511 Feasibility Study and Implementation Plan
for the Monterey Bay Area

Part 1
Feasibility Study
Summary of Results

Submitted to:

Santa Cruz County Regional Transportation Commission
1523 Pacific Avenue
Santa Cruz, CA 95060

Transportation Agency for Monterey County
55-B Plaza Circle
Salinas, CA 93901

A project to consider a
511 Traveler Information System
FOR CALIFORNIA'S MONTEREY BAY AREA

Submitted by:

ICx Transportation Group
1720 Clay Street, Suite 14
San Francisco, CA 94109

January 2012

Table of Contents

List of Figures

List of Tables

List of Acronyms

AAA	American Automobile Association
ADA	Americans with Disabilities Act
Caltrans	California Department of Transportation
CHP	California Highway Patrol
MST	Monterey-Salinas Transit
MTC	Metropolitan Transportation Commission
RTC	Santa Cruz County Regional Transportation Commission
SACOG	Sacramento Area Council of Governments
SAFE	Service Authority for Freeways and Expressways
TAMC	Transportation Agency for Monterey County
TTY	Teletype
URL	Uniform Resource Locator
XML	eXtensible Markup Language

Executive Summary

This 511 Plan evaluates the feasibility of developing a traveler information system for Santa Cruz and Monterey Counties (referred to in this document as "the Monterey Bay Area.") A nationally recognized brand for traveler information, 511 can be accessed by phone, internet, and mobile devices. A wide range of traveler information can be provided over a 511 system, including real-time traffic conditions on highways and roads; transit schedules and real-time transit arrival information; carpool matching services, and bike/pedestrian resources; and transportation impacts from weather, special events and emergency situations.

As of April 2011, 511 is available in 35 states. In California, 511 systems exist in the San Francisco Bay Area, Sacramento, Northern California, Los Angeles, the Inland Empire, San Luis Obispo and San Diego, with San Joaquin County soon to join the Sacramento system. A Monterey Bay Area 511 system could close the gap in traveler information systems on the Central Coast.

Traveler information systems can benefit the transportation system and its users, by reducing stress and improving satisfaction with the travel experience, reducing congestion and therefore travel time, increasing mobility and accessibility, and enhancing the economy.

The Santa Cruz County Regional Transportation Commission and the Transportation Agency for Monterey County developed this 511 Plan with input from key stakeholders that represent a broad range of transportation system users, participants of an online survey, and members of the public. The feedback received helped to assess the need for a traveler information system for the Monterey Bay area, as well as identify the most desirable features of such a system for this region and a set of project goals.

PROJECT GOALS

Determine the feasibility of implementing a 511 system in the Monterey Bay Area that:

1. Enables a high level of customer satisfaction with the transportation system.
2. Optimizes the use of existing transportation infrastructure.
3. Fosters sustainability and improves the environment by reducing vehicle miles traveled.
4. Enhances the economy by moving more people and goods more efficiently.
5. Fosters the safe use of the transportation system.
6. Applies and leverages advances in technology.
7. Builds public-private partnerships and improves interagency coordination.
8. Explores a wide range of funding scenarios for supporting 511 service in region.

Based on the input generated, a list of project objectives was identified:

- Consider a 511 traveler information system that provides real-time traffic conditions and multi-modal information.
- Consider providing, to the greatest extent feasible, a traveler information system that can gather all relevant information into one source ("one-stop shop").
- Ensure that any 511 system deployed takes advantage of existing resources to the greatest extent feasible ("low-hanging fruit").

- Provide significant benefits to the traveling public while deploying a system that is safe to operate.
- Consider planning and building a system to first focus on the needs of the greatest number of people and target markets ("biggest bang for the buck").

The project team identified a number of models that could be used to deliver traveler information to the public. The various models are contracting for full deployment of a 511 system (phone and web); building a 511 system in-house; sharing resources with another 511 system; creating a web-based traveler information hub with existing information that is currently available in many different locations; building an advertiser- and sponsor-supported system so that there are no public costs; and doing nothing.

To help the RTC and TAMC determine which model best meets the goals and objectives of this 511 Plan, each model was set against evaluation criteria measuring the cost to deploy and operate a system, the ranges of functionality available, and the expandability and scalability of a system. In addition to these criteria, factors such as the level of risks involved and how well user needs would be met were used in the selection process.

This analysis found that it is feasible to implement a 511 system for the region. Due to the challenge of securing sufficient funding to develop a customized system from scratch, a deployment that takes advantage of existing resources and makes traveler information available in a centralized location would add value at a relatively low cost. The key finding is for the RTC and TAMC to partner together with either the Sacramento Area Council of Governments (SACOG) or the San Francisco Bay Area Metropolitan Transportation Commission (MTC) using the selected agency's existing 511 system infrastructure.

In either case, a partnership would provide the Monterey Bay Area with a 511 phone system, and a website with a traffic map and multimodal transportation information, along with the option for personalized route notifications of highway conditions for subscribers. The phone system would include information about traffic speeds, highway incidents and emergency situations. The traffic map web-page would include traffic speed on highways and some local roads, incidents, videos of current traffic conditions, messages currently displayed on changeable message signs, and emergency information. The website would also provide access to multimodal information such as a transit trip planner, rideshare information, and bicycling and pedestrian resources.

The TAMC Board of Directors and RTC Commissioners will receive presentations on the findings of the Feasibility Analysis at their January and February 2012 meetings. The key finding is to proceed with Part II of this joint planning project -- to develop an Implementation Plan for delivering 511 services in the Monterey Bay Area by partnering with either SACOG or MTC. The elements in Part II include: finalizing the decision regarding which agency to partner with and building this new partnership; refining costs and obligations for each participating entity; defining specific services to be rendered; pursuing funding sources; developing a strategy for working with telecommunication carriers; refining the schedule for phased implementation; developing marketing and outreach strategies; and creating a set of evaluation criteria to measure performance. The Implementation Plan is expected to take approximately six to nine months to complete. As quickly as a year after completing the Feasibility Analysis and Implementation Plan, Monterey Bay Area travelers could enjoy an indispensable 511 traveler information resource.

1 Introduction and Purpose

The transportation system in the Monterey Bay Area experiences significant congestion and has limited access because of the constrained geographical areas such as Highway 1 along Monterey Bay coastline and Highway 17 through the Santa Cruz Mountains. The environmental impacts of the current use of our transportation system and the new Greenhouse Gas reduction requirements of SB 375 necessitate the need to promote more sustainable alternatives to transportation. Problems that have been identified by the RTC and TAMC as well as Monterey Bay Area stakeholders and the public include:

- Recurring and non-recurring traffic congestion and its related impacts
- Traveler frustration due to lack of reliability in the transportation system from experiencing unexpected delays
- Economic impacts due to time wasted in traffic
- Environmental impacts due to transportation and the need to address new GHG requirements
- Lack of adequate and timely multi-modal information
- Lack of centralized traveler information and coordination
- Inefficient and labor intensive delivery systems to address transportation information needs
- Limited transportation funding

There are a variety of ways to solve these problems, but the extremely limited resources available to invest in significant capital improvements require that transportation agencies optimize the use of existing transportation infrastructure and programs. This study focuses on the role that a 511 traveler information system can play in making better use of our existing transportation infrastructure and addressing environmental impacts of transportation.

511 is a nationally recognized brand for traveler information accessed by phone, internet, and mobile devices. As of April 2011, 35 states have 511 traveler information systems. Although the features of 511 systems vary from location to location, they can provide a wide range of traveler information, including:

- Real-time traffic conditions on highways and roads, including travel speeds, collisions, construction, road closures and travel times.
- Transit schedules and real-time transit arrival information.
- Carpool matching services, and bike and pedestrian resources.
- Transportation impacts from weather, special events and emergency situations.

In California, 511 systems exist in the San Francisco Bay Area, Sacramento, Northern California, Los Angeles, the Inland Empire, San Luis Obispo and San Diego, with San Joaquin County soon to join the Sacramento system. A Monterey Bay Area 511 system could close the gap in traveler information systems on the Central Coast.

511 systems have been shown to provide the following benefits:

- Helping one decide how to travel (i.e., by car, bus, bike, rideshare, and so on), when or if to travel, and which route to take.
- Improving traffic flow and increasing safety by allowing travelers to avoid congestion and other problems
- Managing emergencies more effectively (such as flooding, fires, and other disasters) by providing a single source for traveler information and road conditions.
- Improving the overall transportation system through more efficient use of the transportation network.
- Benefiting the economy by allowing businesses, employees, customers, tourists, freight companies and others to avoid traffic delays.
- Improving the environment by reducing emissions in congested periods and by educating and informing motorists of their transportation options

A 511 traveler information system for the Monterey Bay Area would be designed in accordance with the following goals that are consistent with both Federal and State Transportation Planning Goals, as well as with the RTC's and TAMC's regional transportation plans, which both include traveler information as a way to improve mobility and efficiency. The goals are:

1. **Enable a high level of customer satisfaction with the transportation system**
2. **Optimize the use of existing transportation infrastructure**
3. **Foster sustainability and improve the environment by reducing vehicle miles traveled**
4. **Enhance economy by moving more people and goods more efficiently**
5. **Foster safe use of the transportation system**
6. **Apply and leverage advances in technology**
7. **Build public-private partnerships and improve interagency coordination**
8. **Explore a wide range of funding scenarios for supporting 511 service in region**

The objectives of this project were identified based on the input of the stakeholders, public and project team. Input from stakeholders was generated through meetings and one-on-one

interviews; the general public was able to provide input via a web survey. They are listed below.

- Consider a 511 traveler information system that provides real-time traffic conditions and multi-modal information (Goals addressed – 1,2,3 and 4)

- Consider designing a 511 system that provides safe ways to access and communicate with the traveler information system (Goals addressed – 5 and 6)

- Consider providing, to the greatest extent feasible, a traveler information system that can gather all relevant information into one source ("one-stop shop"). (Goals addressed – 6 and 7)

- Ensure that any 511 system deployed takes advantage of existing resources to the greatest extent feasible ("low-hanging fruit"). (Goal addressed – 8)

- Consider planning and building a system to first focus on the needs of the greatest number of people and target markets ("biggest bang for the buck"). (Goal addressed – 8)

2 Description of 511

This chapter documents the components that make up a typical 511 system. These are presented to provide an overview of the types of information 511 systems can provide; there is no expectation that any eventual Monterey Bay Area 511 system will include all of these elements. The key elements discussed include:

- Strategy, Institutional Arrangements, and Development Process: This section addresses the best ways to establish a strong institutional and technical solution for a 511 system.
- Data Collection and Processing: This section covers the various types of roadway, transit, and other data needed to provide valuable information to the traveling public.
- Data Dissemination: This section discusses the ways that information is made available to the public, and includes the 511 telephone number, web pages, smart phone applications, and social networking.
- Operations and Performance Monitoring: This section discusses how 511 systems are operated on a day-to-day basis.

2.1 Strategy, Institutional Arrangements, and Development Process

This section covers those elements related to the institutional arrangements that underlie and support 511 systems. A strong institutional framework can help ensure a project's success.

2.1.1 Strategic Vision and Planning

A strategic vision for a 511 system will help set measurable goals, and will ultimately help the project developers determine if their project was a success. A notable example of an extensive strategic planning effort was undertaken by the Metropolitan Transportation Commission in April 2006 (available at http://www.mtc.ca.gov/services/511/FINAL_511_Strategic_Plan.pdf). This plan was not undertaken at the beginning of the 511 planning process, but rather at an intermediate point, as the Metropolitan Transportation Commission's contract with its contractor was nearing its end date. Ideally, a deployer would undertake the strategic planning process early in the overall project lifecycle, and then re-evaluate the strategy at appropriate milestones.

The Metropolitan Transportation Commission's plan examined the project to date, described the roles of the various project partners, and developed recommendations for proceeding. To make those recommendations, it analyzed all potential improvements on a matrix like that shown in Figure 1. They focused on implementing elements in the upper left box, and, for the most part, did not implement those in the lower right box. Elements in the other two boxes were taken on a case-by-case basis.

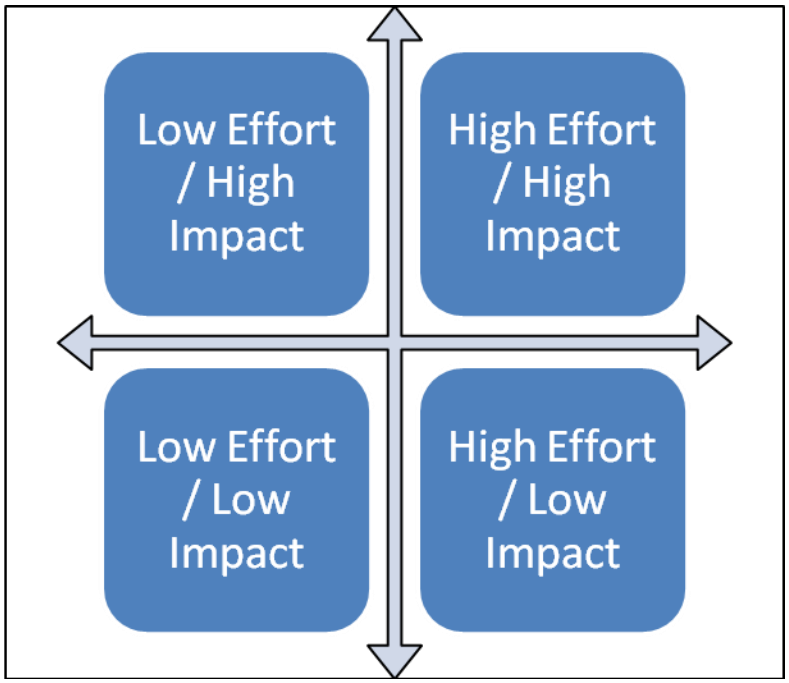


Figure 1: Metropolitan Transportation Commission Planning Matrix

2.1.2 Business Plan

It is challenging to use the term "business plan" for a public sector project, as that term is typically used in the private sector as a way to assess the viability of a product or an entire company. Nevertheless, many 511 systems develop what they refer to as business plans. These are simply documents that lay out the justification for a 511 system, the anticipated costs, and the proposed revenues.

Most 511 systems are supported by federal surface transportation funds, or by state and local funds available in the specific jurisdiction. More recently, some states have attempted to develop 511 systems that pay for themselves by generating revenue through advertising and sponsorships. Revenue-generation is discussed in more detail in the evaluation of potential 511 models (Section 7.2.5).

2.1.3 Governance Agreements

Governance agreements are needed for 511 systems if there is more than one public sector agency responsible for elements of the system. Because most 511 systems around the country are fully operated by the state Department of Transportation, these agreements are not always necessary. The San Francisco Bay Area 511 has operated under a Memorandum of Understanding between the Metropolitan Transportation Commission, Caltrans, and the California Highway Patrol (CHP). The memorandum of understanding establishes governance committees and spells out each agency's role in the project.

2.1.4 Partnership Agreements

There are a number of different kinds of agreements that could be considered partnership agreements for 511, and they cover a wide range of activities. They could cover topics such as:

- Data collection from a private data provider, such as SpeedInfo or INRIX
- Data sharing arrangements with a private sector company that wants to provide data to its customers
- Commitments from other public sector agencies to provide data to 511
- Commitments among public agencies partnering to develop, manage and operate a 511 service

The need for and structure of these agreements will vary based on the specifics of any given project.

2.1.5 511 Call Routing Agreements

Every 511 system needs to work with the local telecommunications providers to route 511 calls to the Interactive Voice Response system that provides information to the caller. All phone service in North America uses the North American Number Plan, which is based on the use of traditional ten-digit telephone numbers, comprised of the three-digit area code and the seven-digit local number.

When a caller dials 511, both the landline and cell phone systems must recognize that number and route it to a traditional ten-digit (usually toll-free) number. For example, the San Francisco 511 system routes calls to 888-500-4636. That number then connects to the interactive voice response system. Depending on the provider, there may or may not be a cost associated with establishing the appropriate call routing.

2.1.6 System Engineering Process

The Federal Highway Administration recommends using the System Engineering process shown in Figure 2 for Intelligent Transportation Systems projects. The Federal Highway Administration requires the use of System Engineering in all Intelligent Transportation System projects that use funds from the Highway Trust Fund. System Engineering ensures a linkage from the early feasibility studies and project concepts all the way through project implementation and operations. It creates traceability between the concepts, requirements, development, implementation, testing, and operations. One of the key elements of the overall process is the Concept of Operations, which describes how the overall system will be structured and how it will operate. It is usually written from the perspective of a wide range of potential stakeholders, including the system owner, other agencies that will interact with the system, and the system's users.

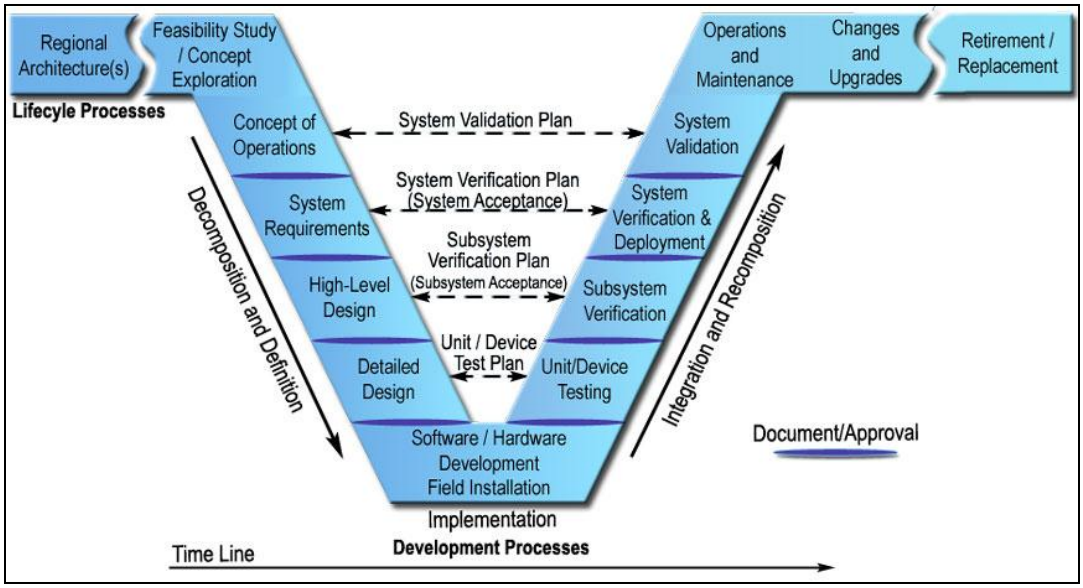


Figure 2: System Engineering "Vee" Diagram

2.1.7 Full System Testing

One of the implications of using the systems engineering process described in Section 2.1.6 is the need to perform full system testing. Ideally, test plans are written in concert with system design documents, and are written so as to test all of the requirements that have been established for the project. The project schedule should then build in enough time to perform acceptance testing, analyze the results, modify the system as needed, re-run the acceptance testing, and repeat this process as needed until all tests are passed.

2.1.8 Soft Launch

After testing is completed, a soft launch (i.e., a launch of the system without any publicity) allows the system operators to begin to assess its performance in an operational environment without the publicity that would accompany a full launch.

2.1.9 Deployment and Enhancement

After a period of time operating under soft-launch conditions, the system can be fully deployed. Ideally, there would be a public relations effort including a launch event covered by the media, with appropriate decision-makers present.

At various times after launching, it makes sense to enhance the 511 system. Enhancements can be planned in advance (as part of a phasing process), can be in reaction to user requests for new services, or can be done as a result of opportunities provided by new technologies. Typically, an agency would assess the various enhancement possibilities by evaluating the funding available, deciding which enhancements will be the most useful, and weighing those factors to determine which ones to implement. The timing of the enhancements will likewise depend on the need and the availability of funding.

2.2 Data Collection and Processing

Accurate, timely data is at the heart of any traveler information system.

2.2.1 Traffic Information

2.2.1.1 Traffic Speed

Traffic speed can be made available on the telephone or over the internet (which includes, for the purposes of this discussion, smart phone applications and mobile websites, as well as traditional browsers). On the phone, speeds are generally reported, if at all, only when they are below a certain threshold, and are not reported when traffic is at free-flow speeds.

Speeds on the internet are generally shown as color bands on a road map (as shown in Figure 3), or occasionally as colored dots representing the speeds.

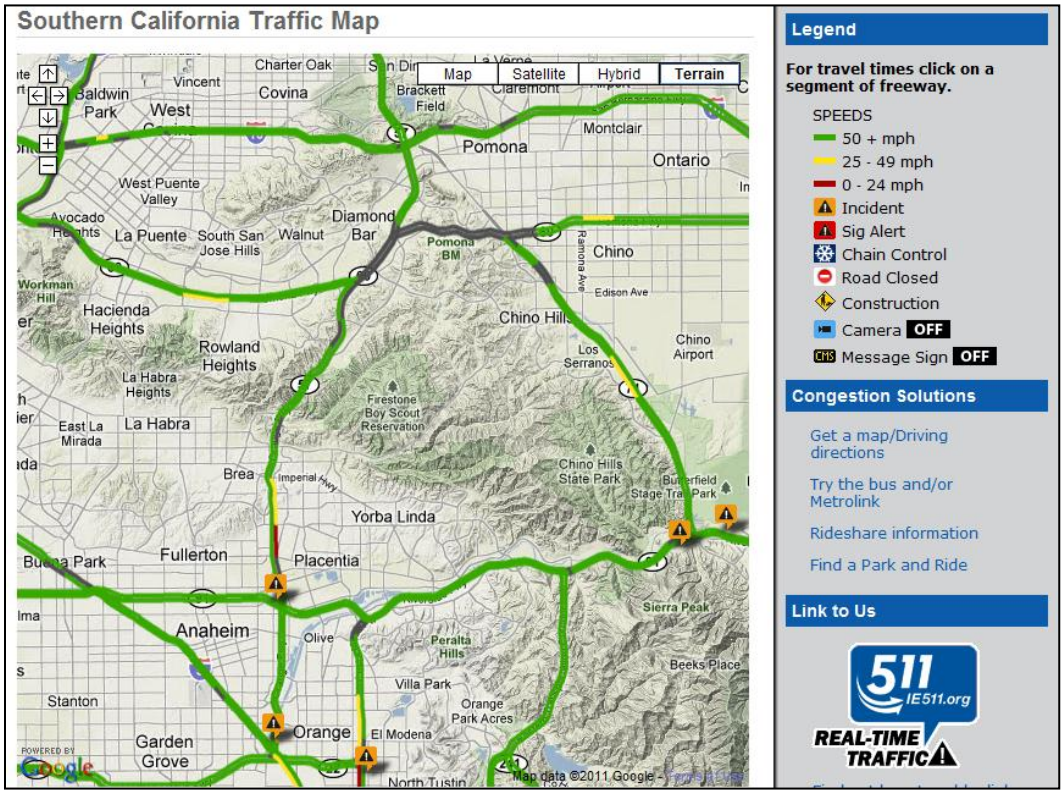


Figure 3: Traffic Speed Map (Inland Empire region, CA, 511)

2.2.1.2 Incidents, construction, and special events

Incidents, construction, special events, and other events that affect road conditions should be on both the phone system and the internet. Data generally comes from some subset of the following entities:

- State Departments of Transportation
- State Highway Patrols

- Event operators
- Local public works departments
- Local law enforcement

On the telephone, this information is generally provided on a roadway-by-roadway basis. In other words, callers ask for information on a specific highway, and they hear all incidents on that highway. More sophisticated systems allow the caller to narrow their query, by asking for some combination of the direction of travel, specific location, and so forth.

On the internet, incidents are displayed on a traffic map, and are often included in a list as well. A well-designed map will include different icons for different incident types (Figure 4), and will also include a pop-up window that provides additional detail on the incident (Figure 5).

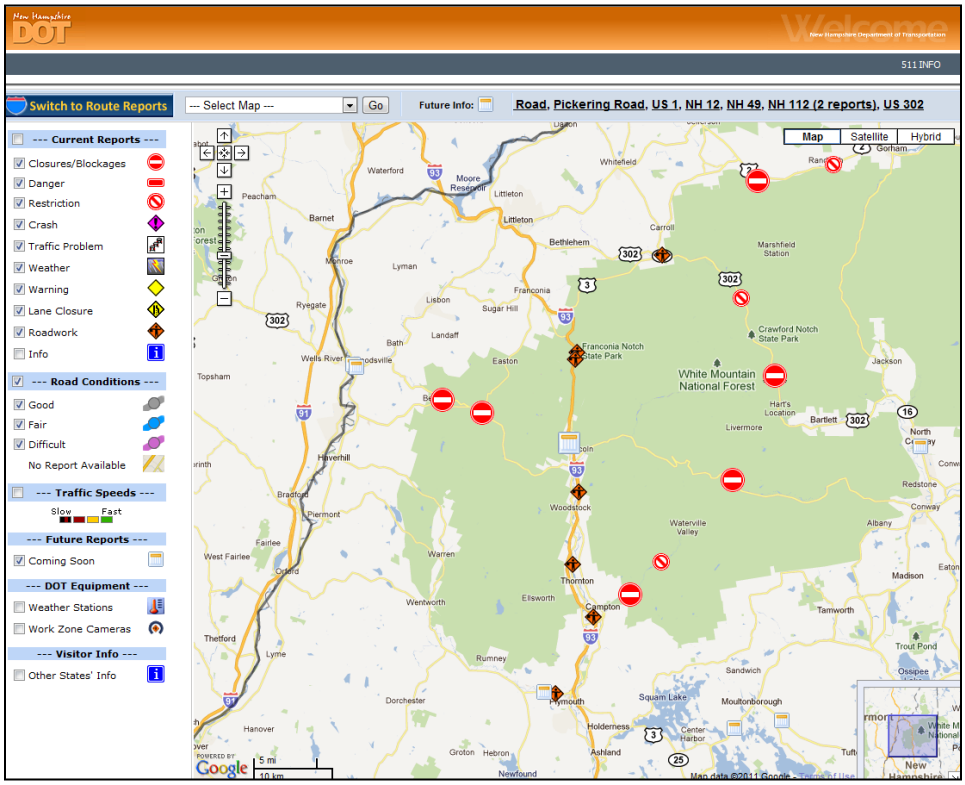


Figure 4: Incidents with Different Icons (New Hampshire 511)

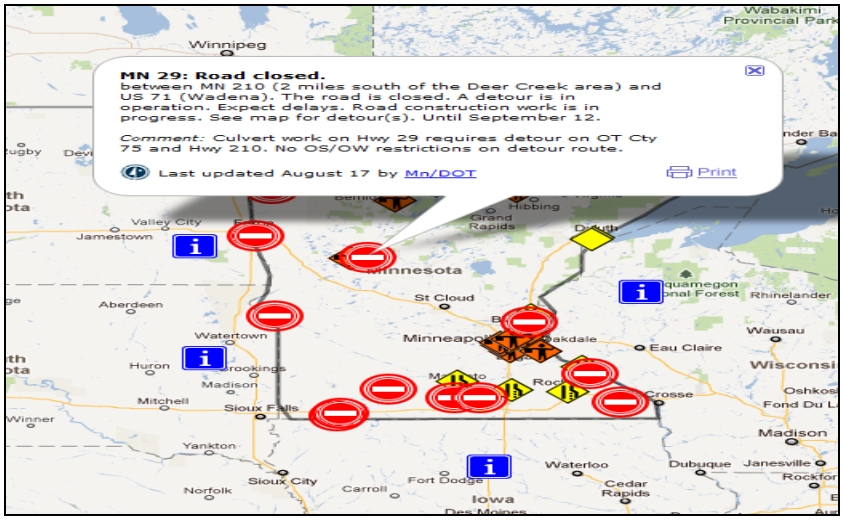


Figure 5: Additional Incident Information (Minnesota 511)

2.2.1.3 Driving Times

Driving times require sufficient data to enable the underlying system to calculate driving times. Typically, this requires either a rich dataset of speed detectors, or it needs detection that can monitor vehicles as they traverse segments (like electronic-toll collection readers or similar technology).

Travel times can be presented over the telephone as is done on the Metropolitan Transportation Commission 511 system. Callers speak their origin and destination, the system calculates the best route between those two points, and then provides the current travel time, along with current incidents, for that route as well as for any viable alternate routes.

Travel times can also be provided over the internet in a variety of ways. Figure 6 shows point-to-point driving times from a start and end point selected by the user.

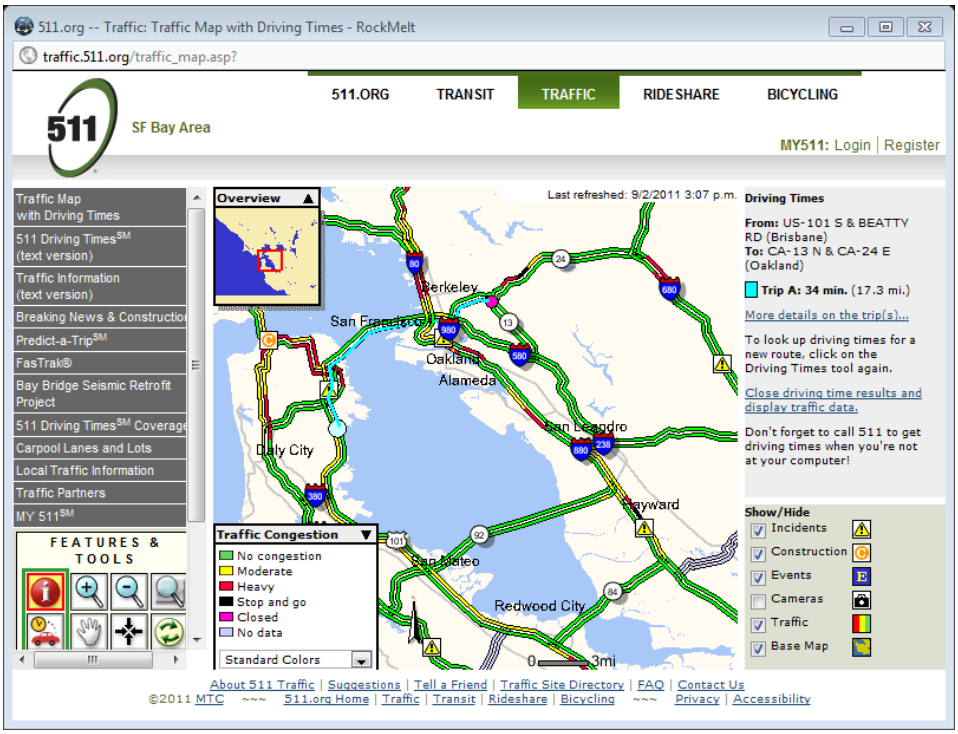


Figure 6: Point-to-Point Driving Times (San Francisco Bay Area 511)

Figure 7 and Figure 8, by contrast, show driving times on pre-selected routes. The interface on Figure 7 allows the user to select the route on which travel times will be reported. Figure 8 displays all of the available routes, and compares the time to the historical travel time and also to the High-Occupancy Vehicle travel time, where applicable.

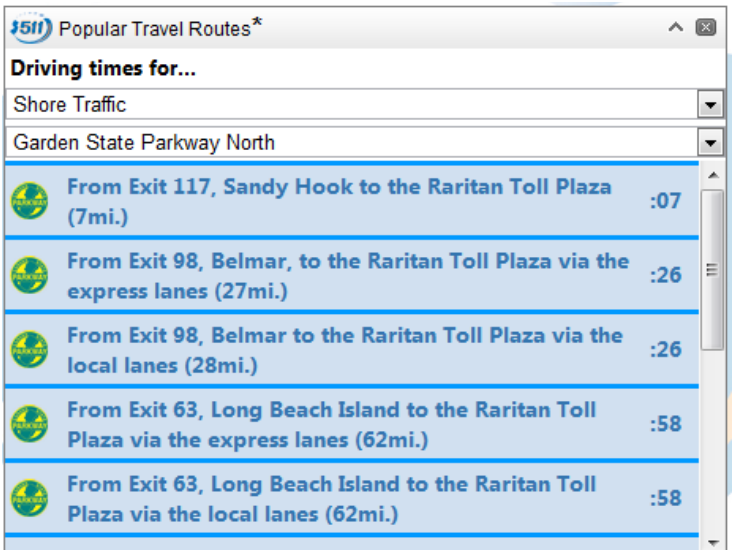


Figure 7: Driving Times on Popular Routes (New Jersey 511)

State Route/ Interstate	Route Description	Distance (miles)	Average Travel Time (minutes)	Current Travel Time (minutes)	Via HOV (min.)
167	Auburn to Renton	9.8	10	10	10
405	Bellevue to Bothell	9.7	11	13	12
405 5	Bellevue to Everett	26.1	50	49	51
405 5	Bellevue to Federal Way	24.6	51	47	36
405 90	Bellevue to Issaquah	9.6	12	14	11
405	Bellevue to Lynnwood	14.9	18	19	16
405 520	Bellevue to Redmond	7.0	10	8	8
405	Bellevue to Renton	11.2	32	24	15
405 90	Bellevue to Seattle	10.6	14	18	14
5	Via Westbound Express Lanes	N/A	N/A	N/A	N/A
405 520 5	Bellevue to Seattle	10.2	18	19	15
405	Bellevue to Tukwila	13.3	36	34	21
405	Bothell to Bellevue	9.9	12	13	13

Figure 8: Travel Times with Comparisons (Washington State Department of Transportation web page)

2.2.1.4 Closed-Circuit Television Cameras

Nearly all traffic web sites include images or streams from closed-circuit television cameras. They are typically shown as icons on the traffic map, and then open in pop-up windows or call-out boxes, as shown in Figure 9.

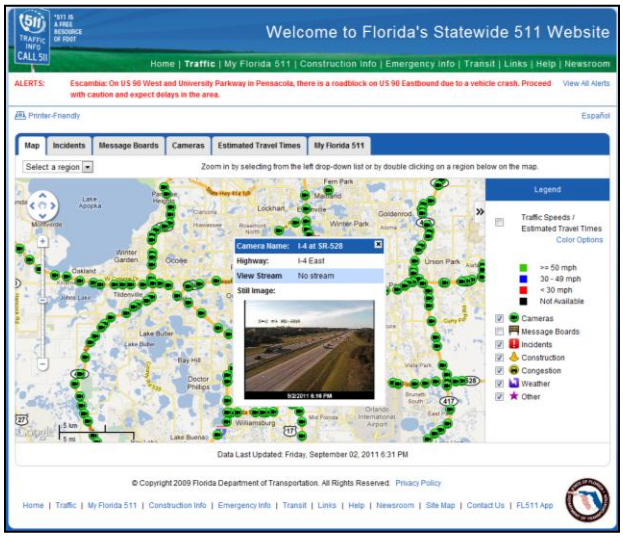


Figure 9: Closed-circuit Television Icons and Image (Florida 511)

2.2.1.5 Changeable Message Signs

Some, but not all 511 systems allow users to see messages that are currently posted on Changeable Message Signs. They are typically presented in the same way that closed-circuit television images and streams are, with icons on the map that provide more information when clicked (Figure 10). Note that this is also another way to provide travel times to 511 users.

Figure 10: Changeable Message Sign Messages (Florida 511)

2.2.1.6 Parking availability

To the best of our knowledge, there are no 511 systems that currently provide real-time parking information. Figure 11 shows how real-time parking information can be provided over the internet; a similar interface could be used for a 511 system.

Figure 11: Real-Time Parking Availability (ParkPGH web page)

The City of San Francisco has recently begun a pilot program for pricing parking based on current parking demand. Parking availability information (Figure 12) could be provided over the Metropolitan Transportation Commission's 511 system. San Francisco has installed sensors covering more than 7,000 parking spaces.

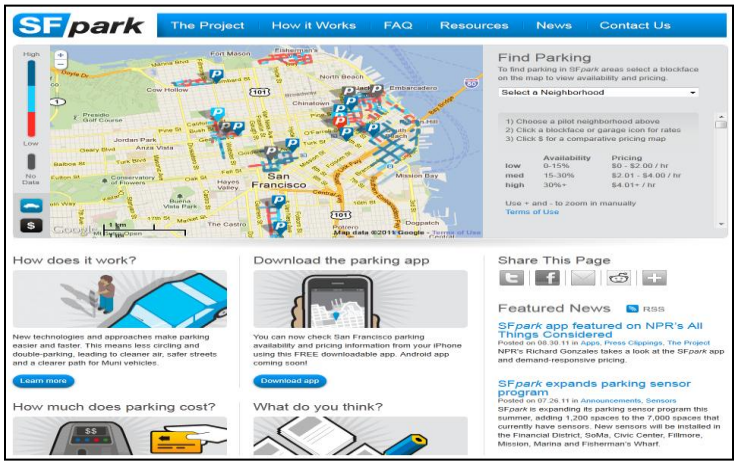


Figure 12: SF Park Web Interface (SFPark web page)

2.2.2 Transit Information

2.2.2.1 Schedules and Other Static Information

Transit information is essential to include on 511. Over the phone, transit information is generally provided with a combination of recorded information and transfers to the transit call centers. It is important, when setting up transfers, to either inform callers of the hours of operation or allow callers to get back to the main 511 system if their call is not answered.

Transit information on 511 generally includes schedules, maps, and general information about riding transit. It is important to note that many 511 web pages do not provide any transit information, but rather count on the individual agencies to do so. For example, Figure 13 shows links to the region's transit agencies. On the other hand, Figure 14 shows a map-based display of transit information. The user can see individual transit routes, and then click the routes or the individual stops for more information.

