Atlanta Regional Commission
Mobility Services for All Americans (MSAA)
Travel Management Coordination Platform (TMCP)

Version 1.8

Concept of Operations (CONOPS)

November 2016

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1 INTRODUCTION

The Atlanta Regional Commission (ARC) is the regional planning and intergovernmental coordination agency for the 10-county area including Cherokee, Clayton, Cobb, DeKalb, Douglas, Fayette, Fulton, Gwinnett, Henry and Rockdale counties, as well as the City of Atlanta. For over 65 years, ARC and its predecessor agencies have helped to focus the region's leadership, attention and resources on key issues of regional consequence.

ARC was awarded a Mobility Services for All Americans (MSAA) cooperative agreement by FTA in July 2015 to pursue a second phase of the Simply Get There project. The MSAA program began in FY 2005 with the goal of helping older adults, persons with disabilities, and economically vulnerable Americans to access their daily needs using transportation. The ARC shares the United States Department of Transportation's (DOT's) desire to improve the transportation system for all Americans and has been partnering with DOT and local partners in order to improve it. In addition to developing its first Human Services Transportation (HST) plan in 2007, the Atlanta region published a Travel Management Coordination Center (TMCC) concept in 2008 with FTA funding. Findings from the 2008 TMCC study supported the development of an HST Advisory Committee and an update of the Coordinated HST Plan to facilitate greater coordination of HST transportation services throughout the region. ARC also received funds during FY 2011 and 2012 to develop a one-click/one-call application called Simply Get There (SGT), which began operating in 2015. The most recent round of MSAA Deployment Planning cooperative agreements will allow ARC to create system specifications for a web-based application that will bring the system forward from "trip discovery" (pinpointing options) to "trip transaction" (centralized booking, scheduling, and dispatching).

Section 2 provides an in-depth background of the current web application that the project will leverage or extend to a more comprehensive travel management coordination platform. SGT is the current trip planning and trip discovery application developed and deployed. The web application is currently deployed and utilized by multiple users and agencies in the Atlanta region.

If the website is not an option for a user, they can call the Aging and Disability Resource Connection (ADRC) for assistance over the phone. This project includes a robust training and dissemination initiative, which includes sharing the website at public events and training users and caregivers and support staff who may work with users. To date ARC has worked with over 80 partner organizations and trained over 1,000 residents.

The current project will leverage this application and, potentially, architecture to extend the scope of the functionality to support a multi-modal, regional transportation coordination platform. Key functional areas to be considered in the next phase include:

- Centralized Resource Management
- Centralized Eligibility Determination
- Web-Based Reservations
- Automated Scheduling and Provider Assignment
- Provider Management and integration to existing Information and Referral System (ESP)
- Transportation brokering and least cost most appropriate provider assignment
- Automated Dispatching
- Automated Payment
- Automated cost allocation and invoicing
- Regional Trip Coordination
- Transportation Analytics

Integration considerations for the coordination platform will consider the following:

- Third party scheduling and dispatching application integration
- Customer Information and Access
- Real Time information integration
- Provider communication and integration
- Transportation Data Exchange

- Support for “no tech” providers
- Security and Privacy

Multi-modal considerations for the coordination platform will consider the following:

- Transportation Network Companies
- Real Time Fixed Route Information
- Vanpool Integration
- Provider database expansion and integration

The planning phase of this effort is underway and includes the following, the first three bullets of which are deliverables in this Cooperative Agreement:

- Development of a Concept of Operations
- Stakeholder engagement
- Travel Management Coordination Platform (TMCP) Design
- Determine technology toolset and functional requirements to expand capacity in existing providers and integrate the trip planning / discovery process into the service delivery operations

Stakeholder Engagement:

The concept of operations document has been developed with extensive feedback with stakeholders. ARC recognizes that Simply Get There’s enhanced capabilities must be based on the needs of users, including end users and partners such as transportation providers, in order to achieve its overall objective to improve mobility for residents through the Atlanta region. Therefore, ARC began the project by engaging stakeholders who had been involved in the initial phase and identifying additional potential partners. Because there had been staff turnover at a number of agencies between the initial phase and the launch of phase 2, ARC staff met one-on-one with new points of contact to build relationships and ensure buy-in from new staff to the project. After those initial meetings with new staff, ARC held a series of group meetings for all stakeholders to gather their input and feedback. This stakeholder engagement was a valuable part of the information gathering that informs this concept of operations document. ARC will continue to engage stakeholders as we move through additional steps of phase 2 and through the future.

Stakeholder meetings have been conducted with the following stakeholder types:

1) Technical Stakeholders, including people who develop and use software applications
2) Agency Stakeholders who work with older adults and people with disabilities
3) User Stakeholders, including residents who may have been trained on the software and who are the target populations for human services transportation

Multiple stakeholder events have been conducted to:

- Educate stakeholders on SGT features and functionality
- Educate stakeholders on the next phase of SGT
- Get feedback from stakeholders on feature gaps, workflow, and process.
- Incorporate stakeholder feedback into concept of operations. Feedback on requested features and functionality will be included in the prioritization and design process.

Stakeholder topics and discussions revolved around the following questions:

- Describe your agency and transportation program?
- Key challenges in coordination or mobility?
- Familiar with SGT and how it could assist your consumers?
- Does anyone currently utilize this type of system? If so, how?
- What are key functional areas that your organization may need relating to fixed / demand response trip planning?
- Do you currently use software for transportation management? If so, what vendor?

Key agency and user stakeholders included:

DARREN WALLACE	DEPARTMENT OF VETERNS AFFAIRS
JESSICA GILL	Cobb Senior Services
CAROL ROWE-JONES	Gwinnet County Senior Services
STEPHEN ARMOUR	Goodwill Industries
DAWN HARDESTY	Noblis
CANDACE KORTOVICH	North Fulton Senior Services
CHARLENE WILDER	FTA
MARSHAREE O'CONNOR	Atlanta Regional Workforce Board (ARWB)
KENYATA SMILEY	MARTA
DIANE REED	Henry County

Table 1 - Indifidual Stakeholders

The Simply Get There (SGT) Comprehensive Stakeholder Team includes:

SIMPLY GET THERE PARTNER ORGANIZATION	POINT OF CONTACT	EMAIL
AGING AND DISABILITY RESOURCE CONNECTION (ADRC)	Cara Pellino	cpellino@atlantaregional.com
ARC TRANSPORTATION ACCESS AND MOBILITY MANAGER	Cain Williamson	cwilliamson@atlantaregional.com
AREA AGENCY ON AGING (AAA)	Kathryn Lawler	klawler@atlantaregional.com
ATLANTA REGIONAL WORKFORCE BOARD (ARWB)	Marsharee O'Connor	MO'Connor@atlantaregional.com
ATLANTA UNITED WAY 211	Don Zubler	dzubler@unitedwayatlanta.org
CENTER FOR VISUALLY IMPAIRED (CVI)	Anisio Correia	acorreia@cviga.org
COBB COMMUNITY TRANSIT (CCT)	Vida Covington	Vida.Covington@cobbcounty.org
DEKALB OFFICE OF SENIOR AFFAIRS	Sandra Morrow	skmorrow@dekalbcounty.ga.gov
DISABILITY LINK, THE CENTER FOR INDEPENDENT LIVING (CIL)	Ken Mitchell	KMitchell@disabilitylink.org
GEORGIA COMMUTE OPTIONS (GCO)	Ryan Ellis	rellis@atlantaregional.com
GEORGIA DEPARTMENT OF COMMUNITY HEALTH (DCH)	James Peoples	jpeoples@dch.ga.gov

GEORGIA DEPARTMENT OF HUMAN SERVICES (DHS), COORDINATED TRANSPORTATION SYSTEM	Peggy Hackett	peggy.hackett@dhs.ga.gov
GEORGIA DEPARTMENT OF TRANSPORTATION (GDOT)	Nancy Cobb	ncobb@dot.ga.gov
GEORGIA GOVERNOR'S DEVELOPMENT COUNCIL (GDC), RURAL AND HUMAN SERVICES TRANSPORTATION (RHST) COMMITTEE AND STATEWIDE MOBILITY MANAGEMENT	Parker Martin	pmartin@grta.org
GOODWILL INDUSTRIES	Stephen Armour	sarmour@ging.org
GWINNETT COUNTY SENIOR SERVICES	Carole Rowe-Jones	gary.galloway@gwinnettcounty.com
LIFESPAN RESOURCES	Peggy Palmiter	peggy@lifespanatlanta.com
METROPOLITAN ATLANTA RAPID TRANSIT AUTHORITY (MARTA)	Ed Johnson	eljohnson@itsmarta.com
RIDE CONNECTION OF PORTLAND, OREGON	Kevin Chambers	kchambers@rideconnection.org
VETERANS AFFAIRS (VA), VETERANS TRANSPORTATION PROGRAM (VTP)	Darren Wallace	Sylvester.Wallace2@va.gov

Table 2 - Agency Stakeholders

2 SYSTEM OVERVIEW

2.1 ATLANTA REGIONAL COMMISSION (ARC)

The ARC is the metropolitan Atlanta Region's planning and intergovernmental coordination agency. ARC coordinates planning efforts across the Region in many areas such as aging, community services, environmental planning, governmental services, job training, land use and public facilities, as well as transportation planning. Many of ARC's responsibilities are defined by either state or federal legislation, while others have evolved over the years in response to a number of critical regional planning issues. The primary roles of ARC are summarized below:

- ARC is responsible for comprehensive planning under state law as the designated Metropolitan Area Planning and Development Commission (MAPDC).
- ARC is also defined as a Regional Commission (RC) to assist local governments with the planning process and to prepare and to implement comprehensive regional plans.
- ARC is the federally designated Metropolitan Planning Organization (MPO) for the Atlanta Region. As the MPO, the ARC is responsible for developing a multi-modal, financially constrained transportation plan that meets all federal transportation and Clean Air Act planning requirements.
- ARC provides planning staff to the Metropolitan North Georgia Water Planning District (MNGWPD), whose mission is to develop comprehensive regional and watershed-specific water resources plans for implementation by local governments.
- ARC serves as the administrative agency for the Atlanta Regional Workforce Development Board (ARWDB).
- ARC also serves as the Area Agency on Aging (AAA) providing services and policy guidance to address aging issues.
- ARC also serves as the local administrative agency for the Atlanta Urban Area Security Initiative (UASI) to prepare and coordinate the Region's response and recovery to homeland security issues.

