developing the grants management system. After determining that they could not obtain a copy of the FTA system for their IT services

[11] Programs funded under Section 5311 of USC Title 49, Financial assistance for other than urbanized areas. Funds are granted to states to disburse to local agencies.
[12] Vehicle leasing program.

department to modify to create an SCDOT version, they decided to search for an appropriate vendor to develop the system from the ground up.

In January 2005, MetaLogix, Inc. submitted a proposal to develop the grants management system, which met with SCDOT's approval. SCDOT is currently in the process of establishing a contract with MetaLogix to perform this work.

3.2.9 Scheduling and Dispatching Software/Centralized Operations Database

SCDOT chose RouteMatch Software to provide the scheduling and dispatching function for VTE for several reasons:

- They were the only company offering Web-based architecture with its numerous advantages:
    - Scalability (easy and inexpensive to add another user)
    - Ease of implementing upgrades (they are installed on the central server for access by all users)
    - Ease of communication (messages appear at log on)
    - Central data storage (SCDOT can access authorized data from statewide users)
- They emphasized customer service and hands-on assistance with user implementation.
- Their bid was competitive.
- In addition to scheduling and dispatching, the RouteMatch system could be expanded to include mobile data and communications and automated vehicle location capabilities if SCDOT decided to pursue them later for VTE.

The product chosen was RouteMatch TS™, the most advanced and comprehensive transit management system offered by the company. It automates the processes of trip requests, trip accounting, trip verification, scheduling, routing, dispatching and reporting for paratransit and demand responsive transportation management. Its key technology components include:

- RouteMatch Scheduling Engine (RSE): an advanced scheduling and routing optimization algorithm that improves on the industry standard triangulation method by employing the real-world street network, taking into account speed limits, one-way streets, traffic congestion and travel times as well as vehicle capacity and seat configuration constraints, to produce realistic vehicle schedules and routes. Users can customize the software to consider their user-specific parameters, such as optimizing only certain vehicles or time periods, and inserting new or last-minute trips while preserving the existing schedule.
- Geographic Information System (GIS): digital map-based system to locate customer addresses, calculate travel times, produce driver directions, and provide detailed route maps. The GIS is an integral requirement of the RSE.
- Mobile Data/Wireless Communications (MDC): potential to integrate mobile data communication devices, such as vehicle terminals, computers, two-way pagers, and cellular phones, with RouteMatch software for seamless communications between dispatchers and vehicles.

- Automated Vehicle Location (AVL): potential to incorporate real-time tracking and monitoring of vehicles based on global positioning systems.
- Relational Database Management Systems (RDBMS): user customer and vehicle databases accessible by other products, such as MS Access and Excel.
- RouteMatch Billing Functions: fully integrated into data management workflow and able to be customized to meet most billing requirements.

The technology requires users to provide three main databases, customers, drivers and vehicles. The customer database contains information on each customer's name, address, telephone number, eligibility for subsidy programs, method of payment, disabilities, etc. The vehicle database contains information on each vehicle's identification, availability, make and model, age, seating capacity and configuration, operating cost, etc. The driver database contains information on each driver's name, address, telephone number, age, qualifications, work schedule, etc. Additional databases include a services database on the properties of the various services an agency offers, and a funding source database on the various sources of program funding an agency receives.

The software produces a number of reports:

- Driving directions for each vehicle trip
- Driver manifest containing the name, address and special needs of each customer on a trip in the order of pick-up or drop-off, schedule, fare. Typically drivers must fill in the odometer reading, actual time, fare collected at each stop.
- Invoices for customer billing
- Transit agency operating statistics
- Trips by funding source report
- Vehicle productivity report
- Run productivity report
- Cancellations and no shows report
- Scheduled trip summary
- Optimization summary statistics
- Six customized reports for SC VTE, mainly for Medicaid reporting

For a thorough description of RouteMatch TS™ features, go to their Web site at:

http://www.routematch.com/

As described in Section 3.2.1, Phase III, the implementation of the S&D software has gone more slowly than anticipated. Originally expected to be a one-year effort for full statewide implementation by the end of 2003, the effort is still underway in 2005. Because the system was not fine tuned in a limited number of agencies before being rolled out to the remainder, some agencies became frustrated with the implementation process, developed a negative impression of the system, and stopped using the software.

At this writing, SCDOT did not yet have the centralized ability to pull operations data of providers that were using the S&D software from the RouteMatch system, but it appeared that the hardware and software were in place and RouteMatch trainers were beginning to work with SCDOT staff to make this feature a reality.

Nevertheless, those providers that persevered in the implementation process are very positive and have become advocates for the software application, even though they have

not begun to use and benefit from all its features, in particular route optimization. In fact, at the 2005 annual TASC meeting, it appeared that some agencies that previously dropped out of the application showed some interest in giving it another try. This is a positive sign for SCDOT to eventually achieve two of its goals for VTE: the ability to access statewide operations data from the central RouteMatch server; and the ability for transit agencies to link trips across the state.

3.2.10 Web Site

The VTE Web site that SCRA developed during Phase I of the VTE project was discontinued upon their contract termination. At this point, although it appears that some work has been done on the site design, there is still no Web site. This is a significant deficiency of the VTE implementation. As one of the more straightforward elements of the VTE project to develop and with the required infrastructure in place (computers with Internet access), the VTE Web site should have been one of the first things SCDOT implemented. Public providers could have used it as a focal point for information on VTE and communication with other participants. It may have helped address public provider attrition and lack of awareness of the various elements of the VTE project as they stretched out over the years. The Web site should have included:

- Updates on the status of the VTE implementation
- Announcements of meetings, conferences, demonstrations of interest
- Case studies of how public providers are using various elements of the VTE
- A chat room or means for public providers to maintain a running dialog on their VTE experiences
- A marketplace for public providers to advertise need for or availability of equipment and other items, and employment opportunities
- Bulletin board for articles, publications of interest to VTE users
- Links to the electronic invoicing Web site, SCDOT web site, others
- More

3.3 Results

3.3.1 Impacts

One of the main purposes of an evaluation is to assess the effects/impacts of the project on participants. Depending on the nature of the particular impact, qualitative or quantitative measures are used. In the case of VTE, the evaluation is limited to qualitative impacts for the most part because the evaluation did not have the resources to conduct new data collections, and the public providers and SCDOT did not collect as a normal part of their operations the specific types of information needed to produce quantitative measures of impact.

Efficiency

The VTE project has improved the efficiency of the public providers in a number of ways, although to a lesser degree than anticipated at the outset of the project.