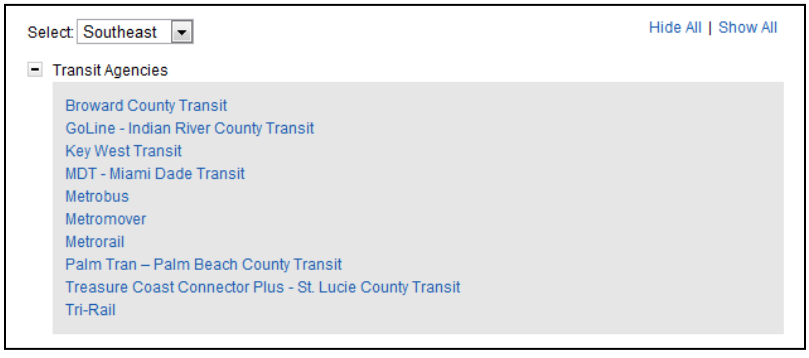


Figure 13: Links to Transit Agencies (Florida 511)

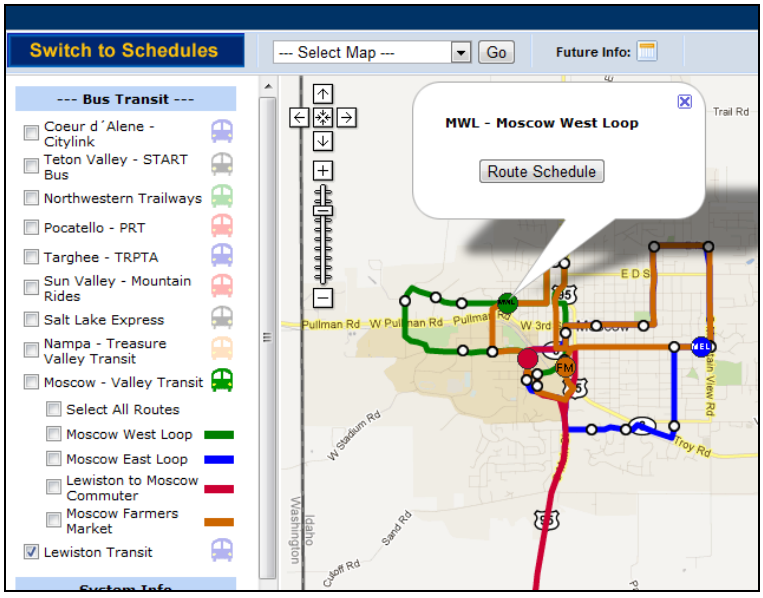


Figure 14: Graphical Display of Transit Info (Idaho 511)

2.2.2.2 Trip planning

Transit trip planning has become a more common feature on 511 web pages. In many cases, the 511 operator simply embeds Google Transit in the 511 web page to perform the trip planning function, as shown in Figure 15.

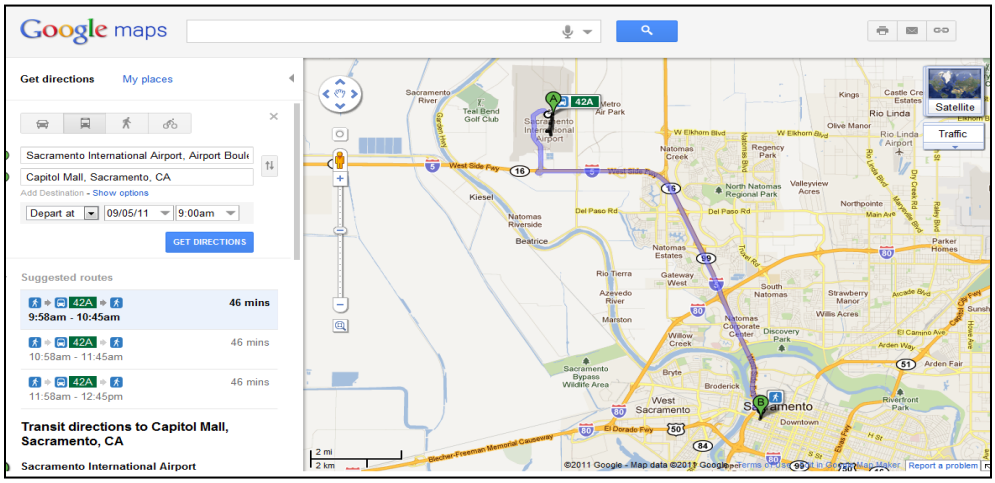


Figure 15: Google Transit Itinerary (Sacramento 511)

Other 511 systems, either because of the complexity of the transit systems or because the transit systems are not covered by Google Transit, have their own trip planning systems (Figure 16).

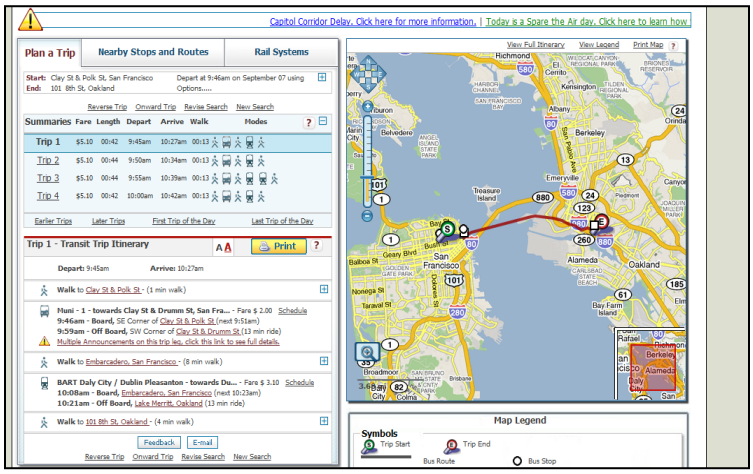


Figure 16: Proprietary Transit Itinerary (San Francisco Bay Area 511)

2.2.2.3 Real-time information

Real-time transit arrival information is considered by many to be the highest level of transit information that can be provided. Due to the expense, however, very few 511 systems are able to collect and disseminate this information. Those that do provide it can do it over the telephone or the internet. Telephone access generally requires a sophisticated interactive voice response system able to recognize many different locations. Figure 17 shows how the information is provided over the internet.

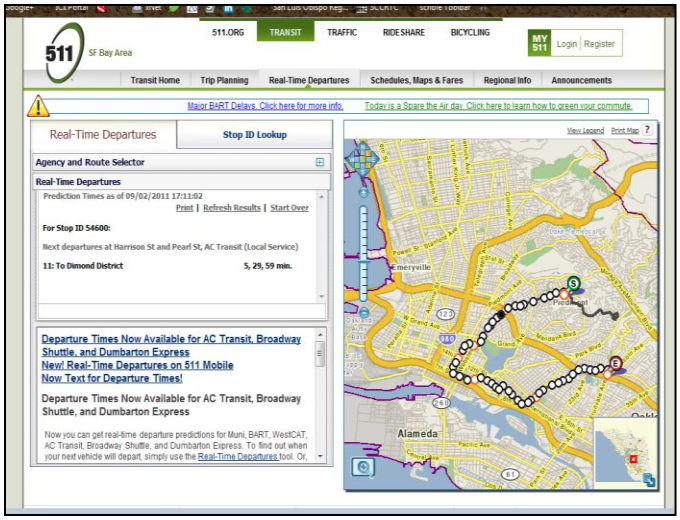


Figure 17: Real-time Bus Arrival Information (San Francisco Bay Area 511)

At least one 511 system has taken another approach, and has put current transit delays and other incidents on a map in much the same way that traffic incidents can be displayed on a map. This is shown in Figure 18.

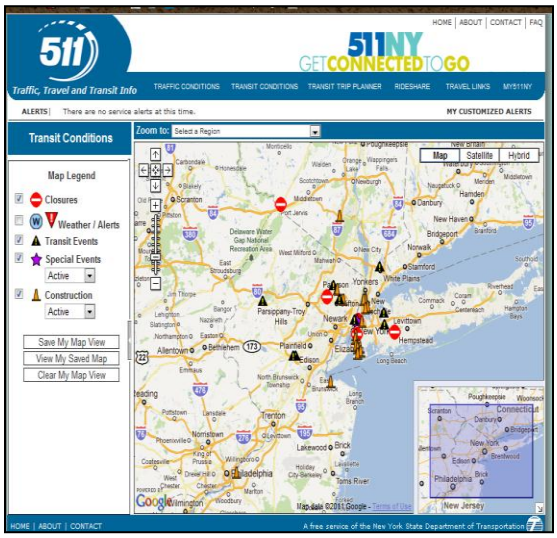


Figure 18: Real-time Transit Conditions (New York 511)

2.2.3 Rideshare Information

Some, but not all 511 systems provide ridesharing information on the phone or the web. On the phone, ridesharing information is generally provided by transferring calls to the region's ridesharing service.

Web-based ridesharing information can take several different forms. The most useful web sites have online ridematching services, where users can input information about their commute and receive referrals for potential carpools and vanpools. Additional information includes maps of high-occupancy vehicle lanes, park and ride lots, location for casual carpool pick-ups, and other relevant information (Figure 19).

Figure 19: Map of Rideshare Information (San Francisco Bay Area 511)

Some agencies have begun pilot programs to test real-time ride-matching. In these projects, drivers and passengers use smartphone applications to find partners, coordinate pick-ups, and pay (in the case of the passenger) or receive (for the driver) funds. None of these systems are deployed as fully-operational projects, and no 511 systems, to the best of our knowledge, provide any real-time ride-matching services.

2.2.4 Bicycling and Pedestrian Information

The most common way to provide bicycle and pedestrian information, if it is provided at all, is through links on the 511 website to bicycle maps, advocacy groups, and other relevant information. Some websites have online bicycle trip planners that attempt to route cyclists on paths or bike-friendly roads (Figure 20). The Metropolitan Transportation Commission's system also helps people find bike buddies.

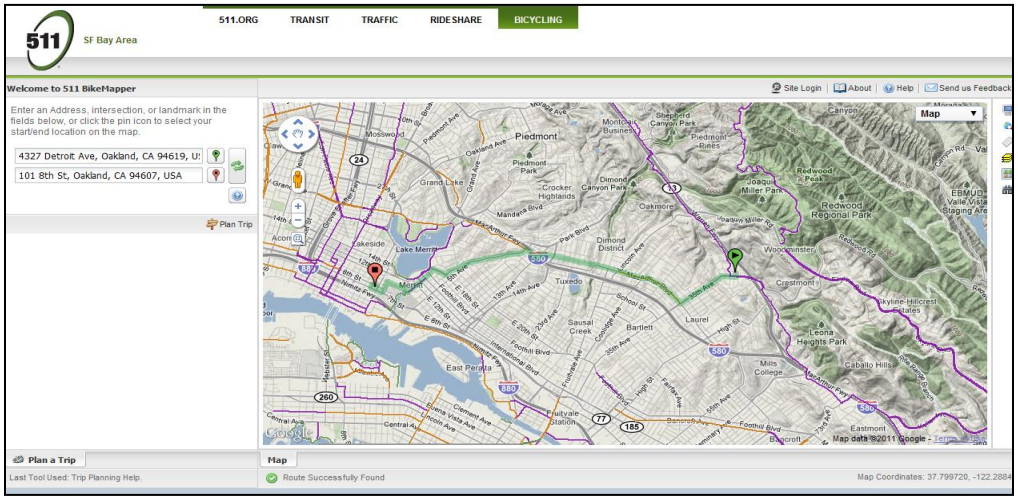


Figure 20: Online Bicycle Trip Planner (San Francisco Bay Area 511)

2.2.5 Truck/freight information

511 can be a valuable resource for truck drivers. In addition to general information about road conditions that appeals to all drivers, 511 can also provide specialized freight information.

On the phone, 511 can provide information on permitting, and can also transfer callers to the appropriate state Department of Transportation permitting offices. On the internet, information can include statutory truck restrictions (such as load restrictions or bridge height and weight limitations) (Figure 21), road closures that specifically affect trucks (Figure 22), and links to the state permitting offices.

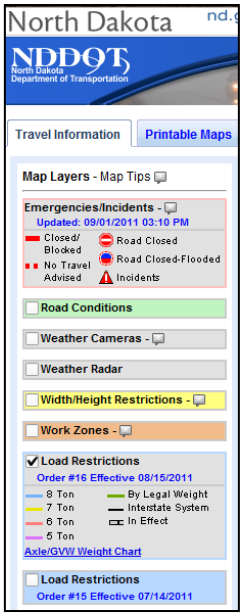


Figure 21: Truck Restrictions (North Dakota 511)

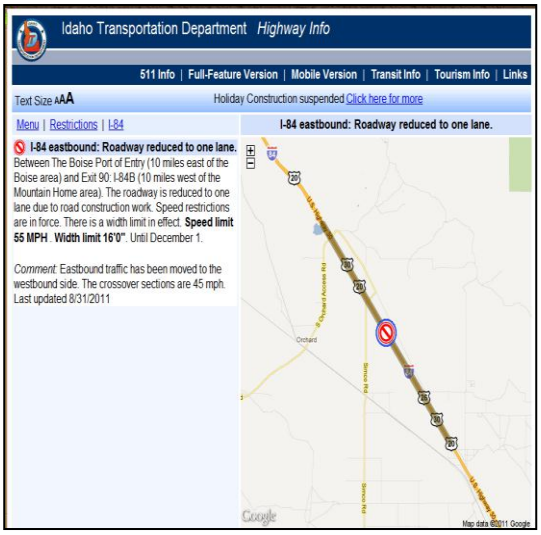


Figure 22: Truck-related Closure Information (Idaho 511)

2.2.6 Emergency Information

511 is a valuable way to get information about emergencies out to travelers. Over the phone, this is generally done through the use of "floodgate" messages. Floodgates are specially-created messages that all callers hear at certain points in the menu. For a major emergency, the floodgate would be the first thing a caller hears after the introductory "welcome to 511" message, and it would give important information about road closures, evacuation routes, or other information related to the specific emergency.

On the web, emergency information is generally provided either through a scroll at the top of the website, or, in the event of major emergencies, by putting information directly on the home page (Figure 23).

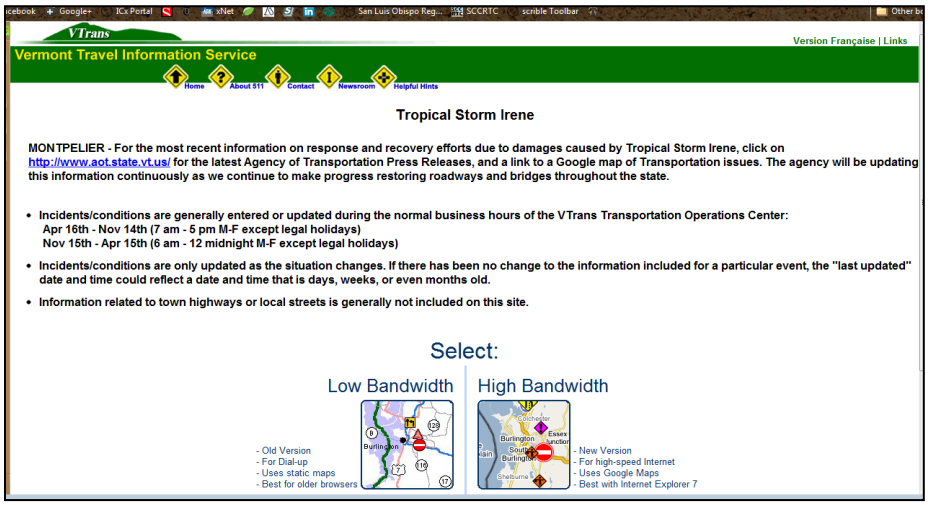


Figure 23: Emergency Information (Vermont 511)

2.2.7 Weather Information

Many states—particularly those in the upper Midwest—consider weather information to be a vital part of their 511 systems. Over the phone, weather information is generally provided simply as an incident type during playback for any specific route or region. The internet allows more latitude to provide weather information. Figure 24 shows how one state provides weather-related road conditions on its traffic map, while Figure 25 displays a weather widget on the main 511 page.

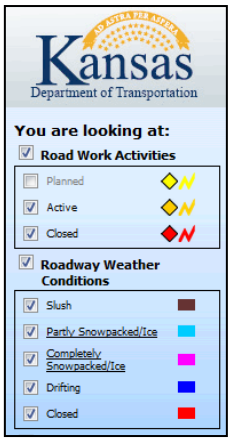


Figure 24: Weather-related Road Conditions (Kansas 511)

Figure 25: Weather "Widget" (New Jersey 511)

2.2.8 Tourism Information

Some states use 511 to provide tourist information, or at least traffic information about tourist attractions, to the public. The state of Arizona's 511 system allows each of the 52 state and national parks to include their information.

On the internet, most tourist information is provided via links to tourism boards or to specific tourist attractions (see Figure 26).

Figure 26: Links to Tourism Information (Maryland 511)

2.2.9 Data format standards

There is a widely used set of standards that govern how traveler information data should be exchanged. They included:

- eXtensible Markup Language (XML)
- Society of Automotive Engineers J2353: Data dictionary for Advanced Traveler Information Systems
- Society of Automotive Engineers J2354 - Message Set for Advanced Traveler Information Systems
- Traffic Management Data Dictionary Standard v3.0 for Traffic Management Center-to-Center Communications

A full discussion of these standards is beyond the purview of this document, but additional information can be found at http://www.standards.its.dot.gov/default.asp.

2.2.10 Error checking and Quality Assurance

Quality assurance is an important, albeit costly, element of using real-time data for traveler information. Many 511 systems do not do any independent error-checking, but instead rely on the error-checking algorithms built into the data-collection infrastructure to filter out erroneous data. Using multiple data sources can help identify errors in any single source as well.

Systems that wish to go beyond this can use two different approaches. The first is to build additional algorithms into the data processing software to check for potential errors. These

algorithms would flag obviously wrong data, such as sensors that report the same value for a number of reporting periods, sensors that report dramatically different values than nearby sensors, and so forth. The second approach is to "ground truth" the data by comparing the information provided over 511 with actual observations of the roadway.

2.3 Data Dissemination

The previous section, discussing the data that is generally available on 511 systems, covered the various types of data. In contrast, this section focuses specifically on the features of the dissemination mechanisms, rather than on how individual data sets are heard on the phone or appear on the web.

2.3.1 Phone System Features

The following is a list, with brief descriptions, of the expected features for a 511 telephone system:

- **Interactive voice response system**: Virtually all 511 telephone systems use an interactive voice response system that allows callers to ask for the information they want by roadway name, direction, and so forth.

- **Touch-tone backup**: 511 systems should include touch-tone backup options where possible to enable callers to enter their requests using the phones keys. This is useful in noisy environments as well as for callers with speech issues.

- **Easily navigable menu**: Provide no more than five options per menu and no more than three menu levels. In addition, allow experienced callers to bypass the menu structure by making their selection at any time. Callers should also be able to access the main menu, help, or the previous menu from any point in the system.

- **Recordings**: Use professional, high-quality recordings for all voice prompts, and use the same voice throughout.

- **Availability**: The system should remain available during periods of high demand.

- **Floodgates**: The system should allow for floodgates to be placed at any level in the menu hierarchy, and should allow for them to be non-interruptible.

- **Help**: In addition to providing help when asked, the system should provide increasing levels of help when callers' utterances are not recognized.

- **Telephone Number**: 511 systems should be free to the user; this generally means that the number that 511 routes to should be a toll- free (8nn) telephone number.

- **Transfers**: 511 systems should transfer callers to other relevant services, such as transit agencies, rideshare agencies, and neighboring 511 systems.

- **Feedback**: 511 systems should allow callers to leave recorded feedback about the system, and should also be able to conduct simple surveys of callers.

- **Americans with Disabilities Act (ADA) Compliance**: Phone systems should strive to make information available to people with disabilities through the use of touch-tone systems and connection to Telecommunication Devices for the Deaf systems.

2.3.2 Website Features

There is also a generally accepted set of features that traveler information websites should have. First, they should include all relevant travel modes, at the very least linking to the appropriate agencies for transit services, ridesharing, and so forth.

Websites also need to be designed so that they work on a wide variety of browsers. The test environment should include different versions of all of the major browsers.

The map interface should use maps that can zoom and pan in the browser without requiring the user to refresh the browser or click a link (commonly referred to as a Google-style interface). In addition, where different types of information are available (such as speeds, incidents, construction, cameras, and so forth), the map should allow the user to select which layers are shown (as in Figure 27).

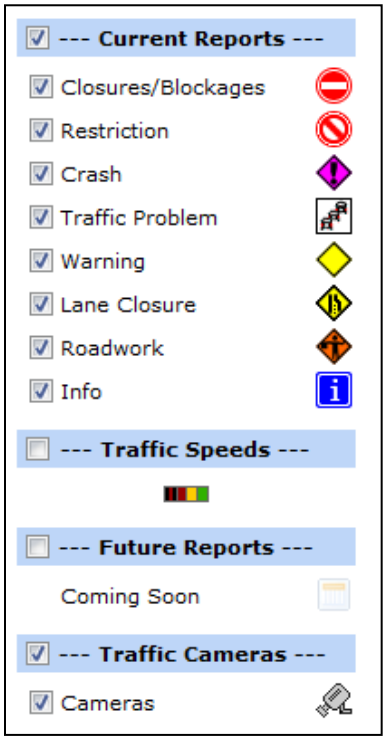


Figure 27: Selectable Layers

As with the phone, information on the web should be ADA compatible, to the greatest extent possible. This requires optimizing web pages for screen readers (to accommodate the visually-impaired) and using different color schemes on maps (to accommodate the color-blind), as shown in Figure 28.

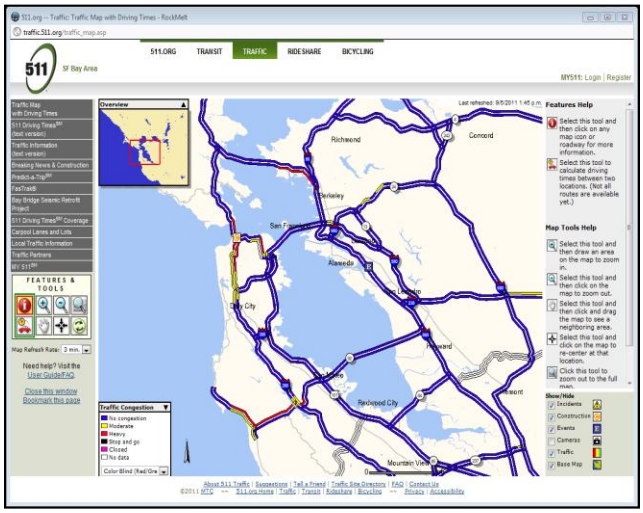


Figure 28: Map Optimized for Red-Green Color Blindness (San Francisco Bay Area 511)

2.3.3 Mobile applications and websites

As smart phones become more prevalent, travelers have begun to expect to get traveler information on their smart phones, tablets, and other mobile devices. This can generally be done either by developing mobile versions of web pages or by developing applications for the various smart phone and tablet platforms (iPhone, Android, and BlackBerry). Mobile web pages are generally streamlined versions of the main 511 web page optimized for viewing on mobile devices, as shown in Figure 29.

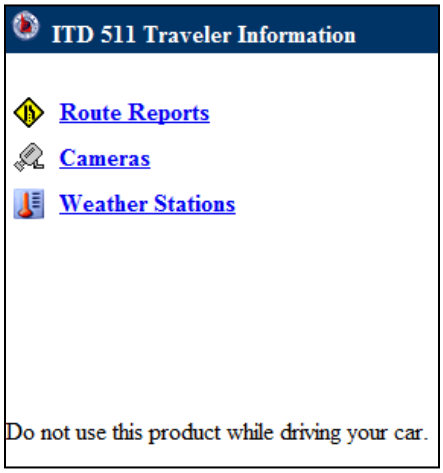


Figure 29: Mobile 511 Webpage (Idaho 511)

Figure 30 shows Florida's mobile application. Note that it includes geographically relevant information (using the geographic positioning system functionality of the phone) as well as the user's personalized home to work commute.

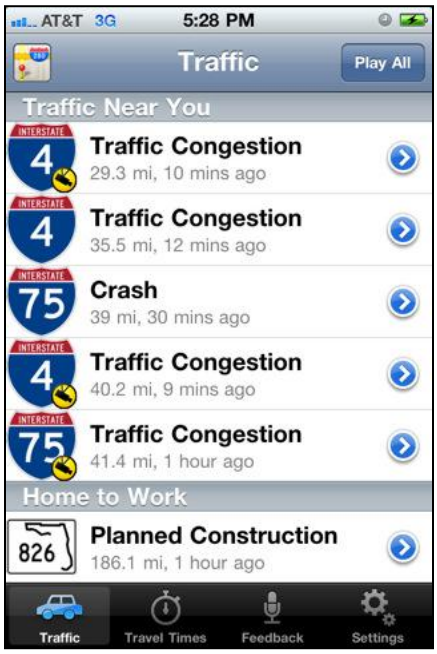


Figure 30: Mobile Application (Florida 511)

The Pennsylvania Turnpike has recently launched a mobile application that uses the GPS in a driver's smartphone to determine the location and direction of travel. It then uses that information to provide spoken traveler information to the driver. It does not require the driver to interact with the application at all while driving. A screenshot of the application is shown in Figure 31.

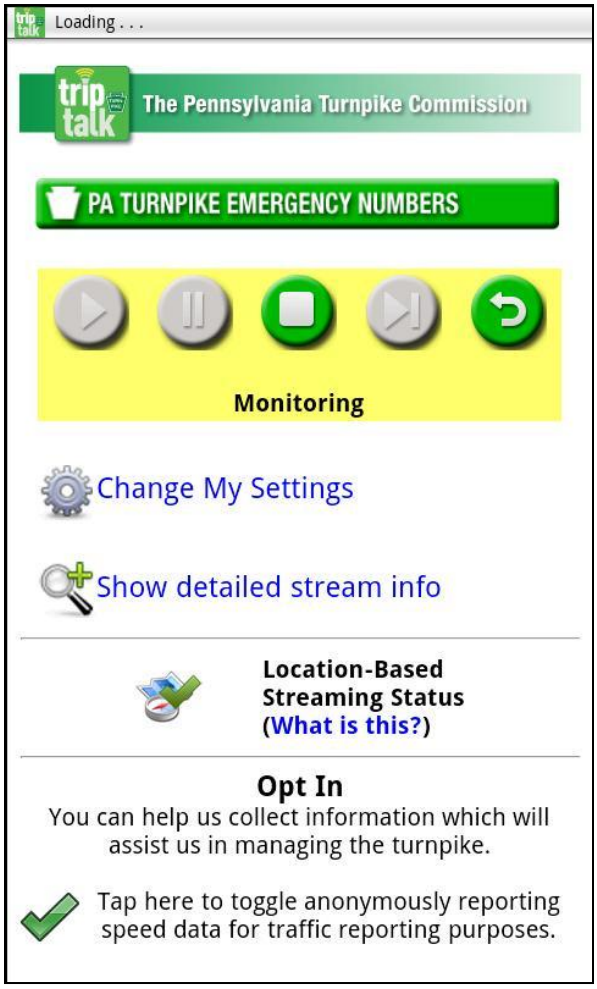


Figure 31: Pennsylvania Turnpike Mobile Application

2.3.4 Bilingual Information on Phone and Web

In some areas, it is vital to provide traveler information in languages other than English (usually Spanish). The Florida system, for example, provides full bilingual services on both the telephone and the web. The web version is shown in Figure 32.

Figure 32: Spanish 511 Web Site (Florida 511)

2.3.5 Customized alerts

Many 511 systems allow customers to sign up for personalized alerts by text message or email. Generally, the user will enter the time of their commute, the routes used (as shown in part in Figure 33), parameters about the types of alerts desired, and the cell phone number or email address that will receive the alerts.

Figure 33: Personalized 511 Trip Set Up (San Francisco Bay Area 511)

Figure 34 shows the result of a personalized alert. Note that the current driving time is double the typical driving time; this was the trigger for the alert.

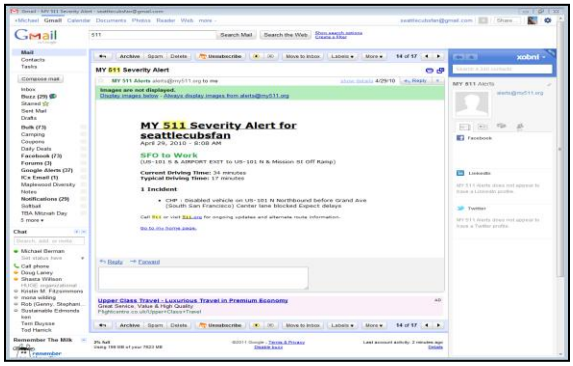


Figure 34: Personalized Alert Email (San Francisco Bay Area 511)

Other states have taken a different approach to personalized information. Figure 35 shows the entry box for route-specific information. Rather than requiring registering for alerts, this tool allows travelers to input their current origin and destination and see any current information for that route.

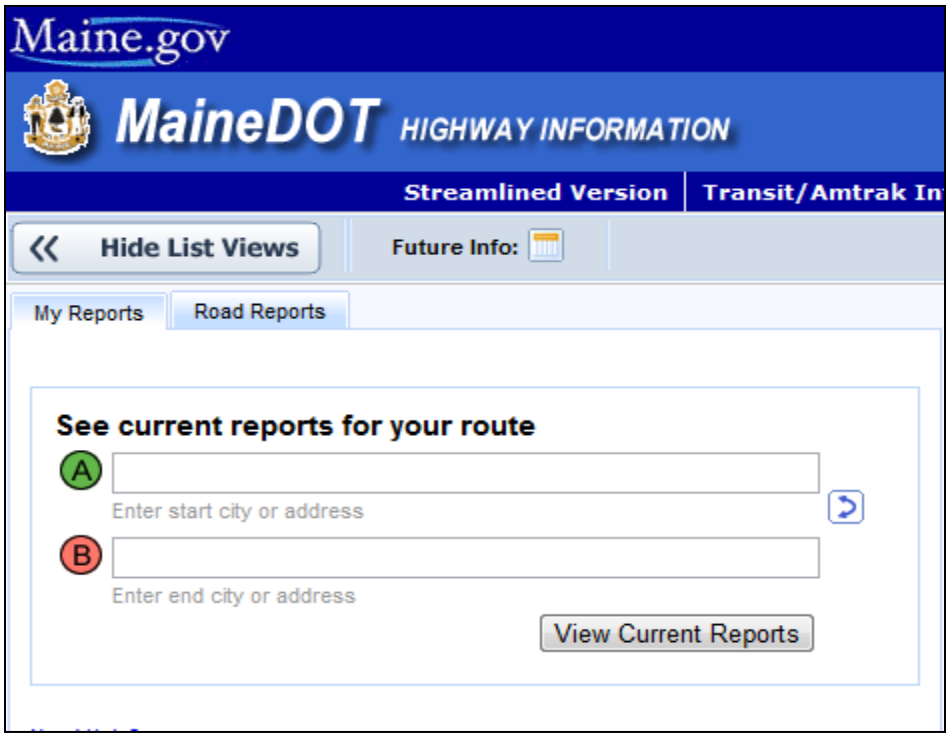


Figure 35: Route-Specific Information (Maine 511)

2.3.6 Social Media and Social Networking

Many 511 systems have started using Twitter (http://www.twitter.com) feeds to provide current information about travel conditions. Figure 36 shows one such feed.

Figure 36: Twitter Traffic Feed (New Jersey 511)

Other ways to use social media include creating 511 fan pages on Facebook, though these tend to serve more as public relations tools than as real-time information dissemination channels.

2.4 Operations and Performance Measurement

This section discusses the best ways to provide for ongoing operations, maintenance, and performance measurement.

2.4.1 Hosting facilities

"Hosting" encompasses a variety of functions, including housing the computer equipment on which a system runs, providing power to the equipment (including back-up power in the event of a power failure), providing communications for the system, and performing routine maintenance on the equipment. A 511 system can be hosted by the operating agency, by the system integrator providing the service, or at a third-party hosting facility. There are no hard and fast rules, but it is becoming generally accepted that it makes sense to use a third-party facility. Unless the operating agency already is responsible for 24x7 system operations, has trained maintenance personnel on staff, and can supply redundant 24x7 power and communications, the agency should probably not try to take on the burden of hosting a 511 system.

2.4.2 Operations and Maintenance Planning

Because 511 systems are operational projects, it is important to consider the implications of ongoing operations during system design. For example, there may be a certain design option that is simple to implement but would require an ongoing commitment from operations staff. Before any decision is made, it will be important to understand the operational parameters and staff availability. Similarly, there may be a trade-off between up-front costs and maintenance costs for specific technology choices. That trade-off can only be made with a solid understanding of the operational environment, including funding.

Maintenance planning is a key element of operational planning. Generally, a maintenance plan will include routine, on-going maintenance as well as emergency maintenance when something fails. On-going maintenance planning will include things such as regular back-ups, virus-checking and system security, and so forth. Emergency maintenance plans will establish trouble-shooting protocols and response times to be followed in the event of system failures.

2.4.3 Upgrade and replacement plan

All technology has a limited life span. Some may last for as little as five years and some for as long as twenty, but all technology needs to be replaced at some point. This eventuality should be taken into account during the initial concept and budgeting exercises, so that there will be an understanding of what will need to happen after the initial operational period. In addition to planning for replacement, designs should also take into account the need for scalability and expandability as new data sources and other technologies become available.

2.4.4 System Security

511 systems, like any other Information Technology IT project, should follow industry-standard security practices. These include such things as restricting access to systems to the appropriate staff, using firewalls and other network security tools, and so forth.

2.4.5 Performance Measurement

Performance measurement helps the implementing agency assess the effectiveness of a 511 project. At a high level, there are two kinds of performance measures, output performance measures and outcome performance measures. Output measures, as the name suggests, are related to an entity's output, while outcome measures assess the effectiveness of the entity's work. For a state Department of Transportation, an output measure could be miles of highway constructed or the number of changeable message signs deployed, while an outcome measure would be congestion reduction. For a 511 system, an output measure would be the number of calls to the 511 system; an outcome measure could be the percentage of trips that were changed based on information received from 511.

Output measures are generally easier to track, and are worthwhile to measure. They can also be used as proxies for outcome measures. Outcome measures tend to be more important, but it can be challenging to gather the right data to perform these measurements.

In either case, the implementing agency should select a small number of key indicators that it wants to measure. Trying to do too many can create an undue burden without a

commensurate benefit. Typical indicators that agencies currently use include call volume, web visits, and system down time.

2.4.6 Marketing

Although it is generally implemented by government agencies, 511 is, in effect, a consumer product, and should be treated as such. This includes marketing 511. It can be a challenge to find the funds to market a 511 system, given all the other demands on government funding, so it is important to spend the limited marketing dollars as effectively as possible. Typically, marketing would be funded out of whatever funding source is used for 511 as a whole. It might be possible, in some instances, to use existing public relations and public information budgets to supplement 511 marketing funds.

2.4.6.1 Marketing Plan

A marketing plan will lay out the overall approach to marketing a 511 system. Marketing, in this case, does not simply mean creating advertising collateral, but rather the full range of marketing activities, beginning with an understanding of the needs of the target users, creating a feedback mechanism to allow that understanding to help shape the product, advertising and promoting the product, and continuing to assess the attitudes and needs of the users.

2.4.6.2 Marketplace and consumer research

Some, but not all, 511 systems have used focus groups or surveys in an attempt to understand, prior to deployment, who their target users are and what they want from 511. If this is done, it is important to do it when the results are still relevant, i.e., when they can still be used to inform the overall concept of the 511 system. Surveys and focus groups can also help fine-tune marketing messages and provide information that can be used to enhance existing systems.

2.4.6.3 Advertising and promotion

Once a system is under development and nearing launch, it is important to advertise and promote it. This will generally be done according to the marketing plan, will likely rely on various partnerships, and will include some or all of the following tasks and activities:

- Public relations: Discuss the project and its benefits with key opinion leaders, such as transportation reporters for local media.
- Highway Signs: Install "Call 511" signs on freeways and other highways.
- Leveraged advertising: Partner with other transportation agencies, local facilities, and other similar entities to increase awareness of 511 cost-effectively. Examples include having the 511 logo and call to action printed on transit schedules and bus stops, or working with event managers to include a "call 511" message in event programs.
- Paid advertising: Some 511 systems, generally in larger regions, have used paid advertising (billboards, radio ads) to raise awareness and increase 511 usage.

2.4.7 Revenue generation

To date, there are no "success stories" to report on 511 revenue generation. The San Diego system implemented a referral system, under which callers to 511 can get referrals to taxi cabs and other services. This has been useful as a proof of concept, but has not generated sufficient revenue to support the system. Massachusetts recently redeployed its 511 system under a contract that it is believed costs the state nothing, but it is too early to assess the success of the contract. Virginia, Ohio, Florida, and Missouri are currently attempting to procure free 511 systems, but none has entered into a contract at this point.

3 Traveler Information Needs in the Monterey Bay Region

This chapter discusses the needs assessment that has been conducted to help assess whether and how to deploy 511 in the Monterey Bay Area region. Information was gathered in two parallel efforts. First, RTC and TAMC, in the initial stages of this project, conducted an online survey to get information about the ways in which people currently get traveler information, the strengths and weaknesses of the current information sources, and the desired information and delivery methods for a potential 511 system. Section 3.2 summarizes the results of the survey.

In addition, the ICx consultant team conducted stakeholder outreach to assess the opinions of key transportation stakeholders in the Monterey Bay Area. The outreach also included an initial meeting with key partners as well as a series of interviews. Section 3.1 provides a high-level summary of all of the user needs. Section 3.2 summarizes the survey results, and Section 3.3 summarizes the stakeholder outreach. Section 3.4 then summarizes the existing transportation information systems currently available in the region. The chapter concludes with a first attempt at identifying target markets for 511 (Section 3.5)

3.1 High Level Summary of User Needs

The results below show that there are two main dimensions of the needs for traveler information: content and delivery method. Table 1 summarizes the information that we gathered from the surveys and interviews.