2.2 SIMPLY GET THERE BACKGROUND

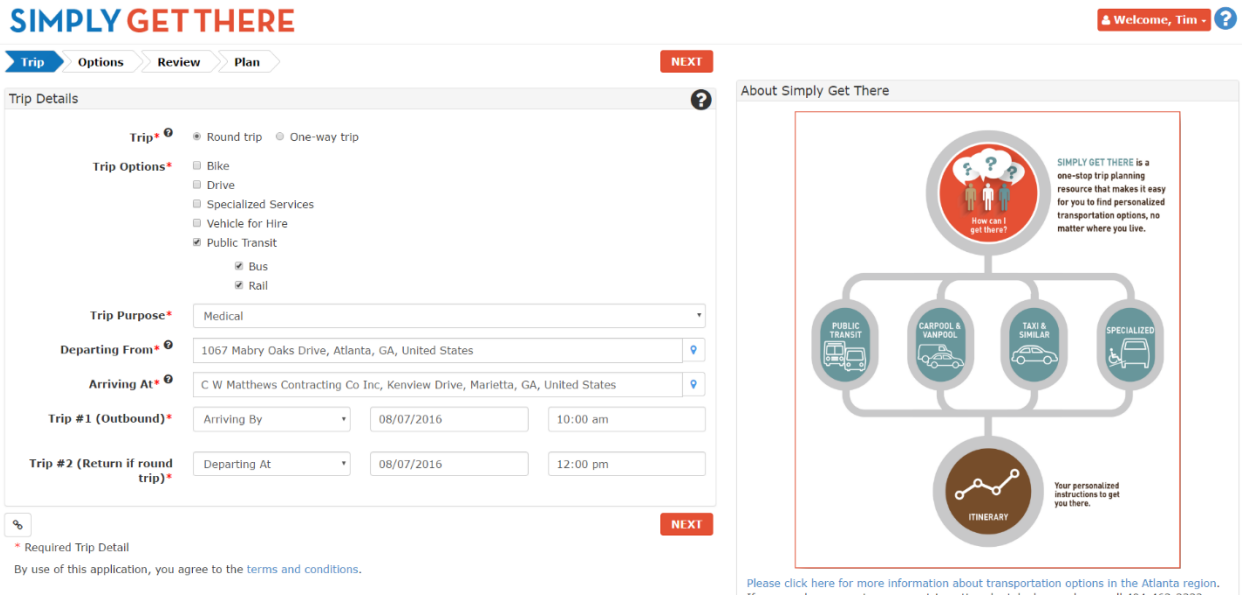
Simply Get There.org is a trip-planning resource for everyone and anyone who lives in or visits metro Atlanta. Users can compare different travel options and costs especially if they need extra or specialized transportation services. It is a relatively new service developed and hosted by the ARC and its Atlanta Area Agency on Aging (AAA). The web-based application uses a comprehensive listing of public and private sector transportation providers in the Atlanta region to help individuals, especially older adults and persons with disabilities, identify available transportation options. It also provides regional fixed route trip planning options as well as biking and for hire options.

The project was funded through a Veterans Transportation and Community Living Initiative (VTCLI) grant of the Federal Transportation Administration (FTA) as part of their "One-Click/One-Call" initiative. Launched on March 2015, Simply Get There became the first comprehensive online trip planner for HST populations in the Atlanta region. It covers all the options explained above such as public transit, carpool/vanpool, specialized curb-to-curb services, pedestrian trips, cycling, and taxis/transportation network companies. Visitors to the website can be confident that all their options are displayed to select the appropriate trip. They will then receive information in order to get in contact with transportation providers to make the final arrangements for the trip. Graphic 1 - Simply Get There User Interface (page 9) displays the home page for the Simply Get There One Click Application.

The pilot partners were part of a diverse stakeholder group that worked with ARC staff and software development contractors to create a product that meets the needs of the people they support with services. Stakeholders for this pilot effort included:

- Aging and Disability Resource Connection
- Atlanta Regional Workforce Board
- Cobb Community Transit
- disABILITY Link
- Georgia Commute Options

- Goodwill Industries
- Veterans Affairs Medical Center of Atlanta
- FTA
- Agewise Connections
- Georgia Commute Options



Graphic 1 - Simply Get There User Interface

2.3 OPERATIONAL ENVIRONMENT

SGT is an open-source web based application developed initially by Cambridge Systematics.

Different deployments can use different server configurations, but 1-Click is typically deployed on four servers:

1) A web server running Apache to host the web application;
2) Storage for various application configuration files (e.g., CSS, images, etc.);
3) An OpenTripPlanner server to respond to trip planning requests; and
4) A PostgreSQL database server to host the 1-Click database.

	SYSTEM	NOTE
PROGRAMMING LANGUAGE	Ruby	Ruby is a programming language. It was created 20 years ago by Yukihiro "Matz" Matsumoto. By most measures of programming language popularity, Ruby ranks among the top ten, though usually as tenth (or so) in popularity, and largely due to the popularity of Rails. Like Java or the C language, Ruby is a general-purpose programming language, though it is best known for its use in web programming.
APPLICATION FRAMEWORK	Rails	Rails is a software library that extends the Ruby programming language. Rails combines the Ruby programming language with HTML, CSS, and JavaScript to create a web application that runs on a web server. When Rails is plugged into Ruby, it is often referred to as "Ruby on Rails".

DEVELOPMENT AND VERSION CONTROL ENVIRONMENT	Git	Git is a version control system that is used for software development and other version control tasks. As a distributed revision control system. Git is free software distributed under the terms of the GNU General Public License version 2.
HOSTING SERVICE	GitHub	GitHub is a web-based Git repository hosting service. It offers all of the distributed revision control and source code management (SCM) functionality of Git as well as adding its own features. Unlike Git, which is strictly a command-line tool, GitHub provides a Web-based graphical interface and desktop as well as mobile integration. It also provides access control and several collaboration features such as bug tracking, feature requests, task management, and wikis for every project. GitHub offers both plans for private repositories and free accounts, which are usually used to host open-source software projects
DATABASE	PostgreSQL	PostgreSQL is an object-relational database management system (ORDBMS) with an emphasis on extensibility and standards-compliance. As a database server, its primary function is to store data securely, and to allow for retrieval at the request of other software applications. It can handle workloads ranging from small single-machine applications to large Internet-facing applications with many concurrent users.
WEB SERVER	NGINX	NGINX is a free, open-source, high-performance HTTP server and reverse proxy, as well as an IMAP/POP3 proxy server. NGINX is known for its high performance, stability, rich feature set, simple configuration, and low resource consumption
WEB SERVER SOFTWARE	Apache	Apache HTTP Server is the world's most used web server software. Apache is an open-source project. Runs on all major server operating systems.

Table 3 - Operational Environment

2.4 EXTERNAL INTERFACES

The following table defines the external systems and interfaces currently utilized by SGT.

	INTERFACE	**NOTE**
ATL TRANSIT	REST API Interface	Mapping and trip planning functionality

GOOGLE MAPS API	Google Maps API is utilized for address geocoding	Address geocoding and general mapping service
LEAFLET API	Map rendering	Open source
ENHANCED SERVICES PROGRAM (ESP	Flat file data import	ESP is the in-house provider management application used for its Aging Information and Resource program. Non-emergency transportation providers are imported into SGT for trip discovery
GEORGIA COMMUTE OPTIONS	Flat file data import	Source dataset for regional commuter options and services
OPEN TRIP PLANNER	Multi Modal Trip Planning API	Open source platform with integrated GTFS
TAXI FARE FINDER	For Hire API	Taxi and for-hire website and API

Table 4 - External Interfaces

2.5 SGT FUNCTIONAL OVERVIEW

SGT is a trip planning system designed to meet the transportation needs of human service clients including veterans, military families, elderly, disabled and other transportation disadvantaged groups. It:

- Provides unified trip planning for public, private and volunteer services;
- Works on computers, tablets, and smartphones;
- Is tailored to an individuals' trip planning needs; and
- Empowers call center staff to deliver improved services.