- The desktop computers, printers and servers presented to the public providers and the training in their use have contributed to the overall efficiency of their offices at no out-of-pocket cost. Particularly employees of agencies with limited resources have benefited from improved skills in the use of general business software, email and the Internet, which they can apply to not only the VTE applications, but also to other office applications, rendering their skill levels on a par with agencies with more robust budgets.
- In the area of electronic invoicing, there is anecdotal evidence of significant savings in the amount of time needed to prepare and file monthly invoices to obtain reimbursement for Section 5311 funding for non-urbanized area transportation contracts. Several agencies interviewed for the evaluation stated that they were able to reduce the amount of time needed to prepare the forms by one third to one half. The turnaround time for the electronic transfer of the funds to the public provider bank accounts was reduced from one to two months to two to three weeks. Faster reimbursement is especially critical to agencies with limited resources.
- Agencies using the RouteMatch S&D software have seen improvements in their efficiency, but some improvements have been quicker to materialize than others. They would all agree, however, that the system has been well worth the effort and wait to achieve. Specific improvements to efficiency were cited in several public provider interviews:
    - In the case of one public provider, overall S&D expenses were reduced by between 10 and 20 percent because the reduction in manual checks and paperwork made it possible to cut back on overtime.
    - They can schedule trips further ahead of time than before. In particular, this enables them to coordinate long distance trips better.
    - One agency said that formerly it took about 45 minutes to put a route together; with RouteMatch it takes about 10 minutes.
    - They believe efficiency of vehicle usage has improved, and will experience further improvement with route optimization in effect.
    - Where it used to take about 45 minutes to produce a manifest, with RouteMatch it takes just the push of a button.
    - Driver manifests are now one sheet of paper instead of several stapled together. Drivers are less likely to miss a customer pick-up or drop-off because they can now see the entire route laid out before them.
    - Manual driver logs were eliminated; however, drivers still have to record mileage readings on their manifests and turn them in each day.
    - The audit trail is much easier to follow.
    - The automatic reports produced by the system for billing purposes make them more efficient, although no estimate of hours saved was available. Although the Medicaid billing report is not entirely automated, it also saves time compared to before RouteMatch.

- Vehicle productivity and other operating statistics and performance measure reports make a great contribution to management decisions.
- Information on customers is quickly accessible from the customer database.

Mobility

Although they had no data to back up their statements, the public providers believed that since they began to use RouteMatch, their on-time performance has improved. They are able to inform customers more accurately of their pick-up and drop-off times. Customer satisfaction with their service has increased.

But none of the public providers has reduced the lead-time required to make a reservation. Most still require from 24 to 28 hours notice. They have not expanded services offered, or noticed an increase in demand. The expected ability to link trips among different public providers and among demand responsive and fixed route services has not yet materialized.

3.3.2 Influence of Exogenous Factors

Several exogenous factors may have had a slight schedule impact on the VTE project. SCDOT had to wait for the S&D procurement to be reviewed by affected labor unions, delaying the issuance of the RFP. As a result of the review, SCDOT included in the contracts that public providers signed to obtain user support and technical assistance for the S&D application, a clause that employees would not be laid off or otherwise adversely affected by the VTE system. Some public providers objected to this, as they hoped they might realize efficiencies in the form of reductions in labor as a result of the new system. At least one public provider refused to sign the contract and did not participate in the S&D application.

State revenue shortfalls due to the events of 9/11, combined with a reorganization of the MTO, also had an impact on the VTE project by delaying the hiring of a new VTE project manager during 2002.

3.3.3 Lessons Learned

Many lessons are to be learned from South Carolina's experience with the development and implementation of the VTE. They should serve as guidance not only for other states and organizations attempting to achieve a similar system in their own areas, but also for SCDOT as they continue with the remaining development tasks.

- Strong, committed and consistent project management and leadership are perhaps the most important elements in a project like VTE that involves a large diverse group of participants, complex interactions among many technical components, and a prolonged development period. This kind of leadership throughout the duration of the VTE project might have prevented:
    - The decision to terminate the original contractor SCRA without a backup plan, stopping the momentum of the project cold in its early stages.

- The lack of progress in other areas of the VTE project during the scheduling and dispatching software RFP protest.
- The absence of a project manager for over one year.
- The need to extend the project duration more than twice the originally planned time.
- Participant attrition, some forgetting about the project altogether and not realizing which components it included.
- The S&D RFP protest, or at least shortened it, as the decision to have only RouteMatch demonstrate its software to SCDOT in August 2000 long before the RFP was issued in June 2001, was contrary to SC procurement standards, and may have served as basis for the protest by Trapeze, who was not invited to demonstrate its software prior to the RFP.

- The importance of conducting thorough requirements analyses and following what is learned cannot be stressed enough. Problems with requirements definitions surfaced periodically throughout the VTE project:
  - The four-point approach agreed to in Phase I, based on thorough analysis of the technology needs of public providers and SCDOT, did not include vehicle maintenance software, yet it was the first application SCDOT gave to the public providers in Phase II. Only two of the public providers ever used it.
  - RouteMatch conducted detailed requirements analysis of each public provider prior to the Go-Live week. Nevertheless the need for the particular data required for DHHS billing was not realized until the public providers began actually using the system. RouteMatch had to develop several new reports for the public providers and it took at least one public provider over a year to work out all the reporting problems.
  - A VTE Web site could have been an effective way to instill the sense of belonging to a "VTE community" in the public providers and gone a long way to developing the "virtual enterprise" identity. SCRA hosted a VTE Web site during Phase I, but discontinued it after the end of their contract. As one of the more straightforward elements of the VTE project to develop and with the required infrastructure in place (computers with Internet access), the VTE Web site should have been one of the first things SCDOT implemented. Public providers could have used it as a focal point for information on VTE and communication with other participants.
- It would have been better first to approach the public providers with the more straightforward elements of VTE to build their enthusiasm and confidence in their capabilities and the VTE Project, and then introduce the more complicated applications to them conditional on the success of the earlier ones.
- Presenting a thoroughly tested and debugged system to users creates a favorable first impression and positive attitude toward the product. SCDOT tested its electronic invoicing system on a few public providers before rolling it out to the rest, with few

resulting glitches. On the other hand, the RouteMatch system, a much more complex system, was rolled out to all public providers at once. Problems encountered, even though some were relatively minor in nature, took a long time to resolve, with the result that many public providers developed a negative attitude toward the system, and decided not to use it.

- During the training sessions, RouteMatch discovered that the training is more successful when the classes are as homogeneous as possible regarding trainee experience with technology, and agency size and S&D needs. Group training that combined several agencies at a time did not address the specific needs of the attendees to the degree needed, and RouteMatch had to spend significant time on training during the Go-Live weeks at each site to insure the users could operate the software properly.
- The lack of digitized road networks that include customer addresses in some rural areas presented an obstacle to using the RouteMatch system in those areas. These networks are necessary for the route planner feature of RouteMatch to determine where the customers live and how to route vehicles for pick-ups. This discouraged some public providers from using the RouteMatch system.