Table 1: Summary of Content and Delivery Needs

Constituent Group	Content		Desired Delivery Mechanisms
	Top Priorities	Second Priorities (if applicable)	
Survey Respondents	• Real-time traffic conditions • Collisions • Construction • Travel times	• Transit trip planning • Transportation for special events • Real-time transit information • Weather conditions • Emergency Information	• Website • Phone • Alerts delivered to phone or mobile device

Constituent Group	Content		Desired Delivery Mechanisms
	Top Priorities	**Second Priorities (if applicable)**	
Elected Officials	• Transit schedules • Alternate routes • Road congestion information • Updates on blockages, road closures and collisions • Travel times • Real-time traffic conditions	• Weather and special event impacts on traffic • Information on cabs and ADA services • Information on trails, bicycles, and walking	• Website • Smart phone applications • Phone service • Geographic positioning system • Multilingual • Disabled access
Agriculture	• Traffic congestion • Construction • Closures		• Website • Email or text alerts • Smart phone applications
Business Organizations	• Information to enable trip planning	• Satellite images	• Phone • Smart phone applications • Website • Video • Radio • Multilingual
Colleges and Universities	• All modes		• Website • Phone • Smart phone • Text and email alerts
Employers	• Real-time traffic conditions • Road closures • Ridesharing assistance • Alternate route and mode options		• Website • Smart phone applications • Phone

Constituent Group	Content		Desired Delivery Mechanisms
	Top Priorities	**Second Priorities (if applicable)**	
Hospitality and Tourism	• Real-time traffic information • Construction alerts • Collision information • Alternate modes • Maps, directions, and event listings	• Geographic positioning system mapping • Referrals/directions to restaurants and other attractions	• Website • Phone • Hotel TV • Hotel business centers and kiosks
Law Enforcement and Public Safety	• Real-time traffic and transit information • Bike information • Referrals to freeway aid and towing services • Construction updates	• Real-time traffic cameras and video streaming • Tie-ins to Amber alerts • Tie-ins to 211	• Phone • Website • Text message alerts • Smartphone • Telecommunication Device for the Deaf/TDY accessible • Bilingual
Nonprofit and Community-Based Organizations	• Collisions • Road closures • Special events • Travel times • Alternate routes • Transit information • Emergency evacuation procedures		• Smart phone applications • Website • Referrals from 211 • Radio
Private Transportation Providers	• Emergency information • Carpooling • Transit information • Road conditions and closures	• Anticipated delays • Weather • Information on a range of transportation options	• Phone • Smart phone • Website

Constituent Group	Content		Desired Delivery Mechanisms
	Top Priorities	Second Priorities (if applicable)	
Public Transportation Agencies	• Traffic reports • Collision alerts • Real-time information • Links to other websites with critical information and Google Maps		• Website • Phone

3.1.1 Content

Most of the people providing input, whether through the survey or through the stakeholder outreach, were in broad agreement on the types of information that should be provided over any eventual 511 system in the Monterey Bay Area.

For roadway information, virtually all respondents felt that the system should include current conditions, collisions, and construction and closure information. Subsets of the respondents wanted other information, such as travel times, alternate routes, and emergency information. The business community wanted information to enable trip planning, and we can assume that this would include some types of roadway information.

Similarly, virtually all respondents wanted some kind of transit planning; staff from Santa Cruz Metro and Monterey-Salinas Transit in particular wanted to be able to include real-time transit information on 511, but were concerned about the cost of doing so. Most respondents, especially among the interviewees, also felt that other modes, such as rideshare, bicycling, and walking should be included. We should note, however, that often, the respondents did not go very far beyond traffic conditions in their descriptions of content that they wished to see on 511 until they were prompted by the interviewer's reference to the full scope of potential 511 services.

3.1.2 Delivery Methods

As with content, there is not a tremendous variation in the responses from either the surveys or the stakeholder group, though there is some. The common ground is across internet-based delivery devices, and virtually all respondents suggested that information should be made available over the internet and smartphones (either through dedicated applications or through alerts that are sent out to people). The most interesting discrepancy relates to the telephone itself. As the idea of 511 evolves, the primacy of the traditional telephone as the delivery method has declined. This is evident in both the survey results (more people want to access information via the web than via the phone), as well as in the results of the stakeholder surveys (all groups suggested webpages as delivery mechanisms, but some did not mention the phone). The end result suggests that the focus should first be on delivery via the internet (which implies smart phones, tablets, and other mobile devices, in addition to traditional computers), but that

the telephone is important to, at least in part, to make sure that all relevant communities are able to access information when and where they want it.

3.2 Detailed Summary of Survey Results

Prior to the RTC contracting with ICx to perform this feasibility study, the RTC and the TAMC created a project website, produced a video, conducted a web-based survey and held an informational meeting in each county about the 511 planning effort. The purpose of these activities was to inform viewers about traveler information systems generally, encourage them to take the survey and to assess various issues related to 511 and traveler information. Links to the online survey and the You Tube video describing 511 services, posted at http://511montereybay.org, were distributed via email to more than 500 organizations and individuals in the Monterey Bay Area.

The survey covered the following general areas:

- Awareness of 511 Systems
- Planning for a Monterey Bay Area 511 System
- Current Sources of Traveler Information
- Demographics

The English version of the survey is included as Appendix A to this report. A Spanish version was available as well. Respondents were asked to watch the video prior to taking the survey. Note that because this was a web-based survey, and it was open to anyone, this is not a statistically valid sample. Nonetheless, it provides some valuable first-hand information from citizens and visitors to the Monterey Bay Area.

As of May 31, 2011, 208 people responded to the survey. Some of the key findings of the survey are:

- Awareness of 511 is relatively high (just under 75%).
- Among respondents who have used 511 in the past, their impressions are generally favorable (66% positive and 30% mixed).
- When asked what information they would want on a 511 system, the most popular answers were real-time traffic conditions, collisions and construction, travel times, and disaster and evacuation route information.
- Survey respondents had a slight preference for accessing 511 information over the internet as opposed to the phone.
- Respondents currently use the radio and the internet to get traffic information; the internet or printed schedules to get transit information; and the internet to get weather information.

- Many respondents were not sure where to go to get information related to ridesharing, bicycling, or pedestrian travel.

- The most significant gaps in current information that respondents found were (a) a lack of real-time traffic information, which is surprising given the number of private-sector companies providing that information; (b) no single source of traveler information; (c) no reliable information for trips out of their county of residence; and (d) no real-time transit information.

The sections below provide more details on these findings.

3.2.1 Awareness of 511

The first series of questions addressed the survey respondents' awareness of 511 prior to watching the introductory video and taking the survey. Most respondents were familiar with the idea of 511 before they saw the video (Figure 37).

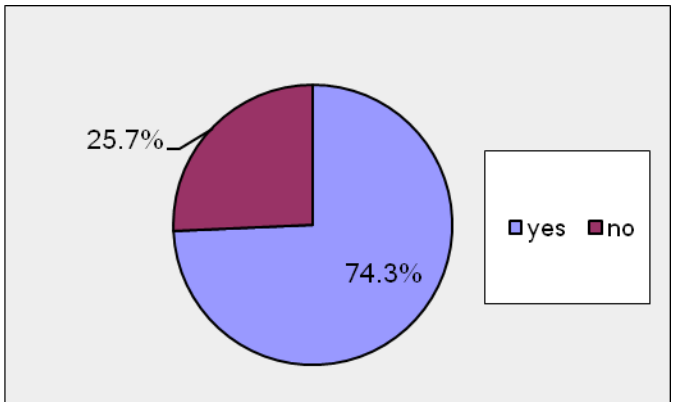


Figure 37: "Before watching the video, were you familiar with the concept of 511?"

Figure 38 shows how the respondents became familiar with 511. Of the 36 respondents who said "other," roughly one-third of them had heard about or used the San Francisco system.

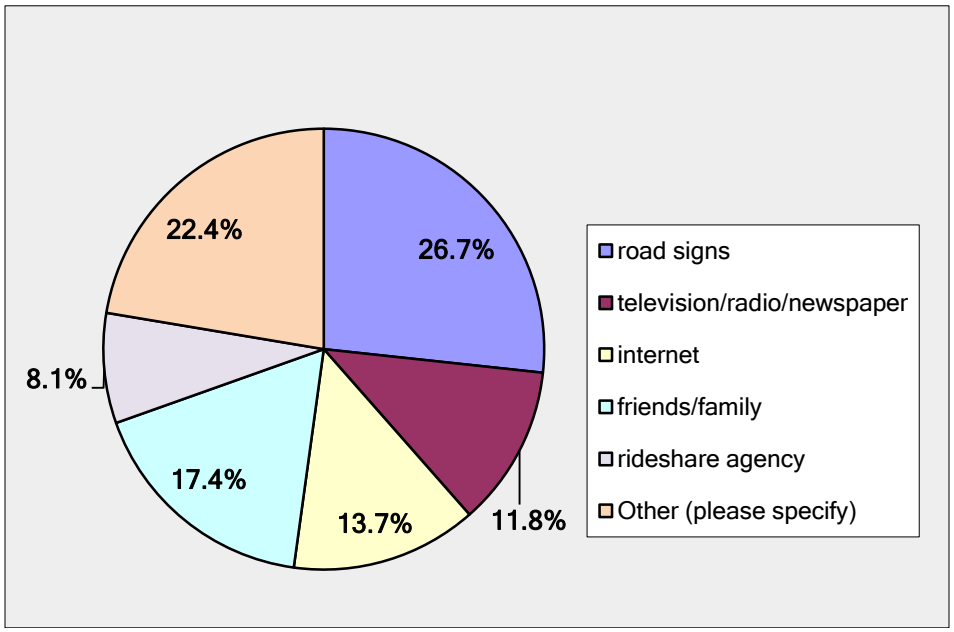


Figure 38: "How did you first hear about 511 Systems?"

Nearly half of the respondents have never used a 511 system, as shown in Figure 39. Most respondents who had used one have done so fewer than 10 times total.

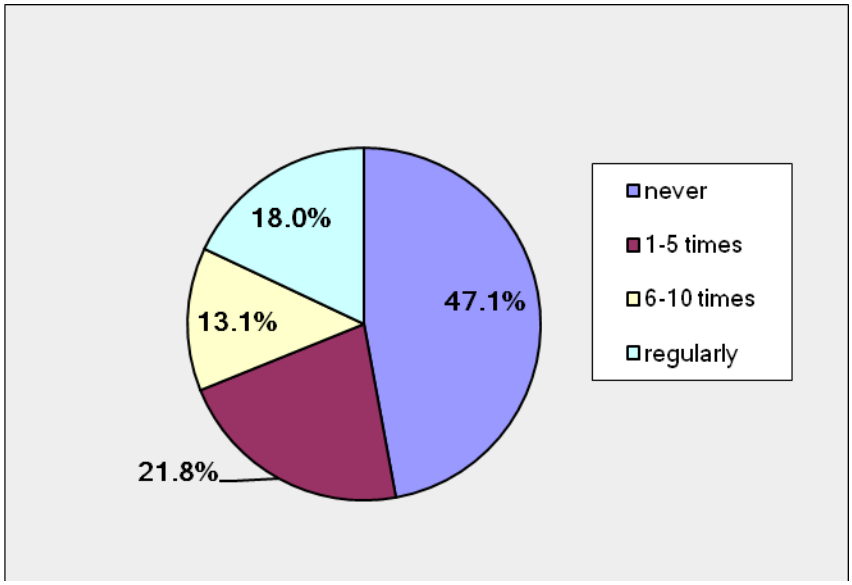


Figure 39: "How many times have you used a 511 phone system or website?"

Figure 40 shows that most of the respondents who used a 511 service previously had either positive or mixed experiences.

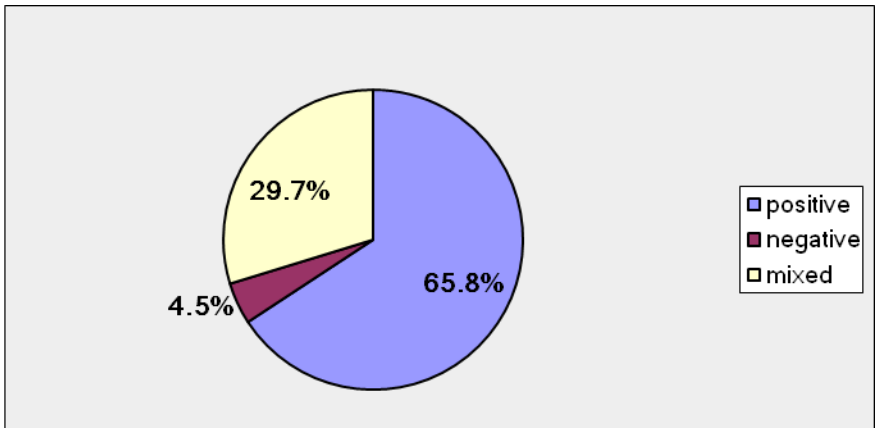


Figure 40: "What were your experiences using a 511 system?"

3.2.2 Planning for a Monterey 511 System

This section made up the bulk of the survey, and included questions on the type of information that respondents would want in a 511 system.

Figure 41 shows the results when respondents were allowed to select as many choices as they wanted. As the graphic shows, the most common choices were related to traffic in one way or another (real-time traffic conditions, collisions and their impact, construction information, disaster and evacuation routes, and travel times). All of these were selected by 70% or more of the respondents; no other items were chosen by as many as 50%.

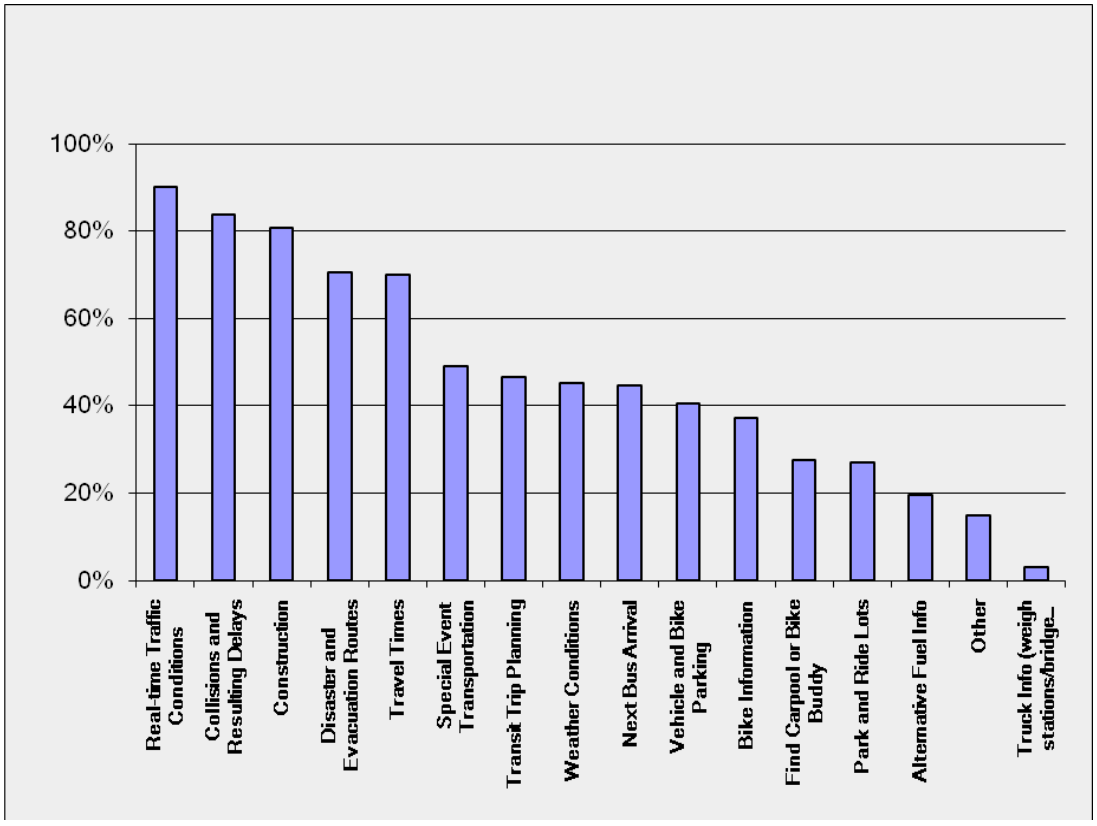


Figure 41: "What type(s) of traveler information would you like to get from 511?"

Figure 42 provides more details on the top selections, showing the results when respondents were asked to select their top four priorities for information. Of the choices shown in Figure 41, real-time traffic conditions was the first choice of nearly 70% of the respondents. No other response was selected as the first choice by even 7% of the respondents. Construction information, location of collisions, travel times, and emergency information made up the other top choices. None of the other possible responses were mentioned more than 7% of the time as any of the top choices.

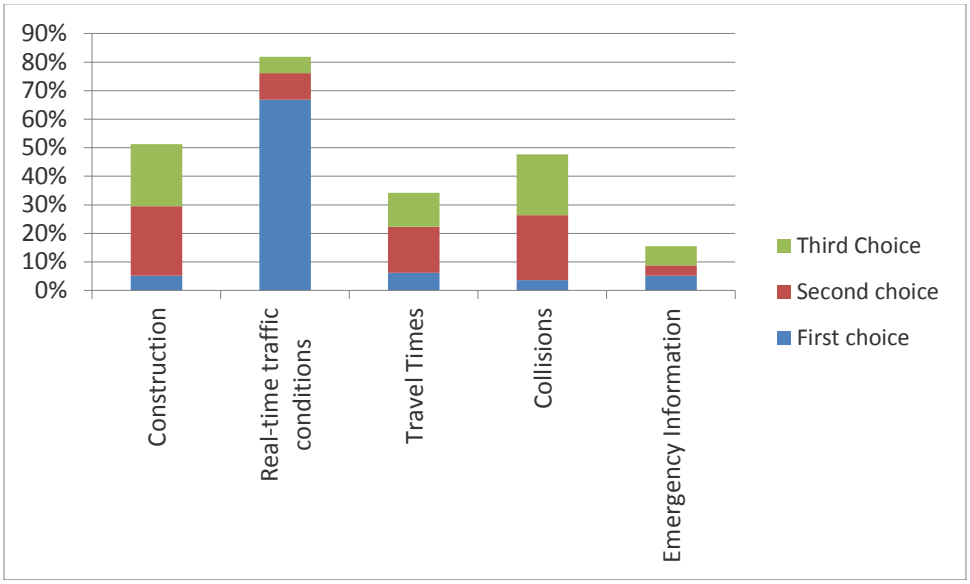


Figure 42: "What information would you find most valuable?"

The next series of questions addressed various topics related to accessing the information that would be available. Figure 43 shows that people generally want to get information via computer, telephone, and smart phone.

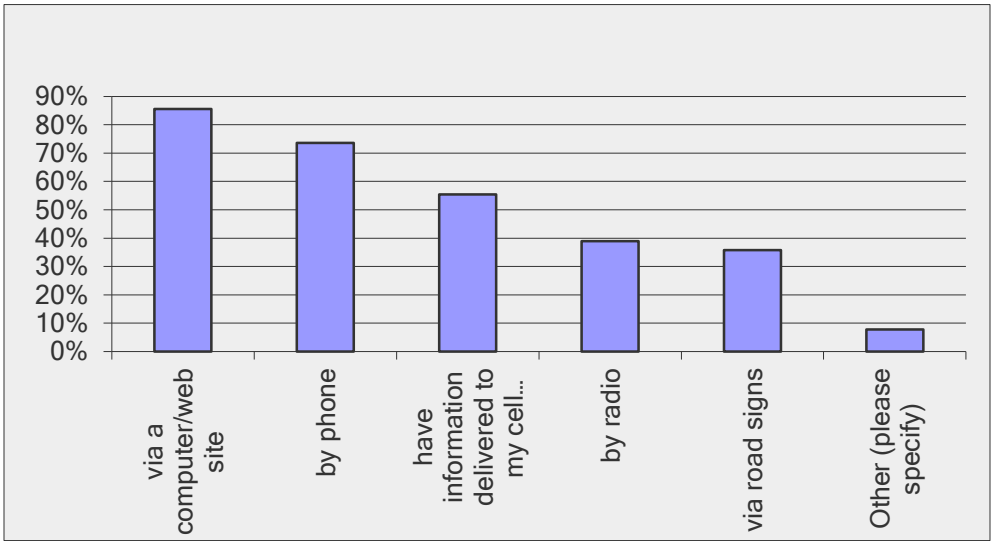


Figure 43: "How would you like to access this information?"

Figure 44 displays how often respondents say they would access 511. Nearly 70% of respondents say they would access the system at least weekly, and nearly 90% say they would access it at least a few times a month.

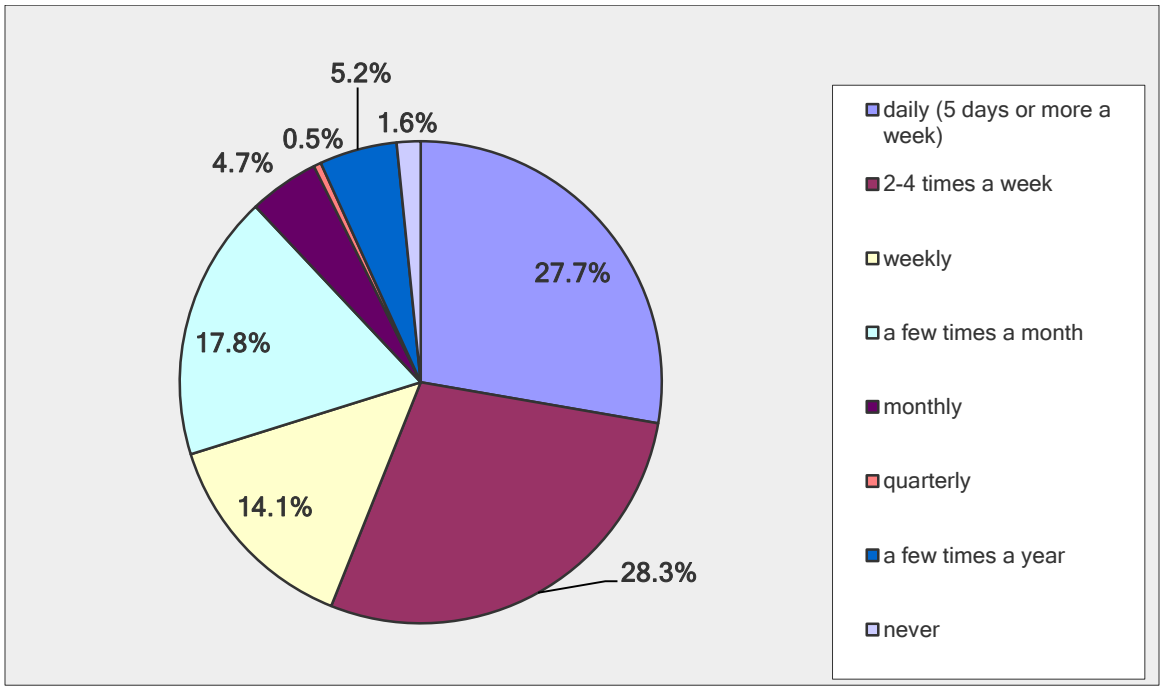


Figure 44: "How frequently would you use a 511 system?"

3.2.3 Current Sources of Transportation Information

The final substantive group of questions asked respondents to identify and assess their current sources of transportation information.

Figure 45 combines the answers to all of the questions about roadway information, which included traffic conditions; state highways; incidents, collisions, and hazards; and local streets and roads. Websites and radio are the most popular ways to get information for all of these different types of roadway information, followed distantly by the telephone and television. Interestingly, for local streets and roads, a plurality of the respondents did not know where to go to get information.

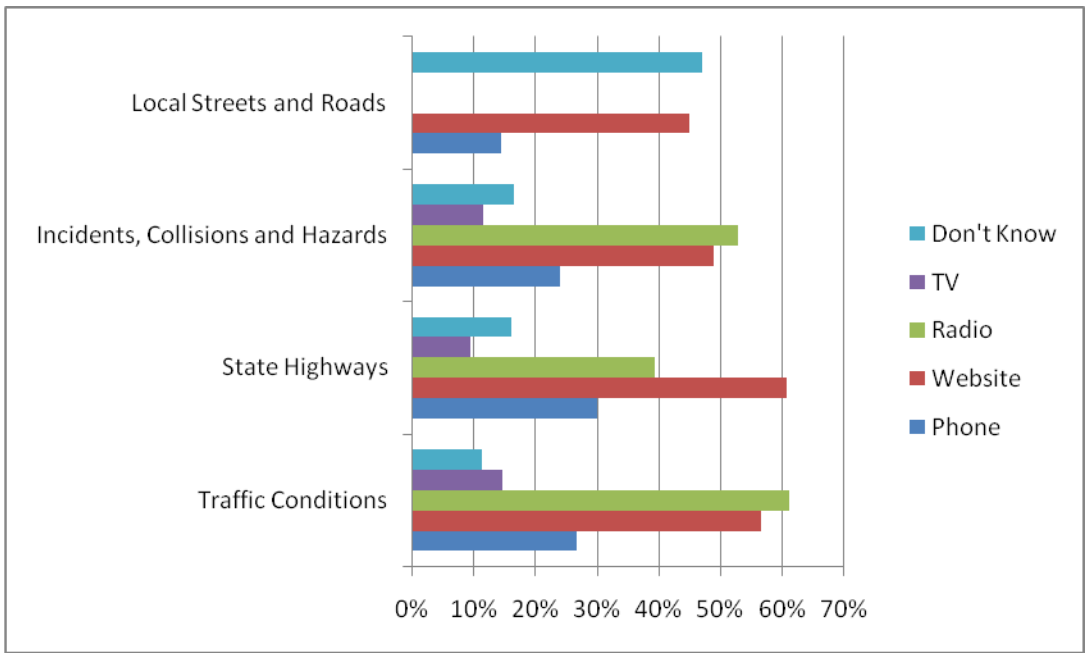


Figure 45: "Tell us what sources you currently use to get roadway information."

The next series of questions dealt with other travel modes: transit (Figure 46); rideshare (Figure 47); and bicycle and pedestrian information (Figure 48). Because of the different ways in which these information types are made available, the questions were more specifically tailored to each travel mode. For transit information, over 50% of the respondents use the transit agency's website and over 30% use the internet. "Traditional" ways of accessing information (printed schedules and calls to the transit agency) were cumulatively used by far fewer people. It is important to note, however the possibility of self-selection bias. Because this was an internet survey, it stands to reason that the respondents would be more likely to use the internet to get information than would the population at large.

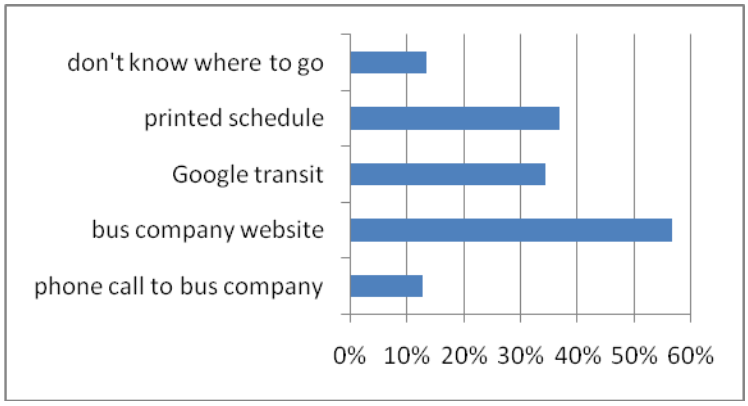


Figure 46: "Tell us what sources you currently use to get transit information."

For rideshare information, as with local streets and roads, a plurality of the respondents did not know where to get information. Of those who did know where to go, the responses were split roughly evenly between government sources (local rideshare agency and online services) and private sources (organized at work or school and organized through family and friends).

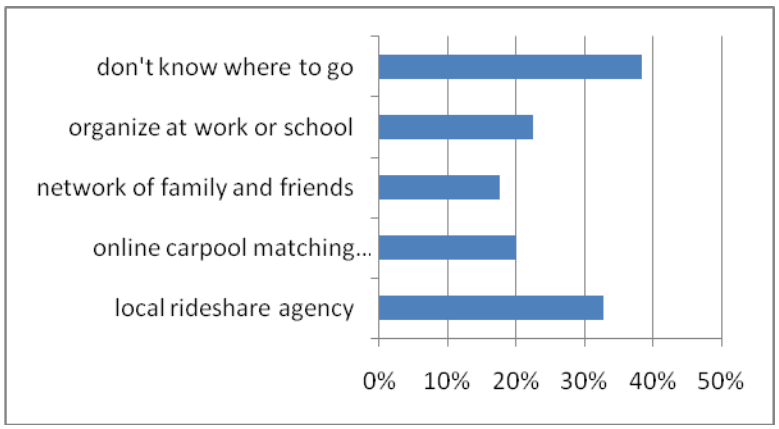


Figure 47: "Tell us what sources you currently use to get rideshare information."

Most respondents seeking bicycle or pedestrian information used their friends and family or bicycle shops. Over 40% did not know where to go to get this information. This question did not provide the option to choose online resources, but some of the free text responses included the TAMC and RTC websites, Google maps, and the California State University Monterey Bay website.

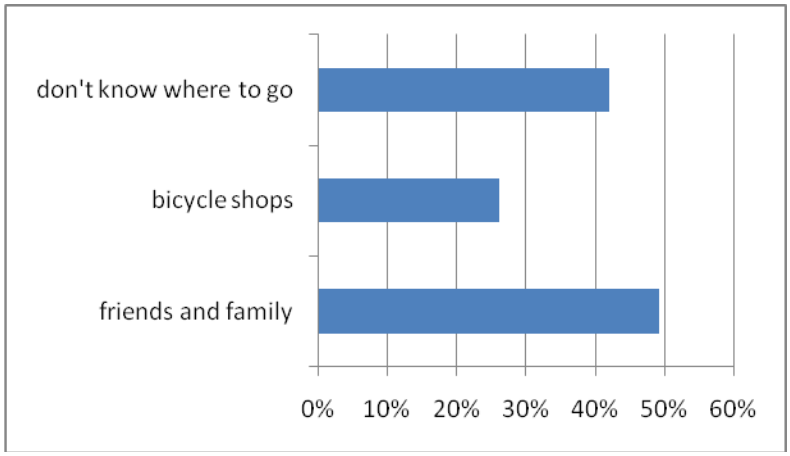


Figure 48: "Tell us what sources you currently use to get bike/ped information."

The next question asked about accessing weather information, shown in Figure 49. As might be expected, the internet was the most popular resource, followed by radio and television.

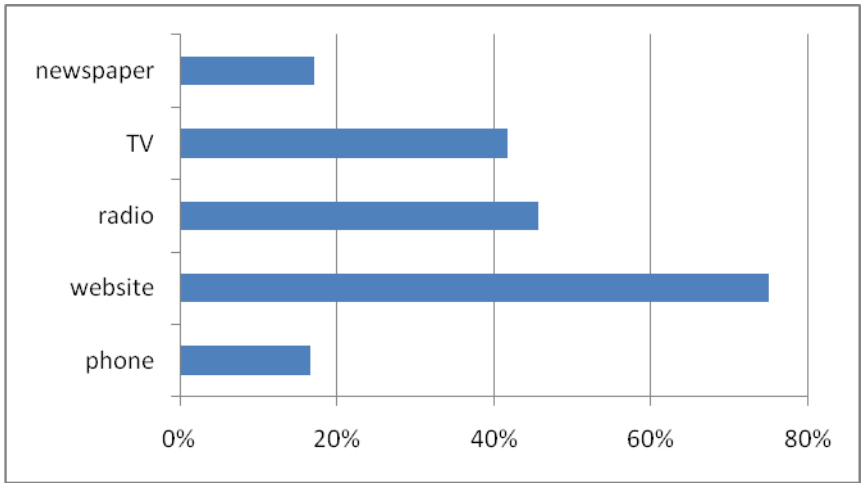


Figure 49: "Tell us what sources you currently use to get weather information."

Finally, given the proximity of the San Francisco Bay Area and its existing 511 system, the final question in this grouping asked how people get information on transportation in that region. As shown in Figure 50, the most popular responses were roughly divided between the radio, the 511 telephone number, and the 511 web page.

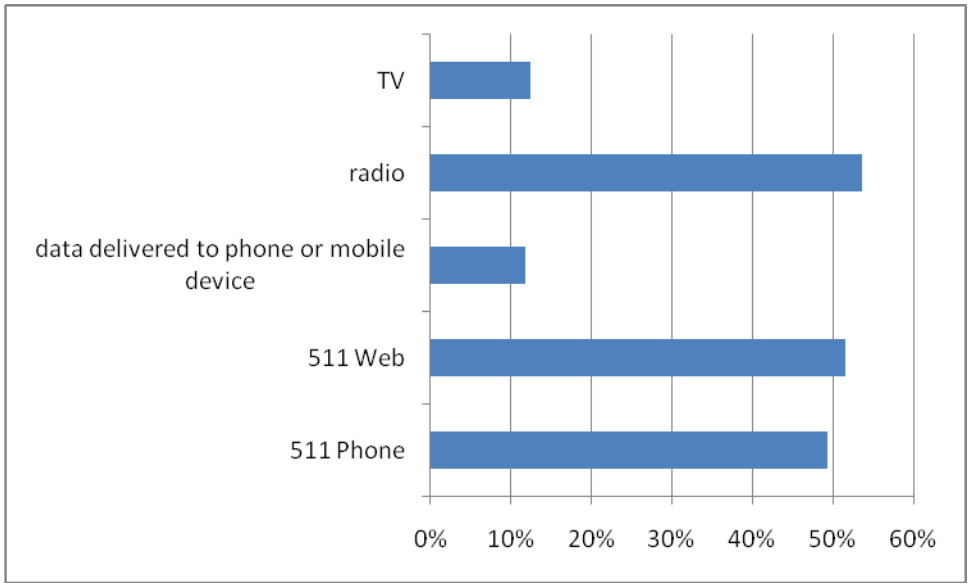


Figure 50: "Tell us what sources you currently use to get SF Bay Area information."

The last two questions in this section asked about flaws in existing data sources for the Monterey Bay Area (Figure 51) and the benefits of having a 511 system for the region (Figure 52). The top four identified flaws or gaps in existing sources, as reported in the survey, are:

- No real-time traffic information
- No single source of traveler information
- No information for trips out of the county
- No real-time transit information

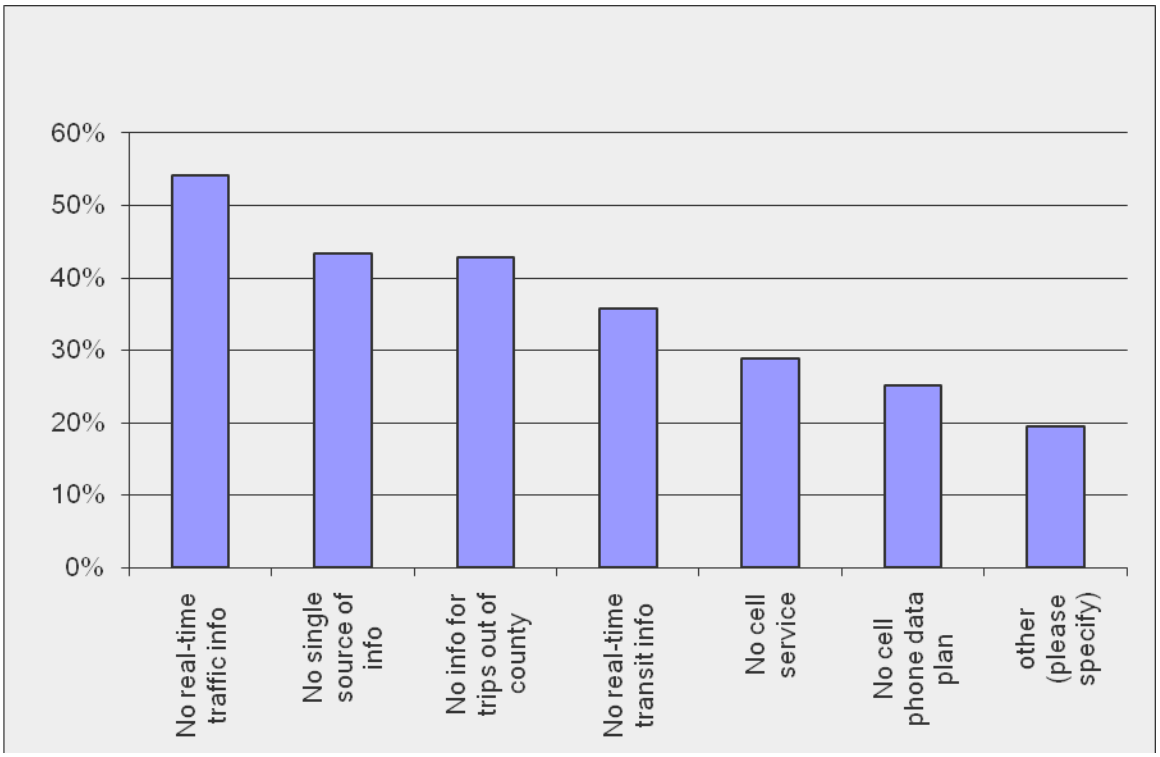


Figure 51: "Of the sources you currently use, what's missing?"

This partially conforms with what the ICx team has documented during its investigation of existing transportation information sources, discussed in Section 3.4, as well as in the assessment of data available for 511, discussed in Section 4—there is no single source of information, and no real-time transit information. There is, however, real-time traffic information available from a variety of sources, such as Google. It's not clear whether the survey respondents were unaware of those resources, if they did not consider them real-time traffic information providers, or if they are looking for information not provided on those websites.

Three of the five most popular benefits of a traveler information system, as shown in Figure 52, related to the ability to change a trip based on better information (change route or departure time, or cancel trip; make better travel choices; modify my commute), while the remaining two of the top five related to the peace of mind that can come from having better information (reduce stress and notify people or make alternate arrangements).