Veterans and their families are often in need of transportation services to enable them to attend medical appointments, receive physical therapy or mental health counseling, seek jobs or education, and access various veterans and related community services. Some veterans and family members have disabilities – mental, physical, or developmental – that exacerbate the challenge of obtaining these services. Numerous other populations experience similar challenges, including the elderly, transit-dependent populations, and other nonveterans with disabilities.

SGT enables these target populations to quickly and easily identify the most appropriate options for making a particular trip, evaluating and identifying options that include fixed-route transit, demand-responsive transit (DRT), taxi and other private transportation services, paratransit, volunteer transportation service networks, carpools, and vanpools. 1-Click also provides call center or social service agency staff with a single, centralized source of this information to use on behalf of their clients.

SGT tailors trip plan options to the needs, preferences, and schedules of each individual, based on factors such as Medicaid eligibility, veterans' transportation eligibility (which depends on Veteran status and trip purpose), age, physical mobility limitations, and other preferences regarding tradeoffs of time, cost, and convenience.

SGT also stores data that can be used to generate a variety of reports on system usage, mobility impacts, trips planned and made, and unmet transportation needs.

User Types

SGT is designed to serve the needs of many different types of users, with features and functions appropriate for each one:

- Travelers are individuals in need of transportation services. Registered Travelers have a user account and travel profile, while anonymous Travelers do not have an account and can use the system without logging in.
- Buddies are friends, family members, or other caregivers who assist Travelers in creating trip plans and managing account settings.
- Agents are customer service representatives who assist Travelers in creating trip plans and managing account settings.

- Agency Administrators are the managers of Agents, who perform maintenance functions related to their Agency.
- Provider Administrators are representatives of organizations that provide transportation services, who need to manage and maintain information on the services they provide.
- System Administrators are the "super-users" who manage the SGT software.

Modes Currently Supported in SGT

- Bicycle;
- Drive;
- Paratransit from local providers;
- Taxi;
- Transit (Bus, Rail) based on General Transit Feed Specification; and,
- Walk.

2.5.1 Trip Planning and Discovery

Trip planning and discovery functionality allows users to plan fixed route and demand response trips and explore multiple options that could be available to them. The table below describes this functionality.

FUNCTION	DESCRIPTION
GENERAL ACCESS	User can access generally available website using any browser. www.simplygetthere.org

TRIP PLANNING	User can select multiple options to plan or discover a trip. Trip options include:
	▪ Bike
	▪ Drive
	▪ Specialized Services
	▪ Vehicle for Hire
	▪ Public Transit
	  ○ Bus Option
	  ○ Rail Option
	User must select a trip purpose.
	User must select origin and destination
	User can select timing preferences for date, arrival and departure

TRIP DISCOVERY	Based on user input, various trip options are provided to the user. These include: bike, drive, specialized services, vehicle for hire, and public transit
ELIGIBILITY	If user selects the specialized service options, an eligibility form is displayed.
TRIP PLAN REVIEW	Based on user inputs a single or multiple trip plans will be displayed. Trip segments are listed by BUS, SPECIALIZED SERVICES, SUBWAY, WAIT, and WALK. Trip Options filters are provided. ▪ Specialized services accommodations are provided including:

	○ Curb to Curb ○ Door to Door ○ Driver Assistance Available ○ Folder Wheelchair Accessible ○ Motorized Wheelchair Accessible ○ Stretcher Accessible ○ Traveler Companion Permitted ○ Wheelchair Lift Equipped Vehicle ▪ Number of Transfers Filter ▪ Total Travel Time Filter ▪ Walking Distance Filter ▪ Wait Time Filter Users can refine their trip plan using the above filters. Users can select the appropriate trip plan.
TRIP DETAILS	Based on trip plan review and selected trip plan, the system will display the trip plan detail. If specialized transportation plan was selected, the system will display the origin and destination and the selected specialized transportation provider. Trip Discovery information includes: ▪ Detailed Provider Description ▪ Name ▪ Phone ▪ Email ▪ URL ▪ Accommodations Provided ▪ Accommodations Not Provided ▪ Rating
TRIP PLAN PRINT	User can choose to print the trip plan
TRIP PLAN EMAIL	User can choose to email the trip plan
TRAVEL PROFILE	If registered, user can maintain and manage their user profile. User preferences are stored here including: • Preferred Language • Walking Speed • Walking Maximum Distance • Maximum wait time • Travel Companions • Eligibility Information • Trip Accommodation Preferences • Booking Information • Preferred Modes
TRIP PROFILE	User can view selected trip plans. Users can delete edit or remove the trip from the profile. User can get details of the planned trip.
PLACES	User can save common origins or destinations in the Places function to customize the planning process to their common travel plans

PROVIDERS	Users can obtain a list of all transportation providers in the system with hyperlink to provider detailed information.

Table 5 - Trip Planning Functions

2.5.2 Administration

SGT provides an administration function for internal ARC users to administer, maintain, and access reports. System Administrators have the ability to maintain SGT, creating and updating user accounts, Agencies and Providers; setting appropriate translations; and reviewing submitted feedback and sidewalk obstructions.

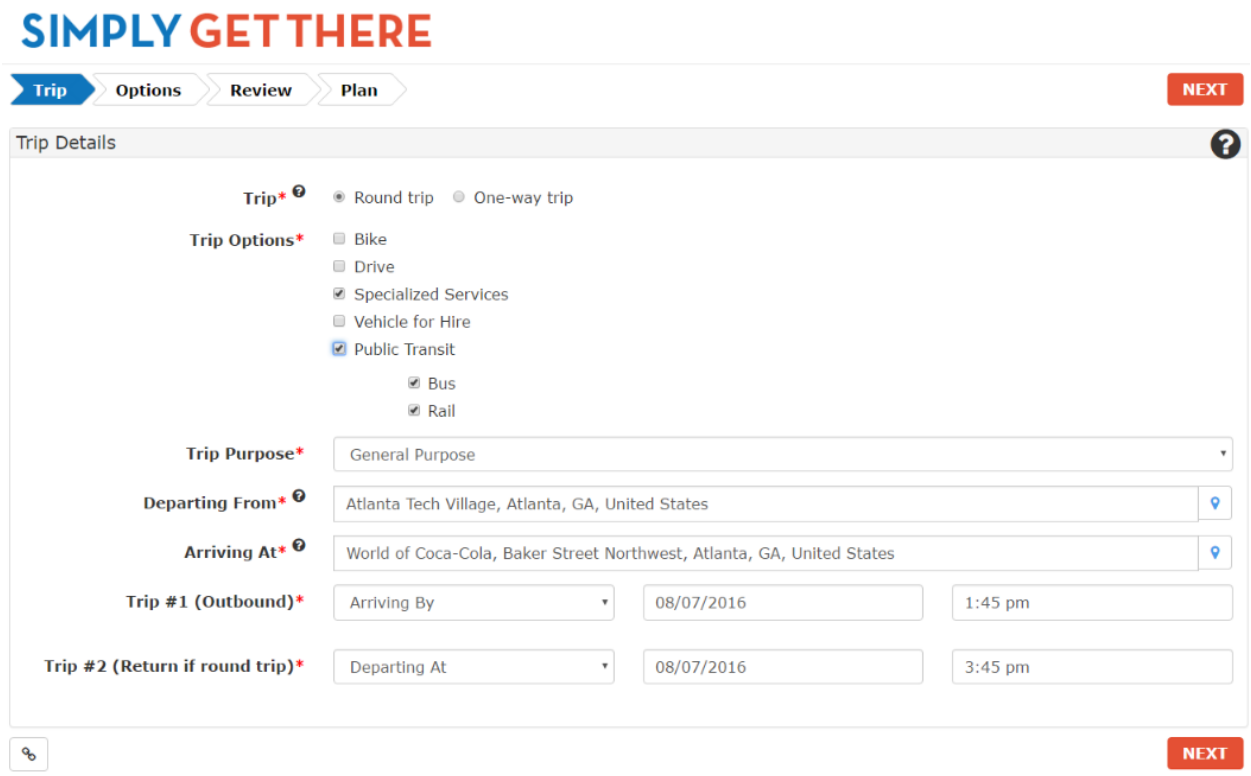
System Administrator functions are available from the Staff and Admin menus. Graphic 6 provides an example of the Admin screen. Menu options include:

MENU OPTIONS	DESCRIPTION OF MENU OPTIONS
SETTINGS	Administrators can manage points of interest, site branding options, and upload favicons to different device types.
USERS	Administrators can create and edit users. User roles include: ▪ General ▪ Traveler ▪ Agent ▪ Agency Administrator ▪ Provider Administrator ▪ System Administrator
TRANSLATIONS	Administrator can modify web content to support English to Spanish translations.
FEEDBACK	Administrators can view feedback provided by the Feedback function of the application.
SIDEWALK OBSTRUCTIONS	Administrators can manage user submitted feedback specifically on sidewalk obstructions.