3.3.4 Summary

The VTE concept was timed to the maturing of Internet platform and Web-based application technology, that are especially appropriate for systems in which many different users need to integrate with common software solutions, such as the public providers of South Carolina and SCDOT. Moving from desktop applications to Web-based applications has many advantages:

- Scalability: it is easy to add another user to a Web-based system, and the cost is very minimal
- Ease of upgrading software: rather than having to install upgrades on individual computer machines, upgrades are installed only once on the central server for access by all users
- Communication ease: users can be notified of important information, such as upgrades, or meetings, at the time of log on
- Central data storage: with all users storing their data on the central server, appropriate password protection can prevent unauthorized users from accessing confidential data, but also can allow users, such as SCDOT, to access selected user data to produce statewide data on transit usage, operations, vehicles, etc.

Although the VTE project has not yet produced the "virtual enterprise" it set out to achieve, it has accomplished some notable successes and has benefited the public providers of South Carolina. The public providers have been brought into the twenty-first century with computer training, access to the Internet and email. They can file invoices with the state electronically for reimbursement for DHHS transportation services, and have the funds deposited automatically into their bank accounts, reducing the turnaround time by weeks.

A number of the providers are using the scheduling and dispatching software to achieve efficiencies in the management of their demand responsive transit service, with paperwork reduction, automated routing, route optimization, driver manifests, financial reporting, and operating statistics.

The VTE concept is sound and South Carolina is to be commended for its forward thinking in its attempt to be one of the first states to implement such a system. Other agencies wishing to implement a similar Web-based system should be able to learn from the stumbling blocks that South Carolina encountered.

3.3.5 Outlook

SCDOT's opportunity to realize its original vision of creating a "virtual transit enterprise" in South Carolina rests with the building the VTE Web site and getting the grants management system up and running. SCDOT may regenerate the momentum and enthusiasm for the project that existed at its commencement by convening a meeting of the public providers, where they review the VTE accomplishments to date, ask for feedback on the VTE project, and reevaluate the public providers' remaining requirements for transit application software as a group and individually. Making sure all participants are satisfied with the VTE elements already implemented would be critical before attempting to implement additional elements. If AVL/fare collection were desired by the public providers, SCDOT might need to look at other funding sources or Congressional earmarks for equipment purchases. Any new plan should include only elements that can realistically be accomplished with the remaining and/or committed funds within the agreed timeframe.

Virtual Transit Enterprise Bibliography

Date	Title	Author	Format
Presentations			
1/21/1998	Mass Transit Technology Meeting & Overview of the VTE Project – to MTTC	SCRA	P E H
4/14/1998	Overview of the VTE Concept and SCRA's Project Methodology	SCRA	P E H
5/18/1998	An Introduction to South Carolina's VTE – APTA Bus Conference	SCRA	P E H
8/19/1998	The VTE Program – Gordon Linton	SCRA	P E H
1999	The VTE Project – general presentation	SCRA	P E H
1/18/1999	The VTE Program – general presentation	SCRA	P E H
3/31/1999	VTE Kick-off Meeting – at Santee-Lynches COG	SCRA	P E H
6/22/1999	The VTE Project Survey Analysis Subcommittee Meeting	SCRA	P E H
8/3/1999	VTE Plan	SCRA	P E H
8/31/1999	The VTE Project… The Statewide Initiative for Mass Transit in SC – Rural Advanced Technology and Transportation Systems International Conference	SCRA	P E H
Fall 1999	The VTE Project… The Statewide Initiative for Mass Transit in SC – overview	SCRA	P E H
10/8/1999	VTE Requirements Consensus Meeting – VTE Development Partners	SCRA	P E H
2/2000	The VTE Project… The Statewide Initiative for Mass Transit in SC – TASC	SCRA	P E H
2/23/2004	VTE Project Status Presentation	SCDOT (Glennith)	P E H
3/2/2004	SCDOT Program Review	RouteMatch	P E H
11/16/2004	VTE Project Status	SCDOT	H
Meeting Minutes			
3/31/1999	VTE Kick-off Meeting and Development Partners Breakout Session	SCRA	W E H
4/28/1999	VTE Development Partners Meeting and Steering Committee	SCRA	W E H
6/8/1999	VTE Steering Committee Meeting	SCRA	W E H
6/22/1999	VTE Development Partner Meeting and Survey Analysis Subcommittee	SCRA	W E H
7/20/1999	VTE Steering Committee	SCRA	W E H

8/3/1999	VTE Development Partner Meeting and Subcommittee Working Group and 6-Point Visualization	SCRA	W E H
10/14/1999	VTE Requirements Consensus Meeting	SCRA	W E H
Reports/ Documentation			
1999	Public Provider background data	SCRA	Ex E H
5/15/1999	On-site Data Gathering Survey Questionnaire	SCRA	Hard-copy report
7/1/1999	On-site Data Gathering Survey Report and Recommendation	SCRA	W E H
7/16/1999	VTE Technical Approach for Working Group Subcommittees	SCRA	W E H
8/25/1999	VTE Technology Transfer Plan	SCRA	W E H
8/26/1999	The VTE in SC – The Statewide Initiative for Mass Transit, Draft Paper for ITS 2000	SCDOT, SCRA	W E H
9/14/1999	VTE Phase 2 Proposal	SCRA	Hard-copy
10/1999	VTE Program Group Charter	SCRA	W E H
10/4/1999	VTE Draft Requirements Document, including 4 Draft Research, Trade-off, and Recommendation Reports	SCRA	Hard-copy
10/29/1999	VTE Configuration Management Plan	SCRA	W E H
11/1999	Documentation of changes in VTE scope	SCRA	W E H
11/29/1999	Draft Scheduling and Dispatching Software RFP	SCRA	W E H
12/1999	The VTE News – newsletter	SCRA	W E H
12/15/1999	VTE GIS and SC's Public Providers: Lessons Learned	SCRA	W E H
2/1/2000	VTE Requirements Document – final	SCRA	W E H
2/7/2000	VTE Phase 1 Update on All Activities	SCRA	Hard-copy
2/11/2000	VTE Return on Investment (ROI) Plan	SCRA	W E H
3/6/2002	VTE Phase 3 Technical Proposal	SCDOT	Hard-copy
5/19/2003	SCDOT RouteMatch Software Installation Project Plan	RouteMatch	MS Project
5/30/2003	VTE Scheduling and Dispatching Charter	RouteMatch	Hard-copy
2004	SCDOT System Acceptance Requirements	SCDOT	Electronic, hard-copy
2004	RouteMatch Software Advanced Training Manual	RouteMatch	Acrobat
2004	RouteMatch User's Guide	RouteMatch	Acrobat, H
2004	RouteMatch Marketing Materials and Brochures	RouteMatch	H
2004	SCDOT System Acceptance Criteria	SCDOT	H
11/16/2004	Project Review	RouteMatch	H

Monthly Schedule and Budget Activities Reports	• Mar 1999 • Apr 1999 • May 1999 • June 1999 • July 1999 • Aug 1999 • Sept 1999 • Oct 1999 • Nov 1999 • Jan 2000 • Feb 2000 • June 2000 • July 2000 • Aug 2000 • Sept 2000 • Oct 2000 • Nov 2000 • Dec 2000 • Jan 2001 • Feb 2001 • Mar 2001 • April 2001 • May 2001 • June 2001 • July 2001 • Sept-Oct 2001 • Nov-Dec 2001 • Jan-Feb 2002 • Mar-May 2002 • June-July 2002 • Aug-Oct 2002 • Nov 2002 • Jan-Mar 2003 • April-June 2003 • July-Sept 2003 • July 2004	SCRA, SCDOT	Some electronic, some hard-copy, some both

Format key:

E	electronic
H	hard-copy
W	Word
P	PowerPoint
Ex	Excel

Appendix A. Transit in South Carolina

(Provided by SCDOT)

History of Mass Transit Funding

The Interagency Council on Public Transportation was established in 1987, in the governor's office, to coordinate all public transportation efforts in the state. State general funds were used as the funding source. Amounts were appropriated for this purpose each year until 1985.