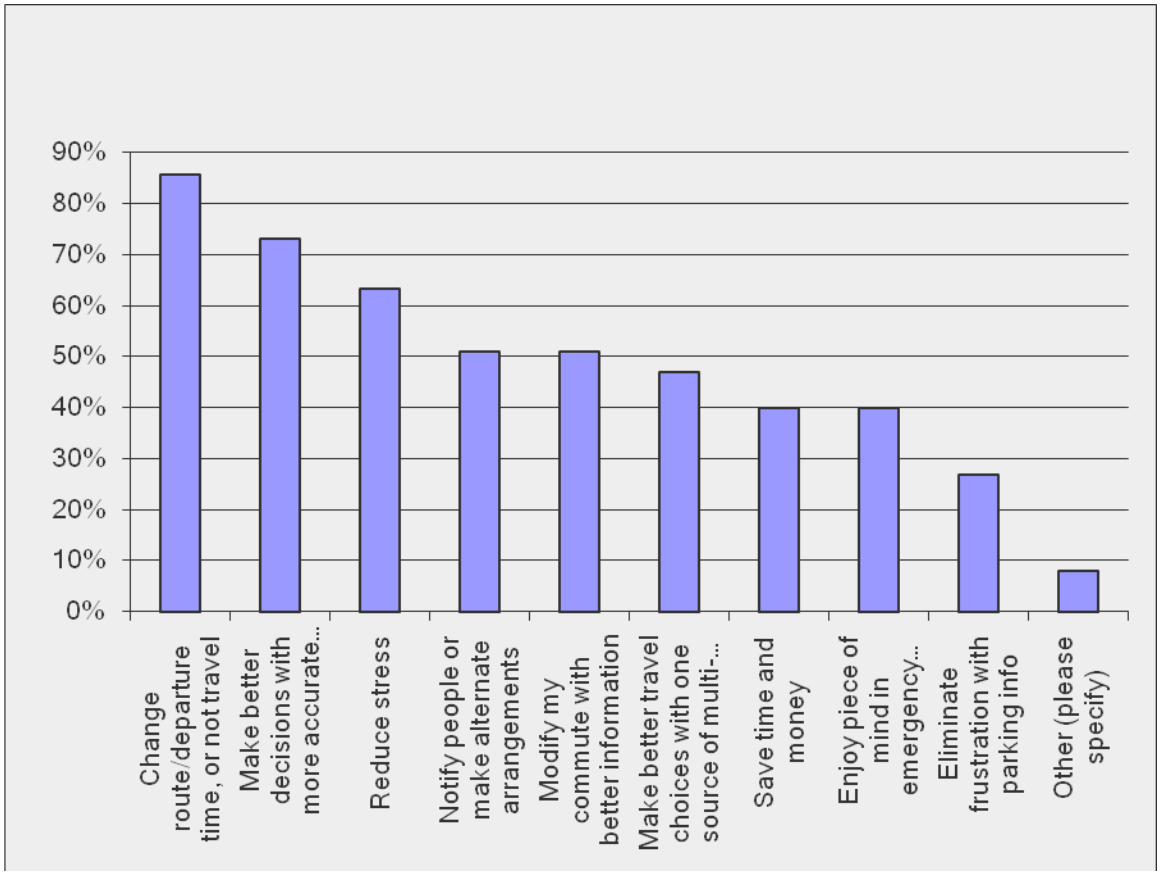


Figure 52: "What do you perceive to be the top 5 benefits of having a 511 System?"

The survey also asked respondents to identify any concerns that they had about implementing 511. This was a free-text question, but the most commonly mentioned concerns related to the cost of the system; concerns that there is not enough data for it to be truly useful; and concerns that the geographic area of coverage isn't large enough.

3.2.4 Demographics of Survey Respondents

The final section of the survey gathered demographic information on the respondents. As can be shown from Figure 53, most of the respondents were from Santa Cruz County, even though Monterey County is more than 50% larger than Santa Cruz County.

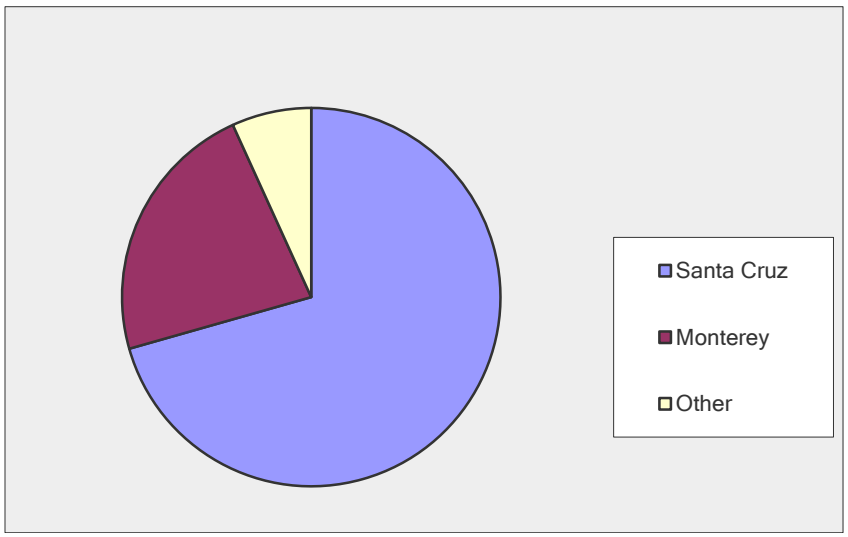


Figure 53: "In what county do you live?"

Roughly half the respondents commute outside of their county of residence at least once a week, as shown in Figure 54. Without more detail, though, it's not possible to know how many of these trips leave the Santa Cruz/Monterey County region and how many are between those two counties.

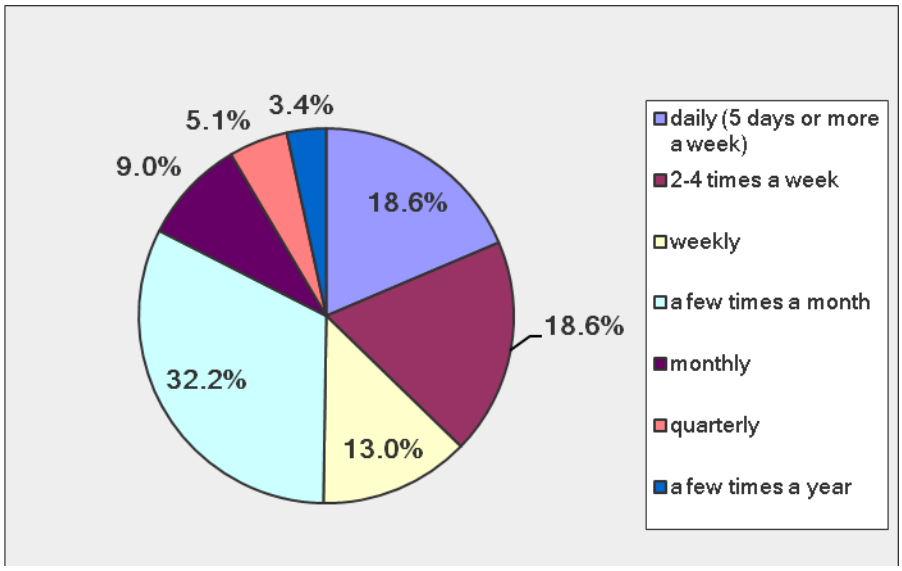


Figure 54: "How often do you make trips to other counties?"

The final two demographic questions asked the respondents' age (Figure 55) and asked them to classify themselves in one or more category (Figure 56).

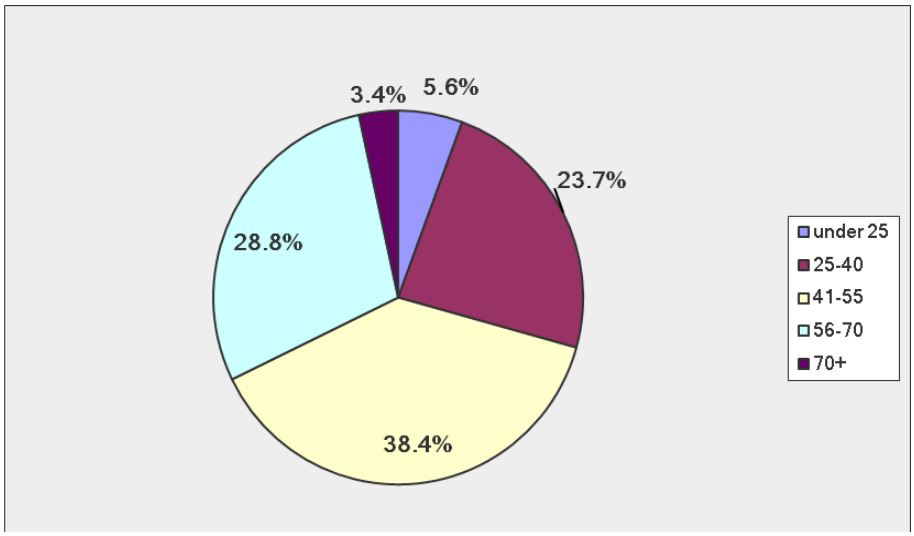


Figure 55: "What is your age?"

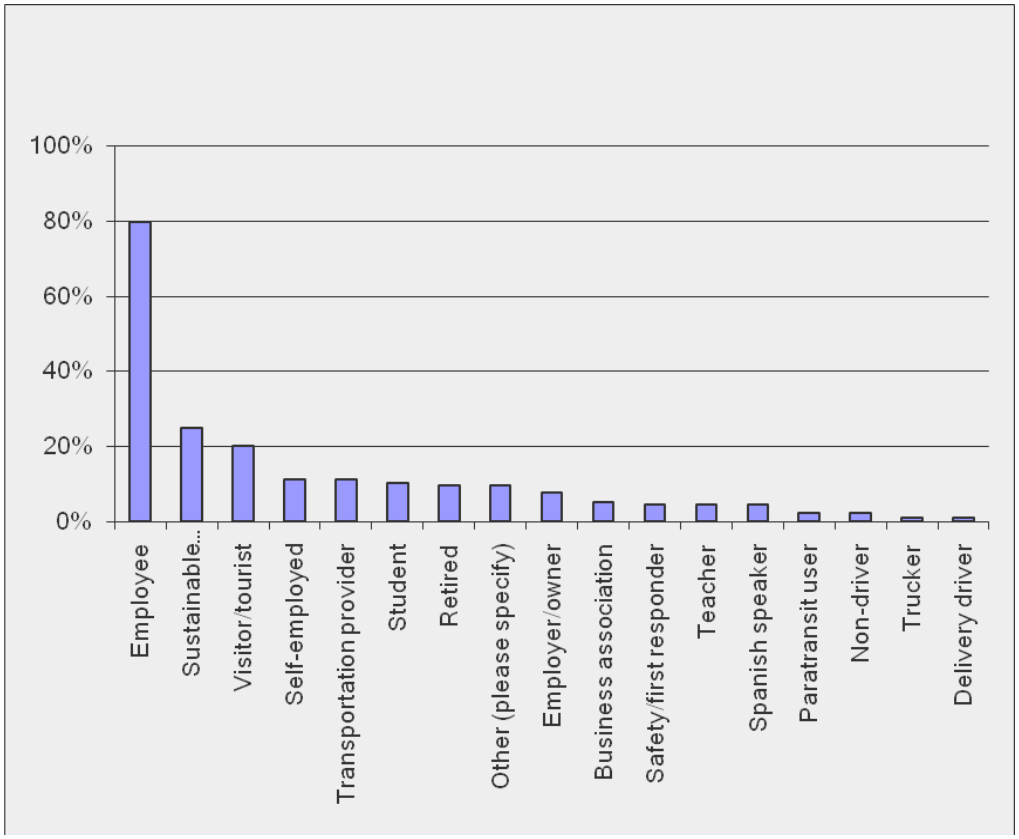


Figure 56: "Do you consider yourself a member of any of the following groups?"

3.3 Summary of Stakeholder Outreach

Stakeholder outreach had two components. The first was an initial kick-off meeting held with the Key Partners Group on April 5, 2011. The second was a series of interviews that the consultant team conducted with key stakeholders in Santa Cruz and Monterey counties. The purpose of the outreach was to assess the need for a traveler information system for the Santa Cruz/Monterey County area, as well as identify the most desirable features of such a system for this region.

3.3.1 Overall Conclusions

The stakeholders included in the interviews represent a broad range of transportation system users, who use everything from highways, local streets and roads, fixed-route public transit (referred to here as transit), carpool matching, vanpooling services, bicycles and bike trails, walking paths and facilities, dial-a-ride services, paratransit, taxis, the Monterey airport, and hotel and other hospitality industry-provided shuttles.

These users seek information on a variety of transportation topics: traffic information, transit schedules and arrival/departure times, bike and pedestrian resources, special events, special services such as paratransit and taxis, flight arrivals and departures, carpool and vanpool matching, and weather that will impact traffic and other transportation services. To get information about these topics, users tap a wide range of resources, including:

- Websites operated by RTC, TAMC, the Association of Monterey Bay Area Governments, transit agencies, Nixle, Google (both transit and map functions), Caltrans, CHP, Mapquest
- Car geographic positioning systems
- Local transportation agency information
- Employers
- Radio and TV news
- Phone services such as 211 and 911
- Social service agencies
- Social media
- Smart phone applications
- Local libraries

While interviewees cited these resources as among those regularly used by constituents, a large number also noted that most people have set travel patterns and do not seek information, or they learn about traffic congestion when they are actually approaching it on the road or highway. They also noted that their constituents often have differing abilities to access technology; some constituents are very technologically savvy, while others may have access to a cell phone and not much else.

The questions about concerns over lack of availability of transportation information yielded mixed results, with interviewees initially contending that they had few concerns about the lack of information and often having difficulty describing what type of transportation information they would most desire. From those who did express concerns, the following themes emerged:

- Lack of information about construction projects and their impact on traffic, particularly when road closures are anticipated
- Inability to convey time-sensitive information
- Lack of information in Spanish
- Lack of a single resource for transportation information (much information is available, but it is diffused)

Before understanding what a 511 traveler information system would provide, some interviewees expressed doubt about the need for such a system. Several interviewees did comment that introducing a 511 system would help diffuse traffic across alternate routes when there is congestion; however, this would require significant re-education of residents because of their set behaviors. The only negative comment in this regard came from a public safety representative, who was concerned that diffusing traffic across alternate routes could negatively impact response times for fire and medical services.

However, when asked what an ideal 511 system would look like, interviewees were generally enthusiastic about the possibility of such a system and referred to the description provided in the one-page backgrounder and in the verbal summary provided during the interview, expressing support for the inclusion of all of the elements in these descriptions. Some even referred to the San Francisco Bay Area's 511 system as a model. Following are all the elements mentioned in the descriptions of an ideal 511 system:

- Real-time traffic and transit information, along with traffic speeds, travel times, directions, and fixed information such as bus schedules
- Up-to-date information about road closures (planned and unplanned), collisions, and special events that can affect traffic
- Comparisons of all modes in an effort to encourage alternatives to driving alone
- Alternate routes
- Weather information
- Links to get people to go to local events and destinations such as restaurants and state parks
- Flight arrival and departure times
- Emergency information
- Recharging stations for electric vehicles
- Carpool and vanpool matching, including dynamic carpooling
- Multimodal mapping, including geographic positioning system capability
- Taxi service information
- ADA/paratransit service information
- Shuttle and trolley service information
- Trails, both bike and pedestrian
- Bike information and resources
- Walking information and resources

Because funding of such a system could be prohibitive, interviewees were also asked about what the minimum elements of a 511 system should be in order to justify investment in a system, and they named the following:

- Real-time traffic and transit information
- Road closure information

- Freeway aid and towing referrals
- Emergency information

When asked how their constituents would best access a 511 system, interviewees named the following methods:

- Website
- Phone number with easy-to-navigate menu
- Smart phone applications
- Push technology, giving users an opportunity to subscribe to alerts about specific topics
- Streaming video or live cameras
- Satellite images

The service should be available 24 hours a day in both English and Spanish as well as be accessible to people with disabilities. Sponsors of 511 should partner with the hospitality industry to arrange for data to feed into hotel information systems, such as hotel TV channels.

Following are summaries of responses from specific segments of the stakeholders interviewed.

3.3.2 Summary of Key Partners Meeting

The meeting was open to all agencies identified by RTC and TAMC as key partners. Table 2 shows the agencies who are key partners, the geographic and subject matter areas they represent, and whether they attended the kick-off meeting.

Table 2: Monterey Bay Area 511 Key Partners

Agency	Area Represented	Attended Meeting
Santa Cruz County Regional Transportation Commission	Transportation planning, policy and funding; Rideshare for Santa Cruz County	Yes
Transportation Agency for Monterey County	Transportation planning, policy and funding	Yes
Association of Monterey Bay Area Governments	Both counties; Rideshare for Monterey County; and Intelligent Transportation System Architecture	No
Caltrans Districts 4 and 5	Both counties; intelligent transportation systems and transportation planning	Yes
Caltrans Headquarters	Statewide perspective	Yes
California Highway Patrol	Region; provider of incident data	Yes
Monterey 911	Monterey County; Emergency Information	Yes
Monterey-Salinas Transit	Monterey County; transit information	Yes
Monterey County Office of Emergency Services	Monterey County; emergency response	Yes
Santa Cruz 911	Santa Cruz County; Emergency Information	No

Agency	Area Represented	Attended Meeting
Santa Cruz Metropolitan Transit District	Santa Cruz County; Transit information	Yes
Santa Cruz County Office of Emergency Services	Santa Cruz County; emergency response	No

While a large part of this meeting was devoted to explaining the project and introducing the key partners to the consultant team, it was also used to gather information that would help the needs assessment process. First, participants were asked to identify sources of transportation information that they or their constituents relied on. The results are listed below.

- CHP communications center
- Google
- American Automobile Association (AAA) paper maps
- Smartphones
- VZ Navigator
- Radio
- TV
- Changeable message signs
- 511 - phone and online
- Transit agencies
- Public works websites
- CHP website/app
- In-vehicle Geographic Positioning System devices
- SIG Alerts
- Private traffic services such as INRIX

They were then asked to describe their desired outcomes from a 511 project. These are highlighted in Table 3.

Table 3: Key Partners' Desired Outcomes

Agency	Comments
RTC	• "Reverse" 511 – notifications • Provide better messages during emergencies (example: Watsonville residents didn't know how where and how far inland to go during tsunami) • Need a hub for information - 511 is a reasonable place • The ability to retain control over messaging, to better ensure the accuracy and quality of information
TAMC	• Push info out; prevent future congestion problems (e.g., Prunedale project)
CHP	• Reduce non-essential calls to 911

Agency	Comments
Office of Emergency Services	• Schools and delivery services call regarding roadwork; we refer to Public Works, which has limited hours. We could be a data provider to 511. • Special event info (parking, crowd size,) - refer to Special Events Committee • Need to convey locally tailored data • Notifications specifically for major disasters, provision of observations by public - would require registration • Feed to 211/system that can provide info for neighboring counties
Caltrans	• Interested in data inputs and outputs related to state highways • 511 can be more comprehensive - transit, as well as provide alternate routes around incidents • Primary concern is incident management • Focus on communications with maintenance • Operates Changeable Message Signs • Work with public information office • Reduce the load on Caltrans, because a lot of people come to Caltrans for information
Monterey Co. 911	• Reduce calls for directions and other non-essential calls
Santa Cruz Metro	• Alerts - route changes, full buses, availability of special/emergency services
MST	• Better than relying on media • Have central place people know to go to

The next portion of the meeting covered any concerns that the key partners had about a Monterey Bay Area 511 system. These are shown in Table 4.

Table 4: Key Partners' Concerns About 511

Agency	Concerns Raised
MST	• Funding for real-time info—would be less useful without it • Depends on data available
RTC	• Operating funds
Caltrans	• Infrastructure to handle issues • Have to rely on others, even internally • Different areas of jurisdiction • Funding

This meeting also included a discussion of the similarities and differences between 511, 211, and 911, both because of the potential overlaps in function, and also because 211 had recently been launched in the region, and many project stakeholders will likely be familiar with it.

911—as most people know—is the emergency number, and dispatches first responders to all roadway crashes, fires, and other emergencies. The 911 dispatch representative at the key

partners meeting noted that many people call 911 to find out about traffic conditions, rather than to report emergencies. 511, once launched, will be able to remove this load from 911 dispatchers, freeing up both the dispatchers and the incoming phone lines to be available to respond to emergencies.

211 is the national social services number. The United Way operates the number in both Santa Cruz and Monterey Counties. It provides a wide range of social services information and referrals. Its key overlap with 511 is its provision of general transportation assistance information at all times, as well as information about emergency shelters and similar facilities during emergency situations. As opposed to 511, 211 is able to provide personalized information to callers.

3.3.3 Interview Methodology

The consultant team conducted a total of 63 interviews, with interviewees generally representing the following areas: agriculture, business organizations, colleges and schools, elected officials, employers, hospitality and tourism, law enforcement/public safety, nonprofit/community-based organizations, private transportation providers, and public transportation agencies. A few interviewees did not fit into these categories, but their input was included in the overall conclusions. The consultants made special efforts to include representatives of organizations that serve monolingual Spanish speakers. Table 5 shows the various categories along with the representatives of each category who were interviewed.

Table 5: Interview Subjects

Category	Representative
Elected Officials	• Monterey County Supervisors • TAMC Board Members • RTC Commission Members
Agriculture	• Driscoll Strawberry Association • Monterey County Agriculture Commissioner's Office • Monterey County Farm Bureau • Watsonville Coast Produce
Business Organizations	• King's Village Shopping Center • Salinas Chamber of Commerce • Salinas United Business Association • Santa Cruz Area Chamber of Commerce
Colleges and Universities	• Cabrillo College • California State University Monterey Bay • Hartnell College • University of California at Santa Cruz
Major Employeers	• CTB/McGraw Hill • HSBC • Plantronics • West Marine

Category	Representative
Hospitality and Tourism	• California State Parks • Chaminade Resort and Spa • Mazda Raceway Laguna Seca • Monterey Bay Aquarium • Monterey Convention and Visitors Bureau • Monterey Hospitality Association • Pebble Beach Resort • Santa Cruz County Convention and Visitors Bureau • Shadowbrook Resort and Spa • Stagnaro Bros. Seafood Inc.
Law Enforcement and Public Safety	• American Medical Response • Aptos/LaSelva Fire Department • CHP Dispatch Center • Greenfield Police Department • Greenfield Public Works Department • Marina Police Department • Monterey County Office of Emergency Services • Sand City Police Department • Santa Cruz County Central Fire Protection District • Santa Cruz County Office of Emergency Services • Santa Cruz County Sheriff • Seaside Police Department
Nonprofit and Community-Based Organizations	• Action Pajaro Valley • Center for Community Advocacy • Ecology Action • ETR Association • La Manzana Community Resources • Live Oak Family Resource Center • Monterey County Area Agency on Aging • Monterey County Community Action Commission • Senior Network Services • Transportation Agency for Monterey County Bicycle and Pedestrian Advisory Committee • United Way Santa Cruz • United Way Monterey County • Watsonville Wetlands Watch

Category	Representative
Private Transportation Providers and Delivery Services	• Courtesy Cab • Outsource • Kings Area Rural Transit • Monterey Peninsula Airport District • Yellow Cab – Monterey
Public Transportation Agencies	• Association of Monterey Bay Area Governments • Santa Cruz Metro

As part of the interview process, stakeholders received a one-page description of the 511 Feasibility Study with background information on 511 traveler information systems, which is included here as Appendix B. Stakeholders were approached via phone and email, and all interviews were conducted via phone. Interviews took anywhere from 10 to 40 minutes, depending on the knowledge and interest of the interviewees.

Interviewees were first asked a series of questions about them and their constituents' use of the transportation system and transportation information:

1. First, please tell me a little about yourself.
2. How do you or your constituents travel around?
3. What kind of transportation information do you or your constituents use?
4. How do you or your constituents get transportation information now?
5. What concerns does your organization have about the availability of transportation information? How does the availability/lack of availability affect you or your constituents?
6. What transportation information do you wish you had access to if it were available?

The interviewer then provided or reviewed background information on 511 traveler information systems, explaining that 511 is a nationally recognized number for traveler information accessed by phone, internet, and mobile devices. Interviewers reviewed the following potential features of a 511 system, explaining that the actual services offered vary from location to location:

- Real-time traffic conditions on highways and roads, including travel speeds, collisions, construction, road closures and travel times;
- Transit schedules and real-time transit arrival information;
- Carpool matching services;
- Bike and pedestrian resources; and
- Transportation impacts from weather, special events and emergency situations.

Interviewers explained that in California, 511 systems exist in the San Francisco Bay Area, Sacramento, Northern California, Los Angeles, San Luis Obispo and San Diego, and that a Monterey Bay Area 511 system could close the gap in traveler information systems on the Central Coast. Interviewees were then asked a series of questions about a potential 511 system for the Monterey Bay Area:

1. If funding were not an issue, what would the ideal 511 system look like to you?
2. What do you think are the minimum elements of a 511 system for it to be useful?
3. How would you or your constituents choose to access or use such a system (for example by phone, internet or mobile device)?

Interviewees were asked an additional set of questions regarding marketing of a 511 system; this information will be incorporated into a marketing plan for the program. The interview protocol is included as Appendix C.

Following are summaries of the responses broken down by stakeholder group.

3.3.4 Elected Officials

Interviewees: TAMC Board Members and RTC Commissioners; various elected officials

This group provides direct representation of the people who elect them, so they had particularly strong feelings about transportation information and their constituents' needs. Their constituents currently use roads, carpools, bikes, and, to a lesser extent, transit. People who live in working class areas tend to make greater use of carpooling and transit, with some also walking. They currently receive information via Google Maps, the MST website, radio, TV (English) and the CHP website.

This group was concerned about the inability to anticipate traffic conditions, and they would like to provide greater access to alternate routes and modes. They are concerned about the effect of traffic on tourism. They agree that there is a general lack of availability of transportation information and feel the impact of this void is wasted time and ultimately wasted money. Residents could be better educated about using transit and how to form carpools.

They would like to see transit schedules, alternate routes, road congestion information, and updates on blockages, road closures and collisions. Their ideal 511 system would include travel times, real-time traffic conditions, alternate routes, weather and special event impacts on traffic, and information on multiple modes including cabs and ADA services. It also should include information on trails, bicycles, and walking and also provide connections to safety services and carpooling assistance. The service should be available via 24-hour phone and web access, with voice-activated responses. Service in Spanish is critical. At a minimum, the service should include road conditions, driving times, alternate routes, basic transit schedules, and real-time transit arrivals.

This group expressed varied preferences for delivery of a 511 service: web, smart phone applications, and phone service. Different audiences would access the system through different means; for example, college students would be more likely to use smart phone applications. It should include geographic positioning system and full language and disabled access.

3.3.5 Agriculture

Interviewees: Monterey County Farm Bureau, Monterey County Agriculture Commissioner's Office, Driscoll Strawberry Association, Watsonville Coast Produce

This group represents two very specific segments of the population in these communities: agriculture businesses and their employees. Their primary use of the transportation system involves highways and roads. Employees often carpool, but these carpools are established through their personal networks of families, friends, and co-workers rather than through any carpool matching service. Some employees are dropped off and picked up at the end of the day. They work very long hours, leaving for work before 5 a.m.; transit is generally not an option for them for commuting purposes, but they may use it occasionally for weekend trips.

All of the interviewees generally agreed that truckers and other workers in the agriculture industry find out about traffic congestion when they run into it. There currently is no source where they can get information that reliably predicts when they will encounter traffic congestion. Santa Cruz agriculture representatives cited the CHP website and mentioned the Caltrans website as sources of information.

The primary concern of these representatives was the lack of information about planned construction projects and noted the poor communication around them. For example, agricultural businesses frequently are not notified about known traffic impacts such as road closures resulting from construction projects. This has a potential significant financial impact on both businesses and individual truckers; traffic congestion can potentially ruin a delivery of produce.

Not surprisingly, these representatives wished they could get more information about planned road closures. When asked about an ideal 511 system, they generally liked all of the features mentioned in the description of 511 systems, but noted that they would specifically use information about road conditions, collisions, special events, and weather since these affect agriculture businesses the most. At a minimum, they would like traffic alerts, availability of various routes and weather. More than one mentioned opportunities to interface with the trucking industry, both to obtain data to feed into the 511 system as well as to send alerts out to truckers about traffic conditions.

They would like see this information be available via a website, email or text alerts, and smart phone applications. Any phone system would need to have a menu that was easy to navigate and not include too many options. Ideally, people should be able to get to the information they need in two to three steps.

3.3.6 Business Organizations

Interviewees: Salinas Chamber of Commerce, Salinas United Business Association, Santa Cruz Area Chamber of Commerce, Kings Village Shopping Center

This group reflected a fair amount of overlap with the agriculture groups because interviewees represent largely agriculture-related businesses and reported that their constituents—which include truck brokers—use highways and major and minor surface street arteries almost exclusively. Some employees use transit, but this is not a widely used mode because people do not trust that transit will arrive on time and get them where they need to go. In addition, there is little information available in Spanish about traffic or other modes.

Most constituents of these organizations become aware of traffic problems when they encounter it on the road, although some may get information in advance via radio, bus schedules and—for the more technologically savvy—smart phones and related applications.

People in this area have established patterns and believe they know everything, in the words of one interviewee. Another noted the weakness in the system is the need to educate people in the hope that they will use a travel information service to change their travel behavior.

An ideal system would be accessible through multiple methods: phone, smart phone applications, web, video, and radio. The goal of this system would be to help people plan their trips and would include travel time calculations using the same toll-collection technology that is used in the Bay Area. It should be integrated with surrounding 511 systems and go beyond transportation information to include hospitality information, such as refueling locations and restaurants, as well as state parks. It also should include satellite images and contain information in Spanish.

3.3.7 Colleges/Universities

Interviewees: California State University Monterey Bay, Hartnell College, Cabrillo College, University of California at Santa Cruz

Interviewees reported that their constituents regularly use local streets and roads, highways, carpools, transit, and bicycles. The information they seek includes traffic conditions, transit schedules and arrival times, carpool matching, driving maps, and bike route mapping. They currently rely on smart phone applications, radio, car geographic positioning systems, email, websites, social media, and guerilla marketing (i.e., word-of-mouth marketing by peer-group influencers).

Concerns expressed by this group include the lack of real-time data and an inability to communicate rapidly changing information to their constituents. They also cited the lack of a single source of transportation information as a concern, and they would like a way to push information to their constituents via smart phone applications or texts.

Their ideal 511 system would include integrated transportation information that covers all modes of travel. This includes traffic conditions, alternate routes, bike information, updates on special events that impact traffic (planned and unplanned), and ridematching.

At a minimum, a 511 system should include carpool matching, multimodal mapping that includes all options, traffic speeds and congestion updates, and a centralized place for road information. All data would be real-time and could be pushed to people via subscriptions to emails, smart phone applications, and texts.

3.3.8 Employers

Interviewees: CTB/McGraw Hill, ETR, HSBC, Plantronics, West Marine

This group's constituents currently use cars, carpools, vanpools, buses, and telecommuting. They receive information from the Association of Monterey Bay Area Governments website, the MST website, the vanpool vendor site, Nixie (an online traffic information service), KSBW, the Bay Area 511 service, other websites, and radio.

This group was concerned about a lack of employer support for alternative modes, a lack of bus information, a lack of Santa Cruz-specific information, and the fact that people do not know how to find transportation information resources.

They would like to see more information on local non-highway modes in Santa Cruz, street conditions, weather, construction projects, collisions, and bus/van service between Santa Cruz and Watsonville. Their ideal 511 system would be very similar to the Bay Area's 511 system and include real-time traffic conditions, road closures, ridesharing assistance, and alternate route and mode options. Information could be pushed to people via phone and email subscriptions. At a minimum, a 511 service should include traffic information, transit information, and road closures, all in real time. The service should be accessible through a website, smart phone applications, and phone.

3.3.9 Hospitality and Tourism

Interviewees: Santa Cruz Convention and Visitors Bureau, Shadowbrook, Stagnaro Bros., California State Parks, Chaminade, Mazda Raceway Laguna Seca, Monterey Bay Aquarium, Monterey Convention and Visitors Bureau, Pebble Beach Resort, Monterey Hospitality Association

These organizations represent both visitors to the area as well as employees. Their constituents use cars, shuttles, the road system, airports, free trolley services, and bicycling. They currently seek road closures and traffic conditions as well as weather. They get information from local sources such as websites, roadside signs, the news, emails, word of mouth, the Caltrans website, Google Maps, the CHP website, car geographic positioning system, visitor information kiosks, and social media.

This group did not seem to have strong concerns about the availability or lack of transportation information. Many tourists stay in one general area and are able to walk or use hotel shuttles, but some would likely use road condition and closure information. Multiple employers said that their employees have fairly set travel patterns and would not seek much additional information.

They would like to have more access to real-time parking and traffic information, construction updates, alternate routes, with this information available via smart phone and push applications. Their ideal 511 system would be comprehensive, similar to the Bay Area 511 system, including real-time traffic information and construction alerts, collision information, and alternate modes. A 511 service should be available via phone, web, and smart phones. 511 should also be promoted via roadside signs.

3.3.10 Law Enforcement and Public Safety

Interviewees: California Highway Patrol, Greenfield Police Department, Sand City Police Department, Marina Police Department, Seaside Police Department, Monterey and Santa Cruz County Offices of Emergency Services, American Medical Response, Santa Cruz County Sheriff, Aptos/LaSelva Fire Department, Greenfield Public Works Department

While these organizations use highways and local streets and roads, their constituents also use bus, dial-a-ride, cars and bikes. They seek information about bus stops, weather, road and traffic conditions, road closures, collisions, parking, and directions to destinations. They

currently get information through word of mouth, smart phone applications, websites, the Caltrans website, KRTC, libraries, TV, posted schedules, and newspapers. They also call 911 for non-emergency information, which is problematic for emergency services.

This group did not express many strong concerns, but those voiced included a lack of bilingual information, especially for Spanish speakers in southern Monterey County, although there are other language needs as well. There is no centralized source of transportation information. They noted that people often do not plan ahead and simply find out about traffic when they are approaching it. Some noted that traffic congestion can lead to frustration and sometimes violence, but also expressed concerns that pushing people to use alternate routes could have a negative effect on emergency service response times since emergency vehicles often rely on alternate routes; with more people using alternate routes, emergency services could face greater delays.

They wish information about collisions, special events, bus schedules, and maps showing construction projects and related road closures were available. Their ideal 511 system would be a simple, bilingual, Telecommunications Device for the Deaf/Teletype (TTY)-accessible service that includes real-time traffic and transit information, bike information, referrals to freeway aid and towing services, and construction updates. It would be user-friendly and incorporate real-time traffic cameras, push notifications, voice activation, video streaming, and possibly include tie-ins to Amber alerts. At a minimum, it must reach all people, both those who are technologically savvy and those who are not, and include real-time traffic and special event information, emergency information, maps, and updates on road closures. It should be delivered via phone service, a website, text, and smart phone applications. It should be sustainable and include hands-free access and voice activation.

3.3.11 Nonprofit/Community-Based Organizations

Interviewees: Monterey County Area Agency on Aging, Monterey County Community Action Commission, United Way Santa Cruz, United Way Monterey County, Ecology Action, Action Pajaro Valley, Senior Network Services, Watsonville Wetlands Watch, Center for Community Advocacy, La Manzana Community Resources

The nonprofit staff members interviewed represent a broad spectrum of constituents, from environmental and bicycle advocates to seniors and non-English speakers. Not surprisingly, their constituents use a wide range of modes—cars, taxis, buses, walking, carpooling, and telecommuting—and transportation network elements—local and regional roads, transit systems, bike paths, and so on. While some constituents seek information on traffic and bus schedules, for the most part, these organization representatives said most have established travel patterns and know where to expect traffic or how to catch their particular bus. When they do seek information, they are likely to get it from TV and radio news reports, Mapquest, other websites, 211, transportation offices of organizations that serve them, and over the phone from service providers. One respondent noted that the RTC has a good website that provides a lot of information to the public.

These organizations did not express concern about the availability of transportation information as much as they did about the lack of transportation options for their constituents; one even said there was "not much need" for additional information. However, others said they would like to have access to a "one-stop shop" where people could get information on anticipated traffic

problems, alternate routes, transit schedules, transit arrival and departure times, biking, hiking, electronic vehicle charging stations, and options for getting to specific destinations such as San Francisco.

Their ideal 511 system would be a 24-hour service that includes all the elements described in the introduction to the interviews—real-time traffic and transit information, information on all modes, travel times, alternate routes and methods, real-time cameras, construction and road closure updates, carpool matching, biking and walking information, weather reports, and special event information. They also would like to have some focus on how to get around town as well as dynamic carpooling—carpools that can be set up on an ad hoc basis. Their minimum system would include updates on collisions, road closures, special events, travel times, alternate routes, transit information, and emergency evacuation procedures. With either approach, the service should be an integrated regional presentation of information in English and Spanish. Information collected for 511 should be accessible via smart phone applications, a website, referrals from 211, and radio.

3.3.12 Private Transportation Providers and Delivery Services

Interviewees: Outsource, Yellow Cab – Monterey, Kings Area Rural Transit, Courtesy Cab, Monterey Peninsula Airport.

This group provided limited input on the program, partly because they only interact with specific modes. Their constituents use buses, taxis, shuttles, and paratransit. They mainly seek information about these specific services, and they access this information through the internet and through printed schedule information found on buses and taxis.

To the extent that this group had concerns about the availability of transportation information, it was mainly around consistency and accuracy of information and lack of information on vanpooling. They did not have a significant desire for additional services, but when probed, said they could see the value of a comprehensive 511 system such as the range of options described at the beginning of the interviews. They did say any such service should be ADA-accessible and -compliant. At minimum, any 511 service should include emergency information, carpooling, transit information, road conditions and closures plus anticipated delays, weather, and information on a range of transportation options. It should be free and available 24 hours a day and be easy to use, and it should be available in Spanish. It should be accessed via a phone number, smart phone applications, and the web.