GRAPHIC 2 - USER ROLES

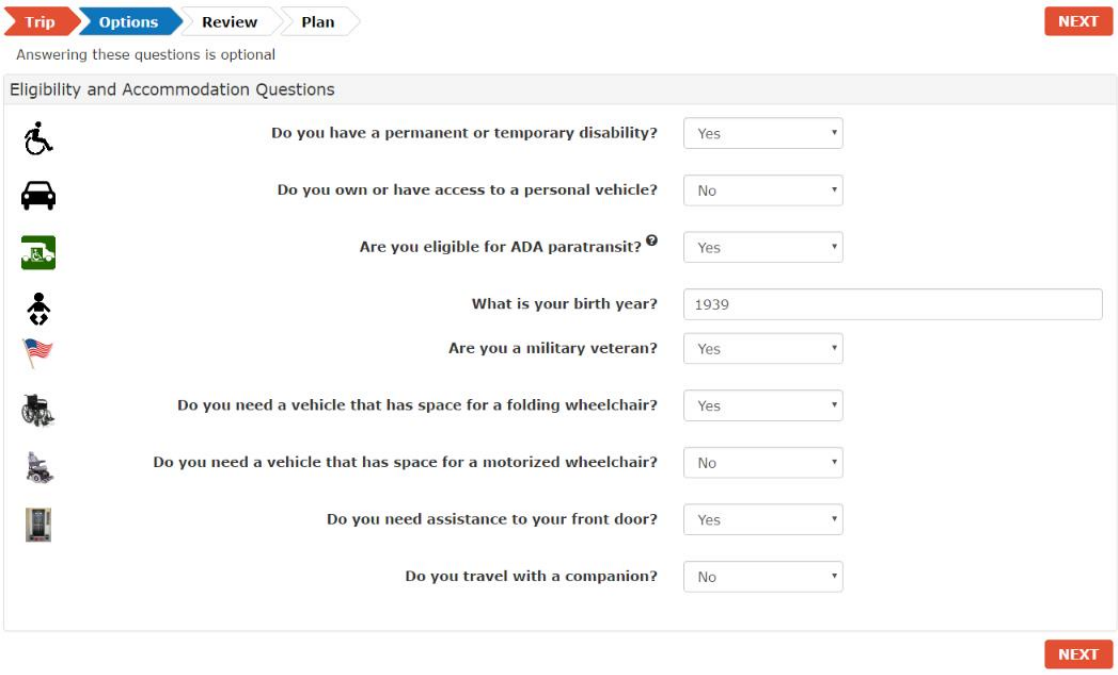
Table 6 - Administration Functions

Graphic 3 represents the user interface for the the trip planning function.

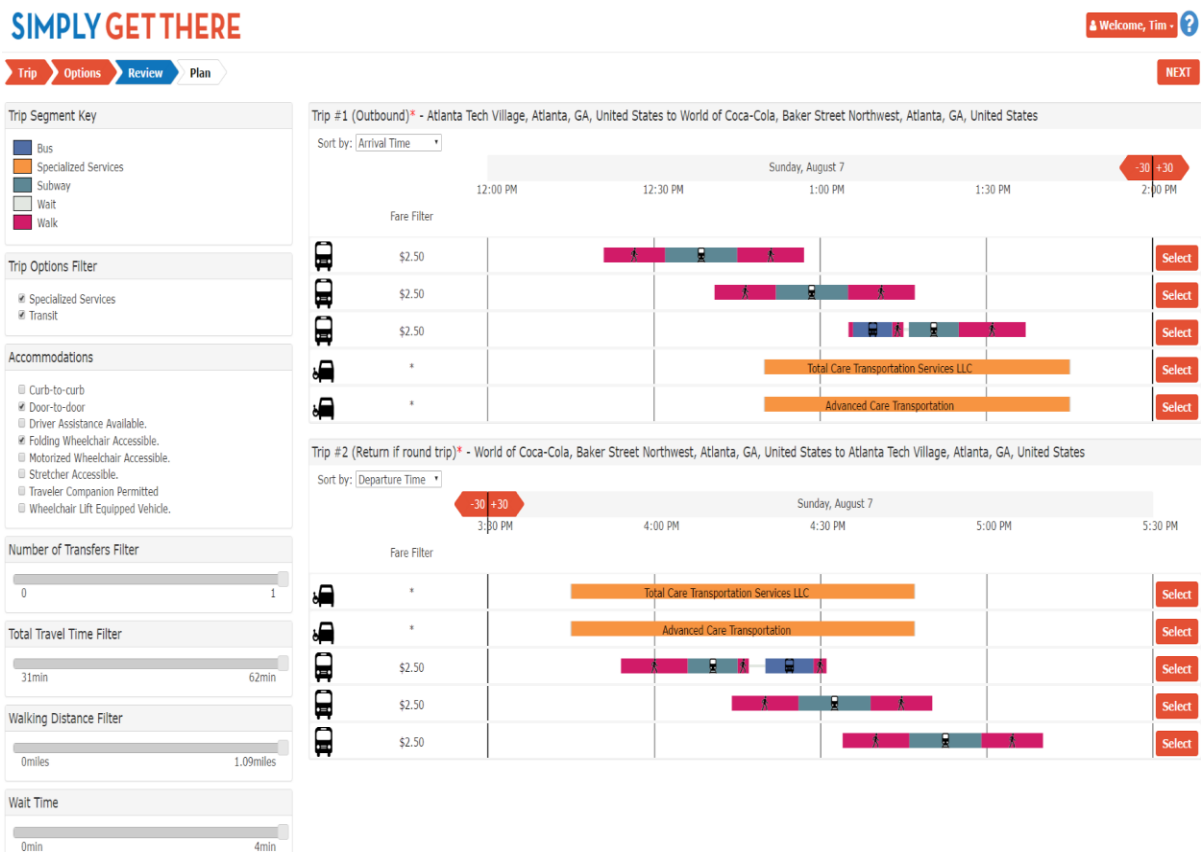


Graphic 3 - Trip Planning Interface

The graphic below (Graphic 4) illustrates the eligibility functions of the current system. Graphic 5 represents the final trip plan review functionality.

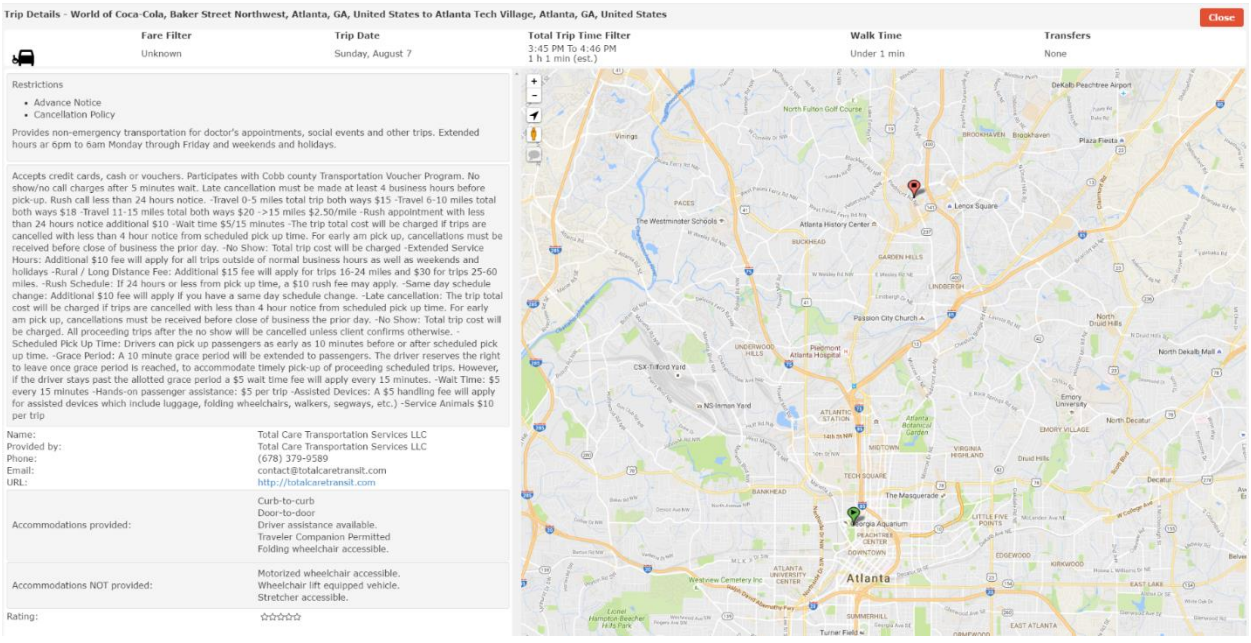


Graphic 4 - Eligibility Screen



Graphic 5 - Trip Plan Review

Graphic 6 displays results of demand response and specialized transportation options for the customer.



Graphic 6 - Demand Response Trip Options

2.5.3 Cost of Systems Operations

The current cost of SGT systems operations is minimal. ARC internal staff administers the web and database servers. ARC staff also have access to Git and Github for source code management. Application source code can be branched and modified as necessary.

It is estimated that the total cost of ownership of the current system, including direct and indirect costs, is less than $1,000 per month. The Google Maps API license is the largest third party direct cost. Internal staff maintenance is estimated at less than sixteen hours per month.

2.5.4 Operational Risk

Operational risks of the current SFT application include the following:

- Bug fixes and ongoing maintenance of the application
- Application updates and upgrades to add additional features and functionality.

2.5.5 Quality Attributes

Existing SGT operates and performs well. Transactions are low at this point. Load testing and application scalability is not known. Application framework and architecture is very good and was designed and implemented using open source model and methodologies. API integration is very strong. Usability is very good. The system requires minimal maintenance and application uptime is good. The development environment is well known and can be supported by third party application developers. The system can also be maintained and extended by third parties. Many components are reusable and can also be extended. Overall, the application shows strong qualities and is in a very good operational state.