In 1986, the South Carolina Highway Department's name was changed to the South Carolina Department of Highways and Public Transportation (SCDHPT) and a new Public Transportation Division (PTD) was created within the agency. General funds continued to be the source of funding. In 1987, legislation was passed providing that one quarter of one cent of the Gasoline User Fee be dedicated to mass transit purposes. As a result, the amount of general fund monies used for mass transit was reduced. The PTD was charged with ensuring the fair and equitable distribution of all these funds as well as FTA dollars received by the state.

SC underwent governmental reorganization in 1993 and the DHPT was restructured. Certain functions remained with the newly named SCDOT. Among these was mass transit in the Mass Transit Office. Other functions, formerly carried out by the SCDHPT, were assigned to a newly created department of public safety.

In 2002 the amount of general funds used for mass transit was $485 thousand and revenues from the Gasoline User Fees were $5,407,322. Further, the state and the general public transit providers worked together to garner an additional $14 million in federal earmarks, which is being used to replace the state's aging fleet of buses.

In the years since the inception of the legislation providing that one-quarter of one cent of the state's gasoline taxes be dedicated to mass transit, various lawmakers have urged the legislature to increase the percentage. The Transportation Association of SC (TASC), a professional association made up of the state's public transportation providers and other interested stakeholders, has lobbied long and hard for a similar increase in mass transit's share of the gasoline tax.

It has become clear that an increase in mass transit funding is necessary if the state's needs for vans, buses, intermodal centers, transit facilities and rail services are going to be met in the future. These needs are going to need to be met without adversely impacting the state's funding for highway uses. Given the relative uncertainty of federal funding levels, there may need to be a drive to increase the level of funding contributed by local governments across the state for mass transit.

Role of Mass Transit in SCDOT's Overall Mission

Without a doubt, mass transit itself has a role to play in providing the public with a safe, efficient and effective alternative mode of transportation to the automobile. Support for mass transit does not work at cross-purposes with the construction and maintenance of

highways and roads. Indeed, mass transit depends on a good highway system to operate. As some highways and roads become more and more congested, mass transit has a definite role to play in relieving some of that congestion.

Mass transit can be seen as an adjunct to the automobile and not a replacement for it. The vehicles used in public transportation, be they vans, buses, or passenger rail cars, will never replace the automobile. At best, their use will give people mobility options when travel needs can best be met by using mass transit. Due to its widespread use and the public demand for it, governments are compelled to provide for its continuance in every jurisdiction in the US. Since mass transit has become a public service, as opposed to a profit-making enterprise, taxpayers must support it whether or not those taxpayers are also users. Non-users receive, at least in theory, indirect benefits such as reduced congestion, reduced air pollution, and mobility options when they want them. Since tax dollars heavily support mass transit throughout the country including here in SC, the agencies that are charged with distributing those dollars must be held accountable for the wise and fair use of them.

The SCDOT is charged with providing "a safe and efficient transportation system for the state of SC." This system includes mass transit. Since it is charged with this large responsibility, the SCDOT must provide for meeting the needs of those mass transit systems and operators who are endeavoring to furnish the safest, most efficient, most cost effective services to the traveling public. The SCDOT's overarching goal is mobility for all South Carolinians, be that mobility on the highways and roads in a private automobile or in a public bus or van. Mass transit is a means to an end in providing that mobility that is so essential to a good quality of life. The SCDOT supports mass transit in SC as another way to provide mobility for all citizens.

Types of Public Transportation

In SC, public transportation takes several forms. Most transit services are provided as either fixed route and/or demand response or some combination of the two. Most fixed route services are found primarily in the larger cities and towns. A form of fixed route service is found in the rural areas of the state as well (see below). Demand response transportation service can literally be found everywhere in the state, in both urbanized and rural areas.

Fixed route service is well suited to urban areas by virtue of the population density of these types of settings. People in urban areas know that a certain public transit vehicle will travel along a predetermined route at predetermined times on predetermined days. A schedule or timetable is printed and made available and service follows this timetable.

Demand response service involves prior notification to an agency by an individual needing to go to a known destination at a specific time. Advance notice is given to the agency so that a vehicle can be dispatched to pick up that individual at the specified time. A return trip is planned at the same time so that the rider will know that he or she will have transportation when they are ready to return.

Appendix A. Transit in South Carolina (continued)

Since SC is such a rural state, much of the travel of transit dependent individuals is work commuter trips over great distances. This type of transportation is long-haul bus service from areas of limited job opportunity to areas where employment is more plentiful. These rural services are fixed route in that the vehicles cover virtually the same routes and connect the same origin and destination points each day. However, some rural transit operators provide a demand response type of service for their rural riders also.

The foregoing types of public transportation services are open to the general public, that is, any member of the general public is eligible to ride these types of services whether they are provided in the rural areas or in the urbanized areas of the state.

Another type of service provided by SC's public transportation industry is that furnished by the state's human service agencies. These types of service are not open to the general public; rather they are intended for that segment of the state's population who are more often than not, unable to utilize general public transportation. These agencies provide a very specialized transportation service for their clients who often have very special needs. These needs range from those persons who are totally disabled and must be transported in their wheelchairs to those with limited cognitive skills and must be taken to special centers for rehabilitation and care. There are also special transportation providers who transport only senior citizens and those eligible for Medicaid services including transportation. For most all of these organizations, transportation is only one, albeit an extremely important one, of the services they provide.

All of these types of public transportation services combine to make up the big picture of mass transit in SC, an industry that is vital to the economic progress and quality of life of our citizens. This is because access to jobs is critical in a state that is so largely rural and so many workers have named transportation as one of the top problems in getting to work. The other factor (quality of life) is critical because so many South Carolinians depend on being mobile and independent as a primary part of their welfare and wellbeing. Having access to the type of transportation that is specifically tailored to the special needs of this group of citizens gives them this extra measure of the quality of life.