3.3.13 Public Transportation Agencies

Interviewees: Association of Monterey Bay Area Governments, TAMC Bicycle and Pedestrian Facilities Advisory Committee, Santa Cruz Metropolitan Transit District

These agencies or representatives are primarily concerned with vanpooling, transit and bicycling, and their focus was less on consumer needs and benefits of a 511 system than with their own services and planning for their own agencies. Their constituents already know how to access the information they need for the most part, and they rely on the various agency websites, brochures and other marketing materials, Google Transit, Bay Area 511, recorded alerts and assistance from agency customer service representatives, and the Santa Cruz Metro subscription email service. They did not express any major concerns about the availability or

lack of availability of transportation information. They also were unclear about what additional information might benefit their constituents.

However, when probed, they did say that an ideal 511 system would include all of the services in the description of 511 systems provided in advance of the interviews, with an emphasis on traffic reports, collision alerts, and real-time information. The ideal system would be simple to use and be voice-activated. At minimum, the system should be a website with links to other websites with critical information and Google Maps. It should be user friendly with clear information, and it should be accessible to people with disabilities. It should be available via the web, but also via the phone number, with signs on the highway to advertise the availability of the service.

3.4 Existing Traveler Information Resources

One of the key elements in assessing user needs for a traveler information system is determining what traveler information resources exist in the region. This section provides an inventory of other traveler information systems (public and private) and their functions, strengths and limitations.

3.4.1 Definition of Traveler Information Services

For purposes of this section, we are defining traveler information services rather broadly, and include resources that may not necessarily be designed solely to provide traveler information to the public but that can be used for that function. They will also be defined to include not just current and real-time information but static traveler information as well.

There are several ways that the information provided in this section could be organized. An inventory of traveler information could be organized by any of the following parameters:

- Delivery Method (telephone, internet, radio, television, smart phone applications, paper)
- Geographic Region (Santa Cruz, Monterey, Salinas, rural areas)
- Type of Provider (public sector or private sector)
- Travel Mode (driving, transit, rideshare, bicycling)

While arguments could be made for any of these, this section is arranged by travel mode. Each section then includes information on the other parameters as appropriate.

3.4.2 Overview of Results

Table 6 summarizes the results of this effort, and describes the information available, the modes and facilities covered, and an assessment of the information source's strengths and limitations as an information source for Monterey Bay Area travelers. Key results from this table are:

- There are a large number of private-sector providers of real-time traffic information, though the source of the data, and its accuracy, are not known.

- There is no real-time transit information available.
- Information about collisions and other roadway problems is available from several sources, but it is not very user-friendly, and there is no single source of that information.
- The transit agencies' web sites provide a lot of information about transit routes, schedules, and itinerary planning.
- There is substantial information about ridesharing, bicycling, and pedestrian travel available at various web sites.
- There is no single best resource for traveler information in the region.

Table 6: Information Summary

Type of Information	Source	Coverage	Available via ...	Assessment
Roadway Incidents (including collisions, construction, closures)	CHP Computer-aided Dispatch Data	All state highways	Internet	Not very user-friendly.
	Google	Freeways, highways and local roads	Internet	Useful to travelers.
	Santa Cruz County Public Works	County highways	Internet	Update frequency not known.
	Monterey County Public Works	Traffic; County highways	Internet	Update frequency not known.
	Caltrans Construction Information	Caltrans roadways	Internet (via Quickmap)	Useful to travelers.
	Metropolitan Transportation Commission 511	Highway 17	Internet; phone	Useful, but very limited geographic scope
	Various radio stations	Major highways	Radio	Useful for getting information about major incidents; not tailored to individual needs.
	Changeable Message Signs	Three locations in Santa Cruz County	Observation while driving	Useful information where deployed.

Type of Information	Source	Coverage	Available via ...	Assessment
Roadway Speeds	Google	Freeways, highways and local roads	Internet	Useful to travelers; accuracy not known; gaps in Monterey County
	Caltrans	Freeways, highways and local roads	Internet (Quickmap uses Google)	Useful to travelers; accuracy not known; gaps in Monterey County
	Metropolitan Transportation Commission 511	Highway 17	Internet; phone	Useful, but very limited geographic scope
	Other Private Traveler Information and General Information Providers	Freeways, highways, and local roads, depending on the provider	Internet	Useful to travelers; accuracy not known
Traffic Cameras	Caltrans	Select locations on Highway 1 and U.S. 101	Internet	Useful, but limited coverage
Parking Information	Santa Cruz City	City garage information	Internet	No real-time information
	Monterey City	City garage information	Internet	No real-time information
Transit Information	Santa Cruz Metropolitan Transit District	Schedules, fares, maps, and trip planner	Internet; phone; printed material	Very thorough static information; no real-time information
	MST	Transit; schedules, fares, maps, and trip planner; real-time arrival information at transit hubs	Internet; phone; printed material; signs at transit hubs	Very thorough static information; no real-time information available on-line or over the phone

Type of Information	Source	Coverage	Available via ...	Assessment
Tourist information	Various Venues	Directions and parking information related to their venues	Internet	Useful for tourists.
Rideshare information	Commute Alternatives (RTC)	Ridesharing and other alternative modes for Monterey County	Internet; phone	Useful information for alternative travel modes.
	Commute Solutions (AMBAG)	Ridesharing and other alternative modes for Santa Cruz County	Internet; phone	Useful information for alternative travel modes.
Bike/Ped Information	RTC	Bicycling, pedestrian information for Santa Cruz County	Internet	Useful information for alternative travel modes.
	TAMC	Bicycling, pedestrian information for Monterey County	Internet	Useful information for alternative travel modes.
	Santa Cruz City	Bike parking	Internet	Useful information for alternative travel modes.
Freight Information	Caltrans	Truck routes and other freight-related information	Internet	Website is challenging to navigate. No real-time information
Airport Information	Monterey Peninsula Airport	Information about getting to and from the airport	Internet	Useful for tourists.
Weather Information	Various private weather providers.	Weather conditions and forecasts	Internet	Limited information about real-time weather conditions on the roads.

3.4.3 Driving Information

This section provides an inventory of driving information resources in the covered region, focusing first on public agencies and then turning to information provided by the private sector.

3.4.3.1 Publicly-Provided Information

3.4.3.1.1 Freeway Coverage

As part of its overall mission to manage collisions and other incidents on the freeways and other state highways, the CHP uses a Computer-Aided Dispatch system to provide information about incidents to officers in the field. Some of the information from the computer-aided dispatch is also posted on the CHP's website at http://cad.chp.ca.gov/, as shown in Figure 57. Note that because the CHP is responsible for all state highways, the computer-aided dispatch also includes information on state routes that are not freeways.

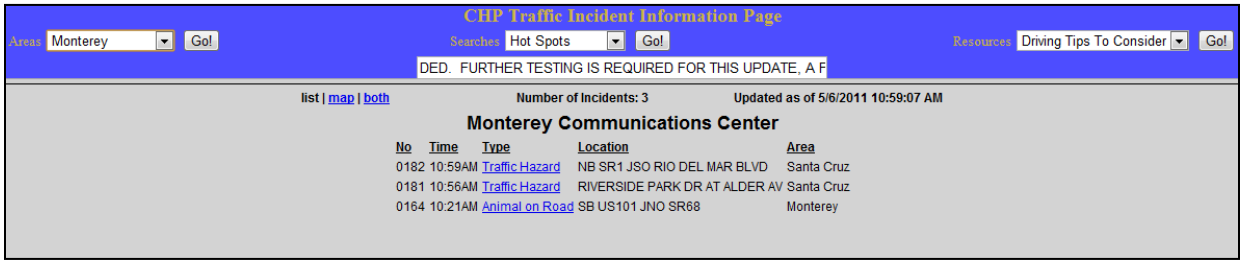


Figure 57: CHP Public computer-aided dispatch

Caltrans includes CHP incident data on its newly launched Quickmap. In addition, a private application developer has created an iPhone application that puts CHP data on a Google map interface. A screen capture is shown in Figure 58.

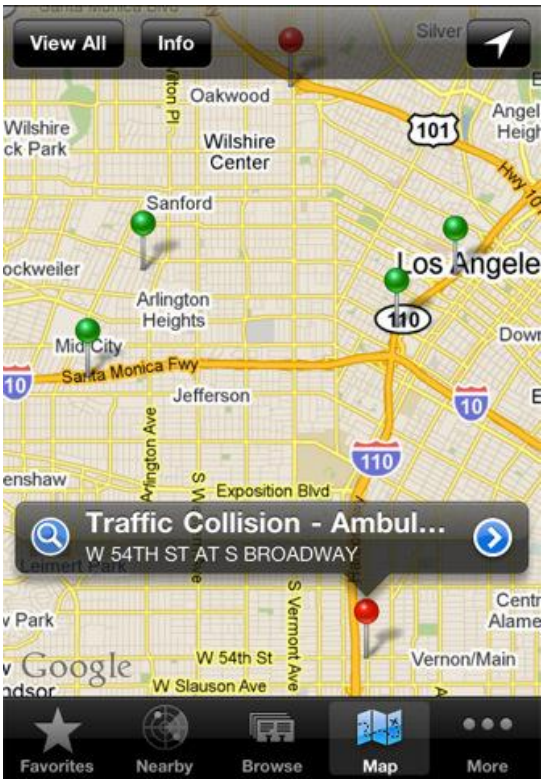


Figure 58: CHP iPhone App

Caltrans uses Changeable Message Signs (CMS) on the freeways to provide information about current conditions to travelers, including collisions or closures ahead on the roadways. In Santa

Cruz County, there are signs located on northbound Highway 1 at 41st Street; northbound Highway 17 at Glen Canyon Road; and Southbound 17 at Summit Road. In Monterey County, there is a sign on southbound Highway 101 at Mallory Canyon Road. Additional message signs are under construction. CMS messages that are turned on can also be viewed on Caltrans Quickmap.

Caltrans provides access to video feeds at a limited number of locations on Highway 1, 17, and US 101 on its website at http://www.video.dot.ca.gov/ and still images at http://quickmap.dot.ca.gov/. An example is shown in Figure 59.

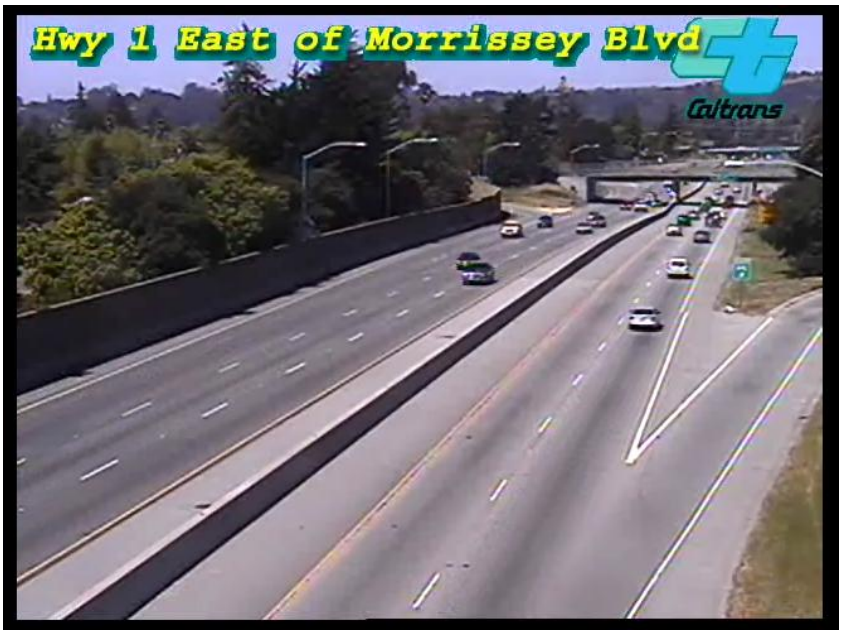


Figure 59: Caltrans Camera Image

The other major public source of freeway information for the Monterey Bay region is the 511 system operated by the Metropolitan Transportation Commission. While this system focuses on the nine-county San Francisco Bay Area region, it also provides information on Highway 17 in Santa Cruz, between the Santa Cruz/Santa Clara County line and Highway 1, as shown in Figure 60. The information is available over the internet at http://traffic.511.org and over the 511 telephone number in the Bay Area. Information includes incidents, roadway speeds, and travel times. The website also provides links to streaming video from the Caltrans traffic cameras discussed above.

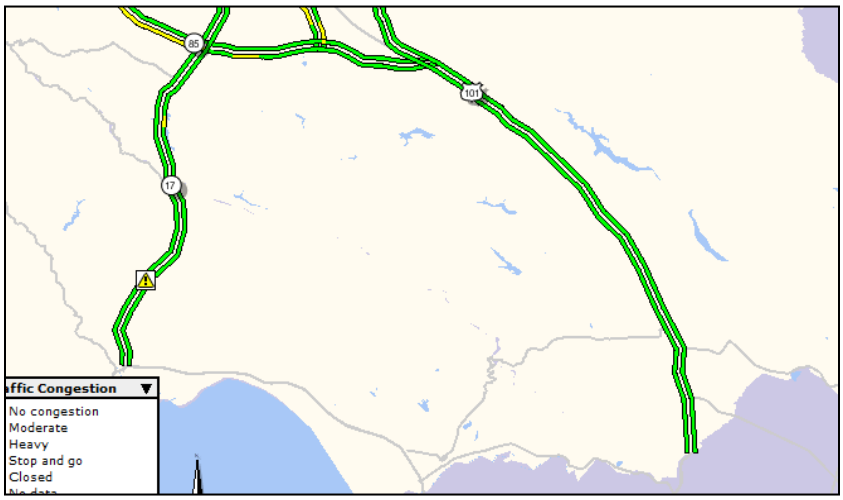


Figure 60: 511.org Traffic Information

The newest source of freeway and roadway information is Caltrans' statewide Quickmap launched in December 2011. This system uses a Google traffic map to provide speeds and includes information for the Monterey Bay Area, although there are significant gaps in roadway information for Monterey County including a key stretch of Highway 1 through Moss Landing. Quickmap is only available over the internet at http://quickmap.dot.ca.gov/. Information includes incidents, highway construction info and roadway speeds as well as links to traffic cameras and changeable message signs.

Figure 61: Caltrans Quickmap

3.4.3.1.2 Non-Freeway Coverage

The public works departments of both Santa Cruz and Monterey Counties provide information on road closures due to weather, construction, and other reasons. Santa Cruz County (available online at http://www.sccroadclosure.org/) provides a list of roads (see Figure 62 below) as well as a map (Figure 63).

SANTA CRUZ COUNTY PUBLIC WORKS DEPARTMENT

TRAFFIC ADVISORIES AND ROAD CLOSURES

Public Works Home Page | Road District Map

Road Closure Map | Post Mile Map | Sort by Category | Sort by Road Name | Sort by Road District | Contact Information

Last Updated 5/6/2011 7:01:56 AM

Weather/Storm Related Traffic Advisories

Road Name	Location	Dist	Description	Status
Branciforte Dr	in the 300 Block	A	One Lane Closed	One Lane with Stop Controls
Calabasas Rd	Near PM 1.65	D	Slip Out	One Lane with Stop Controls
El Rancho Dr	Between Carbonero Estates and La Madrona	A	Road Slipout	One Lane With Stop Controls
Glen Canyon Rd	Address 400	A	Road Washout	One Lane with Stop Controls
Highland Way	PM 2.21 and PM 3.63	D	Slide and Debris in Roadway	Road Closed Avoid This Area
Nelson Rd	By Skymeadow Ln	B	Large Slide	Road Closed No Through Traffic
Paulsen Rd	South of Lapis Dr	D	Sinkhole	One Lane Open
Redwood Lodge Rd	PM 1.65	A	Road Failure	Road Closed to Through Traffic
Rodeo Gulch Rd N	PM 4.73	A	Washout	One Lane Open w/Stop Signs

Construction Related Traffic Advisories

Road Name	Location	Dist	Description	Status
Eaton St	From Lake Ave to 7th Ave	A	Roadway Improvements	Periodic Lane Closures of up to Half Hour. From 8:30 to 4:30 Tuesday April 5th Through Thursday June 30th **Weather Permitting**
Graham Hill Rd	Between Roaring Camp Rd and 0.61 Miles East	B	Roadway Improvements	Traffic Will be Subject To Periodic Lane Closures and Delays Between 08:30 and 04:30 Monday April 11 Through Friday October 14, 2011 - Detour Signs Will be Posted - **Weather Permitting**
Sand Dollar Dr.	Entire Road	D	Sanitary Sewer Improvements	Traffic Subject to Delays and Lane Closures Between the Hours of 8:30 AM and 4:30 PM Monday May 2nd, 2011 Through Friday September 9th, 2011. Avoid This Area if Possible as Delays of up to One Half Hour May Occur. **Weather Permitting**
Sand Dollar Lane	Entire Road	D	Sanitary Sewer	Traffic Subject to Delays and Lane Closures Between the Hours of 8:30 AM and 4:30 PM Monday May 2nd, 2011 Through Friday September 9th, 2011. Avoid This Area if Possible as

Figure 62: Santa Cruz County Public Works Department Traffic Advisories

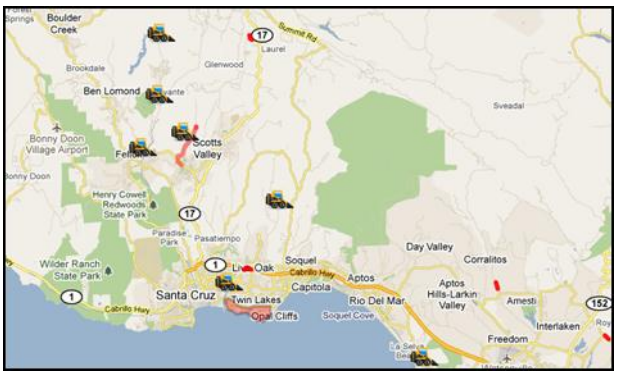
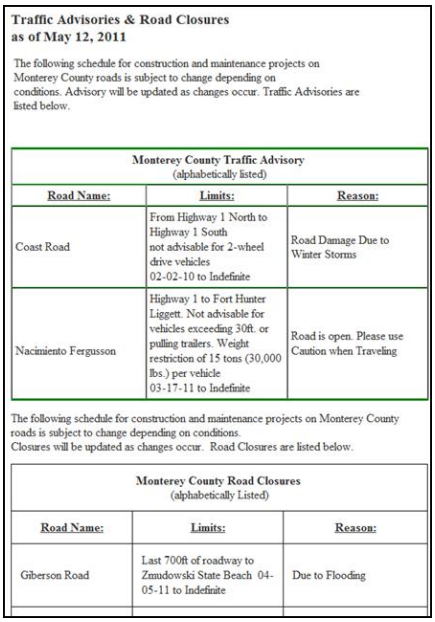


Figure 63: Santa Cruz County Public Works Department Road Closure Map

Figure 64 shows similar information for Monterey County (available on its website at http://www.co.monterey.ca.us/publicworks/status.htm). Monterey County does not provide the information on a map.



Traffic Advisories & Road Closures
as of May 12, 2011

The following schedule for construction and maintenance projects on Monterey County roads is subject to change depending on conditions. Advisory will be updated as changes occur. Traffic Advisories are listed below.

Monterey County Traffic Advisory
(alphabetically listed)

Road Name:	Limits:	Reason:
Coast Road	From Highway 1 North to Highway 1 South not advisable for 2-wheel drive vehicles 02-02-10 to Indefinite	Road Damage Due to Winter Storms
Nacimiento Fergusson	Highway 1 to Fort Hunter Liggett. Not advisable for vehicles exceeding 30ft. or pulling trailers. Weight restriction of 15 tons (30,000 lbs.) per vehicle 03-17-11 to Indefinite	Road is open. Please use Caution when Traveling

The following schedule for construction and maintenance projects on Monterey County roads is subject to change depending on conditions.
Closures will be updated as changes occur. Road Closures are listed below.

Monterey County Road Closures
(alphabetically Listed)

Road Name:	Limits:	Reason:
Giberson Road	Last 700ft of roadway to Zmudowski State Beach 04-05-11 to Indefinite	Due to Flooding

Figure 64: Monterey County Public Works Traffic Information

3.4.3.1.3 Parking Information

In order to provide tourists and residents alike with information about downtown areas and tourist destinations, Monterey Bay Area municipalities provide parking information on their websites. None of the cities, however, provides any real-time information about current parking availability. Rather, they provide static information about the location of the facilities, rates, hours of operation, and total spaces available. Figure 65 shows Santa Cruz's parking map (available on the City's website at http://www.cityofsantacruz.com/index.aspx?page=1075). The web page with this map also includes links to various multi-modal transportation options.

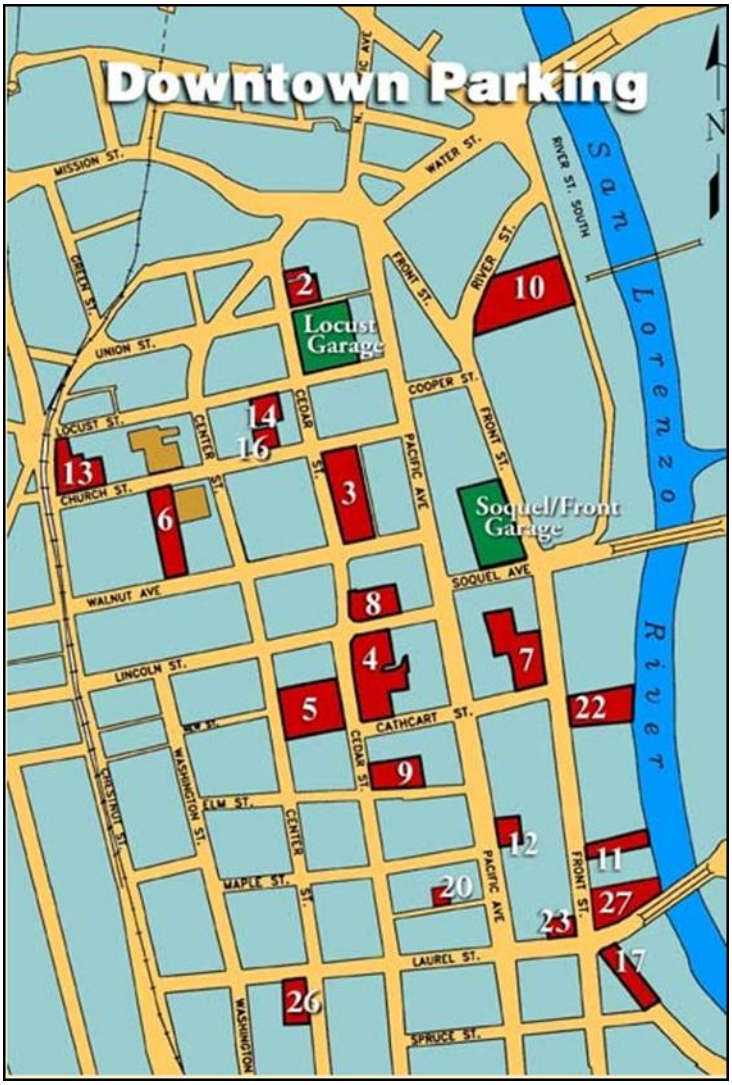


Figure 65: Santa Cruz Parking Map

The city of Monterey also provides information about its parking facilities at http://www.monterey.org/parking/garages.html. Figure 66 provides an example for one of the garages; similar information, and a description of rates, total spaces, and hours of operation, is available for all city-owned garages.

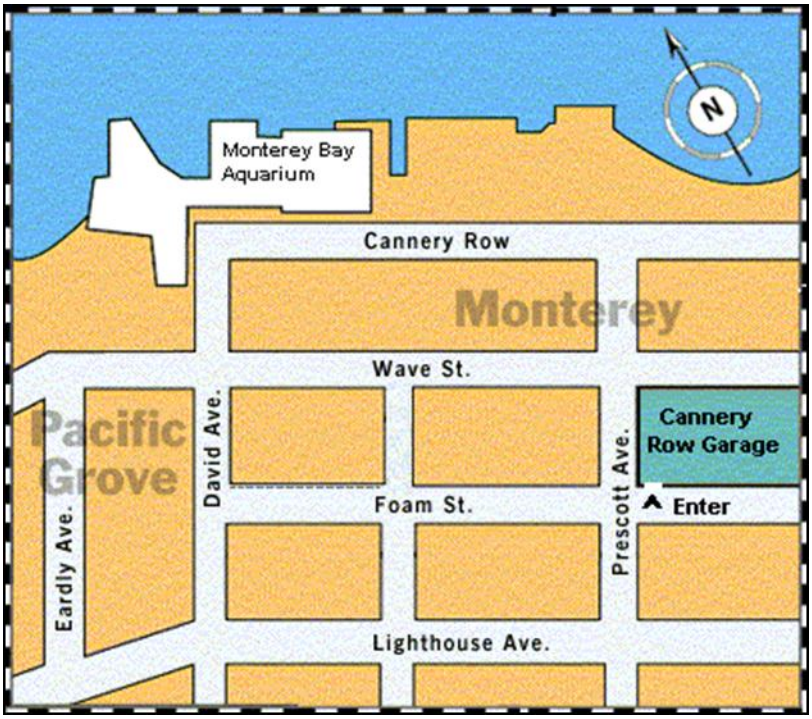


Figure 66: Monterey Parking Information

As a major tourist destination, the city of Carmel-by-the-Sea provides information about parking in its downtown area, although the description is limited to general information about street parking. This information is at http://ci.carmel.ca.us/carmel/index.cfm/residents/city-services/transportation-parking/

3.4.3.2 Privately-Provided Information

Generally speaking, there are three categories of private traveler information providers. They include companies that focus specifically on providing traveler information as their core business (such as SigAlert); general information providers that provide traveler information as well (such as Google); and tourist attractions and other similar entities that provide traveler information as a convenience to their customers. This section will discuss all of these types of providers.

3.4.3.2.1 Dedicated Traveler Information Providers

There are a number of private companies that provide roadway information, covering both freeways as well as other major roadways. They include the following companies:

3.4.3.2.1.1 **SigAlert**

Sigalert, which is owned by Westwood One, provides information via its web page (http://www.sigalert.com) and on an iPhone app. Its data comes from Caltrans, the CHP, and AirSage, a company that uses cell-phone location data to calculate traffic speeds. SigAlert's

website is shown in Figure 67. In addition, this information is also provided on the Santa Cruz Sentinel's website, at http://www.santacruzsentinel.com/traffic.

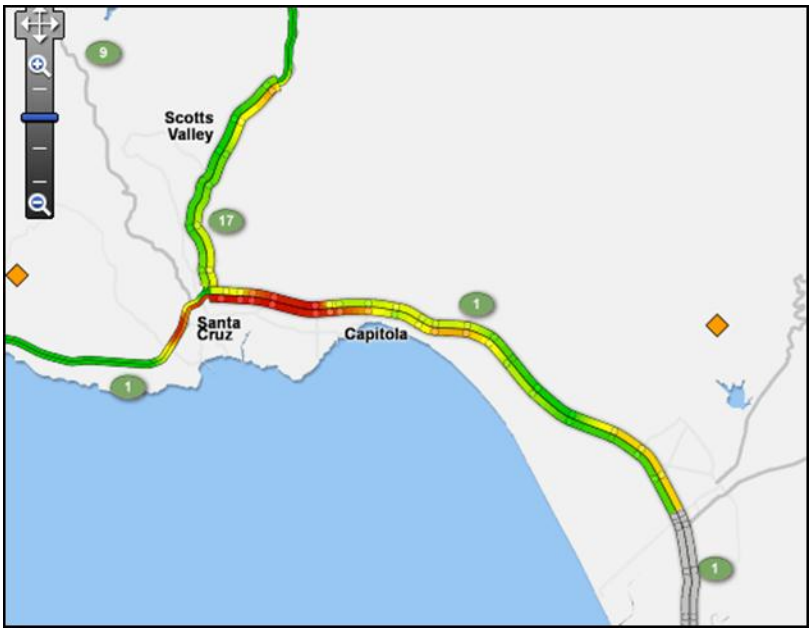


Figure 67: SigAlert Coverage

3.4.3.2.1.2 **Beatthetraffic.com**

Similar information is provided by Beatthetraffic.com on its website (http://beatthetraffic.com/), and on apps for iPhones, iPads, Blackberry devices, and Android devices. The web display is shown in Figure 68. Data comes from INRIX, an aggregator of fleet data. In addition, beatthetraffic.com provides private label websites to other web services, such as SFBaytraffic.info, shown in Figure 69, and available at http://sfbaytraffic.info/#SANTA_CRUZ.

Figure 68: Beatthetraffic.com

Figure 69: SFBaytraffic.info

3.4.3.2.1.3 **INRIX**

INRIX collects data from probe vehicle fleets and government agencies and processes it to provide real-time information as well as predictions about future traffic conditions. Its business model generally relies on providing data to consumer companies and other entities that provide it to the public. As a result, INRIX does not have a public web page. It does, however, have iPhone and Android apps (shown in Figure 70) that provide real-time traffic information.

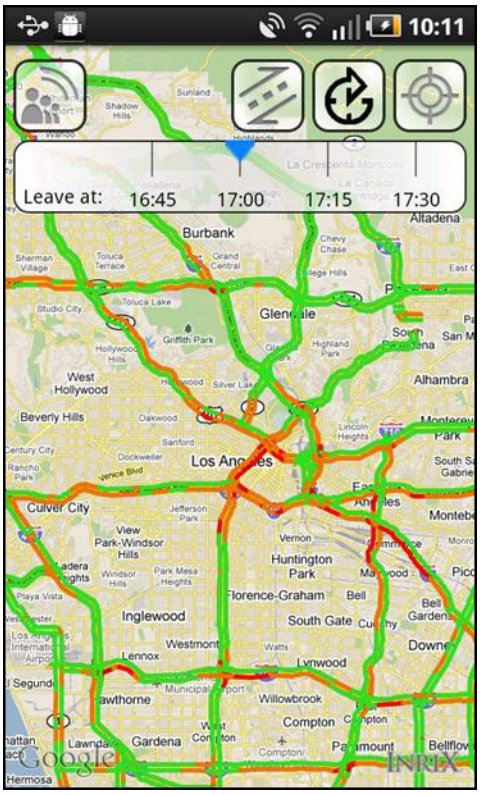


Figure 70: INRIX Android App

3.4.3.2.1.4 **Navteq**

Navteq, a subsidiary of Nokia, has been providing map databases for well over fifteen years, and has recently begun providing real-time information as well. As with INRIX, it gathers information from various sources, including probe vehicles and existing government resources. Its maps are available at http://www.navteq.com/. Figure 71 shows the data available in the

Monterey Bay region. Traffic.com, a subsidiary of Navteq, provides similar information on its webpage.

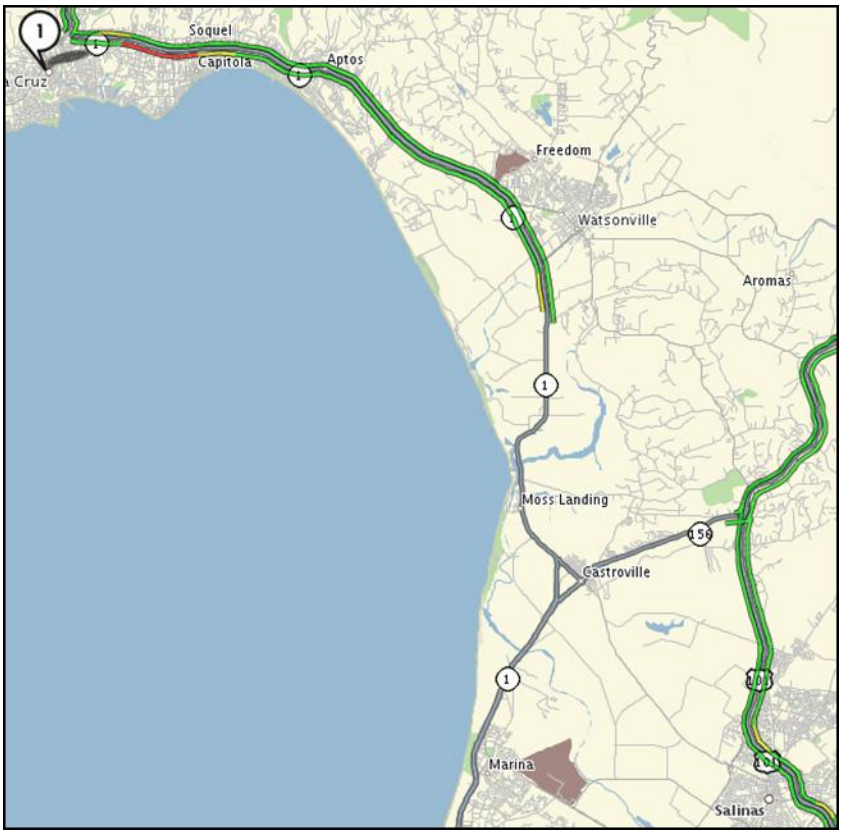


Figure 71: Navteq Traffic Information

3.4.3.2.2 General Information Providers

Virtually all of the major web portals and internet map providers now provide some form of real-time traveler information to supplement the mapping and directions they provide.

3.4.3.2.2.1 **Google**

Google seems to provide the most comprehensive suite of traveler information. Its maps include an option to display traffic information, including speed and incidents. As can be seen in Figure 72 and Figure 73, the level of detail depends on the zoom level of the chosen map, with information on local streets and roads available when zoomed in more. In addition, Google provides point-to-point routing information as an Android mobile phone application (see Figure 74). It also provides transit, bicycling, and pedestrian information (discussed below in Section 3.4.7).

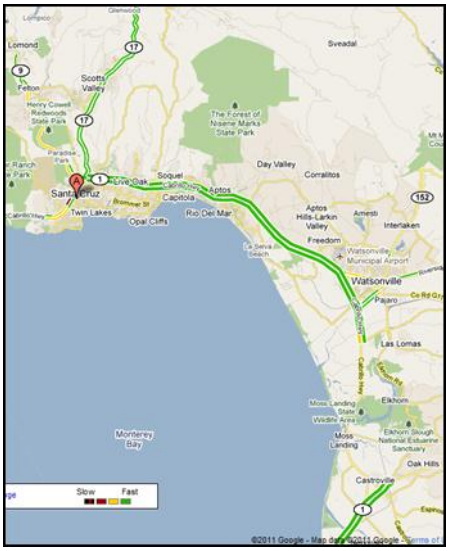


Figure 72: Google Maps Area View

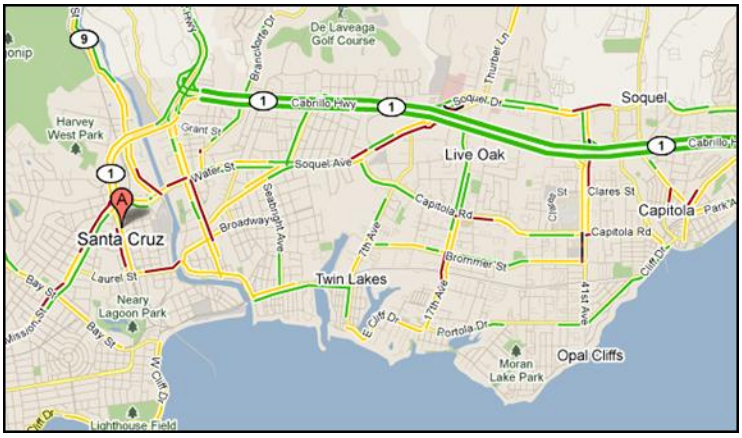


Figure 73: Google Maps Urban View

Figure 74: Android Navigation Application

3.4.3.2.2.2 **Mapquest**

Mapquest is one of the oldest mapping providers on the internet, and like most of the others, provides real-time traffic as one of the layers on its maps. An example, showing the level of detail (similar to that provided by Google), is shown in Figure 75. The source of the data is not known.

Figure 75: MapQuest Traffic Map

3.4.3.2.2.3 **Yahoo**

Yahoo also provides traffic information as part of its mapping services, as shown in Figure 76. Yahoo gets its data from TrafficCast, another aggregator of data from various sources. Yahoo does not provide the same level of detail on local roads that Google and Mapquest do.

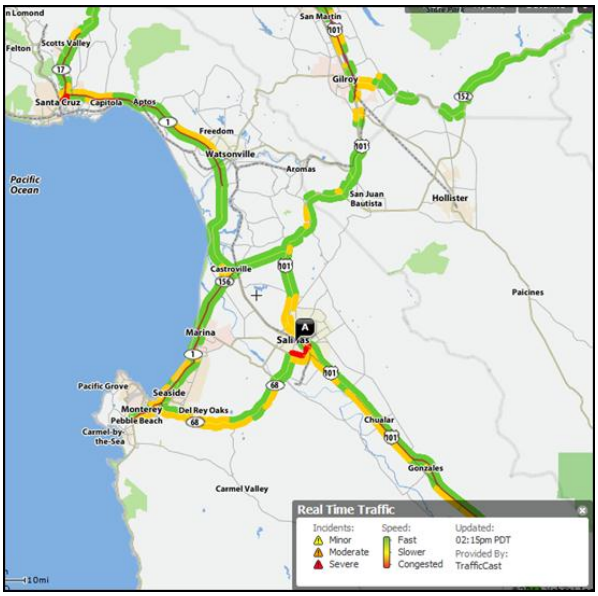


Figure 76: Yahoo Traffic Map

3.4.3.2.2.4 **Radio Stations**

There are several radio stations in the region that provide traffic information during peak periods as part of their daily programming. These include KSCO, KUSP, and KPIG in Santa Cruz and KAZU, KDON, and KCDU in Monterey. Typically, they provide information on major incidents and problems on a set schedule.