2.5.6 Other

None

3 CONCEPT OF PROPOSED SYSTEM

3.1 BACKGROUND AND OBJECTIVES

ARC has entered a cooperative agreement with FTA to create a TMCC that includes system specifications for a web-based application that will bring the system forward from "trip discovery" (pinpointing options) to "trip transaction" (centralized booking, scheduling, and dispatching). ARC staff will work with Ride Connection and the third party consultants, ThingTech, to design this application. The specifications created must be appropriate to use to solicit and contract with a vendor to produce the application. These specifications will be based on project goals and objectives described below. These goals and objectives are developed from user needs gathered from stakeholder engagement.

As with websites like kayak.com that aggregate airline data, the long-range vision is for residents to book trips through one online web application, ideally supplemented with phone services. This concept and application design will include the entire process of establishing eligibility, scheduling a trip, finding the right transportation mode and provider, executing the trip, and invoicing the client and paying the provider, as applicable. The application must be designed to be intuitive, supportable, scalable, cost effective, and have the foundation to support future growth. It should also be user-friendly for the general public, transportation and service providers, and ARC staff. ARC has developed an extensive network of external partners and may want to grow or extend the network over time. These partners may wish to access the information directly through a user interface or through an API into their own client system. ARC must have a hierarchy of access points within the application's administrative functions so that ARC may select the level of access for various external partners.

Project goals include:

1) Integration with Simply Get There trip discovery web application
2) "Trip triaging" capabilities to find ideal cost/accommodations match
3) Data analysis/monitoring to find efficiencies and influence planning/future implementation in a system-wide feedback loop

Additional functions to support project goals include:

1. Ability to create client profiles with permissions to use multiple providers, records of current eligibility, trip accommodations needed, and indication of other programs they might join
2. Ability to schedule a trip
3. Ability to pay for a trip
4. Ability for ARC or a provider to charge a user and for ARC to pay a provider
5. Information on and ability to schedule travel coaching/training assistance
6. Cross-modal trip booking and connections to manifest creation and scheduling systems as well as route optimization across modes
7. Payment and billing - Cost sharing calculated on back-end
8. Modular system ("plug and play" system that users could adapt to local needs)
9. Integration with third party systems, including Computer- Aided Dispatched /Automatic Vehicle CAD AVL software, Google, Google Maps, RouteMatch, and Trapeze
10. Ability to track trips by the funding source
11. Ability to generate invoices
12. Web-based application that can be hosted or deployed locally on ARC servers or a location of ARC's choosing
13. A robust API to map data from other ARC and partner systems
14. Ability to house some transportation provider information on this application, rather than pulling all information from two external databases
15. Ability to be 508 compliant

The major new functional modules and extensions to support the goals above may include:

- Centralized Eligibility Determination
- Centralized Resource Management
- Automated Web Reservations
- Electronic Payment
- Automated Scheduling and Provider Assignment
- Route Planning and Optimization
- Multi Modal Transportation Coordination
- Real Time Asset Tracking and Dispatching
- Transportation Verification
- Transportation Data Analytics
- Customer Mobile App
- Driver Mobile App

3.2 CONSTRAINTS AND IMPACTS

The following table describes the contraints and impacts of ARC's SGT operational policies.

CONSTRAINT	IMPACT
HOURS OF OPERATION	Due to the operational and mission critical nature of the proposed system changes, hours of operation may be impacted. Proposed system could provide significantly more operational functions that must be supported and provide more risk for user error or data integration challenges.
TECHNICAL SUPPORT	Technical support requirements will be a major impact. Technical support for external users, agencies, and API consumers will be required.
TRAINING SUPPORT	End user training requirements may grow the extension of functionality. Current system is limited in functionality. Proposed system will dramatically increase the mission critical functions of the system. As an example, if trips are not properly assigned and distributed to provider, those scheduled trips may not get performed. This may lead to stranded riders that are already fragile or have physical or mental disabilities.
SYSTEM MAINTENANCE AND UPTIME	System uptime and service level agreements will increase. System will have little tolerance for failure. Application, database, and web servers must be replicated and fault tolerant. Service level agreement may be 99.999%.
INSTIITUTIONAL BARRIERS	Regional coordination and "trip sharing" business models are subject to increased institutional barriers. Private sector transportation providers may be more operationally involved.
DATA SECURITY AND PRIVACY	Proposed system may require the sharing or transmission of sensitive data that must remain private. HIPAA privacy concerns must be addressed in the sharing and transmitting of health related data.

Table 7 - Constraints and Impacts

3.3 DESCRIPTION OF PROPOSED SYSTEM

The proposed system may extend the current system via the existing SGT framework or by the development of a modular component that "plugs" into the existing SGT application. The proposed solution may be commercially

available or custom developed to fully meet the requirements of the project. ARC will host the application internally but may also choose to host the solution in a third party environment. Technical support and maintenance will be required for the transactional and mission critical components of the system. The system must provide strong security and credentialing methods to ensure privacy and system security.

The system could provide substantial functionality to the existing SGT application. ARC shall develop the functional requirements that the meet the user needs. Further, ARC shall estimate and document the applicable capital and ongoing support costs.

3.3.1 Operational Environment

The following bullets list the operational environment of the the proposed system (See above for more details of the proposed system)

- Ruby on Rails Development
- Git Version Control
- Github Repository
- PostgreSQL Database
- Apache Web Server
- NGINX Server

3.3.2 System Components

New system components may include the following:

- Web Based Eligibility Determination
- Web Based Reservations
- Automated Provider Assignment
- Automated Scheduling
- Automated Route Optimization
- Automated Dispatching
- Automated Vehicle Tracking
- Transportation Analytics
- Regional Coordination and Trip Data Exchange
- Mobile Apps for Customer Information and Access

Additional ITS components that may apply:

- Interactive Voice Response (IVR)
- Mobile Driver Apps for manifests, dynamic trip assignment, route navigation, messaging, and data capture

3.4 USER INVOLVEMENT / ROLES

Information may be added to the web application directly or indirectly by ARC staff and transportation providers. Some of this information must be immediately visible through a publicly available version (website) of the application. However, some information should not be available directly to the public by accessing this website. ARC staff and some external partners must have the ability to designate certain parts of provider profiles as visible to application administrators but not to the public.

The system must provide abilities to view, submit, and edit data based on roles and permissions. User roles and permissions will be administered by ARC. Authorized users must be able to edit only data for which they have proper roles and permissions. Administrators must be able to edit all data and must also be able to selectively grant or revoke extended access to other users. Users must be authenticated using latest application security methods such as JWT or oAuth 2.5 to ensure database security.

The following table summarizes the existing SGT application user types with associated roles and permissions.

USER TYPE	ROLES AND PERMISSIONS	IMPACT
USERS	Trip Planning Trip Discovery Trip Booking Trip Payment Trip Alerts and Notifications Where's My Ride Mobile App	Users are the general public that currently utilize the SGT application for trip planning. Additional capabilities may be exposed to them. This may require substantial user training. Users may be able to actually reserve transportation requests, pay online, receive real time trip status updates, and potentially have access to a mobile app for trip management and "where's my ride". Additional options may be displayed for additional modes or business models (i.e. Uber, Lyft, Vanpool)
INTERNAL USERS	Trip Planning Trip Discovery Trip Booking Provider Assignment Cost Allocation Analytics	Internal user impact will not be impacted; only extended. ARC internal users (Information and Referral staff) will continue to utilize the system in similar fashion. Minimal impacts to their workflow or process are expected
EXTERNAL ORGANIZATIONAL USERS	Trip Planning Trip Discovery Trip Booking Trip Payment Provider Assignment Analytics	External organizational user impact could be significant. External organizational users (i.e. organizations such as hospitals and nursing homes that utilize the system for trip planning and discovery on behalf of their customers) will have significantly more functionality available. Trip planning and discovery may be extended to include the scheduling, provider assignment, and payment for transportation services. Training and support of these organizations may require additional staff and support budgets.
EXTERNAL APPLICATION USERS	Trip Planning Trip Discovery Trip Booking Trip Payment Trip Scheduling Trip Dispatching Trip Validation Trip Billing Analytics	External users (i.e. users that will utilize the extended functionality for scheduling, dispatching, tracking, etc.….) are non-existent in the current system. These users may use the proposed toolset for reservations, scheduling and dispatching. Roles and permission rules would allow for these users to only see transactions associated with the provider. This user is associated with a provider that typically has no existing technology or would want to move to this platform.
API CONSUMERS	API Trip Data Exchange	Organizations with existing technology may require the ability for trip data

		exchange. This could be a two-way data exchange. These users may have an existing scheduling and dispatching application and simply require the consumption of trip data. The proposed system may assign trips to a API CONSUMER provider, data is consumed via API, service is delivered, completed trip data is sent back to proposed system
FUNCTIONAL SYSTEM ADMINISTRATOR	All Functions	Functional administrator that has access to application setup and configuration tools.
TECHNICAL SYSTEM ADMINISTRATOR	All Functions	Technical administrator that has access to technical setup and configuration

Table 8 - User roles and Permissions

3.5 SUPPORT ENVIRONMENT

The technical support environment should remain relatively consistent.