History of Public Transportation in SC

The history of public transportation in SC really begins as various human service agencies began transporting their clients in response to the very specific needs of those persons. Those needs included visits to doctors, senior centers, meal sites, employment sites, shopping trips, and even to receive such specialized services as dialysis treatment. It was soon observed that many of these agency trips were duplicative of one another. As a result some agencies began informally coordinating some of their trips to the same destinations and for the same riders with other like agencies. An office was set up to track this informal coordination among the human service agencies providing specialized transportation. It was called the Interagency Council on Public Transportation and was initially made up of the various heads of the agencies that provided this type of transportation.

Appendix A. Transit in South Carolina (continued)

More services were needed for persons, particularly in the rural areas of the state, who had no alternative way to get to work. Many of these persons did not qualify to use the human service agency's transportation so another means had to be devised. In the mid-1970's enabling legislation was introduced that allowed for the creation of regional transportation authorities. These authorities could be set up along the lines of a special service district (e.g., a water or sewer district) irrespective of county boundaries, hence regional. Among the first to be established were authorities in the Pee Dee Region and the Santee-Lynches Region. Initially, the authorities had no tax levying power. Later amendments to the legislation provided for referendums to be held so that the authorities could determine constituent support for a tax that would be dedicated to public transportation for that region.

Later, some local jurisdictions saw the need for public transportation and established smaller transit operations as a part of local government services. Fairfield County and Williamsburg County are examples of jurisdictions that have done this. Some cities and towns have also determined that there was a latent demand for public transit in their jurisdictions and organized transit operations as a part of their general services. An example of this is the city of Clemson where no public transit had previously existed. Still other communities had been provided with public transit service by private operators, such as utility companies, and when those utilities wanted out of the transit business, the community was faced with a choice: either go without mass transit service or find a way to assume the responsibility for the service. Such cities as Anderson, Greenville, Spartanburg, Columbia and Charleston successfully met this challenge and now have mass transit services because of initiatives they took to ensure that mass transit would continue for the citizens of their respective cities or regions.

Today passenger rail services are being seriously considered in some locales that have high concentrations of populations and significant road congestion problems, such as the Greenville-Spartanburg region. Also areas that have high seasonal influxes of people, notably the Myrtle Beach/Grand Strand area of SC, have begun to think about ways in which a high capacity mode such as passenger rail could alleviate some of the area's traffic congestion and attendant problems.

Appendix B. VTE Desktop Computer Equipment and Server Specifications

Desktop Equipment

Processor:	Intel Pentium© III Processor 700 MHz
Memory:	256 MB 100 MHz SDRAM
Monitor:	VX720 17-inch Color Monitor (16.0-inch viewable area)
Case:	E-series 8-bay Mid Tower
Keyboard:	104+ Keyboard
Mouse:	MS IntelliMouse and Gateway mouse pad
Operating System:	Microsoft© Windows NT Workstation 4.0/Windows 98
Expansion Slots:	3 PCI, I PCI/ISA, 1 ISA and 1 AGP
Floppy Drive:	3.5-inch, 1.44MD diskette drive
CD-ROM:	20X min./48X max. CD-ROM drive
Hard Drive:	15GB Ultra ATA hard drive
Video:	ATI RAGE 128GL 16MB AGP Graphics
Fax/Modem:	56k Controller-based Internet/Fax Modem
Network Card:	3COM PCI 10/100 Twisted Pair Ethernet with WOL
LANDesk Software:	Intel© LANDesk Client Manager Software v6.0
Anti-Virus Software:	Norton 2000
Limited Warranty Program:	4 Years Parts and Labor Limited Warranty with 3 Years On-site Service, Limited Hardware and Software Tech Support as long as you own your system

Appendix B. VTE Desktop Computer Equipment and Server Specifications (continued)

Server Specifications

Dell PowerEdge 1400 Server

- Dual Pentium III 1.0GHZ processors each w/256K Cache
- 512MB SDRAM (2x256) (2 open slots)
- Standard Windows Keyboard
- 17" monitor
- 3 36GB, U160, SCSI, 10K hard drives in a RAID 5 configuration
- 39160 Dual Channel Ultra3, SCSI Controller, 1 INT/1 EXT Port
- 3.5" 1.44MB Diskette Drive
- Microsoft Small Business Server 4.5 w/5 client licenses
    - Includes Windows 2000 Server, Exchange 2000 server, Microsoft Internet Security and Acceleration Server 2000, SQL Server 2000, Frontpage 2000 and Outlook 2000. This Network operating system is designed for small businesses with 50 or fewer users.
    - While this software will give each RTA the ability to connect their users to the Internet, they need to be aware of the security needs of opening their network up to the Internet. Trained IT staff or consulting services are recommended.
- Intel PRO 100+, Dual Port NIC w/Adaptive Load Balancing & Adapter Fault Tolerance
- 56K Internal Modem
- PowerVault 100T 20/40G Internal Tape Drive
- 48X IDE CD-ROM
- Veritas Backup Exec Enhanced Software
- 3 Years Parts & Labor (Next Business Day) support
- APS Smart UPS 1400, 1400VA UPS

Appendix C. RouteMatch System Acceptance Criteria

General Requirements

Requirements	Comments
• Allows each agency access to only their data – defined as private data. • Allows SCDOT and other agencies access to only public provider data approved by the public provider – defined as public data. • Allows easy and efficient data entry and user-defined reporting. • Generates reports for the transit agency's operations and performance data. • Does not cause a loss of previously saved and archived data due to failure of system capabilities • Allows remote backup and restore capability of data. • Controls user access (SCDOT and agencies) to system through user password protection. • Designed to handle multiple billing functions including zones, vehicle miles/hours, passenger mile, or any combination. • Designed with an integrated GIS and/or mapping component. • Allows access via thin client solution (Citrix Metaframe). • Allows concurrent user access to the applications by agencies and SCDOT (where applicable). • Allows execution over dial-up modem connection with transit industry standard of acceptable performance. • Provides the ability to optimize routes in collaboration with the GIS component. • Allows establishment of a minimum of 18 different datasets or database schemes/segmentations to reside on one unit (server or server cluster). To be utilized in subscription type service. • Allows concurrent access to the software by at least 45 users.	

Appendix C. RouteMatch System Acceptance Criteria (continued)

- Allows execution of the S&D software under TCP/IP protocol.
- Allows remote system administration.
- capabilities including establishing new/revoking accounts, setting user access permissions and overall VTE system maintenance.
- Provides the ability to handle a minimum of 20,000 passengers per agency or 100,000 passengers statewide.
- Provides the ability to handle a minimum of 2,000 ride requests per day per agency or 10,000 ride requests per day statewide.
- Provides the ability to query the software component's data or export in a comma delimited or documented format.
- Allows access to S&D data using ODBC, JDBC or other well-defined API.
- The loss of a single CRT, console, printer, or other incremental equipment is not considered a system failure. However, the inability of the software to perform a major system function shall be considered a system failure. The reliability rate shall be based upon any consecutive 7-day period. The software shall have 99.99% availability.
- Provides a maximum acceptable response time to any activity other than automatic scheduling at peak periods of ten (10) seconds.
- Provides on-line system help.