3.4.3.2.3 Tourist Attractions and Other Providers

Some of the major tourist attractions in the Monterey Bay Area provide information to help tourists travel to the attractions, either by road or transit. Examples are shown below for the Santa Cruz Beach Boardwalk (Figure 77), which also provides information about its shuttle service; the Monterey Bay Aquarium (Figure 78); and the 17 Mile Drive at Pebble Beach (Figure 79). Note that none of these tries to provide any kind of dynamic or real-time information.

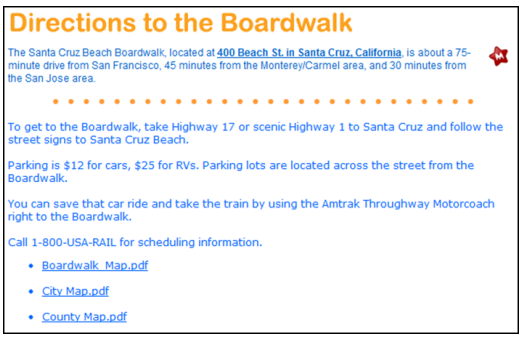


Figure 77: Santa Cruz Beach Boardwalk Information

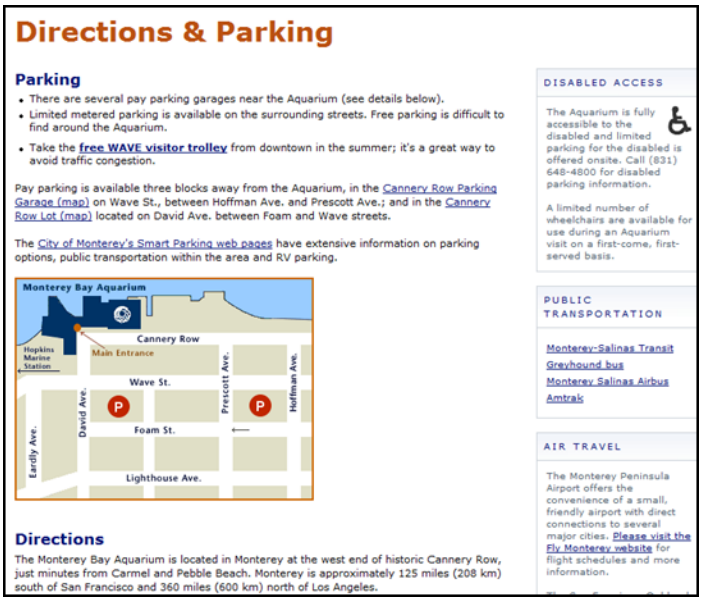


Figure 78: Monterey Bay Aquarium Information

Figure 79: 17 Mile Drive

3.4.4 Emergency Information

Generally, emergency information will be available at both of the counties' Offices of Emergency Services web sites during and after emergencies. In addition, local media would also provide information. One innovative source of emergency information is Nixle.com. Public agencies that participate in the program provide their emergency alerts to the website, which then sends them to subscribers via email and text message. Figure 80 displays the information available.

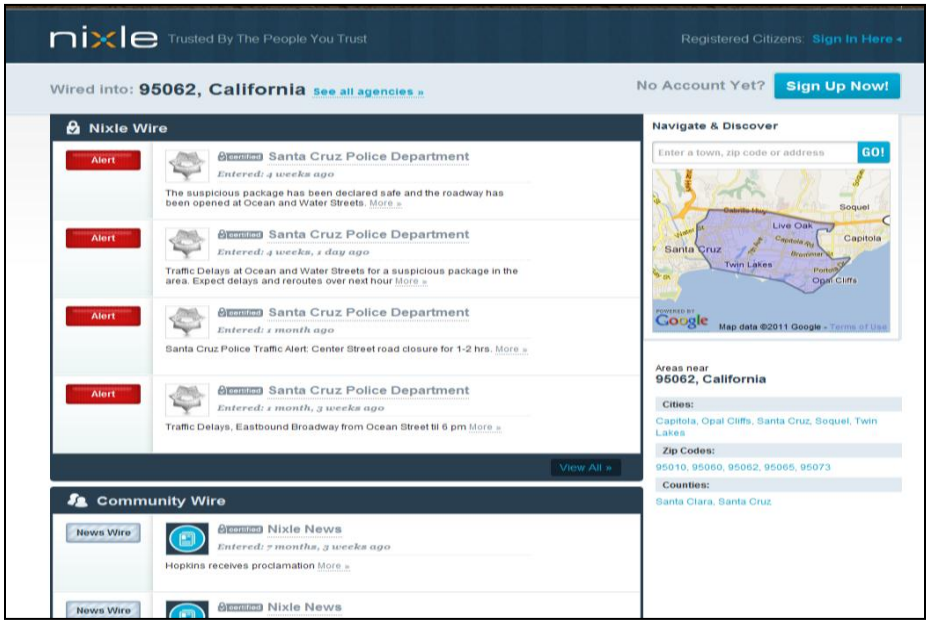


Figure 80: Nixle.com Information

Additionally, as discussed in Section 3.3.2, some limited emergency information is available by calling 211.

3.4.5 Transit Information

There are two primary transit agencies in the Monterey Bay area, the Santa Cruz Metro, available online at http://www.scmtd.com/, and MST, online at http://www.mst.org/. Each of these agencies provides detailed information on its website, and also over the telephone. A sample of their online information is shown below.

Both agencies have embedded the Google Transit itinerary trip planner on their websites, as shown in Figure 81.

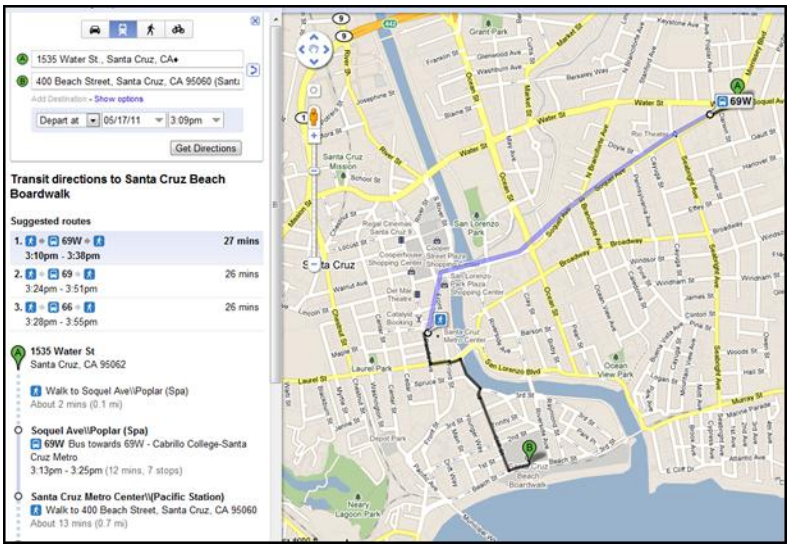


Figure 81: Transit Itinerary

Each agency also provides a wide variety of static information on its website, including route maps (Figure 82), route schedules (Figure 83), and system maps (Figure 84).

MST uses geographic positioning system to provide real-time arrival information to passengers hubs, but that information is only available at transit hubs, and is not currently available over the internet.

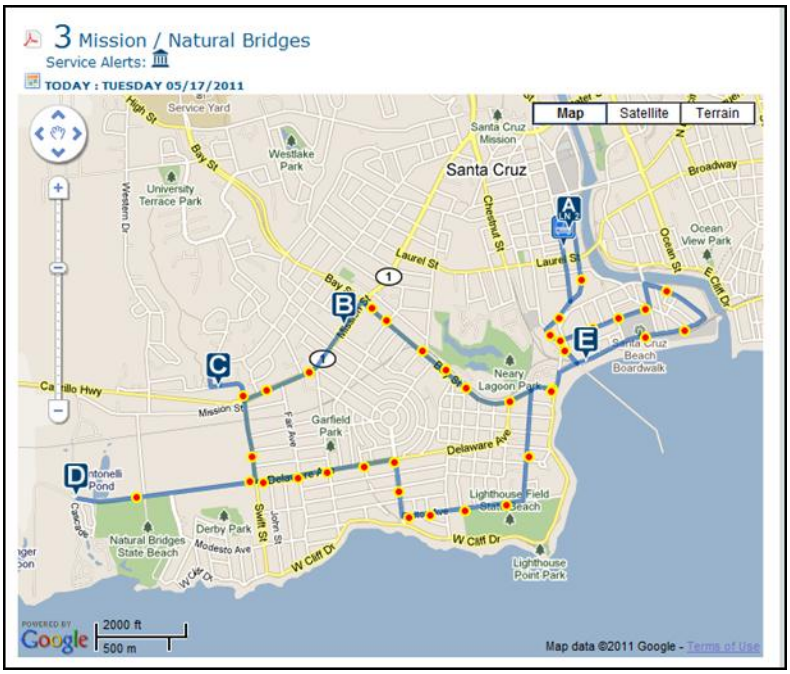


Figure 82: Route Map

3 Mission / Natural Bridges
Service Alerts:
TODAY : TUESDAY 05/17/2011

Mon-Fri | Route Map | Route Alerts

Departs Santa Cruz Metro Lane 2	Departs Bay & Mission	Departs Grandview & Arroyo Seco	Departs De Anza Mobile Home Park	Departs Beach & Pacific	Arrives Santa Cruz Metro Center
A	B	C	D	E	A
6:50am	6:58am	7:02am	7:10am	7:20am	7:35am
7:50am	7:58am	8:02am	8:10am	8:20am	8:35am
8:50am	8:58am	9:02am	9:10am	9:20am	9:35am
9:50am	9:58am	10:02am	10:10am	10:20am	10:35am
10:50am	10:58am	11:02am	11:10am	11:20am	11:35am
11:50am	11:58am	12:02pm	12:10pm	12:20pm	12:35pm
12:50pm	12:58pm	1:02pm	1:10pm	1:20pm	1:35pm
1:50pm	1:58pm	2:02pm	2:10pm	2:20pm	2:35pm
2:50pm	2:58pm	3:02pm	3:10pm	3:20pm	3:35pm
3:50pm	3:58pm	4:02pm	4:10pm	4:20pm	4:35pm
4:50pm	4:58pm	5:02pm	5:10pm	5:20pm	5:35pm
5:50pm	5:58pm	6:02pm	6:10pm	6:20pm	6:35pm

Figure 83: Route Schedule

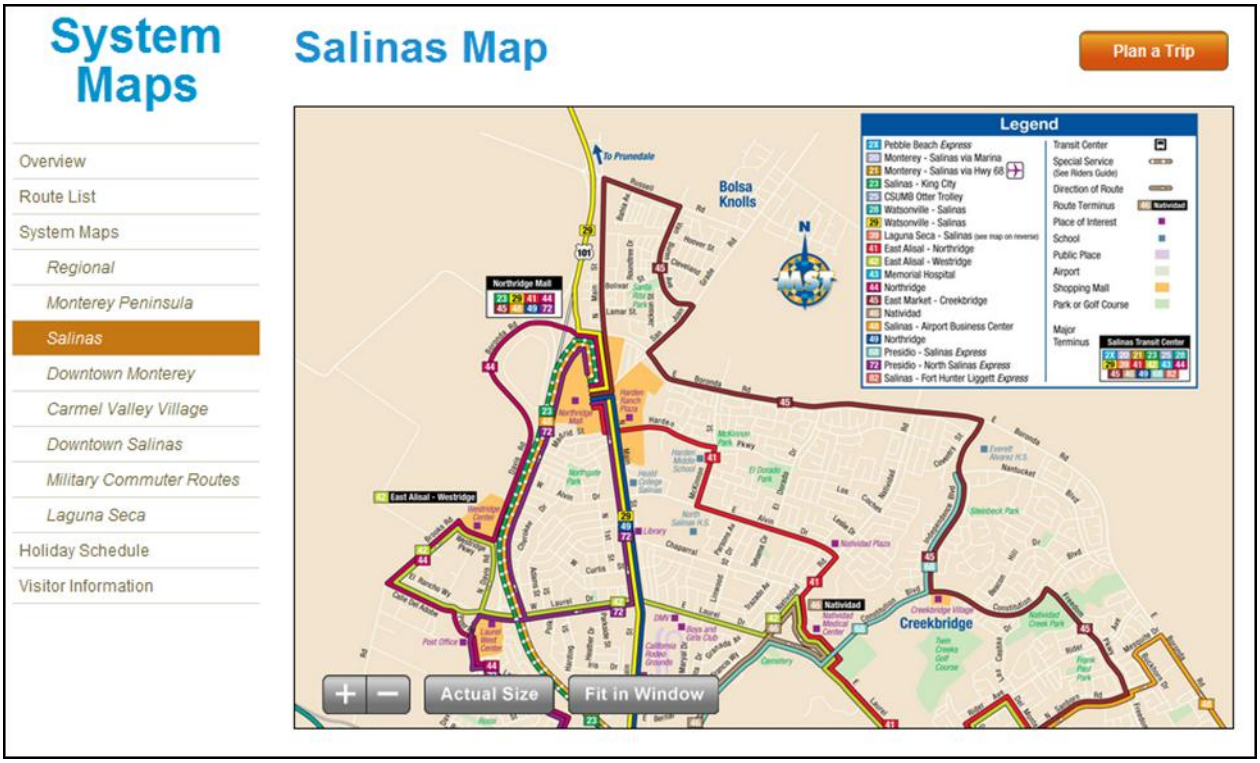


Figure 84: Partial System Map

3.4.6 Rideshare Information

Monterey's Rideshare program, Commute Alternatives, is administered by the Association of Monterey Bay Area Governments, and is available at http://commutealternatives.info and (831) 422-POOL. Santa Cruz's program, Commute Solutions, is at http://www.commutesolutions.org or (831) 429-POOL. Both the Association of Monterey Bay Area Governments (Figure 85) and

RTC (Figure 86) use the Metropolitan Transportation Commission 511 program to provide the actual ridematching service to help people find carpool and vanpool partners and bike buddies.

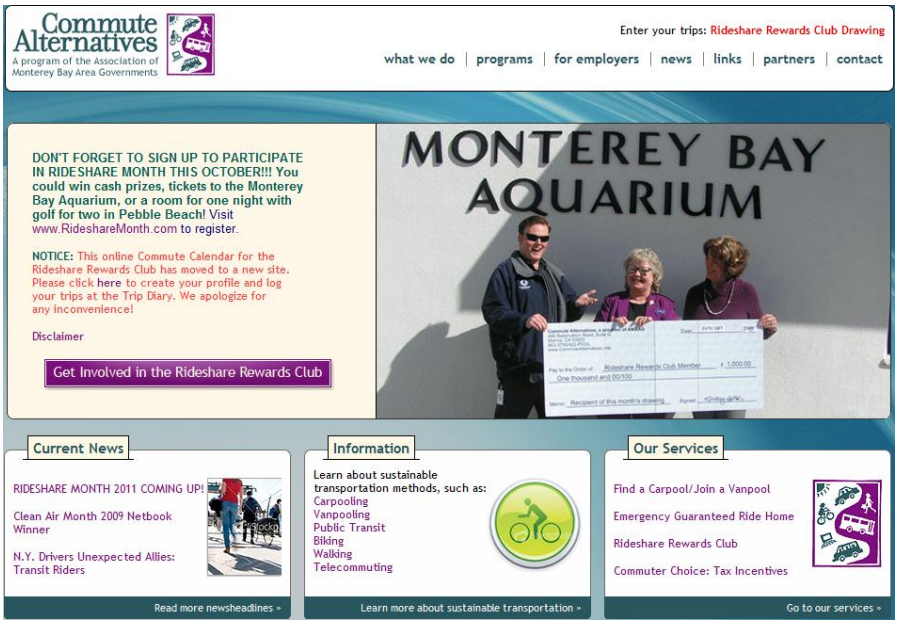


Figure 85: Commute Alternatives Webpage

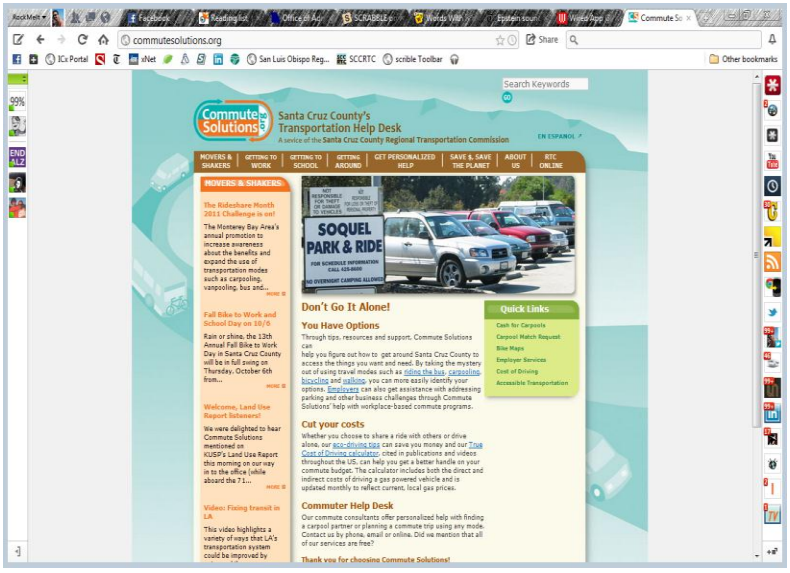


Figure 86: Commute Solutions Webpage

3.4.7 Bicycle and Pedestrian Information

3.4.7.1 Bicycle Information

The RTC is the primary source of bicycling information for Santa Cruz County. Its web page (http://www.sccrtc.org/bike.html) serves as a clearinghouse for a wide range of information, including information about bike lockers, bikes on transit, and bike maps published by the agency (Figure 87).

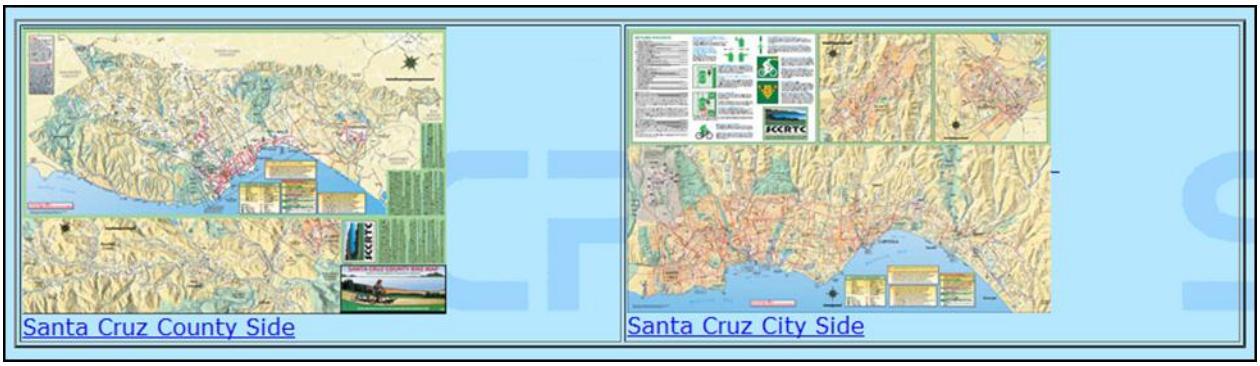


Figure 87: Santa Cruz Bicycle Information

Similarly, TAMC maintains a bicycling information web page at http://www.tamcmonterey.org/programs/bikeped/bike_map.html. It includes information similar to that provided by Santa Cruz, including county bike maps, information about bike lockers and racks, and general biking resources (Figure 88).

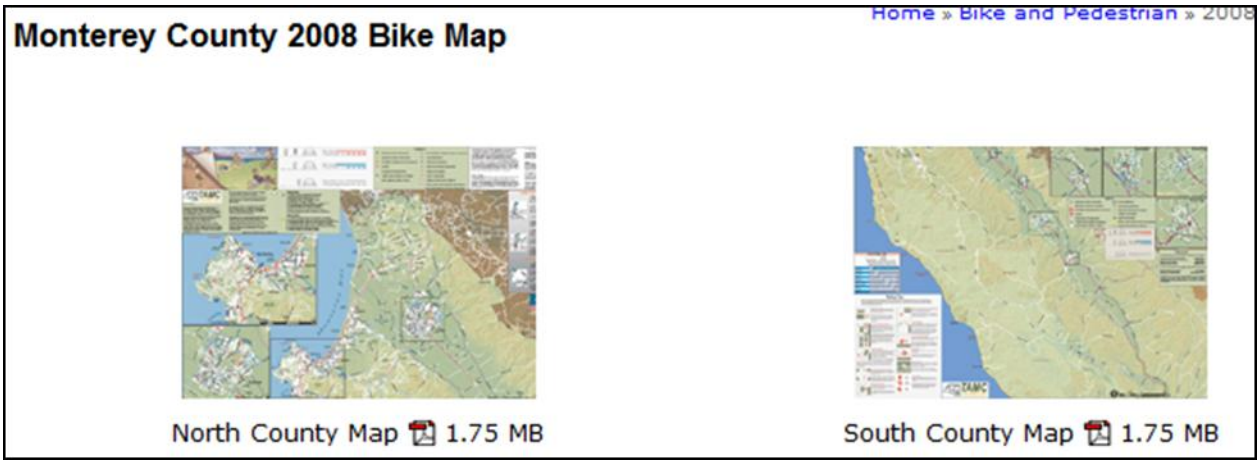


Figure 88: Monterey County Bike Maps

Google also includes bicycle-specific directions as part of its mapping services. Figure 89 and Figure 90 show the differences between bicycling directions and driving directions, respectively, between TAMC and the RTC. Note also how Figure 89 shows identified bicycle routes in green.

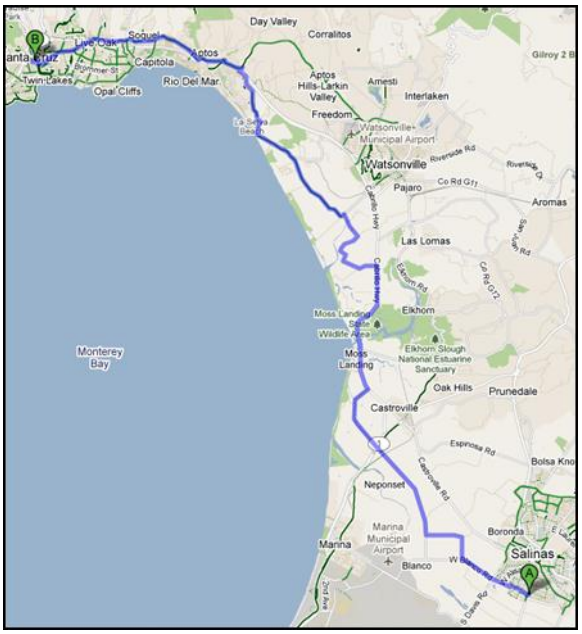


Figure 89: Google Bicycling Directions

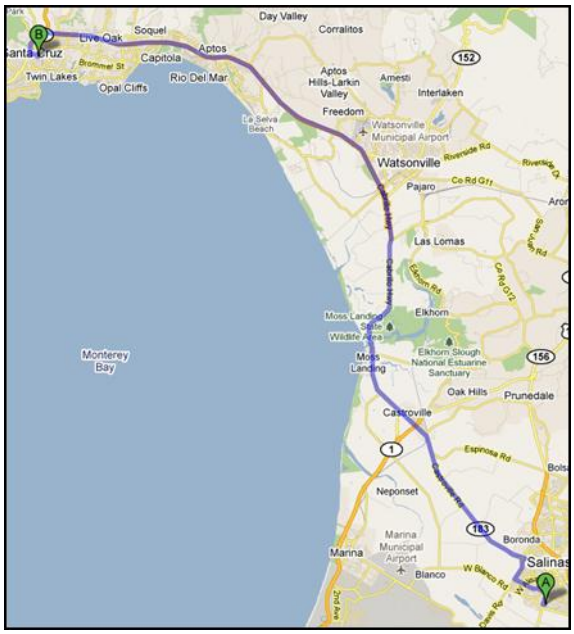


Figure 90: Google Driving Directions

3.4.7.2 Pedestrian Information

Santa Cruz's pedestrian information is provided through RTC's Commute Solutions program (discussed in Section 3.4.6 above) and on its pedestrian projects (http://sccrtc.org/projects/pedestrian/) and pedestrian services (http://sccrtc.org/services/ped/) web pages. . Monterey's pedestrian information is provided on its bicycle information page, also discussed in Section 3.4.7.1.

Google's services include walking directions (shown in Figure 91).

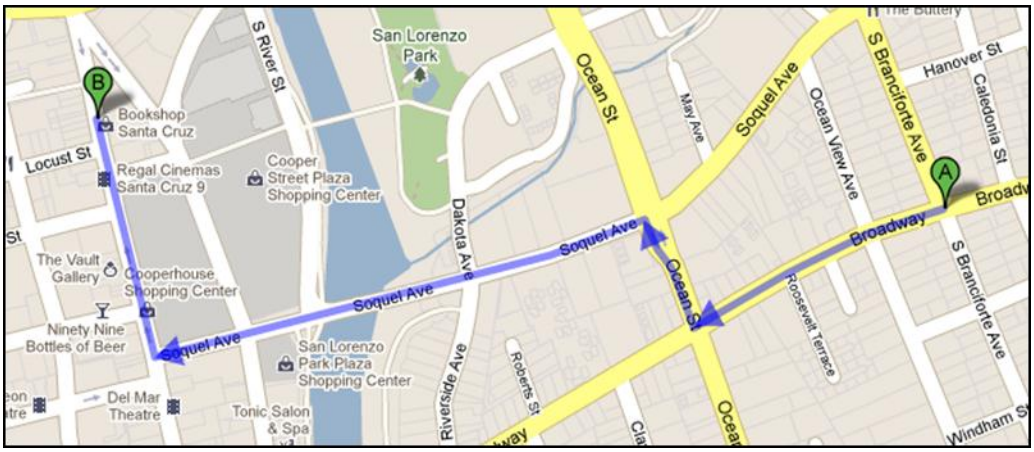


Figure 91: Walking Directions

3.4.8 Other Types of Information

This section covers other types of information that certain market segments may have interest in.

3.4.8.1 Freight Information

There is no real-time information in the region specifically for trucks and freight. Caltrans maintains a web site at http://www.dot.ca.gov/hq/traffops/trucks/ that provides information on truck routes, permitting, and so forth.

3.4.8.2 Airport Information

The Monterey Peninsula Airport (http://www.montereyairport.com/) provides information for travelers, including directions to the airport, parking information, and flight information. Included in the flight information is a link to real-time flight status information. The publicly-owned Watsonville Municipal Airport (http://www.watsonvilleairport.com) provides information regarding flight instruction, airplane rentals, scenic flights, fuel, aircraft sales, and maintenance facilities.

3.4.8.3 Weather Information

None of the transportation information providers include weather information, but weather information is available from a wide variety of sources, including:

- Television and radio broadcasts
- Media web pages
- The National Weather Service web page
- Private sector weather providers' web pages, including accuweather.com, weather.com, and wunderground.com

3.4.8.4 Information for Specialized Transportation Information Needs

The RTC regularly publishes a "Guide to Specialized Transportation Services for Seniors and People with Disabilities" that includes information about all of the providers and services in Santa Cruz County, including contact information hours, costs, and eligibility requirements. Members of the public can also access this information by calling 211.

3.5 Potential Transportation Information Users

The key potential users identified through this process are shown in Table 7.

Table 7: Potential Transportation Information Users

Mode	Trip Type				
	Work Commute	**School**	**Shopping/ Errands**	**Tourism/ Recreation**	**Freight**
Drivers	**X**	**X**	**X**	**X**	**X**
Transit riders	**X**	**X**	**X**	**X**	
Ride-share participants	**X**	**X**			
Bicyclist and Pedestrians	**X**	**X**	**X**	**X**	

There is clearly overlap among these various potential users. By providing a single resource with a wide variety of information available, a 511 system will be able to support all of these user groups, as well as any other groups not identified here, such as the elderly, Spanish speakers, or other communities with specific transportation and transportation information needs. Additional detail on how to reach them will be generated during Part 2 of this project, when we develop the marketing plan.

4 Traveler Information Data Inventory

4.1 Introduction

This chapter assesses the availability of data that can be used in any eventual Monterey Bay Area 511 system. It differs from the analysis of existing transportation resources discussed in Section 3.4, because that analysis was geared towards information that travelers can currently use, while this section focuses on data sources that can be incorporated into 511.

Key findings from this element of the study are:

- There are significant sources of collision and incident data in the region, including the CHP, the county public works departments, and the local 911 dispatchers. Incorporating the information into a 511 system would require some software development.
- There are a number of maps showing traffic speeds and incidents that could be embedded in a traveler information web hub.
- There are currently gaps in publicly available freeway speed and congestion information for use on the telephone. As the California Department of Transportation (Caltrans) deploys additional data collection equipment, these gaps will narrow.
- Private sources of speed data are available through providers such as INRIX and Navteq who obtain speed data from geographic positioning system-enabled vehicles and mobile devices. This data must be purchased from the vendor.
- Options to fill gaps in speed detection include deploying roadside equipment.
- There are very few closed-circuit television cameras that view traffic in the region, but Caltrans is deploying more cameras.
- There is no real-time transit information (actual bus arrivals) available except at MST transit hubs. Automated Vehicle Locator technology is installed on all MST buses, but is not available on the Santa Cruz Metro fleet.
- The Google transit trip planner, currently used by the region's transportation agencies, could easily be included in a 511 web hub either as a widget or embedded directly
- The region's transportation and rideshare agencies provide a substantial amount of information about multi-modal options and services, which could be included in a 511 web hub.

4.2 Data Availability and Gaps

4.2.1 Summary of Data Availability

The first undertaking was to inventory existing data sources that could be incorporated within a Monterey Bay Area 511 system. We contacted all local transportation and emergency response

agencies and asked them to provide information on any current (or planned) sources of data. We asked follow-up questions as needed to develop a better understanding of the available data. We also reviewed various websites to gather information on the sources of data, and used information from the Inventory of Traveler Information Services (Section 3.4) as needed. Table 8 below is a matrix of the available real-time data and information on those data sources.

Table 8: Inventory of Real-Time Data

Type of Data	Geographic Coverage	Source	Format	Availability for 511	Ability to be Fused	Frequency of Updates	Collection Method	System Constraints
Freeway Traffic Flow	Varies across the region. Expansion underway, planned for 2012.	Caltrans District 5 Detection	Text-based Tables	Yes	Yes	Every 30 seconds	Loops; Radar detection coming	Maintenance can be an issue.
Freeway Traffic Flow	Highway 17	Metropolitan Transportation Commission 511	XML Feed	Yes	Yes	Every minute	Radar detection	
Freeway and Roadway Traffic Flow	Entire region	Google, Beatthetraffic, Sigalert, Mapquest, Yahoo (and others)	Red-yellow-green speed map	Yes, for web hub. Not available for phone or mobile apps.	No	Ongoing	Unknown	Can only be used for web pages. No underlying data available.
Freeway and Roadway Traffic Flow	Entire region	INRIX, Navteq	Red-yellow-green map overlay; segment-based data	For web and phone, at different purchase prices	Depends on license	Ongoing	Automatic Vehicle Location system from fleets of vehicles	Must be purchased on an annual basis. Data for phone is more expensive than data for web.
Incidents	Freeways and State Highways	CHP computer-aided dispatch	XML Feed or text	Yes	Yes, with software integration	As info changes	Operator input	No geo-coding.
Incidents	Freeways and State Highways	Google, Beatthetraffic, Sigalert, Mapquest, Yahoo (and others)	Icons for incidents	Yes, for web hub. Not available for phone or mobile apps.	No	Ongoing	Unknown	Can only be used for web pages. No underlying data available.
Construction	Caltrans facilities	Caltrans Road Closure Database	Text	Yes	Yes, with software integration	As info changes	Operator input	No geo-coding.

Type of Data	Geographic Coverage	Source	Format	Availability for 511	Ability to be Fused	Frequency of Updates	Collection Method	System Constraints
Freeway Cameras	Specific locations on Hwy 1, 17, 101. Expansion underway, planned for 2012..	Caltrans video website	Video stream	Yes, except for the phone	No	Streaming	Cameras	
Local Roads (Collisions and related incidents)	Monterey County	Monterey 911 Dispatch	NA	No	No	NA	Operator input	No external interface possible
Local Roads (Collisions and related incidents)	Santa Cruz County	Santa Cruz 911 Dispatch	Text on web page	Yes	Yes, with software Integration	As info changes	Operator input	No geo-coding. Would need to develop that functionality. Would also need to filter out irrelevant information.
Local Roads (construction and closures)	Monterey County	Monterey County Public Works	Text on web page	Yes	Yes, with software Integration	As info changes	Operator input	No geo-coding.
Local Roads (construction and closures)	Santa Cruz County	Santa Cruz County Public Works	Text on web page	Yes	Yes, with software Integration	As info changes	Operator input	No geo-coding.
Transit	Monterey-Salinas	Monterey-Salinas Transit	NA	No	No	Ongoing	geographic positioning system on buses	No external interface possible

We have also gathered information on other data sources that can be either integrated into a 511 system or linked to on a 511 web page. The majority of the transportation information available in the region consists of static web pages, as shown in Table 9 below.

Table 9: Traveler Information Websites

Type of Information	Agency	URL
Parking	City of Santa Cruz	http://www.cityofsantacruz.com/index.aspx?page=1075
Parking	City of Monterey	http://www.monterey.org/parking/garages.html
Parking	City of Carmel-by-the-Sea	http://ci.carmel.ca.us/carmel/index.cfm/residents/city-services/transportation-parking/
Transit and transit trip planning	Santa Cruz Metro	http://www.scmtd.com/
Transit and transit trip planning	MST	http://www.mst.org/
Rideshare, Park and Ride, Bicycle, Pedestrian, Traffic Conditions	Commute Solutions -- Santa Cruz County (provided by RTC)	http://commutesolutions.org
Rideshare, Bicycle, Pedestrian	Commute Alternatives – Monterey County (provided by the Association of Monterey Bay Area Governments)	http://www.commutealternatives.info
Park and Ride	Caltrans	http://www.dot.ca.gov/dist05/commuter_info/pdf/08lots.pdf
Bicycling	TAMC	http://www.tamcmonterey.org/programs/bikeped/bike_map.html
Bicycling	RTC	http://www.sccrtc.org/bike.html
Special Events	Santa Cruz Visitors Bureau	http://santacruzca.org/events/
Special Events	Monterey County Visitors Bureau	http://www.seemonterey.com/calendar/
Alternative Fuel Stations and Electric Vehicle Charging	NA	http://www.altfuelprices.com/index.php?location=salinas%2C+ca&lat=36.6777372&lng=-121.6555013; http://www.evchargernews.com/regions/ch-bay-spi.htm
Other green transportation options	Ecology Action	http://www.ecoact.org/Programs/Transportation
Tsunami Warnings	Pacific Tsunami Warning Center	http://ptwc.weather.gov/

The inventory of the existing data revealed gaps in what would be needed to support a robust 511 system for the region. There are gaps for traffic, transit, ridesharing, and parking.

4.2.2 Traffic Data Availability and Gaps

Traffic data covers three primary categories: flow data, which can include speed, congestion, or travel times; incident data, which includes collisions, special events, weather, construction, and closures; and traffic cameras.

4.2.2.1 Traffic Flow Data

Traffic flow information in the region is provided by the public sector and the private sector. The private-sector data, discussed in Section 3.4.3.2, takes two forms. Its more familiar form is as a regional map that represents traffic speeds as red, yellow, and green overlays on the street map, as shown in Figure 72 above. Data in this format could be used on a web-based traveler information system, but cannot be used to provide information over the telephone or on mobile applications, since both the format and the licensing agreements restrict it to use on the internet. The other form is from private providers such as INRIX and Navteq. This data can be used on the internet, the telephone, and on mobile applications, but the costs of the different options vary. The costs to purchase this type of data are discussed below, in section 4.3.1.

Public-sector data is available from Caltrans, and can be used on the internet, telephone, and mobile applications. The traffic data comes from a combination of in pavement loops and spot speed sensors. Caltrans uses the Caltrans Performance Measurement System for collecting and archiving traffic data. The system currently provides coverage on Highway 17 and parts of US 101 and US 1. The map in Figure 92 shows the current Performance Measurement System coverage in the region. The red, yellow, and green segments reflect speeds, and show where data is currently available. The grey bands represent areas where there is no data.

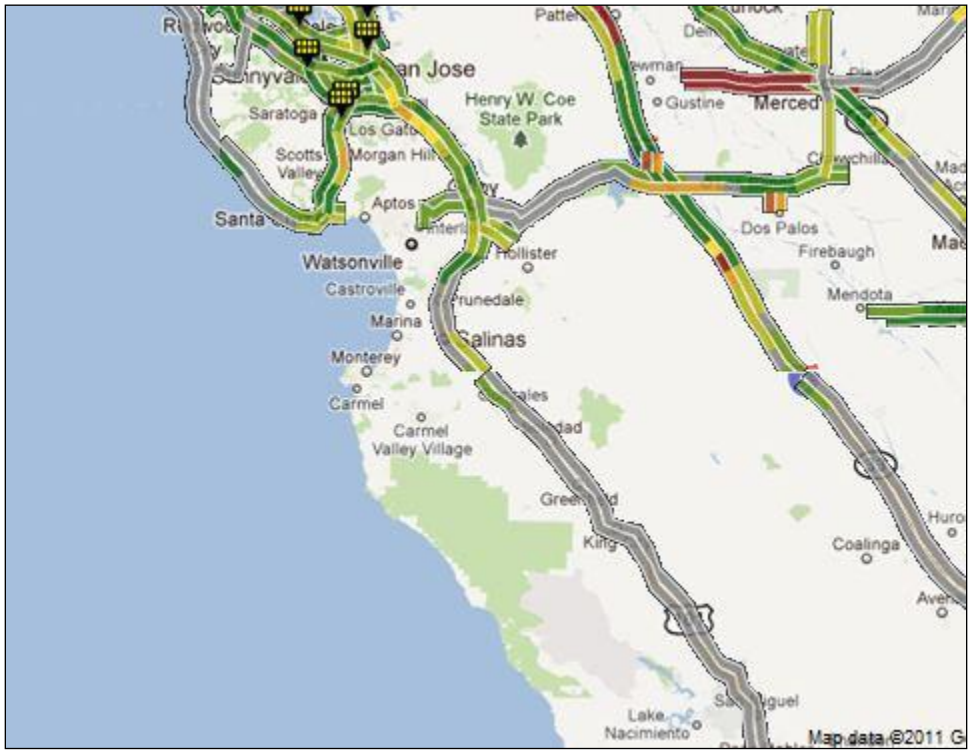


Figure 92: Performance Measurement System Data

Caltrans has recently installed additional data collection infrastructure, and is in the final phases of making available in the Performance Measurement System. Caltrans is also installing additional data collection infrastructure at various locations in Santa Cruz and Monterey Counties. Twenty-three new data collection points have just become operational in Santa Cruz County and nine are in construction. In Monterey County, there are 34 data collection points in construction and 29 in design. These data collection sensors are planned to be operational in 2012.