Device	Web Server	Storage	OTP Server	Database Server
Type	Heroku 2X Dyno	AWS S3	AWS m3.xlarge	Heroku 2X Dyno
CPU	8-core Intel Xeon E5-2680 v2 (Ivy Bridge)	2 virtual cores	13 virtual cores	8-core Intel Xeon E5-2680 v2 (Ivy Bridge)
Memory	2 GB	4 GB	15 GB	2 GB
Storage	100 GB+	100 GB	80 GB	512 GB
OS	Ubuntu v12.04 LTS (or later)	Ubuntu v12.04 LTS (or later)	Ubuntu v12.04 LTS (or later)	Ubuntu v12.04 LTS (or later)
Software	Apache	-	OpenTripPlanner	PostgreSQL 9.x (or later)

Table 9 - Support Environment

3.5.1 Interconnectivity

In addition to the number of modes currently supported by SGT, there exist a number of services external to the existing and proposed systems which provide additional fixed-route, taxi, or ride share information to travelers.

ATL Transit

ARC has created and maintains ATLTransit, a regional transit information hub web application for transportation options not currently offered by existing trip planning applications. ATLTransit contains route information from all of the transit agencies in the region. ATL Transit is a regional fixed route trip planner that leverages both Google Maps and Open Trip Planner. SGT connects to this system for fixed route planning information. It is integrated to SGT via API.

Google Maps

Services from Google are used to display the background of the maps within 1-Click, and to geocode street addresses to determine full addresses and the latitude/longitude location.

As such, a unique Google Maps API Key is needed for each 1-Click instance.

OpenTripPlanner

OpenTripPlanner provides fixed-route transit, walking, bicycling, and driving itineraries for the SGT system. OpenTripPlanner requires GTFS data from each public transit agency. OpenTripPlanner also requires a graph of the street network derived from OpenStreetMap.

An instance of OpenTripPlanner will be setup and maintained as part of the proposed system.

Rideshare

Rideshare integration is not available due to the propriety nature of these services, no standard integration method can be implemented. If a public API is available, the proposed system may be able to integrate this mode into the system.

Taxi Fare Finder

SGT uses a taxi fare estimator known as Taxi Fare Finder to estimate taxi fares for trips. Taxi Fare Finder does not require any additional hardware or services to be setup. Taxi Fare Finder provides a public API that the system will query as part of the trip planning process.

Transportation Network Companies (TNCs)

TNC's may be implemented in the proposed system. Uber and Lyft both provide well published open API's for integration into third party systems. The system would be able to take advantage of these business models to complement or supplement transportation services.

General Transit Feed Specification (GTFS) Real Time

Regional transit systems may publish real time GTFS feeds. This allows third party systems to consume the real time location data for fixed route buses and rail. MARTA currently publishes this information on their developer website. Other regional transit systems may choose to do this in the future. If so, this dramatically improves the same day trip planning and multi-modal coordination capabilities of these types of systems.

GTFS Flex

GTFS flex is the newest emerging transit standard that models mobility on demand, demand response, and flex-deviation services. As an example, Cobb Link (formerly Cobb Community Transit) has recently implemented a flex service that could be integrated into this system.

Emerging Business Models

Integration and connectivity to emerging business models must be envisioned in the proposed system. Car sharing, bike sharing, and other emerging models should be supported via published and open API's. These new emerging business models will leverage new modes and protocols that support transportation network companies, new General Transit Feed Specifications, and other open published API data interchanges.

Third Party Commercial Application Integration

Many providers have implemented third party applications for customer management, eligibility, reservations, scheduling and dispatching. Integration and connectivity support may be required to coordinate and exchange data across multiple platforms. It is anticipated that an open and published set of API's will facilitate this effort. Current research projects in Portland, Oregon, are exploring the concept of open sourced transportation clearinghouses to support this.

Major commercial providers include:

- Trapeze
- RouteMatch
- SimpliTransport

- Ecolane
- Mobilitat
- Stratagen

Transportation Clearinghouse

The Ride Connection Clearinghouse ("Clearinghouse") is a web site that allows ride services to share trips that cannot be fulfilled and claim trips shared by other services. The Clearinghouse API is an Internet-accessible programming interface that allows services and third parties to integrate other software with the Clearinghouse to automate the sharing and claiming of trips. One such system has already been developed: the Ride Connection Clearinghouse Adapter. This reference is intended to assist with further work on the Adapter as well as the development of new adapter software.

Adapter API

The Ride Clearinghouse Adapter is a software system that simplifies back office integration with the Ride Clearinghouse web site. The Adapter runs as a Windows Service in the background, periodically triggering a worker process that synchronizes data with the Clearinghouse API, then imports new data from a user's system to send to the Clearinghouse. The Ride Clearinghouse web site supports manual import and export (upload and download) of trip tickets via the Bulk Upload menu. Imported trip tickets must be formatted as text files in the CSV format.

4 CHANGE JUSTIFICATION

The current SGT application works functionally as designed and performs well. The intent of this effort is not to modify the application substantially but to extend the functionality to support more complex operational functions. SGT in its current state only allows users to plan trips. For fixed route options, this is fine; however, for specialized transportation or other modes where an advanced reservation is required, the system has limitations. Those limitations are described in section below.

4.1 JUSTIFICATION FOR CHANGE

JUSTIFICATION	DETAILS
USERS CANNOT RESERVE TRANSPORTATION REQUESTS	Once trip options are identified for specialized services, users are provided the contact information for the provider. Users must then call or email the provider to inquire about scheduling service. This can be a difficult process. The proposed system will allow users to reserve and confirm transportation while on the SGT site. This creates a true one click system.
CENTRALIZED RESOURCE DATA MANAGEMENT	System does not allow for centralized consumer, vehicle, and provider data management which is required for regional coordination and improved mobility management processes.
USERS CANNOT DETERMINE ELIGIBILITY IN CENTRALIZED PLACE	System does not provide for a centralized eligibility determination process. If system is connected to agency stakeholder systems, eligibility can be determined automatically or trip can be directed to agency where eligibility is in place (i.e. paratransit).
TRIPS CANNOT AUTOMATICALLY BE ASSIGNED TO LEAST COST MOST APPROPRIATE PROVIDEER	System does not provide options to directly book with selected provider. User may want option to identify the "least cost most appropriate" provider automatically.
TRIPS CANNOT BE AUTOMATICALLY SCHEDULED AND ROUTED IN MOST EFFICIENT AND COORDINATED FASHION	Scheduling and route optimization does not exist in current system.
TRIPS CANNOT BE EXCHANGED WITH OTHER PROVIDERS USING COMMERCIALLY AVAILABLE SCHEDULING SOFTWARE	Data exchange of resource data across providers does not exist in system.
TRIPS CANNOT BE EASILY COORDINATED	System does not support ability to share or coordinate resource and/or transportation data across multiple providers and agencies.
TRIPS CANNOT BE DISPATCHED EFFICIENTLY	System does not provide dispatching solution.

TRIP DATA CANNOT BE CAPTURED EFFECTIVELY	Service delivery data is not captured in the system.
CUSTOMERS CANNOT RECEIVE REAL TIME DATA OF TRIP SERVICE DELIVERY	Consumers cannot get access to real time arrival or trip status data easily.
SYSTEM DOES NOT SUPPORT REAL TIME CUSTOMER DATA FOR "WHERE'S MY RIDE"	System does not support native customer facing mobile apps.
SMALL OR NON-TECHNOLOGY PROVIDERS NEED BETTER TOOLSETS TO DELIVER SERVICE	System does not provide a holistic set of tools to small providers with little to no technology.
SYSTEM NEEDS BETTER DATA ANALYTICS TO REPORT AND ANALYZE PATTERNS AND TRENDS	System provides limited reporting and data analytics.
SYSTEM DOES NOT SUPPORT REGIONAL COORDINATION OF SPECIALIZED SERVICES	System does not provide regional coordination tools and data exchange capabilities.
SYSTEM MUST SUPPORT 'WHERE'S MY RIDE' PASSENGER INFORMATION	System does not provide consumer facing tools

Table 10 - Justification Details

4.2 CHANGE DESCRIPTION

New capabilities, functions, processes, interfaces, and other changes are needed to respond to the factors identified in the table above. The changes are based on the current system capabilities. Functional gaps (i.e., no existing support / function) and new capabilities are described in the table below.