Appendix C. RouteMatch System Acceptance Criteria (continued)

Passenger Records/Information Tracking Requirements

Requirements	Comments
• Records general passenger information. • Records special needs of passenger. • Provides the ability to report on new versus duplicate customers during the fiscal year. • Provides the ability to track if customer is elderly or disabled but not count in both categories.	

Reservation/Service Request Processing Requirements

Requirements	Comments
• Schedules passenger trips in advance. • Schedules repetitive passenger trips and demand-response passenger trips. • Schedules rides for same day service. • Automatically retrieves passenger data when name keyed into software. • Allows multi-user reservation processing. • Copies existing trips to other dates or other existing customers.	

Appendix C. RouteMatch System Acceptance Criteria (continued)

Run/Vehicle Scheduling Requirements

Requirements	Comments
• Provides the ability to assign vehicles and drivers to specific runs. • Maintains data including vehicle equipment (size of lift), passenger capacities (wheelchair and ambulatory passengers), size of wheelchair tie-downs and vehicle status (in/out of service) on each vehicle in the fleet to properly schedule rides according to vehicle capabilities. • Provides the ability to automatically create a daily schedule. • Provides a driver's log/manifest that is less labor intensive than current process. • Provides ability to use the same vehicle for a specified service (i.e., dialysis) on a day-to-day basis. • Provides ability to determine directions for drivers especially when out of their normal service area.	

Vehicle Tracking/Dispatching Requirements

Requirements	Comments
• Receives and stores vehicle locations for the entire fleet (up to 2000 vehicles) from the AVL gateway and display the vehicle locations on a graphical map. • Provides ability to quickly see available vehicles for the scheduling of will-call trips. • Reduces data entry required to verify trip information.	

Appendix C. RouteMatch System Acceptance Criteria (continued)

Reporting Requirements

Requirements	Comments
• Provides necessary data relevant to scheduling and dispatching to complete Title XIX Report. • Generates system reports for each public providers individual data. • Provides ability to automatically calculate billing information for a funding source using multiple rules. • Provides ability to report on different Title XIX categories by county.	

By signing this document, the agency agrees that the RouteMatch system substantially meets and performs to the requirements outlined above. This document serves as the system acceptance document confirming the successful completion of the implementation process. It allows the project to move from implementation into customer support which will be provided based upon the individual contracts of each agency.

_____ _____

RouteMatch Software Representative Public Provider Representative

_____

SCDOT Representative

Appendix D. Public Provider Participation in Elements of VTE

Public Provider Name	Participation								
	Computer Equipment	Computer Training	Internet / email	OMNI Fleet	Electronic Invoicing	RouteMatch			
						Training	Scheduling	Reporting	Optimization
Urban									
City of Anderson – Electric City Transit Authority	Yes	N/A	Yes	No	Yes	No	No	No	No
Charleston Area Regional Transit Authority (CARTA)	N/A	N/A	Yes	No	Yes	No	No	No	No
City of Columbia – Trolley System and Central Midlands RTA	Yes	N/A	Yes	No	Yes	No	No	No	No
Clemson Area Transit System (CAT)	Yes	Yes	Yes	No	Yes	No	No	No	No
Greenville Transit Authority (GTA)	Yes	N/A	Yes	No	Yes	Yes	N/A	N/A	N/A
Transit Management of Spartanburg (SPARTA)	Yes	Yes	Yes	No	Yes	No	No	No	No
Lymo-Waccamaw RTA	N/A	N/A	Yes	No	N/A	No	No	No	No
Rural									
Berkeley-Charleston-Dorchester (BCD) RTMA	Yes	Yes	Yes	No	Yes	No	No	No	No
Coastal Rapid Public Transit Authority (CRPTA)	Yes	N/A	Yes	No	Yes	No	No	No	No
Fairfield County Transit System (FTS)	Yes	Yes	Yes	No	Yes	To be trained	No	No	No
Lowcountry Regional Transportation Authority (LRTA)	Yes	Yes	Yes	Partial	Yes	Yes	No	No	No
Pee Dee Regional Transportation Authority (PDRTA)	Yes	Yes	Yes	No	Yes	No	No	No	No
Santee Wateree Regional Transportation Authority (SWRTA)	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes
Spartanburg County Transportation Services Bureau (TSB) operated by Spartanburg Regional Healthcare System	Yes		Yes	Yes	Yes	Yes	Yes	Yes	N/A
Williamsburg County Transit System (WCTS)	Yes	Yes	Yes	No	Yes	To be trained	No	No	No
Council on Aging									
Aiken Area Council on Council on Aging (AACOA)	Yes	Yes	Yes	No	Yes	Yes	No	No	No
Aiken County Public Transit System	Yes	Yes	Yes	No	Yes	No	No	No	No
Edgefield Senior Citizens Council	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes
Generations Unlimited (GU)	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes
Bamberg Council on Aging	No	N/A	Yes	No	No	Yes	Yes	Yes	No
York County COA	N/A	N/A	Yes	No	N/A	Yes	N/A	N/A	N/A

Appendix E. Distribution of Computer Equipment to Public Providers

Public Provider Name	Desktop Computers	Laser Printers	Servers
Urban			
City of Anderson – Electric City Transit Authority	2	1	0
Charleston Area Regional Transit Authority (CARTA)	N/A	N/A	N/A
City of Columbia – Trolley System and Central Midlands RTA	2	1	0
Clemson Area Transit System (CAT)	4	2	1
Greenville Transit Authority (GTA)	4	2	1
Transit Management of Spartanburg (SPARTA)	4	2	1
Lymo-Waccamaw RTA	N/A	N/A	N/A
Rural			
Berkeley-Charleston-Dorchester (BCD) RTMA	4	1	0
Coastal Rapid Public Transit Authority (CRPTA)	5	3	1
Fairfield County Transit System (FTS)	4	1	0
Lowcountry Regional Transportation Authority (LRTA)	3	2	0
Pee Dee Regional Transportation Authority (PDRTA)	15	4	1
Santee Wateree Regional Transportation Authority (SWRTA)	4	3	1
Spartanburg County Transportation Services Bureau (TSB) operated by Spartanburg Regional Healthcare System	4	2	1
Williamsburg County Transit System (WCTS)	3	2	0
Council on Aging			
Aiken Area Council on Council on Aging (AACOA)	4	1	1
Aiken County Public Transit System	2	1	0
Edgefield Senior Citizens Council	2	1	0
Generations Unlimited (GU)	2	2	1
Bamberg Council on Aging	N/A	N/A	N/A
York County COA	N/A	N/A	N/A