4.2.2.2 Roadway Incident Data (Collisions, Construction, Special Events, and Weather)

Roadway incident data covers a wide range of data types, including collisions and other incidents on the roadway, construction and closure, special events, and, sometimes, weather information.

4.2.2.2.1 Collision Information

Generally, this type of information comes from law enforcement and 911 dispatch centers. These agencies typically use a Computer-Aided Dispatch System that includes every dispatch to a first responder. Often, much of the information in such a system is not related to the

transportation network, so some kind of filter must be employed to ensure that only relevant information is passed to 511.

In the Monterey Bay region, there are three main dispatch centers. The CHP dispatches officers for incidents on state roadways, while the Santa Cruz and Monterey County 911 service dispatches officers, firefighters, and paramedics for all purposes on all other facilities. As discussed above, the CHP computer-aided dispatch data is available, and can be used on a 511 system. Investigation as to the availability and usability of computer-aided dispatch data from the counties continues. It is our current understanding that full data coverage is available, but that interfaces and appropriate filters would need to be developed.

4.2.2.2.2 Construction and Closure Information

There are three primary sources of construction and closure information: the Caltrans road closure system for state routes, and the county public works departments for both Santa Cruz and Monterey Counties. All three sources would require integration work to fully incorporate into a 511 website. There is no gap in the data itself for state and county roadways, but rather in the format. There is no data available for construction and closures on city streets. Santa Cruz and Salinas publish information about planned construction, but have no real-time information.

4.2.2.2.3 Other Incident Information

Some 511 systems include weather information, but there are no standardized feeds that provide weather information specifically for traffic and road conditions. One option is to link to a weather provider (such as accuweather.com) on the web page.

Finally, information on disasters and emergency response will be available from the county Offices of Emergency Services. Generally, however, this type of information is not automated, and will rely on open lines of communication between the 511 operator and the Office of Emergency Services staff.

4.2.2.3 Closed-Circuit Television Cameras

There are currently only five roadway cameras in the region that provide streaming video. Two are on Highway 1 in Santa Cruz County, two are on Highway 17 in Santa Cruz County, and one is on US101 in Monterey County. If camera streams or images are desired, a much broader network would be needed. Caltrans is currently planning to install additional cameras in Santa Cruz and Monterey Counties. The timing and quantity are not currently known.

4.2.2.4 Commercial Vehicle Information

There is currently no easily-accessible source of information related to truck restrictions, bridge heights, weigh station locations, and so forth.

4.2.3 Transit Data Availability and Gaps

Both MST and Santa Cruz Metro use Google transit for trip planning, and they provide a vast amount of information on their web pages. Currently, however, neither agency has real time data that can be used for a 511 system. MST does have an Automatic Vehicle Location system on its buses, and uses it to provide arrival information at transit hubs. Due to constraints in the system architecture, however, that data cannot be made available to a 511 system.

4.2.4 Ridesharing Data Availability and Gaps

Monterey (Commute Alternatives) and Santa Cruz (Commute Solutions) Counties have information-rich websites. Since there is a robust amount of information on these sites, there is no need for additional data. The same data can be provided over a 511 system as well. There is no real-time ride-matching service at this time. If there is a desire to provide this service, the function would have to be developed.

4.2.5 Parking Data Availability and Gaps

There is no automated data source for parking in the region. The cities of Santa Cruz and Monterey as well as UC Santa Cruz and Cabrillo College have static information on parking. Given the importance of tourism for the region, information that helps people decide where to park could be very valuable, especially during peak tourist season.

If there is a desire for automated parking information or services, such as the number of spots remaining in a garage or the ability to reserve parking, these applications would have to be developed.

4.2.6 Bicycling and Pedestrian Data Availability and Gaps

Both counties have well-developed bicycle maps and pedestrian and bicycle services, and Google provides both walking and bicycling directions on its maps (although there are questions about its accuracy). There are no major gaps to be filled, although a bicycle mapping application similar to that provided by the Metropolitan Transportation Commission system (see Figure 20 above) could be useful. The ideal bicycle trip planner would also include data on elevation.

4.2.7 Multi-modal Trip Planner Gap

A multi-modal trip planner would allow a traveler to enter his or her origin and destination, and then would provide information that would allow the traveler to complete that trip using a variety of modes. Assuming full data availability, the results would include such things as:

- Driving directions with current road conditions and travel times
- A transit itinerary with real-time information on bus arrivals
- Real-time ride-matching and information about how to rideshare for that trip in the future.
- Walking and bicycling directions, with current weather information.

It is not feasible at this time to develop a cost estimate for this functionality.

4.3 Cost to Fill Data Gaps

4.3.1 Costs

As shown in the previous section, there are gaps either in the availability or the usability in the following areas:

1. Real-time Speed Data
2. Various Types of Incident Data
3. Traffic Video Feeds
4. Real-time Transit
5. Real-time Parking Data
6. Real-time Ride-matching
7. Bicycle Trip Planner

The costs for obtaining each type of data described below refer to a full deployment of a 511 system with all functionalities.

4.3.1.1 Speed data

There are two primary ways to get traffic speed data in the region. The more traditional option is for the agencies to deploy spot speed sensors along the highways at their own cost, although fewer agencies are choosing to deploy equipment to support traveler information. The second option is to use a data feed provided by a third party private vendor.

While prices vary somewhat based on the technology, traditional sensors (such as those provided by RTMS or Wavetronix, two different sensor vendors) that provide speed, volume, and occupancy data generally cost about $19,000 to install (including roughly $2,000 per site for permitting) and $600 per year to operate. Sensors generally should be located every three miles on average (with closer spacing in urban areas and farther spacing in rural areas). These sensors generally are installed on a new pole, and would be subject to the Caltrans permitting process. There are also sensors that only provide speed data, provided by SpeedInfo; these generally cost around $5,000 to install and operate for two years. The ongoing cost after the first two years is $1,200 annually per sensor. Alternatively, SpeedInfo has monthly pricing available as well, with no upfront costs. These are $220 per month per sensor for unlimited data rights (i.e., the ability to share the data with private-sector partners) or $110 per month per sensor for full public-sector data rights. All of SpeedInfo's costs include installation and permitting.

The primary vendor of traffic data services is INRIX. INRIX has different prices, based on whether it provides a web page overlay or data to use on the telephone system. To provide just a web page overlay, the cost would be $25,000 per year on the web for all facilities that INRIX covers in the region (see Figure 93 and Figure 94).

Figure 93: INRIX Coverage (part 1)

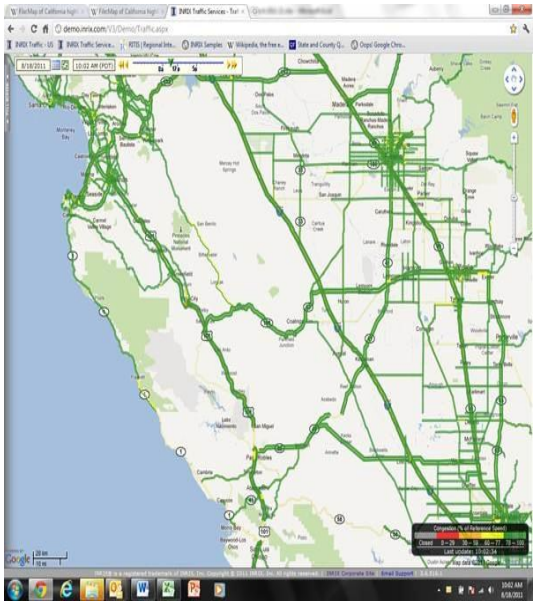


Figure 94: INRIX Coverage (part 2)

The cost to purchase data that could then be used to provide congestion or speed information on the phone is an initial cost of $200 per mile per year and ongoing costs of $800 per mile year.

Table 10 summarizes the costs for the various options. Note that it is based on an assumption of 270 miles of coverage (US 101, CA 1, and CA 17) needed, with sensors every three miles. The costs would obviously change should it be decided that less coverage or different spacing would be appropriate.

Table 10: Comparison of Speed Data Costs

	Deployment	Annual Operations
Traditional Sensor	$1,710,000	$54,000
SpeedInfo Purchase	$450,000	$108,000
SpeedInfo Monthly Limited Data Rights	$-	$118,000
INRIX--Web Only	$-	$25,000
INRIX--Phone and Web	$54,000	$216,000

4.3.1.2 Incident Data

As noted above, most of the incident data that a 511 system needs already exists, but it will likely be necessary to develop interfaces to the data sources. In some cases, the interfaces will be a web screen-scraper. In other words, a software application will retrieve the relevant web

page, copy the information from the web page, assign all of the data to specific fields (roadway, time, type of incident, and so forth), and then send it to the 511 phone and web page. In other cases, a more robust interface can be developed to retrieve the data. The ultimate 511 system could have interfaces to the following systems:

- CHP computer-aided dispatch
- Caltrans Road Closure Information
- Santa Cruz County Public Works Department
- Monterey County Public Works Department
- Santa Cruz 911 Dispatch (note that it is not possible to access the Monterey County 911 dispatch data)

Our current estimate is that each interface would cost roughly $50,000 to design, develop, test, and implement, for a total of $250,000. Depending on the format of the data from the various streams, and the level of expertise of the firm chosen to develop the system, that cost might be lower.

4.3.1.3 Streaming Video

In order to get more streaming video on 511, Caltrans or other agencies would need to deploy additional cameras. Each camera costs approximately $17,000 to deploy and $600 per year to operate.

4.3.1.4 Real-time Transit

There is currently no real-time transit information available except at MST transit hubs. MST has estimated that it would cost $100,000 to upgrade its existing system to make real-time transit data available for 511. There would be little increase in ongoing operations cost, since the bulk of those costs relate to maintaining and communicating with the equipment on the vehicle, which is already in place for Monterey-Salinas Transit. If Santa Cruz Metro wants to make real-time transit information available to its riders, it would need to deploy a brand new system. The average cost to deploy an automated vehicle location system is $8,000 per vehicle in capital costs and $1,100 in annual operations.

4.3.1.5 Real-time Parking Data

Some urban and tourist areas have begun to provide real-time parking information on changeable message signs, over the internet, and on smart phones. Data collection for smart parking is performed through different kinds of sensors (magnetometers, infrared, or inductive loops), either at each parking space or at the entrances and exits of garages. These sensors gather data on the availability of parking spaces at targeted facilities. Real-time parking is a fairly new market, and costs are therefore rather high. The average cost to deploy a smart parking system that tracks each space is roughly $500 per space in capital costs and $75 per space in annual operations costs. Entry and Exit systems cost roughly $250,000 to install and $10,000 year to maintain, but they provide less useful data. RTC and TAMC could investigate the possibility of partnering with tourist attractions to support these costs.

4.3.1.6 Real-time Ride-matching

There are very few deployed real-time ride-matching systems in operations, and the systems that are deployed are pilot projects. As a result, costs are not available at this time.

4.3.1.7 Bicycle Trip Planning

There are few examples of bicycle trip planners, but the Metropolitan Transportation Commission system cost approximately $200,000 to develop, and requires roughly $100,000 annually to maintain. Presumably, the costs for the Monterey Bay region would be lower, since the geographic area is smaller, but the difference is not currently known.

4.3.2 Funding Options

Because funding options for data collection are not appreciably different than those for 511 systems as a whole, they are discussed in Section 5.3.

5 Benefits and Cost Analysis

This chapter describes the benefits and costs of a 511 system for the Monterey Bay Area.

5.1 Benefits

511 Traveler Information Systems are becoming widespread throughout the country to optimize the use of our transportation systems and to promote more sustainable forms of transportation. Forty states are completely or partially covered by 511 systems, with three more in development. When travelers can inform themselves of traffic conditions, they have the opportunity to travel on a different route or mode, travel at a different time or not at all. Allowing travelers to make these choices by providing them with traveler information will provide numerous worthwhile benefits to our region.

There is substantial evidence that 511 systems are being heavily utilized. The use of 511 in the San Francisco Bay Area has been documented by the Metropolitan Transportation Commission in its 511 monthly reports to be an average of roughly 400,000 phone calls per month and 2,000,000 web user sessions per month for an area with a population of over 6,000,000 people. The extensive use of these systems shows that they are satisfying a need among motorists to be more informed of their travel options to avoid unexpected delays.

The key benefits that are discussed include:

- Benefits to the individual, such as the ability to make better use of his or her time, as well as knowing what to expect in order to reduce frustration.
- Benefits to the transportation system through more efficient use of the transportation network.
- Economic benefits of a transportation system that allows businesses, employees, customers, tourists, freight companies, to avoid traffic delay.
- Environmental Benefits from educating and informing travelers of their transportation options.
- Benefits of centralized location for traveler information.

5.1.1 Individual Benefits

The primary benefit to an individual using 511 is the ability to save time while travelling by finding out about problems with the transportation network and to reduce frustration by knowing what to expect. While no studies have assessed the real-world time savings that travelers might realize, simulations have found there to be benefits, primarily in terms of higher trip reliability and less time wasted on early departures.[1] If a driver has no information about

[1] Wunderlich, Karl, et al. *On-Time Reliability Impacts of Advanced Traveler Information Systems (ATIS): Washington, DC Case Study.* Federal Highway Administration, 2001.

travel conditions on, for example, the route to work, the driver will tend to leave home earlier than needed in order to allow for possible delays en route. If, however, the driver knows that there are no delays, he or she can leave at a later time. Moreover, on those occasions where traffic is worse than usual, the driver can leave earlier than usual, and avoid the issues associated with arriving late to work.

An additional benefit that travelers get when they have accurate traveler information is knowing what to expect. Knowing whether the accident in front of them is a quarter mile away or three miles away can help them assess how long they will be stuck in traffic, reducing uncertainty and the accompanying stress. It also allows travelers to let other people know that they are delayed, reducing stress and anxiety for their friends, families, and business associates. Studies have shown that motorists are less likely to be frustrated when informed of traffic conditions.

5.1.2 Transportation System Benefits

Transportation system benefits occur when travelers use information to manage and improve their transportation experiences. Every time a traveler avoids a congested roadway, either by taking an alternate route, traveling at a different time (if at all), or changing the mode of travel, the congestion on the roadway is reduced, as is the chance of secondary collisions. The end result is more efficient use of the entire transportation network, as demand is spread across the routes, times, and modes that can better accommodate it.

In addition, 511 systems enable government agencies to provide more accurate, useful information during emergency situations, such as earthquakes, tsunamis, floods, fires, and man-made disasters. Depending on how it is configured, it could also be used to push information to subscribers during emergencies.

5.1.3 Economic Benefits

Benefits to the transportation system for regions that have 511 systems as described above will also yield economic benefits. All users of the transportation system (i.e. businesses, employees, customers, tourists, freight companies) will be better able to plan their trips throughout the routes, times and modes allowing for a greater movement of people and goods which is beneficial to the economy. Freight companies are worth noting specifically for the Monterey Bay Area as freight hauling, particularly when the freight is time-sensitive, can benefit tremendously from accurate, reliable traveler information. The largest freight companies, such as FedEx and UPS, have their own proprietary traveler information systems that their drivers use. Smaller freight haulers, however, tend to not have these systems.

Much of the economy in the Monterey Bay Area is based on agriculture, which is clearly time-sensitive freight. Whether a shipment is going to a grocery distribution warehouse or the Port of Oakland, it is very important that it reaches its destination on time. Truck drivers and freight dispatchers can use a 511 system to learn about and avoid traffic problems, potentially saving the value of a shipment.

5.1.4 Environmental Benefits

The environmental impact of our current transportation system is not sustainable. Transportation contributes 38% of the greenhouse gas emissions within California. The passage

of AB 32, the California Global Warming Solutions Act, and SB 375, commonly referred to as the climate change smart growth bill specifies regional GHG targets to be achieved by 2020 and 2035. In order to reach these targets and foster sustainability in the region, motorists must be educated and informed about their transportation choices. Traveler information through a 511 service is an excellent mechanism for educating and providing information to drivers about how they can reduce their greenhouse gas emissions and other pollutants. Real time traffic conditions will allow motorists to choose which route they take or the time of day they travel to avoid congestion and the increased level of emissions associated with traffic delays. A 511 service can inform motorists of their many options for travel including transit, ridesharing, bicycling and walking.

5.1.5 Benefits of Centralized Location for Traveler Information

There is currently a lot of transportation information available in the region, but there is no single source of information. Providing a centralized location for traveler information could yield the following benefits:

- It will be easier for travelers to find information,
- It provides exposure to many modes of transport to travelers. Good information about congested roadways might help convince travelers to try other modes, particularly if the information is available in one location.
- It reinforces existing transportation agency marketing efforts, as all transportation agencies can point their customers to the same location.

Although it may be difficult to validate the benefits of a 511 traveler information system and how well it reduces frustration, congestion and environmental impacts and enhances the economy, it is logical that these affects will follow from motorists becoming more informed of their travel options.

5.2 Costs

Overall cost of the system will be a very important factor when deciding whether and how to proceed with a 511 system. This section of the document talks qualitatively about the types of costs that are incurred in developing a 511 traveler information system. Section 7.2 will discuss the costs associated with each of the alternative models that are being considered.

Costs can be broken down both by the functional area for which the cost is incurred (project management, data collection, marketing, and so on), as well as by capital or other one-time costs compared to ongoing operations costs. For all systems, initial costs will include the hardware and software which the systems will require to run at whatever level of functionality is decided upon (including any hardware and software needed to support back-up and redundancy). This will enable the project team to assess not just the overall feasibility of developing a 511 system but also the relative benefits of implementing specific elements of a 511 system. Marketing costs are difficult to quantify, and the marketing expenditures for 511 systems around the country vary tremendously. In spite of the difficulty of developing a hard and fast estimate, it is vital to market 511 to the public.

Generally speaking, lower costs will lead to a more favorable decision to implement a system, but lower-cost systems tend to have reduced functionality when compared to more expensive systems. Functionality will be discussed in the next sub-section.

5.2.1 Project Management and System Administration

Project management costs will generally be borne both by the implementing agencies (RTC and TAMC) as well as by the contractor. There will be startup costs as well as ongoing costs. We estimated that the internal start-up project management costs for a typical project would be the rough equivalent of one full-time employee for one year. This will provide sufficient staff time to cover various activities, including:

- Negotiating various interagency agreements, including agreements between RTC and TAMC as well as agreements between both those agencies and other participants in the program
- Procuring the contractor that will provide the 511 services (or, in the case of a partnership, negotiating an agreement between the partnering agency and its contractor)
- Time needed for internal meetings and other coordination

We have estimated that each of the two agencies will need approximately one-sixth of a full-time equivalent on an ongoing basis, to oversee the contractor, enter data into the 511 system, and perform other general tasks.

The contractor's start-up project management costs will generally include such things as the development of a program management plan; ongoing costs are estimated as a percentage of the overall project costs. Project management costs also include system administration costs, as these costs tend to apply across the board to all project activities, and are thus hard to allocate to individual project elements. They include items such as servers, communication infrastructure for the project (such as T1 lines), and co-location facilities for project equipment.

5.2.2 Data Collection

All 511 systems need data, though there can be many different ways to define and acquire the needed data. Table 11 summarizes the types of costs that will be associated with different types of data and methods of data acquisition.

Table 11: Data Collection Cost Drivers

Data Type	Startup Costs	Annual Costs	Rough order of magnitude costs
Existing agency flow data (e.g., Caltrans)	Development of software interface; purchase of hardware	Software maintenance and updates	Low to medium
Existing agency incident data (e.g., CHP, County public works)	Development of software interface; purchase of hardware	Software maintenance and updates	Low to medium

Data Type	Startup Costs	Annual Costs	Rough order of magnitude costs
New flow data (from agency-owned data collection equipment)	Purchase and installation of infrastructure, including permitting costs; development of software interface; purchase of hardware	Field maintenance; field communications; Software maintenance and updates	High
New flow data (licensed)	Development of software interface; purchase of hardware	Ongoing license fee; Software maintenance and updates	Medium
Existing Transit Data	Development of software interface; purchase of hardware	Software maintenance and updates	Low to medium
New Transit Data	Purchase and installation of equipment; Development of software interface; purchase of hardware	Field maintenance; field communications; Software maintenance and updates	High

5.2.3 Phone System

Typically, 511 telephone systems have been built for government agencies by private implementers, who charge for the development of the interactive voice response system as well as for every minute of actual phone calls.

5.2.3.1 Development and Provisioning Costs

The most significant cost drivers for the development of the system are (a) the number of simultaneous calls expected; (b) the number of features built into the system; and (c) the complexity of the roadway network. For example, a system capable of playing point-to-point travel times, like the San Francisco Bay Area system does, will be more expensive than a system that simply plays back traffic incidents. A system that has to recognize and play back incidents on a roadway network made up of hundreds of roads will be more expensive than one that has only 20 roads. Also, a system designed to "burst" during emergencies and ensure that no caller ever gets a busy signal will be more expensive to build than a system in which some callers might get busy signals during the busiest periods.

There also might be costs associated with provisioning the telephone system to accept and transfer 511 calls, but they tend to be modest.

5.2.3.2 Ongoing Costs

Different phone system providers have different business models and cost structures. A typical example includes a monthly fee, a per-minute cost for incoming calls, and a fee for annual tuning and recalibration of the system.

5.2.4 Web Page and Mobile Applications

As with the other elements of a 511 system, a web page can have a lot of functionality, for comparatively more money, or it can serve more as a clearinghouse for existing information, in which case the costs can be significantly lower.

5.2.4.1 Development Costs

The primary costs for a web page will be for the software and graphic design needed to make a functional, user-friendly website. While there are some fixed costs involved in this process, most of the costs will depend on the level of complexity of the site. The level of complexity refers to both the functionality of the site, but also to the overall site architecture, in terms of the number of total pages, how they inter-relate, as well as underlying database architecture needed to run the site. Mobile applications are generally based on the existing web site, but do require development so that they are compatible with the various platforms (iPhone, Android, BlackBerry).

5.2.4.2 Ongoing Costs

The key ongoing costs for web pages and mobile applications will be the domain and hosting fees, communications costs, and ongoing software monitoring and maintenance.

5.2.5 Marketing

Because 511 is, in essence, a consumer service, it is useful only if the general public knows about it and is motivated to use it. Most 511 services use some kind of marketing, but the level of effort (and therefore cost) varies dramatically from region to region.

5.2.5.1 Development Costs

The up-front costs for marketing would include such things as:

- Developing a marketing strategy
- Developing a brand for the 511 service
- Developing graphics and a toolbox of materials to support the brand and the strategy
- Implementing fixed-infrastructure marketing, such as 511 highway signs

5.2.5.2 Ongoing Costs

The ongoing costs for marketing would include regular advertising, printing and distributing collateral, staff time needed to support outreach events and activities, and related items.

5.3 Funding Options

There are no hard and fast rules for how to fund 511 systems. Generally, implementation can be funded using federal transportation funds as well as various state and local funds. Typically, deploying agencies use state and local funds almost exclusively to fund ongoing operations. In California, some deployers (most notably Los Angeles) have used Service Authority for Freeway and Expressway funds to support their 511 systems. TAMC and RTC, as the Service Authorities for Freeways and Expressways for their regions, could consider this approach.

Many 511 deployers have, in the last several months, increased their exploration of using the assets of a 511 system to generate revenues to fund the systems, in whole or in part. San Diego has been implementing revenue generation tools for several years, Massachusetts recently deployed a 511 system at no cost to the state Department of Transportation, and both Virginia and Ohio are conducting procurements in an attempt to get self-supporting systems.

In these systems, revenue is generally expected to come from the following sources:

- Selling advertising on the 511 web page and mobile applications.
- Selling sponsorships on the 511 telephone system (so that the introductory greeting would be something to the effect of "Welcome to the Monterey Bay Area 511 System, brought to you by XYZ Company. To hear more about XYZ, say 'more information'. Otherwise, you can ask for information about traffic, transit, ridesharing, or other types of transportation. Please tell me what you'd like."
- Providing referrals to related services, such as towing companies or taxicabs, in exchange for a payment for each referral. San Diego has implemented such a system, but has not generated a significant amount of revenue from it.
- Selling advertising on 511 highway signs (see Figure 95).
- Partnering with local tourist attractions to generate funding for project elements that would help them (such as real-time parking information).

Figure 95: Sponsored 511 Highway Sign

6 Risks and Barriers

Virtually any project will face barriers and risks that will make it challenging to implement. This is especially true in these times of reduced budgets and limited government funding. This chapter highlights the risks that might be faced by a potential 511 deployment in the Monterey Bay Area.

The key risks can be summarized as follows:

- Institutional Risks: These include any risks related to agreements and cooperation among the various public agencies needed to make the project a success. Specific risks are related to funding availability and allocation, the ability to get the appropriate agencies involved in the project, and the ability to keep them involved.

- Technological and Schedule Risks: These are risks related to the actual implementation, and have to do with the ability to implement the project on schedule and to keep it functioning once implemented.

- End User Risks: These are risks that are related to how and whether the ultimate users—travelers in and around the Monterey Bay Area—actually use the system. It is related to whether the system, as deployed, actually meets their needs.

- Distracted Driving Risks: As distracted driving becomes a more important concern, it will be essential to deploy the system so that it does not encourage people to engage in unsafe behaviors.

6.1 Institutional Risks

6.1.1 Funding

The key issue for an operational program is ensuring that funding is available, not just to implement the program, but to operate it indefinitely. Once a system is up and running and the general public is accustomed to using it, it will be important to be able to continue to support it. Moreover, as a system becomes more popular, it is likely that costs will increase, since the system will need to have higher capacity to handle more users.

Funding has two components, availability and need. Need is driven by the complexity of the system, as discussed in the Evaluation Criteria, Section 7.1. When designing the system, it will be important to work to keep both the implementation costs and the ongoing operations costs as low as is possible given the desired functionality.

The other key component of funding is availability. Currently, the planning and administration budgets of both the RTC and TAMC are approximately $2.5 million not including funds dedicated to specific projects, ongoing programs and capital projects. Absent additional funding, the costs to implement and operate a Monterey Bay Area 511 system will have to come from existing resources.

Funding issues can be mitigated in a number of ways. One would be to procure a system supported by sponsorship (discussed in more detail in Section 7.2.5), but this carries risks of its own. If, for example, such a system is deployed but it turns out that the revenue forecasts were not achievable, the developer may abandon the system, leaving the region without a 511 system after the public becomes used to it. Another way to mitigate funding risks is to secure a dedicated funding source, such as Service Authority for Freeways and Expressways (SAFE) funds. Other California regions have used SAFE funding to support their 511 systems.

6.1.2 Other Institutional Issues

Institutional issues can arise on operational projects when different agencies—which likely have different overall objectives—need to cooperate in order to have a successful project. Examples of the agencies that will likely need to be involved in the project, and their projected roles, are shown in Table 12. These agencies must not only be willing to participate, but also must be able to provide reliable, useful data for the system.

Table 12: Partner Agencies and Their Roles

Agency	Role	Effect if Not Involved	Likelihood of Risk Occurring
RTC	Co-project leader.	Virtually impossible to implement in Santa Cruz County.	Very low
TAMC	Co-project leader.	Virtually impossible to implement in Monterey County.	Very low
Caltrans	Installing and maintaining field equipment; providing traffic speed data through the Performance Measurement System; and providing access to the road closure database.	Valuable freeway data not available and/or not current.	Moderate
CHP	Providing incident data through computer-aided dispatch system.	Valuable freeway data not available and/or not current.	Very low
Local transit and rideshare partners	Provide transit data and transfer numbers.	Data and contact numbers may not be current.	Varies

All of these institutional risks can be mitigated by ensuring that all potential partners are, at a minimum, aware of the project and, ideally, supportive of it. In this instance, RTC and TAMC staff have done a good job to date of keeping partners involved, seeking their feedback, and making sure that they know that they are extremely valuable to the success of the project. This work will need to continue through the feasibility study, the implementation plan, implementation of the project, and ongoing operations.

6.2 Technological and Schedule Risks

Technological risks are those risks related to the actual deployment of the project, and they include such things as:

- Delays in implementation
- Software failures
- Hardware failures
- Communication failures
- Field equipment failures
- Technological Obsolescence

Intelligent transportation systems in general and traveler information systems in particular have become more mature industries, and are less prone to technological risks than they were even ten years ago. That said, there is still the possibility that these risks will affect a system's implementation or operations. Table 13 discusses the risks, the potential impact, and the mitigation strategies for each one.

Table 13: Technological Risks

Risk	Impact	Likelihood of Risk Occurring	Mitigation Strategy
Delays in implementation	Project takes longer to implement than planned, potentially increasing costs	Moderately high	Do not seek "state-of-the-art" solutions; contract with experienced vendor. Seek solution that can be implemented in stages.
Software failures	Elements of system (phone, web page, underlying systems) fail when needed	Moderate	Select proven solution; have rigorous acceptance testing.
Hardware failures	Elements of system (phone, web page, underlying systems) fail when needed	Low	Same as with software, but also build in redundancy.
Communication failures	Elements of system (phone, web page, underlying systems) fail when needed	Low	Consider implementing redundant communication systems; use reliable co-location facility for hosting.

Risk	Impact	Likelihood of Risk Occurring	Mitigation Strategy
Field equipment failures	No real-time data available from failed equipment	High for individual components	Work with equipment owner (such as Caltrans) to monitor equipment; use other technologies to provide data.
Technological Obsolescence	System cannot be adapted to changing needs or technologies.	Moderate—depends on technology deployed	Use requirements rather than specifications to procure system, putting responsibility on contractor to remain current.

6.3 End-User Risks

End-user risks are those risks related to how the ultimate users of the system perceive and interact with it. Ultimately, if end users do not use the system, or use it but do not find that it meets their needs, the system will not be a success.

6.3.1 Perceived Need

The first key risk is that the targeted user groups (which will include a wide cross-section of the general public in the Monterey Bay Area) do not feel that there is a need for a government-provided 511 system. This could be because they feel that current information meets their needs; because they don't have enough flexibility in their travel plans to benefit from better information; or for other reasons.

Mitigation of this risk has already begun, with the outreach done as part of Task 1 of this project. The results of the survey and the stakeholder outreach suggest that there is a need for some level of traveler information.

6.3.2 Data Availability

Another risk from the end-user perspective is that there is a need for a traveler information system, but that it doesn't provide enough data to meet the need. As discussed in Section 4, there are certain types of data—in particular real-time transit arrival information—that are not currently available. Although real-time traffic flow data can be procured from private sector vendors for use on all dissemination channels, it might be too costly to implement for some of them, in particular the telephone system. Travelers who want that information are liable to be disappointed by what might be available on a 511 system. This is particularly true for travelers who are accustomed to seeing real-time speed information (in the form of a red-yellow-green speed map on various internet sites).

This risk can be mitigated by (a) managing expectations of what the system can and cannot do, (b) working to develop the desired data sources; and (c) making sure that the data that is provided is accurate, timely, and useful.

6.4 Distracted Driving Risks

Concerns over distracted driving have prompted a range of responses, including bans on using cellphones while driving unless in a hands-free mode, as well as bans on texting while driving. It will be important, especially given the participation of public safety agencies such as the CHP in this project, to minimize the chances that any 511 system that is developed increases the risks of distracted driving. There are three ways to mitigate this risk.

First, all project communications and marketing materials should make it clear that any 511 applications should be used safely. For the telephone applications, this means that drivers should be reminded about California's law banning the use of cell phones while driving unless they are in a hands-free mode. For mobile web pages and other mobile applications, the applications themselves should require an acknowledgement that they are not to be used while driving as well as a reminder on the application itself to not use them while driving, as shown in Figure 96, a beta version of the Hawaii DOT mobile application.

Figure 96: Mobile Application with Distracted Driving Warning

Second, marketing and outreach materials, particularly with project partners, stakeholders, and media, should emphasize the ways in which 511 and traveler information can enhance safety. For example, informing people of congestion and crashes allows them to choose alternate routes or modes, and can reduce the likelihood of secondary crashes.

Third, we should explore ways to use technology to make drivers' interaction with the 511 system safer.

7 Evaluation of Alternative Models and Overall Findings

This chapter lays out criteria that will be used to evaluate the alternative models of a 511 traveler information system, describes those potential models, and then applies those criteria to the models.

The evaluation criteria categories are:

- Cost (deployment and operating)
- Functionality
- Deployability
- Deployment Risks
- User Needs

Initially, the evaluation criteria included Systemic Effects. These criteria relate to how well a 511 system will work to improve the functioning of the transportation system and other related activities. They include:

- Benefits to the transportation network (i.e., assessing whether the 511 system will be likely to reduce congestion, support mode shifting, and so forth).
- Benefits to the environment (i.e., assessing whether the 511 system will be likely to reduce emissions or otherwise help to improve the environment)
- Benefits to the economy (i.e., assessing whether, by improving the transportation system or in other ways, the 511 system will be likely to benefit the economy of the Monterey Bay region).

As discussed in Section 5.1.2, these benefits exist, but they are difficult to calculate for 511 systems in general, making it even more challenging to assess how different 511 deployments might have different benefits. After assessing these criteria, therefore, it was decided that they did not help make the decision about whether and which kind of 511 system to deploy.

We used the criteria listed above to evaluate the following potential models:

- Contract for full deployment of 511 system (phone and web)
- Build 511 system in-house
- Share resources with another 511 system, adding new data as needed
- Create web-based traveler information hub using existing information available on the internet
- Build advertiser- and sponsor-supported system so that there are no public costs

- Do nothing

7.1 Evaluation Criteria

This section lays out the evaluation criteria that the RTC and the TAMC will use to determine whether to proceed with the development of a 511 traveler information system for the Monterey Bay region. It is important to note that the evaluation criteria that are discussed here can, at best, provide guidance in the decisions to be made concerning a 511 system. There are no hard and fast rules that will enable the RTC and the TAMC to make their decision.

The primary trade-off, and thus the primary set of evaluation criteria, will be related to the costs of any proposed system compared to its functionality. As a general rule, as functionality increases, so do costs. In addition to cost and user functionality, though, there will be evaluation criteria related to facets of the deployments of the system and the risks that any particular deployment model will be subject to.

Figure 97 provides a summary of the proposed evaluation criteria. The remainder of the section provides detail on these criteria.

Figure 97: Summary of Evaluation Criteria

7.1.1 Costs

Costs for each specific model are discussed in Section 5.2.

7.1.2 Functionality

Table 14 provides an overview of the ranges of functionality that can be achieved in each key project area. It does not attempt, at this point, to recommend the appropriate level for a future Monterey Bay Area 511 system.

Table 14: Range of Possible Functionality

Functional Area	Examples of High Functionality	Examples of Low Functionality
Project Management	• Dedicated consultant project manager • 24x7 technical support • Redundant system in event of primary system failure	• Part-time project management • Top-level support only during peak periods
Data Collection and Acquisition	• Full flow data on all area freeways, arterials • All area incidents • Transit arrival information • Real-time ride matching	• Incorporates only existing roadway data • Bus schedules and link to trip planner
Telephone System	• Full grammar recognition throughout system • Sufficient bursting capacity for busy periods • Easy to modify • ADA compliant	• Hierarchical menus • Busy signals
Web Page and Mobile Applications	• Professional looking user interface • Well-organized, with emphasis on graphic uses (camera images, maps) • ADA compliant • Takes advantage of latest Web programming languages	• Made up mostly of links to other web services • Relies on old technologies and doesn't offer panning and zooming, for example
Marketing	• Comprehensive marketing plan • Incorporates consumer marketing approaches	• Marketed to agencies, not to travelers
Overall Provision of Traveler Information	• One-stop shop for traveler information • Multi-modal • Available 24x7 across different delivery platforms	• Disorganized information sources • Confusing delivery mechanisms
Ease of Use	• Fully voice-responsive telephone system • Web page with clear links, Google-type map interface	• Poorly designed or implemented interactive voice response system • GIS-based map that doesn't support in-browser panning and zooming

This table only provides examples of some of the different levels of functionality that can be provided, and it is not meant to suggest that a system with high functionality in a given

category is "better" or that one with low functionality is "worse" for the Monterey Bay Area. That decision can only be made after weighing all of the relevant criteria in the context of all of the information gathered during Phase 1 of this project.

7.1.3 Deployability Criteria

There are also criteria related to how the system gets deployed. The first one concerns the expandability and scalability of the system. This has two primary components. First, due to potential funding constraints, it might be necessary to implement a 511 system in a series of stages. Thus, it would be important to have a system that could be deployed incrementally, and could be expanded functionally over time. Second, there is the possibility that, at some point, San Benito County might want to join the system, so the ability to expand geographically would be important.

Selecting a data collection system – should it be decided that additional freeway data is needed – presents another set of deployability criteria. It is important to choose the right data collection system to meet the project's needs, because without good data, the system will not be able to provide useful information to travelers. Choosing to deploy equipment in the freeway right of way can be costly and time-consuming, in part because of the permitting process. Selecting a vendor for licensed data presents much lower initial costs, but creates a risk if the vendor goes out of business or cannot meet its contractual obligations. Assessing which system provides the best data with the least cost and risk will be essential.