CHANGE	DETAILS
CAPABILITIES	System will add substantial new functional and transactional capabilities. System will serve as a central repository for all modes and transport options. System will centralize resources such as customer, vehicle, and provider information. Trip planning and discovery will be extended to support transactional and operational tasks. Once trip plan is identified for service requiring advanced reservations, system will provide function to book transportation online. Users can edit or modify reservation within booking guidelines. System will be able to identify least cost and most appropriate provider. System will be able to send trip information in real time to the provider for acceptance. If accepted, system notifies user and confirms trip. User can view status in profile. Ideally user can access system through a mobile application available on Apple or Google Play. System will provide tools to provider user to automatically schedule and route trips for greater efficiencies. System will allow provider user to dispatch fleet and view trip status, ETA, and location. Ideally, the system will support driver mobile app for real time GPS data, trip status, navigation, and messaging. App may

	also provide supervisor app to view location of all vehicles. Trip notifications and alerts may be pushed to consumers for real time status and ETA of vehicle. Trip cancels may be supported to allow customers to cancel within cancellation guidelines. System and provider level reports and analytics should be provided to support provider operations and regional coordination analytics. Coordination and exchange of trips among providers and agencies should be facilitated.
DATA MANAGEMENT	System will provide additional data management capabilities. These will include, but not necessarily be limited to, the following: ▪ Customer Data ▪ Vehicle Data ▪ Reservation Data ▪ Provider Data ▪ Schedule and Route Data ▪ Trip Validation Data ▪ Administrative Data The provider database must be accurate and updated. Providers must have ability to update their records directly. Accurate provider information will be critical to accurate provider assignments and recommendations
USER INTERFACE	New user interfaces for each new module will be required. User interface will allow for the capture of required data such as customers, vehicles, and reservations. Functions will be required to perform key activities such as create routes and schedules. User experience will be critical. User interface must be very easy to use and provide strong graphical representations for the user. Most users will be small providers with limited technical support or knowledge of automated systems.
STAFF / PERSONNEL	Internal staff will require substantial additional training on how to use and administer the system. Provider users will be dependent on the system to perform key operational functions. External users will also require substantial training on the use of the software and also basic concepts of scheduling and dispatching. Additional staff may be required to support the application and associated users.
ENVIRONMENT	Environment and general framework of SGT will remain consistent. Additional features and functionality will be developed or third party toolsets will be integrated into the application framework.
OPERATIONAL	Operationally SGT will migrate from a planning and discovery tool to a mission critical operational and, potentially, high transactional tool. In some cases, third parties will rely on the system to maintain their business processes. Consumers will rely on the system to accurately and consistently assign trip information to a provider, schedule the ride, confirm the ride, and manage the delivery of the ride. API consumers will require that the data exchange is accurate and consistent. API consumers will require support for API development and integration. Toolsets, such as Swagger, for API management and documentation will be required. Information may be added to the web application directly or indirectly by ARC staff and transportation providers. Some of this information must be immediately visible through a publicly available version (website) of the application. However, some information should not be available directly to the public by accessing this website. ARC staff and some external partners

	must have the ability to designate certain parts of provider profiles as visible to application administrators but not to the public. System must be available twenty-four (24) hours per day, seven (7) days per week, three hundred and sixty-five (365) days per year, with periods of intermittent slowness not exceeding ninety (90) minutes per month and average downtime—both scheduled and unscheduled—not exceeding sixty (120) minutes per month.
SUPPORT	Technical and business support for the system will be a major change. The system must be able to support multiple provider users. Users will require day to day technical support and training on how to utilize the system. Web-based training and support tools may be developed for this effort. Third party support may also be utilized for after hour support and software maintenance.
INTEGRATION	Integration is a major component of the system. API's for data exchange, third party access, real time AVL data, and others will be required. Existing API integration must be maintained. Additional data sources or systems may be integrated based on user requirements. TNC's may be an additional mode for SGT and API integration will be required. ARC requires the application to provide an open architecture to allow for integration scenarios, such as API's or other web-based solutions. The architecture of the application must permit these additional services with minimal customization.

Table 11 - Change Description

4.3 PRIORITIES

Based on stakeholder engagement and feedback, the following table lists the major functional priorities for the application.

WEB BASED RESERVATIONS	1
PROVIDER ASSIGNMENT	2
RESOURCE DATA MANAGEMENT	3
TRIP DATA EXCHANGE	4
CENTRALIZED ELIGIBILITY	5
TNC MODE INTEGRATION	6
REPORTING AND ANALYTICS	7
AUTOMATED SCHEDULING	8
ROUTE PLANNING AND OPTIMIZATION	9
AUTOMATED DISPATCHING	10
AUTOMATED VEHICLE TRACKING	11

MOBILE DRIVER APP	12
CUSTOMER INFORMATION APP	13

Table 12 - Priorities

4.4 CHANGES CONSIDERED BUT NOT INCLUDED

None. All ideas and concepts associated with project goals and stakeholder feedback have been included.

4.5 OUT OF SCOPE

Tasks that are currently outside the scope of the Cooperative Agreement include the following:

- Current SGT Application Modifications
- Current SGT Application bug fixes

4.6 ASSUMPTIONS

The following bullets describe the major key assumption(s) of the existing application.

- SGT is open source and third parties can modify or extend as needed via open source license.

5 OPERATIONAL SCENARIOS

Section 5 describes scenarios that show how the system will be used to perform its functions, and to meet the project's objectives and the user's needs. Each scenario can be illustrated as in a use case.

5.1 MAJOR PROCESS DESCRIPTIONS

Process	Purpose	Description	Priority	Frequency
Reservations	Web based trip booking	Customers can book transportation directly from trip planning function. Users may choose to book directly without going through planning process	High	Daily
Centralized Resource Management	Central repository for customer, vehicle, and provider data	System can leverage regional resources more effectively. Foundation for regional coordination and provider assignment	High	Daily
Provider Assignment	Trip Assignment and Brokering	Functions to support automated trip assignment based on least cost most appropriate logic.	High	Daily
Scheduling	Schedule and route planning	Customers can reserve transportation and system will provided automated, computer assisted, and manual scheduling and route optimization to coordinate trips and improve capacity.	High	Daily
Dispatching	Real time dispatching and tracking	Users can view real time location, status, and ETA of transportation to improve service delivery and customer service.	High	Daily
Electronic Payment	Web or mobile payment	Customers can pay for transportation online via credit card or, potentially, a pre-paid transportation account.	High	Daily
Cost Allocation	Transportation cost sharing	System can allocate costs to proper funding source	High	Daily
Reporting	Reporting and Analytics	Users can run canned reports and dashboards. Users can create custom ad hoc reports.	High	Daily / Weekly / Monthly
Coordination	Trip Coordination	Trip data can be exchanged electronically via published and open API's for the facilitation of coordination of resources and trips	High	Daily

Table 13 - Major Functional Processes

6 IMPACT SUMMARY

Section 6 describes how the proposed system may impact users, stakeholders, consumers, and internal support and maintenance staff

6.1 RISKS

The following table attemtps to identify business, operational, and technical risks with undertaking the project. The major risks of the project include the following:

FINANCIAL	System enhancements are significant. Development costs for all major components will be high. System enhancements may need to be phased in over time. It is uncertain if a commercially available product can meet the needs of this effort.
USER ADOPTION	System will require providers and regional transit stakeholders to participate and adopt the solution.
INSTITUTIONAL	Local and regional policy or operating perceptions may challenge the implementation of the system.
SUPPORT	System, as envisioned, would be an enterprise mission critical application and will require professional support and maintenance of the system. This also relates to the financial risk.
INTEGRATION	System will be dependent on the ability to integrate to existing systems and potentially new systems. Third party integration support from the major commercially available scheduling systems will be required for trip data exchange.

Table 14 - Risks

6.2 ISSUES

The following table identifies potential risks to the project with description of mitigation activaties to resolve or minimize the issue.

	DESCRIPTION	MITIGATION
FUNDING	Funding for the project is not in place	Government grant. Phased in deployment schedule. Cost sharing of project among major stakeholders.
SOURCE CODE	Source code may not be owned by ARC. Source code may not be available to extend. Unsure if the source code is proprietary.	Open Source License agreement. API integration to SGT application which would not require modification to existing system.
RESOURCES	Staff availability to build, implement and support the solution	Hire additional staff. Share support costs across major stakeholders.
SCHEDULE	Project schedule may be measured in years for full deployment	Outsource to third parties to assist in development and rollout

MARKETING AND BRANDING	Marketing, branding, and user education	Increased marketing and branding activities

Table 15 - Issues

6.3 OPERATIONAL IMPACTS

The operational impacts of the project may include the following:

PROVIDER COORDINATION	Providers may be required to collaborate and coordinate service delivery
COST REIMBURSEMENT	Cost allocation and sharing models may have to be developed
SUPPORT	Operational support tasks will have to be provided to new users and providers
ECONOMIC	Significant economic benefits will be obtained by coordinating demand response, specialized, and human service transportation.
MOBILITY	Increased access to jobs or health care, or trips provided to passengers at a lower cost per trip.
REVENUE OPPORTUNITIES	Create new or unrecognized revenue opportunities for ARC, stakeholders, and provider network.
ADDITIONAL BENEFITS	▪ Improved service quality ▪ Improved transportation services available to more people ▪ Transportation services available to larger service areas ▪ Centralized oversight and management ▪ Reporting costs and outputs more accurately

Table 16 - Operational Impacts

6.4 ORGANIZATIONAL IMPACTS

The table below provides a brief description of the anticipated operational impacts on the user, development, and support departments during operation of the proposed system. For example, modification of roles and responsibilities; changes in job descriptions; training programs for users; changes in numbers, skill levels, or locations of personnel; resources required to for new operations.

TECHNICAL SUPPORT ROLES	System would require a technical support function to be added to existing organization. Staffing may range from one to three staff members depending on size and scope of adoption
END USER TRAINING ROLES	System would require additional training staff to train end users in the field.
IT SUPPORT AND MAINTENANCE DUTIES	System would expand the roles and duties of the IT department. System would require much more maintenance and IT support than existing SGT. System becomes an enterprise mission critical application to

	potentially hundreds to thousands of users, agencies, and providers.
REGIONAL ONE CALL ONE CLICK ROLE	ARC would take on role as the region's one call one click mobility management center. Additional responsibilities, duties, and accountability will be placed on ARC and its staff.