Appendix F. Electronic Invoicing Forms

Financial Summary Form – Page 1

Financial Summary

Record Id

Agency Name: _____ Invoice # _____

Invoice Period: _____ Contract # _____

		Category	Monthly Expenditures	Year To Date Expenditures
Line#	Codes	Administrative Charges	Total Expenditures	Total Expenditures
1	501.02	Other Salaries & Wages		
2	502.02	Fringe Benefits		
3	503.01	Management Service Fees		
4	503.02	Advertising Fees		
5	503.03	Professional & Technical Services		
6	503.05	Contract Maintenance Services		
7	503.06	Custodial Services		
8	503.99	Other Services		
9	504	Materials and Supplies		
10	505	Utilities		
11	506	Casualty & Liability		
12	509.01	Dues & Subscriptions		
13	509.02(a)	In-State Travel & Meetings		
14	509.02(b)	Out-of-State Travel & Meetings		
15	509.03	Bridge, Tunnel and Highway Tolls		
16	509.08	Advertising & Promotion Media		
17	509.99	Other Miscellaneous		
18	512	Leases & Rentals (Specify):		
19		(A) _____		
20		(B)		
21				
22				
23				
24				
25				
26				
27				
28				
29				
30				
TOTAL ADMINISTRATIVE CHARGES:				
(Equal Line 3, Column (b) on Form 600)				

Appendix F. Electronic Invoicing Forms (continued)

Financial Summary Form – Page 2

Financial Summary

Record Id: [ ]

		Category	Monthly Expenditures	Year To Date Expenditures
Line#	Codes	Operations Charges	Total Expenditures	Total Expenditures
1	501.01	Operations & Wages		
2	501.01	Operations Overtime		
3	502.01	Operations Fringe Benefits		
4	503.01	Management Service Fees		
5	503.02	Advertising Fees		
6	503.03	Professional & Technical Services		
7	503.05	Contract Maintenance Services		
8	503.06	Custodial Services		
9	503.99	Other Services		
10	504.01	Fuel & Lubricants		
11	504.02	Tires & Tubes		
12	504.99	Other Materials & Supplies		
13	507.04	Vehicles Licensing & Fees		
14	509	Miscellaneous Expenses (Specify):		
15		(A) _____		
16		(B) _____		
17		(C)		
18				
19				
20				
21				
22				
23				
24				
25				
26				
27				
TOTAL OPERATIONS CHARGES: (Equal Line 1, Column (c) on Form 600)				
LESS CONTRA EXPENSES: (Equal Line 2, Column (c) on Form 600)				
TOTAL OPERATIONS NET COST: (Equal Line 3, Column (c) on Form 600)				

Approval Information:

Prepared By [ ] Date [ ]

1st Sig: [ ] Date [ ]

2nd Sig: [ ] Date [ ]

Appendix F. Electronic Invoicing Forms (continued)

Financial Status Report Supplement

South Carolina Dept. Of Transportation
Division of Mass Transit
Financial Status Report Supplement

Record Id ☐

Subrecipient Information

Subrecipient Name: _____

Contract Number: _____

Report Period: _____

REVENUE/INCOME SOURCES	CAPITAL	ADMINISTRATION	OPERATIONS	TECHNICAL ASSISTANCE	TOTAL
1. Contra-Expense					
1a. Farebox					
1b. Contracts					
1c. Other					
1d. **Total Contra-Expense** (Sum of Lines 1a through 1c)					
2. Local Match					
2a. Government Appropriation					
2b. Other Cash					
2c. State Funds					
2d. Donations					
2e. Advertising Profits					
2f. Charter Profits					
2g. In-Kind					
2h. Contracts					
2i. Other(Specify): _____					
2j. Total Local Match (Sum of Lines 2a through 2i)					
3. Total Revenue/Income (Sum of Lines 1d And 2j)					

Prepared By ☐ Date ☐

Approval Information:

1st Sig: ☐ Date ☐

2nd Sig: ☐ Date ☐

Appendix F. Electronic Invoicing Forms (continued)

Property Delivery Receipt

South Carolina Dept Of Transportation
Office Of Mass Transit
Property Delivery Receipt

DMT USE
MR/CW
MC
TJ

(Format for Date Entry: mm/dd/yyyy)

Record Id

Name of Agency/Grantee: _____

Vendor's Name, Address: _____

Contract # _____ Invoice # _____ Type of Program: _____

Contract Award/Approval Date: _____ RFP/Bid Date: _____

I certify that on ____ / ____ / ____ this agency received the property listed below:
mm dd yyyy

Make/Model	VIN/Serial Number	Purchase Date	Delivery Date	Total Cost

☐ The property was inspected and met all specifications agreed to in the contract with the vendor.

☐ The property was inspected but did not meet all specifications. The deficiencies are listed below:

_____

_____

☐ The safety equipment (First Aid Equip., Fire Suppressor) has been installed on the vehicle.

		Title:	Date:
Prepared By:			

Approval Information:

		Title:	Date:
1st:			
2nd:			

PROPDELR - 4/00

Appendix F. Electronic Invoicing Forms (continued)

Request for Payment Invoice Form – Page 1

South Carolina Dept. Of Transportation
Division of Mass Transit
Request For Payment Invoice Form

Record Id: ☐

Section 1 Subrecipient Information	Section 2 Contract Data	Section 3 Invoice Data	Section 4 Type Of Programs
Federal Employer Id: _____	Contract No.: _____	Invoice Number: _____	FTA Section: _____
Sub. Name: _____	Contract Amt.: _____	Invoice Period: _____	State: _____
Address: _____	Contract Period : _____	Total Inv. Amt.: _____	Other: _____
City, State, Zip: _____	SCDOT Verified: _____	Federal Amount: _____	
Telephone Number: _____	INITIALS: _____ DATE: _____	State Amount: _____	Final Report: ○ Yes ◉ No

Section 5 **FINANCIAL STATUS INFORMATION**

LINE#	CATEGORIES	CAPITAL (a)	ADMINISTRATION (b)	OPERATIONS (c)	TECH. ASSISTANCE (d)	TOTAL (e)
1	Total Expenditures - This Report					
2	Contra - Expenses - This Report					
3	Net Cost - This Report (Line 1 - Line 2)					
4	FTA Share - This Report					
5	State/Other Share - This Report					
6	Local Match - This Report (Line 3 - Line 4)					
7	Net Cost - Prior Report					
8	Net Cost - To Date (Line 3 + Line 7)					
9	FTA Share - To Date					
10	State/Other Share - To Date					
11	Local Match - To Date					
12a	Total Funds Authorized: FTA					
12b	Total Funds Authorized: State/Other					
13a	Unexpected Balance: FTA (Line 12a-Line 9)					
13b	Unexpected Balance: State/Other (Line 12b-Line 10)					

Remarks:

Appendix F. Electronic Invoicing Forms (continued)

Request for Payment Invoice Form – Page 2

Request For Payment Invoice Form

Record Id

Total (e), Line 13b =

I certify that the information contained in this report is true to the best of my knowledge and belief; that all expenses are for the purpose set forth in the contract agreement; that supporting documentation will be submitted and retained for audit purposes and that payment is due and has not been previously requested.