Table 17 - Organizational Impacts

7 ANALYSIS OF PROPOSED SYSTEM

7.1 IMPROVEMENTS

The proposed system should have significant improvements to the existing system. These can be measured in operational improvements as well as regional economic improvements.

The following table provides a summary of major improvements that could be derived from the implementation of the proposed system.

ONE CLICK FUNCTIONALITY	System will provide a true one click system. System could dramatically improve accessibility and mobility across the Atlanta region. Transportation disadvantaged populations may be served more effectively. Economies of scale can be achieved. Costs can be reduced while overall system capacity can be increased.
IMPROVED CUSTOMER EXPERIENCE	System will allow users to request, reserve, and schedule transportation in a single session. When a user is moving between multiple services with multiple providers, it can be very time-consuming, confusing, and challenging.
IMPROVED EFFICIENCIES	System will provide tools to providers to improve schedule and route efficiencies
IMPROVED SERVICE DELIVERY	System will provide tools to users and providers to improve day-of service delivery through real time dispatching tools
IMPROVED ACCOUNTABILITY	System can support real-time location of service delivery to improve on-time performance, customer service, and ETA alerts
IMPROVED TRANSPORT ANALYTICS	System will provide comprehensive report and data analytics to allow for improved operational reporting, cost allocation, trip generation, pattern analysis, and geospatial analysis.
IMPROVED CUSTOMER ACCESSIBILITY	System will provide customer facing technologies to improve transportation access, mobility, and real-time information.
INCREASED MODAL OPTIONS	System will expand modes to include bike sharing, car sharing, volunteer services, TNC's, and other emerging models.
IMPROVED REAL TIME FIXED ROUTE INFORMATION	System can serve as the regional real-time fixed route customer information portal. Real-time GTFS data can be consumed from the regional transit providers (MARTA, CCT, Gwinnet Transit, GRTA, and C-Tran).
IMPROVED MEASURABLE ECONOMIC BENEFITS	Research on transportation coordination has proven that multiple direct economic benefits will be gained from this system.

Table 18 - Potential Improvements

7.2 LIMITATIONS

The following table lists potential operational, system, resource, and adoption limitations that could be encountered during or after the deployment of the proposed system.

The following table describes potential limitations and constraints that must be considered for the proposed system.

INTERNAL RESOURCES	ARC does not have internal resources to develop application and would require third party services.
100% INTEGRATION	System may not support 100% of third party systems available for integration due to third party lack of technical support or capabilities.
100% REAL TIME SUPPORT	It may not be reasonable to think the system will support a 100% real time environment. Third party GPS devices, tablets, or smart phones are required for location-based data. Many providers may or may not be able or willing to support this.
100% FULLY FUNCTIONAL SYSTEM	System may not have the funds or resources to fully develop. There may not be funding to operate and maintain the system long-term.

Table 19 - Potential Limitations

7.3 ALTERNATIVES

The following table describes potential alternatives to the proposed system.

PROCURE COMMERCIALLY OFF THE SHELF TECHNOLOGY	Commercially available software that is configured specifically to the needs of the project requirements may be a valid alternative. Software would require extensive API and third party integration capabilities.

Table 20 - Potential Alternatives

8 CONCEPT OF OPERATIONS DEVELOPMENT TEAM

The core ConOps development team includes Renee Autumn Ray and Mary Blumberg from the ARC Aging and Health Resources Division. Tim Quinn and Carly Harper, transportation and transit ITS consultants with ThingTech, provided technical support.

Additional partners include

1. ARC Aging and Disability Resource Connection (ADRC)
2. ARC Transportation Access and Mobility Services Division
3. ARC Area Agency on Aging
4. Center for Visually Impaired (CVI)
5. City of Atlanta, Vehicles for Hire/Taxi Management
6. Cobb Community Transit (CCT)
7. DeKalb Office of Senior Affairs
8. Disability Link, the Center for Independent Living (CIL)
9. Goodwill Industries
10. Georgia Commute Options (GCO)
11. Georgia Department of Community Health (DCH)
12. Georgia Department of Human Services (DHS)
13. Georgia Department of Transportation (GDOT)
14. Georgia Governor's Development Council (GDC), Rural and Human Services Transportation (RHST)
15. Georgia Transit Association (GTA)
16. Gwinnett County Senior Services
17. Lifespan Resources (volunteer driver program)
18. Metropolitan Atlanta Rapid Transit Authority (MARTA)
19. Ride Connection of Portland, Oregon
20. Atlanta United Way 211
21. Veterans Affairs (VA), Veterans Transportation Program (VTP)

Additional support is being provided by Kevin Chambers, IT Director of Ride Connection in Portland, OR.

9 APPENDICES

9.1 SAMPLE TRIP DATA EXCHANGE SPECIFICATION

Field Name	Requirement	Description
origin_trip_id	Required	Trip ID in the originating provider's scheduling system.
appointment_time	Required	Full date and time. Trips with the same origin_trip_id but different appointment times are treated as distinct tickets in the Clearinghouse. This field helps the Adapter match trips to determine if the trip is new or an update.
requested_pickup_time	Required	Just the time, assumed to be same days as appointment_time.
earliest_pick_up_time		Just the time, assumed to be same days as appointment_time.
requested_drop_off_time	Required	Just the time, assumed to be same days as appointment_time.
time_window_before		Minutes early pickup & drop-off allowed.
time_window_after		Minutes late pickup & drop-off allowed.
scheduling_priority	Required	"pickup" or "dropoff"
origin_customer_id	Required	Customer ID in the originating provider's scheduling system.
customer_information_withheld		"true" or "false"
customer_first_name	Required	
customer_last_name	Required	

Field Name	Requirement	Description
customer_middle_name		
customer_dob	Required	
customer_primary_phone	Required	
customer_emergency_phone		
customer_primary_language		
customer_ethnicity		
customer_race		
customer_gender		M/F
customer_identifiers		Free-Form Field (see above)
customer_notes		
customer_seats_required	Required	
customer_boarding_time		
customer_deboarding_time		
customer_impairment_description		
customer_service_level		
customer_mobility_factors		Array Field (see above)
customer_service_animals		Array Field (see above)

Field Name	Requirement	Description
customer_eligibility_factors		Array Field (see above)
num_attendants		
num_guests		
trip_purpose_description		
trip_funders		Array Field (see above)
trip_notes		
estimated_distance		In miles.
additional_data		Free-Form Field (see above). API-only, this data will not appear in the Clearinghouse web site.
customer_address_id		Clearinghouse ID (if known, to update existing address). Customer address is optional.
customer_address_address_1		Required if address present.
customer_address_address_2		
customer_address_city		Required if address present.
customer_address_state		Required if address present.
customer_address_zip		Required if address present.
customer_address_position		Map coordinates expressed as longitude and latitude, formatted as “lon lat” or “POINT(lon lat)”.
customer_address_lon		Alternative to customer_address_position, specifies longitude in its own field.

Field Name	Requirement	Description
customer_address_lat		Alternative to customer_address_position, specifies latitude in its own field.
customer_address_phone_number		
customer_address_common_name		
customer_address_jurisdiction		
pick_up_location_id		Clearinghouse ID (if known, to update existing address).
pick_up_location_address_1		Required if address present.
pick_up_location_address_2		
pick_up_location_city		Required if address present.
pick_up_location_state		Required if address present.
pick_up_location_zip		Required if address present.
pick_up_location_position		Map coordinates expressed as longitude and latitude, formatted as “lon lat” or “POINT(lon lat)”.
pick_up_location_lon		Alternative to pick_up_location_position, specifies longitude in its own field.
pick_up_location_lat		Alternative to pick_up_location_position, specifies latitude in its own field.
pick_up_location_phone_number		
pick_up_location_common_name		

Field Name	Requirement	Description
pick_up_location_jurisdiction		
drop_off_location_id		Clearinghouse ID (if known, to update existing address).
drop_off_location_address_1		Required if address present.
drop_off_location_address_2		
drop_off_location_city		Required if address present.
drop_off_location_state		Required if address present.
drop_off_location_zip		Required if address present.
drop_off_location_position		Map coordinates expressed as longitude and latitude, formatted as “lon lat” or “POINT(lon lat)”.
drop_off_location_lon		Alternative to drop_off_location_position, specifies longitude in its own field.
drop_off_location_lat		Alternative to drop_off_location_position, specifies latitude in its own field.
drop_off_location_phone_number		
drop_off_location_common_name		
drop_off_location_jurisdiction		
trip_result_id		Required when updating trip result. Not required for creating a new result.
trip_result_outcome	Required	“Completed”, “No-Show”, “Cancelled”

Field Name	Requirement	Description
trip_result_actual_drop_off_time		
trip_result_actual_pick_up_time		
trip_result_base_fare		
trip_result_billable_mileage		
trip_result_driver_id		
trip_result_extra_securement_count		
trip_result_fare		
trip_result_fare_type		
trip_result_miles_traveled		
trip_result_odometer_start		
trip_result_odometer_end		
trip_result_rate		
trip_result_rate_type		
trip_result_vehicle_id		
trip_result_vehicle_type		
trip_result_notes		