Approval Information:

Prepared By: Title: Date:

1st Sig: Title: Date:

2nd Sig: Title: Date:

Note: When submitting a refund due to an overpayment, please make a check payable to the South Carolina Department of Transportation. Make sure your Request for Payment Form reflects the necessary credit adjustments.

Mail Request To: SCDOT/Division of Mass Transit
Post Office Box 191
Columbia, South Carolina 29202-0191
Attention: Request for Payment

If you have any questions regarding this Request for Payment Invoice Form, please contact the Program Budget & Controls Section at (803) 737-0831

Appendix F. Electronic Invoicing Forms (continued)

Request for Payment Invoice Form 600 Jarc – Page 1

South Carolina Dept. Of Transportation
Division of Mass Transit
Request For Payment Invoice Form (Form600Jarc)

Record Id

Section 1 Subrecipient Information	Section 2 Contract Data	Section 3 Invoice Data	Section 4 Type Of Programs
Federal Employer Id:	Contract No.:	Invoice Number:	FTA Section:
Sub. Name:	Contract Amt.:	Invoice Period:	State:
Address:	Contract Period :	Total Inv Amt.:	Other:
City, State, Zip:	SCDOT Verified:	Federal Amount:	Final Report: Yes No
Telephone Number:	INITIALS: DATE:	State Amount:	

Section 5

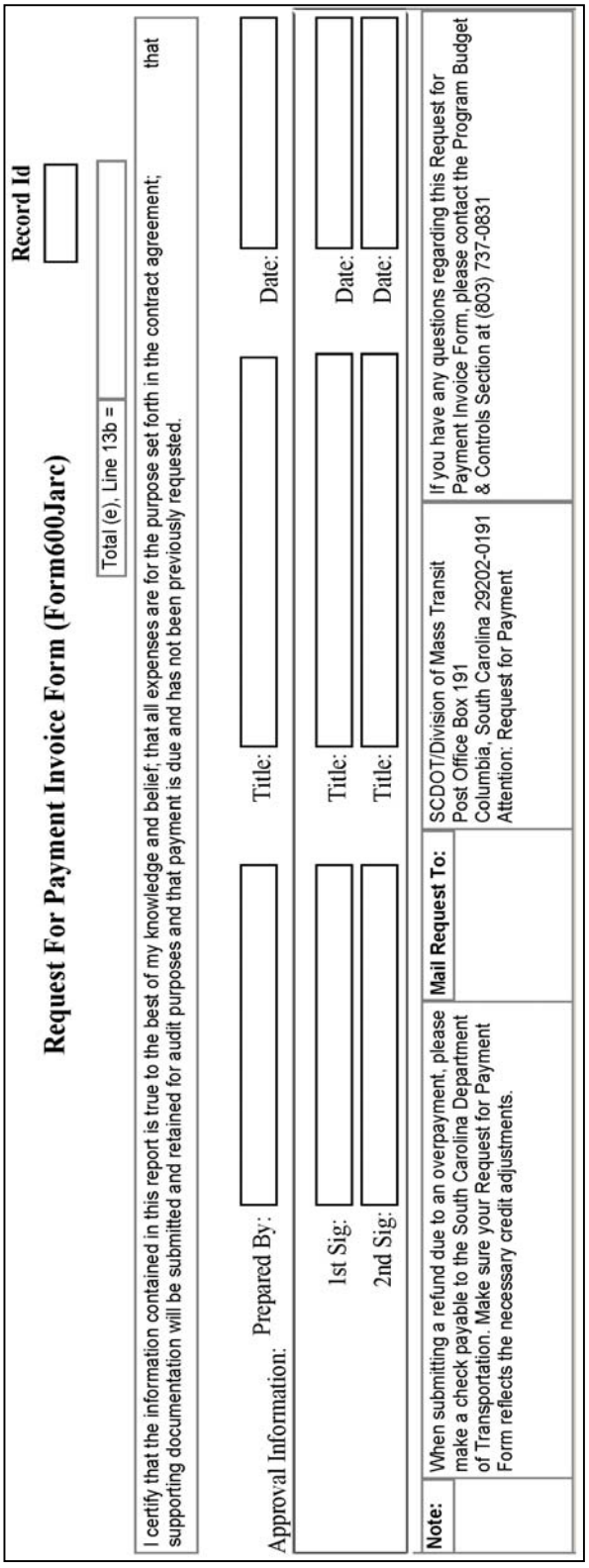
FINANCIAL STATUS INFORMATION

LINE#	CATEGORIES	CAPITAL (a)	ADMINISTRATION (b)	OPERATIONS (c)	TECH. ASSISTANCE (d)	TOTAL (e)
1	Total Expenditures - This Report					
2	Contra - Expenses - This Report					
3	Net Cost - This Report (Line 1 - Line 2)					
4	FTA Share - This Report					
5	State/Other Share - This Report					
6	Local Match - This Report					
7	Net Cost - Prior Report					
8	Net Cost - To Date (Line 3 + Line 7)					
9	FTA Share - To Date					
10	State/Other Share - To Date					
11	Local Match - To Date					
12a	Total Funds Authorized: FTA					
12b	Total Funds Authorized: State/Other					
13a	Unexpected Balance: FTA (Line 12a-Line 9)					
13b	Unexpected Balance: State/Other (Line 12b-Line 10)					

Remarks:

Appendix F. Electronic Invoicing Forms (continued)

Request for Payment Invoice Form 600 Jarc – Page 2



Request For Payment Invoice Form (Form600Jarc)

Record Id

Total (e), Line 13b =

I certify that the information contained in this report is true to the best of my knowledge and belief; that all expenses are for the purpose set forth in the contract agreement; that supporting documentation will be submitted and retained for audit purposes and that payment is due and has not been previously requested.

Approval Information:

Prepared By: Title: Date:

1st Sig: Title: Date:

2nd Sig: Title: Date:

Note: When submitting a refund due to an overpayment, please make a check payable to the South Carolina Department of Transportation. Make sure your Request for Payment Form reflects the necessary credit adjustments.

Mail Request To: SCDOT/Division of Mass Transit
Post Office Box 191
Columbia, South Carolina 29202-0191
Attention: Request for Payment

If you have any questions regarding this Request for Payment Invoice Form, please contact the Program Budget & Controls Section at (803) 737-0831

Appendix F. Electronic Invoicing Forms (continued)

Tracking Sheet

Tracking Sheet

(Budgets & Control Section)

Record Id ☐

SubRecipient/Agency Name: _____

Address: _____

Phone: _____ Federal Id No: _____

Contract No: _____ Invoice No: _____ Invoice Amt: _____

Program/Shims #	Line Item/Description	Amount

Total ☐

(Total should match Invoice Amt)

Approval Information:

Prepared By ☐ Date ☐

1st Sig: ☐ Date ☐

2nd Sig: ☐ Date ☐

SCDOT, Division of Mass Transit — Prepared by Budgets & Controls Section