7.1.4 Deployment Risks

In addition to cost and functionality, it is important to assess the risks inherent in the various models.

These criteria all relate to the risks inherent in any of the chosen deployment models. They are:

- Institutional Risk (i.e., is the chosen deployment model subject to risks related to institutional relationships or arrangements?)
- Technical Risk and Reliability (i.e., does the chosen model rely on unproven or speculative technologies?)
- Schedule Risk (i.e., can the system be deployed incrementally to align with funding availability, and can the selected elements be deployed in a timely manner?)
- Mitigation of Proximity to San Francisco 511 (i.e., does the chosen model duplicate or overlap with the San Francisco 511 system in a way that will cause confusion or other issues?)

7.1.5 User Needs

Discussing functionality and cost makes no sense without assessing just what it is users need. At the highest level, there are two components of user needs:

- What are the traveler information needs of the various user groups?

- Which of those needs are currently met by existing options?

7.1.5.1 Traveler Information Needs

The results of the needs assessment show that there are not dramatic differences in what the various user groups want from an eventual 511 system. The key elements that travelers are interested in are shown in Table 15.

Table 15: Summary of User Needs

	Content	Delivery Mechanisms
Top priorities	• Driving-related information • Collisions and incidents • Congestion and speed information • Construction information • Emergency Information	• Website • Smart phone applications • Telephone • Alerts
Lower-tier priorities	• Information about other modes • Transit information • Travel times • Ridesharing, bicycling, and pedestrian information) • Information about tourist attractions	• Radio • Changeable message sign • Television

In addition, the results of the user outreach steps suggest that travelers want one source of traveler information for the region. In addition, it will be important that the information be available to all relevant groups in the area, regardless of the content, including Spanish-speakers and people with disabilities.

7.1.5.2 Utility of Existing Options

For many reasons, not least of which are the financial constraints, any Monterey Bay Area 511 system should strive to not duplicate existing traveler information resources. To take one obvious example, it would not make sense for the potential system to provide point-to-point driving directions, since that type of information is readily available from many other sources.

7.2 Possible Models

The purpose of this section is to describe the various models that can be used by government agencies to deliver traveler information to the public.

While there could, conceivably, be an almost infinite variety of models, they effectively fit into the following groupings. They are roughly ordered from the largest public sector commitment to the smallest.

- Contract for full deployment of 511 system (phone and web)needed

- Build 511 system in-house
- Share resources with another 511 system, including new data where needed
- Create web-based traveler information hub using existing information available on the internet
- Build advertiser- and sponsor-supported system so that there are no public costs
- Do nothing

The models that were initially considered are summarized in Table 16.

Table 16: Summary of Traveler Information Models

Model	Description and Features	Examples
Contract for full deployment, including data	• Full system • Robust data • Phone and web access • Generally implemented by consultant team	• San Francisco Bay Area
Build system in house	• Full system • Generally uses existing data • Phone and web access • Implemented by in-house agency staff	• Washington • Oregon
Share resources	• Can take many different forms (partnership, franchise) • Features vary based on partnerships' decisions • Two very different models are explored in Section 7.2.3.	• San Luis Obispo
Web hub	• No telephone application • Consolidates existing information • Additional data can be deployed, but cost estimate does not include data • High level of content control	• No existing model
Revenue Generation/ Sponsorship	• Supported with advertising and sponsorships • No government agency costs • Quality may be suspect	• Massachusetts • Ohio (procurement underway) • Virginia (procurement underway)
Do Nothing	• No consolidated information source available. • Every agency provides its data as it sees fit.	• Texas • Illinois

For reasons discussed below, the project team decided that it was not worthwhile to generate costs for all of the models. The models for which we estimated costs are full deployment, sharing system resources with the Sacramento Area Council of Governments without procuring new data, sharing resources with the Metropolitan Transportation Commission with new data, and developing a web hub. The following subsections describe the various models in more detail.

7.2.1 Full Deployment

This model includes a full deployment of all 511 functionality, including the following:

- Development of interfaces to incorporate existing data sources, which would be things such as the CHP computer-aided dispatch System and the county public works departments for the Monterey Bay Area.
- Development of software to incorporate all incoming data into one geo-referenced database and to prepare it for dissemination to the general public.
- Work with wireless and landline telecommunications providers to recognize 511.
- Development of an interactive voice response telephone system to provide up-to-the minute traveler information and to transfer callers to other agencies, as needed.
- Development of a web-page with real-time traveler information, a traffic flow map, other appropriate information, and links to other agencies.
- Development of mobile applications to provide subsets of the information, as desired.
- Procuring hardware and hosting facilities, as needed.

Contractually, this type of service would generally be provided by a contractor team working for the public agency. The contract would most likely be for a fixed price, and the team would probably have various subcontractors that are experienced in the various elements of the project. There would be a substantial project management component in addition to the substantive requirements.

The best example of this model is the San Francisco Bay Area 511, developed by the Metropolitan Transportation Commission. Beginning in 2000, the Metropolitan Transportation Commission embarked on a program to deploy new data collection systems, integrate existing systems, and make the resulting data stream available through as many dissemination channels as possible.

Traffic data collection costs for a full deployment model are based on purchasing data from a private transportation data provider such as INRIX with $54,000 startup costs and $216,000 annual costs, in addition to incident data with a $250,000 startup cost and $25,000 annual operating costs. The costs for collecting transit data is based on a startup cost of $352,000 to deploy an automatic vehicle location system for Santa Cruz Metro, and $100,000 for Monterey Salinas Transit in developing software to make bus arrival information available. There is an annual cost of $48,400 from both agencies. In addition, there are data integration costs of $50,000 for startup and $12,500 for annual operating costs for each agency. Phone costs

assume a $4,000 monthly fee, a per-minute cost for incoming calls ($0.50/ call, 3,000 calls/month and 1.67 minutes per call), and a $25,000 fee for annual tuning and recalibration of the system.

The specific costs included in the estimate shown above are shown in Table 17.

Table 17: Detailed Data Collection Cost Estimates

Data Collection Element	Startup Costs	Annual Costs
Freeway Flow Data (INRIX data, as described in Section 4.3.1.1)	$54,000	$216,000
Incident Data (5 interfaces, as described in Section 4.3.1.2)	$250,000	$25,000
Real Time Transit—Santa Cruz Metro	$352,000	$48,400
Real Time Transit—Monterey Salinas	$100,000	$0
Bicycle Trip Planning	$150,000	$50,000
Total	**$906,000.00**	**$339,400.00**

Cost estimates for the phone system are shown in Table 18.

Table 18: Phone System Ongoing Costs

Ongoing Cost Element	Price per unit	Units	Annual Cost
Monthly Fee	$4,000	Monthly	$48,000
Calls	$0.50	Per Minute	$30,000
Annual Tuning	$25,000	Annually	$25,000
Total			**$103,000.00**

Total cost estimates for this model are shown in Table 19.

Table 19: Cost Estimate: Full Deployment

	Startup	Annual ongoing costs
Project Management	$159,600	$69,600
IVR	$450,000	$103,000
Web	$300,000	$60,000
Mobile Applications	$50,000	$10,000
Data Fusion	$500,000	$75,000
Data Collection--Traffic	$54,000	$216,000
Marketing	$25,000	$50,000
Total	**$1,538,600**	**$583,600**
Real Time Transit - Monterey	$150,000	$12,500
Real Time Transit - Santa Cruz	$402,000	$60,900
Total -- with Real Time Transit	**$2,090,600**	**$657,000**

7.2.2 Build 511 System In House

Under this option, the deploying agency performs all of the development work using in-house resources. A system built in this manner will generally have the same features as those described in Section 7.2.1 depending on the desire to enhance existing data resources. Notable examples of this deployment model are the Washington and Oregon systems, which were both developed by state Department of Transportation personnel, although the actual interactive voice response system operations were contracted out to a vendor. Performing the work in-house requires staff who are software developers, database developers and administrators, network and system administrators, and web developers and designers. Building a 511 system in-house is not a viable model due to the need to hire a large number of software developers, information technology staff, and so forth, which are beyond the scope of TAMC's and RTC's current hiring practices. Because this option is not considered feasible at this time, this model will not be considered further.

7.2.3 Share System Resources

There are various ways in which this model could be implemented, but they all share some common goals and features. The primary advantage of sharing resources is to more efficiently use capacity on the phone system and web page, as well as to reduce other fixed costs, such as communications and hosting.

In all cases in which system resources are shared, it is important to understand that, for the most part, the ability to share resources covers only the interactive voice response system, the web page infrastructure, some communications, and hosting for the various servers needed to operate a 511 system. Because every geographic region is different, each area needs its own geographically accurate database to allow information on 511 to be reported. The level of effort to do this depends on the size of the area and the complexity of the road network. Although every region's needs are different, it is reasonable to assume that at least half of the

cost of a traditional 511 system is for the phone and the web, so sharing resources would reduce that portion of the total project cost.

As part of the team's investigation of the possibilities of partnering with other California systems, we sent the following questions to the 511 project managers across the state, including the Metropolitan Transportation Commission, Los Angeles Metro, the San Diego Association of Governments, the Inland Empire, the Sacramento Area Council of Governments, and the San Luis Obispo Council of Governments. The San Diego Association of Governments is in the process of reevaluating its current system, and therefore is not a feasible candidate at this time for sharing a system; because the San Luis Obispo Council of Governments uses the San Diego system's infrastructure, it is likewise not a feasible partnership candidate. The project team has also had discussions with the Metropolitan Transportation Commission and the Sacramento Area Council of Governments, which are summarized below. The Sacramento system's traffic map web page includes Google traffic information in a color-coded format. Although the source of Google traffic data is not known, the Monterey Bay Area is covered on that congestion map. The Sacramento partnership would also be able to utilize the traffic congestion information from the Caltrans detection equipment once it is operational to the PeMs system. The current MTC system's traffic map relies heavily on Caltrans congestion data, which is not currently available for the Monterey Bay region. MTC is planning to acquire traffic data from a third party source in order to display congestion information for our area on the MTC 511 web page.

Table 20 shows the questions that were sent to the other 511 programs.

Table 20: Questions Sent to other CA 511 Programs

Phone System
Does your system currently have sufficient capacity for all of your system's needs (both normal and during periods of high use)?
Does it have sufficient capacity to handle expected growth in call volume?
Does adding capacity require adding physical infrastructure, or can it be done through simpler methods?
What would be the level of effort required to add new recognitions and locations to the IVR? Assume that the system would need to include no more than 10 new roadways, no more than 20 new cities, no more than 10 new points of interest, 2 transit agencies, 2 rideshare agencies.
Data Fusion/Processing
What modifications, if any, would be needed to incorporate data from the Santa Cruz/Monterey region? Assume that the data would include incident data as well as flow data, and would be in a standard format.
Can your system accommodate processing and disseminating real-time transit data?
Web Page and Mobile Apps

Is your internet and mapping solution able to support a web page for the Santa Cruz/Monterey region?
Does your system have any mobile applications? If so, can they be extended to include the Santa Cruz/Monterey region?
Does your system have the capability to stream video from CCTVs?
Cost Estimates/Timing
What would we need to provide to get rough cost estimates for entering into a partnership with your system?
How much time is remaining on your current contract? Do you have the ability to extend that contract, and if so, do you intend to do so?
What is your best estimate of how long it would take to implement the changes needed to support our system, should we decide to partner?
Administration
Should we decide to partner, is this a decision that will require actions from your Board of Directors or Commission? Do you expect it to be a controversial topic? How long do you estimate the decision-making process to take?
What types of funding does your organization use to support the 511 system? Are there any concerns relating to the longevity and stability of these funding sources?
What is the level of project management support offered through your consultant? (Is there 24/7 technical support or is there only top level support during peak periods?)

7.2.3.1 Join Metropolitan Transportation Commission System

The Metropolitan Transportation Commission operates one of the most ambitious and complex 511 systems in the country. A partnership with the Metropolitan Transportation Commission would provide the most seamless system, in that it would essentially create one system covering the nine-county San Francisco Bay Area as well as Monterey and Santa Cruz Counties.

For the RTC and TAMC to partner with the Metropolitan Transportation Commission on a 511 system, would require the following:

- The RTC and TAMC would have to come to an agreement with the Metropolitan Transportation Commission about scope and costs. Items to be discussed would include: new freeway data collection; acquisition of local road and street data; whether and how to include MST and SCMTD in the Metropolitan Transportation Commission trip planner; new real-time transit data; how to accommodate ridesharing, bicycling, and pedestrian information; call routing; and other related topics. The ultimate functionality would depend on the outcome of these negotiations.

- The Metropolitan Transportation Commission would have to amend its contract with SAIC, its current 511 system provider, to accommodate the additional work.

- SAIC would design and implement the additional functionality to cover Santa Cruz and Monterey counties. This would include things such as:

    - Purchasing additional traffic speed data for the Monterey Bay Area Developing the geographic database and link database needed to include information on the telephone and web.

    - Modifying MTC's travel time calculation processes to (a) include points in Santa Cruz and Monterey Counties and (b) create trips among those points and between those points and the points in the current system. This would be among the most expensive and difficult element in a partnership with MTC, but would provide significant benefits to callers throughout the San Francisco and Monterey Bay regions.

    - Modifying the interactive voice response system so that it recognizes and plays information on the roads and highways in the Monterey Bay Area.

    - Adding Monterey Bay Area agencies to the relevant sections in the interactive voice response system.

    - Expanding the web page traffic map to include the Monterey Bay Area.

RTC, TAMC, and ICx staff have discussed the possibility of partnering with MTC on their 511 system. Although joining the MTC system would signify a more seamless integration between the nine Bay Area counties and the Monterey Bay region, with travel time calculation, a centralized and comprehensive ridematching system, and a transit trip planner that facilitates cross county travel, the MTC system is comparatively expensive to join. This is mainly due to the high cost associated with acquiring traffic data in order to display congestion information on the 511 web page. It should be noted that MTC is considering purchasing new traffic congestion information to address the deficiency in no traffic speed data on their current map for local roads. The Monterey Bay region could be included in this data purchase. Additionally, if our agencies were to pursue a partnership, MTC would remain as the main decision maker for administering and managing the traveler information system. Therefore, the arrangements can be subject to higher institutional risks, and may also limit system expandability and scalability. MTC anticipates revisiting its role in the distribution of traveler information, which adds an element of uncertainty to a potential partnership with them.

While discussions have been preliminary, project staff have received enough information from MTC and its contractor to develop preliminary cost estimates as shown in Table 21.

Table 21: Cost Estimate: MTC Partnership

	Startup	Annual ongoing costs
Project Management	$159,600	$79,800
IVR	$183,575	$39,667
Web	$183,575	$39,667
Mobile Applications	$50,000	$10,000
Data Fusion	$183,575	$39,666
Data Collection--Traffic	$40,500	$162,000
Marketing	$25,000	$50,000
Total	**$825,825**	**$420,800**
Real Time Transit - Monterey	$150,000	$12,500
Real Time Transit - Santa Cruz	$402,000	$60,900
Total -- with Real Time Transit	**$1,377,825**	**$494,200**

7.2.3.2 Partner with Sacramento 511

The project team has also discussed the possibility of partnering with the Sacramento Area Council of Governments, which operates the 511 system for the Sacramento region. The Sacramento Area Council of Governments has discussed with its 511 contractor, Castle Rock, ways to incorporate a Monterey Bay Area 511 system within its infrastructure. The Sacramento 511 web page is shown in Figure 98.

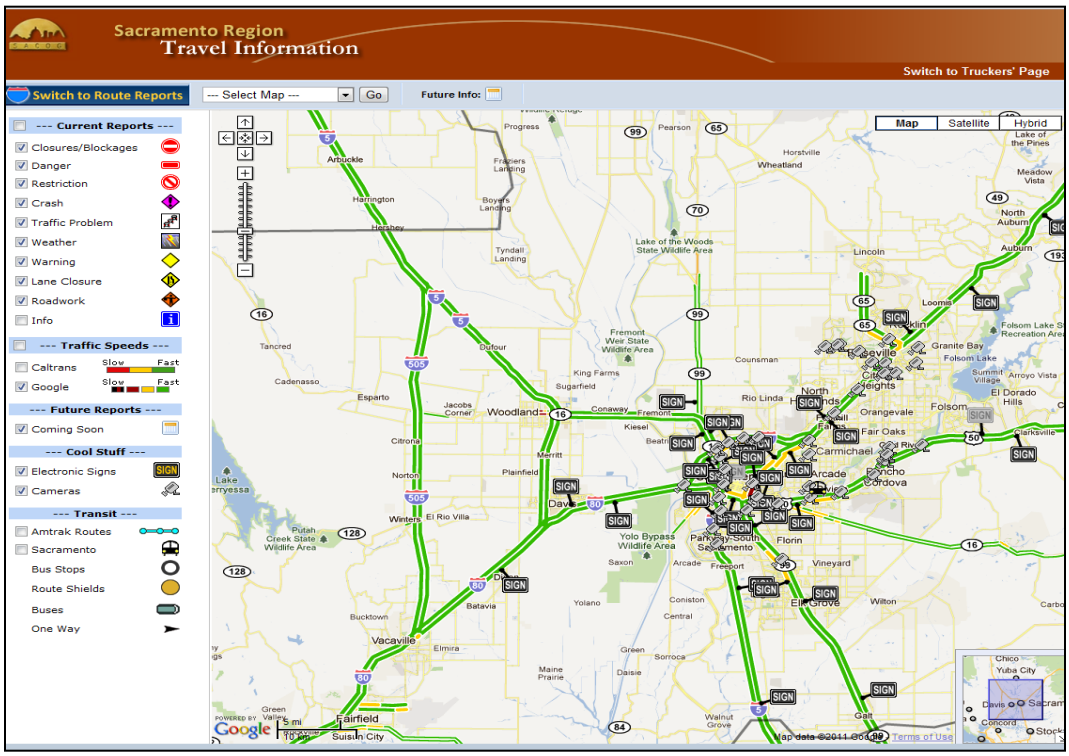


Figure 98: Sacramento 511 Traffic Map

Under this approach, the RTC and TAMC would partner with SACOG to develop a 511 system for the Monterey Bay area that would include:

- A 511 interactive voice response telephone system with CHP incident data, construction data, emergency information, manually entered incidents and once available, PeMs traffic congestion data.

- Full-feature 511 traveler information web page, including incidents and a red-yellow-green speed map (using the existing Google traffic layer), transit routes and stops, CHP incidents, County Construction Projects, Closed-Circuit TV locations and video, Changeable Message Sign location and messages, emergency information and once available, PeMs (Caltrans) traffic congestion data.

- Ability to manually enter event information for either the phone or web page

- Personalized "My Reports" text and email notifications for account holders

- Mobile web site

In addition to what SACOG could offer in partnership with RTC and TAMC, RTC and TAMC would develop a full website that would include multimodal information such as transit trip planner, rideshare information, and bicycling and pedestrian resources. Mobile applications would be developed to support user needs and, if feasible, hands-free use for drivers. A marketing strategy to inform travelers about the 511 service would also be developed. The costs for this system are included in Table 22.

Table 22: Cost Estimate: Sacramento 511 Partnership

	Startup	Annual ongoing costs
Project Management	$138,000	$66,500
IVR	$40,000	$7,750
Web	$100,000	$37,375
Mobile Applications	$50,000	$10,000
Data Fusion	$140,000	$12,375
Data Collection--Traffic		
Marketing	$25,000	$50,000
Total	**$493,000**	**$184,000**
Real Time Transit - Monterey	$150,000	$12,500
Real Time Transit - Santa Cruz	$402,000	$60,900
Total -- with Real Time Transit	**$1,045,000**	**$257,400**

7.2.3.3 Partner with other California 511

The only other 511 system to express interest in discussing a partnership with RTC and TAMC was the San Luis Obispo Council of Governments. Due to that system's dependency on the San Diego System, and the fact that the San Diego Association of Governments will soon be

releasing an RFP for a new system, it is not feasible at this time to consider partnering with SLOCOG. In the future, it may be advisable to investigate partnering with San Luis Obispo on its own, due to the geographic proximity.

7.2.4 Web Hub

Under this model, a traveler information system is developed by bringing existing sources of traveler information together into a centralized location via a website and mobile applications. A phone system would not initially be developed under this model. There are numerous sources of existing traffic condition maps that could potentially be embedded onto a Monterey Bay Area 511 website such as Google Traffic, Beat the Traffic, Caltrans Quickmap or PeMs traffic congestion map, Sigalert.com, and so on. These maps provide speed data for highway and often include speed data for arterials as well as construction, collision, and closure information. The Google transit trip planner could also be embedded onto this website as both transit agencies in the Monterey Bay Area have added their route and schedule information into Google transit and thus would work seamlessly between Monterey Bay Area and the outlying regions. Rideshare and multi-modal information and services from Commute Solutions in Santa Cruz County and Commute Alternatives in Monterey County could be linked to from a centralized 511 Monterey Bay Area website. Existing resources for Caltrans traffic camera views, park and ride, freeway aid, bicycling, emergency, weather, and so forth could either be added to the 511 centralized site or linked to from the site.

A version of this model could also include new data feeds discussed above in Section 7.2.1.

The costs for this model would include the following:

- Design and development of the website (including graphic design and optimizing for viewing on mobile devices)
- Web hosting
- Mobile application development
- Ongoing technical support

The costs for this model are shown in Table 23.

Table 23: Cost Estimate: Web Hub

Task	Startup	Annual ongoing costs
Project Management	$89,110	$44,555
Phone System		
Web	$50,000	$25,000
Mobile Applications	$50,000	$10,000
Data Fusion		
Data Collection--Traffic		
Marketing	$25,000	$50,000
Total	**$214,110**	**$129,555**

7.2.5 Sponsorship Supported System

The latest trend in 511 system deployment is the deployment of systems at no cost to the government agency. The private-sector deployers are then responsible for generating, from advertising and sponsorships, enough revenue to cover the costs of the system and their profit, as discussed in Section 5.3.

Because this is a relatively new trend, there is no data available yet to enable a full analysis of the likelihood of succeeding with this approach. There is some concern that the quality of a system provided in this manner might be lower than a system that is paid for by government funds.

As a general rule, it seems that this model is likely to be more successful where there is a large population to support high call volumes and web uses. Evidence from previous attempts to generate revenue from 511 systems in Virginia and San Diego suggest that this type of system is challenging. Both Virginia and Ohio are in the process of procuring 511 systems using this model.

7.2.6 Do Nothing

The last model is to do nothing, and to allow travelers to continue relying on the currently available, decentralized resources identified in Section 3.4 to support their traveler information needs.

7.3 Findings

This section discusses the results of the evaluation criteria in determining the recommended model.

7.3.1 Application of Criteria to the Models

The team assessed how well each model met the evaluation criteria, primarily on a qualitative scale, using high, moderately high, moderate, moderately low, and low as the ratings. The following two tables show the outcome of our evaluation of the models using the criteria described above.

Table 24 summarizes the total cost of each model, along with the key features and benefits.

Table 24: Costs and Features of Selected Models

	Model			
	Full Deployment	**SACOG Partnership**	**MTC Partnership**	**Web Hub**
Deployment Cost	1,538,600	493,000	825,825	214,110
Annual Operations Cost	583,600	184,000	420,800	129,555
Telephone Features			All phone features in this partnership combine MBA highways with SF Bay Area highways	No telephone
Voice Activated	X	X	X	---
Real-time traffic speed for highways	X	Available once Caltrans detection equipment operational in PeMs	X	---
Point-to-Point real-time driving times for highways	---	---	X	---
Highway Incidents	X	X	X	---
Highway Construction	X	X	X	---
Transfer to Transit Agencies	X	X	X	---
Transfer to Rideshare Agencies	X	X	X	---
Emergency Information	X	X	X	---
Ability for MBA to Manually Enter Incident Data	---	X	---	---
Ability for MBA to Manually Enter Emergency Information	---	X	---	---
Web Features				
Map Page with				
• Real-time color coded traffic speed for highways	X	Google Traffic layer (and PeMs layer once Caltrans detection equipment operational)	X	Google traffic or other traffic map provider

	Model			
	Full Deployment	**SACOG Partnership**	**MTC Partnership**	**Web Hub**
• Highway Incidents	X	X	X	X
• Highway Construction	X	X	X	X
• Live traffic camera videos on traffic map	X	X	X	Videos embedded on website, but not on map
• Changeable message sign information	X	X	X	---
• Transit routes and stop information on traffic map	X	X	---	---
• Emergency information banner above traffic map	X	X	X	X
Point-to-Point real-time driving times on highways	---	---	X	---
Embedded Transit Trip Planner	X	X	X	X
Transit schedule information	X	X	X	X
Multimodal information for rideshare, bike, walk	X	X	X	X
Ability for MBA to manually enter incident data for map	---	X	---	---
Ability to manually enter emergency information for map	---	X	X	---
Mobile Devices				
Website optimized for viewing on mobile device	X	X	X	---
One mobile application	X	X	X	---
Personalized Notifications				
Text and email notifications for traffic speed on routes of interest	X	Available once Caltrans detection equipment operational in PeMs	X	---
Text and email notifications for incident and construction data on routes of interest	X	X	X	---

Table 25 summarizes the evaluation at a high level and Table 26 provides details at a finer level. Note that for some criteria (such as functionality), a "high" rating is good. For others, however, such as cost or risk, a "high" rating is least favorable. The tables are color coded, with green representing those criteria that support deploying any particular model, yellow those criteria for which the results are mixed or unclear, and red representing the criteria that weigh against deploying the particular model.

Table 25: Summary Evaluation of Models

Criteria	Potential Deployment Models					
	Full Deployment	**SACOG Partnership**	**MTC Partnership**	**Web Hub**	**"Free" System**	**Do Nothing**
User Needs and Benefits						
Costs						
Functionality						
Deployability						
Deployment Risks						

Key for Table 25 and Table 26
Supports Deployment of Model
Partially Supports Deployment of Model
Argues Against Deployment of Model
Neutral, No Data, or Otherwise Not Determined

Table 26: Detailed Evaluation of Models

Criteria		Potential Deployment Models					
		Full Deployment	**SACOG Partnership**	**MTC Partnership**	**Web Hub**	**"Free" System**	**Do Nothing**
User Needs and Benefits	Content	High	Moderate	High	Moderate	Varies	Low
	Delivery Mechanisms	High	High	High	Moderately High	Varies	Low
	Inter-regional operations	Low	Low	High	Low	Low	Low
	Comparison to Existing Sources	Significantly Better	Better	Better	Same data, better delivery	Better	No difference
Costs	Management and Admin	High	Moderate	Moderate	Moderate	Very Low	None
	Data	High	Low	High	Low	Very Low	None
	Phone	High	Low	Moderate	None	Very Low	None
	Web and Mobile Apps.	Moderate	Moderate	Moderate	Low	Very Low	None
	Marketing	Varies	Varies	Varies	Varies	Very Low	None
Functionality	Data	High	High	High	Moderately Low	Moderately Low	Moderately Low
	Phone	High	High	High	None	Moderate	None
	Web and Mobile Apps	High	High	High	High	Varies	Low
	Overall System	High	Moderately High	High	Moderate	Varies	Low
	Ease of Use	High	Moderately High	High	Moderate	Varies	Low
Deploy-ability	Scalability and Expandability	High	Moderate	Low	High	Low	None
	Data Dependency	High	Varies	Varies	None	None	None
Deployment Risks	Institutional Risk	Moderately High	Moderately High	Moderately High	Low	Moderate	None
	Technical Risk	Moderate	Moderate	Low	Low	Moderate	None
	Schedule Risk	Moderately High	Moderate	Moderate	Low	Moderate	None
	Proximity to SF	Moderate	Moderate	Low	Low	Moderate	None

Applying the evaluation criteria to the alternative models shows the following:

Full Deployment: Full deployment supports user needs, and provides high functionality, but is very costly, and carries a fairly high level of risk. The cost and the risk suggest that this is not a top choice.

Shared Resources:

***Partnering with SACOG*:** Partnering with the Sacramento Council of Governments provides a high functionality with relatively low costs, along with ease of deployment, and meeting most user needs with only moderate risk. Staff from SACOG and its contractor have met with TAMC and RTC project staff and have provided preliminary information about partnering. SACOG is on the verge of launching the second generation of its 511 system, and the system could easily accommodate the Monterey Bay Area's 511 needs. As shown in Table 24 above, this partnership would provide the Monterey Bay Area with a voice-activated 511 system, as well as a robust traveler information web page. The web page currently displays traffic speeds from Google maps, so it would be able to provide traffic data for this region with no additional investment in traffic data. The web page would also display transit routes and stops.

Based on preliminary discussions, project staff believe that this partnership would be both cost-effective and able to be implemented in a comparatively short time. It is one of two approaches still under consideration.

***Partnering with MTC*:** RTC, TAMC, and ICx staff have discussed the possibility of partnering with MTC on their 511 system. Although joining the MTC system would signify a more seamless integration between the nine Bay Area counties and the Monterey Bay region, with travel time calculation, a centralized and comprehensive ridematching system, and a transit trip planner that facilitates cross county travel, the MTC system is comparatively expensive to join. This is mainly due to the high cost associated with acquiring traffic data in order to display congestion information on the 511 web page. It should be noted that MTC is considering purchasing new traffic congestion information to address the deficiency in no traffic speed data on their current map for local roads. The Monterey Bay region could be included in this data purchase. Additionally, if our agencies were to pursue a partnership, MTC would remain as the main decision maker for administering and managing the traveler information system. Therefore, the arrangements can be subject to higher institutional risks, and may also limit system expandability and scalability. MTC anticipates revisiting its role in the distribution of traveler information, which adds an element of uncertainty to a potential partnership with them.

The higher costs, however, provide a higher level of service, in that Monterey Bay Area travelers would be able to get information for trips (including point-to-point real time driving times) anywhere within the nine-county Bay Area region as well as the Monterey Bay Area region. Partnering with the MTC would, meet user needs better than any other system. Partnering with MTC is one of the two approaches still under consideration.

Web-Hub: Developing a web hub to bring together currently available information is extremely cost effective, but has its limitations. A phone system would not be available with this model and data useful for displaying on the traffic map would not be able to be integrated together outside of what is already provided by the traffic map that is utilized (i.e. Google Traffic, Beat the Traffic, Caltrans Quickmap, etc).

Sponsor-Supported System: Developing a sponsor-supported system would have no cost, but it is risky, given the untested nature of "free" 511 systems, and is liable to provide a lower quality service.

Do Nothing: The option to not provide any additional traveler information or to not bring together the current information into one centralized location severely limits users from being able to access the information and change their travel patterns accordingly.

7.3.2 Findings

Based on this evaluation we found that establishing a 511 traveler information service for the Monterey Bay Area is feasible. Specifically, we conclude that partnering with either SACOG or MTC, using their existing 511 system infrastructure, provides the greatest benefit to cost ratio for delivering 511 services to travelers in our region.

In either case, a partnership would provide the Monterey Bay Area with a 511 phone system, and a website with a traffic map and multimodal transportation information, along with the option for personalized route notifications of highway conditions for subscribers. The phone system would include information about traffic speeds, highway incidents and emergency situations. The traffic map web-page would include traffic speed on highways and some local roads, incidents, videos of current traffic conditions, messages currently displayed on changeable message signs, and emergency information. The website would also provide access to multimodal information such as a transit trip planner, rideshare information, and bicycling and pedestrian resources.

This conclusion leads us to move forward with developing the Implementation Plan for 511 in the region.

Next Steps

The next steps for completing the 511 Caltrans Partnership Planning Grant project between the Transportation Agency for Monterey County and the Santa Cruz County Regional Transportation Commission are outlined below.

The key objective of the second part of the 511 planning grant project is to develop an Implementation Plan for delivering 511 services in the Monterey Bay Area that includes the following elements:

- Finalize decision to partner with either the Sacramento Area Council of Governments or the Metropolitan Transportation Commission for 511 based on further analysis of cost, revenue, functionality and ease of partnership
- Plan next steps for building a partnership with the selected organization
- Define the roles, responsibilities and obligations for each participating entity
- Identify specific services to be rendered
- Refine the schedule for phased implementation

- Pursue funding sources
- Develop strategies for working on agreements with telecommunication carriers
- Formulate marketing and outreach strategies

The Implementation Plan is expected to take approximately six months to complete. As quickly as a year after completing the Feasibility Analysis and Implementation Plan, Monterey Bay Area travelers could enjoy an indispensable 511 traveler information resource.

8 Appendix A: Survey Instrument

511 Monterey Bay Area Survey

1. WELCOME TO THE MONTEREY BAY AREA 511 SURVEY

As a potential user of a Monterey Bay Area 511 traveler information system, your opinions about such a system are essential. Responses to this survey will help planners design a system that meets the travel information needs of residents, visitors, and businesses in the Monterey Bay Area.

Questions with an asterisk (*) require an answer.

Esta encuesta es disponible en español aqui: http://www.surveymonkey.com/s/ENCUESTA511

2. AWARENESS OF 511 SYSTEMS

*** 1. Before watching the video, were you familiar with the concept of 511 traveler information systems?**

- ◯ yes
- ◯ no

2. If you answered yes to the last question, how did you first hear about 511 systems?

- ◯ television/radio/newspaper
- ◯ friends/family
- ◯ road signs
- ◯ internet
- ◯ rideshare agency

Other (please specify)

*** 3. How many times have you used a 511 phone system or website?**

- ◯ never
- ◯ 1-5 times
- ◯ 6-10 times
- ◯ regularly

511 Monterey Bay Area Survey

*** 4. Were your experiences using a 511 system basically**

- ◯ positive
- ◯ negative
- ◯ mixed
- ◯ no opinion

3. PLANNING FOR A MONTEREY BAY AREA 511 SYSTEM

*** 1. What type(s) of traveler information would you like to get from a 511 system? Information may be available on a website, by phone or mobile device. (Mark all that apply)**

- ☐ construction zones, detours, road and lane closures
- ☐ help finding a carpool partner or bike buddy to ride with to work or school
- ☐ when the next bus is going to arrive at my stop
- ☐ location of weigh stations and bridge heights
- ☐ estimated travel time between points
- ☐ bicycle information such as routes, maps, and laws
- ☐ parking locations for vehicles and bicycles
- ☐ special event transportation such as shuttles, carpools and/or valet bike parking
- ☐ alternate roads I could take in a disaster, evacuation and emergency response instructions
- ☐ weather conditions
- ☐ bus trip planning including route, schedule and cost
- ☐ location of collisions and an estimate of how long they will take to clear
- ☐ places to get alternative fuel or charge electric vehicles
- ☐ real-time traffic conditions on local streets, roads and highways
- ☐ places I can park to meet my carpool or bus
- ☐ other (please specify)

SECTION 3. PLANNING FOR A MONTEREY BAY AREA 511 SYSTEM

QUESTION *2. Of the information that could be made available through a 511 system, what information would you find most valuable? (Please rank your top three)

Choices provided under the pull down menu

construction zones, detours, and closures
real-time local traffic conditions
estimated travel time between points
location of collisions
emergency response information
weather conditions
places I can park to meet my carpool or bus
parking locations for vehicles and bicycles
help finding a carpool partner or bike buddy
special event transportation
when the next bus is going to arrive
bus trip planning
bicycle information: routes and maps
alternative fuel or electric vehicle charging
location of weigh stations and bridge heights
no preference

511 Monterey Bay Area Survey

*** 2. Of the information that could be made available through a 511 system, what information would you find most valuable? (Please rank your top three)**

	Top Choice	2nd Choice	3rd Choice
See drop down menus.			

*** 3. How would you like to access this information? (Mark all that apply)**

- [ ] via a computer/website
- [ ] by phone
- [ ] have information delivered to my cell phone or mobile device
- [ ] by radio
- [ ] via road signs
- [ ] Other (please specify)

4. How frequently would you use a 511 system if it becomes available?

- ◯ daily (5 days or more a week)
- ◯ 2-4 times a week
- ◯ weekly
- ◯ a few times a month
- ◯ monthly
- ◯ quarterly
- ◯ a few times a year
- ◯ never

4. CURRENT SOURCES OF TRAVELER INFORMATION

Tell us what sources you currently use to get traveler information.

511 Monterey Bay Area Survey

1. traffic conditions

- [ ] phone
- [ ] website
- [ ] radio
- [ ] TV
- [ ] don't know where to go

please list the specific agencies, websites or mobile apps that you use

2. state highways

- [ ] phone
- [ ] website
- [ ] radio
- [ ] TV
- [ ] don't know where to go

please list the specific agencies, websites or mobile apps that you use

3. incidents, collisions and hazards

- [ ] phone
- [ ] website
- [ ] radio
- [ ] TV
- [ ] don't know where to go

please list the specific agencies, websites or mobile apps that you use

511 Monterey Bay Area Survey

4. local bus service

- [ ] phone call to bus company
- [ ] bus company website
- [ ] Google transit
- [ ] printed schedule
- [ ] don't know where to go

please list the specific agencies, websites or mobile apps that you use

5. carpooling

- [ ] local rideshare agency
- [ ] online carpool matching service
- [ ] network of family and friends
- [ ] organize at work or school
- [ ] don't know where to go

please list the specific agencies, websites or mobile apps that you use

6. bicycle and pedestrian information

- [ ] friends and family
- [ ] bicycle shops
- [ ] don't know where to go

please list the specific agencies, websites or mobile apps that you use

7. local streets and roads

- [ ] phone
- [ ] website
- [ ] don't know where to go

please list the specific agencies, websites or mobile apps that you use

8. weather reports

- [ ] phone
- [ ] website
- [ ] radio
- [ ] TV
- [ ] newspaper

please list the specific agencies, websites or mobile apps that you use

9. traveler information for the San Francisco Bay Area, including San Jose

- [ ] phone 511
- [ ] website 511.org
- [ ] data delivered to phone or mobile device
- [ ] radio
- [ ] TV

Other (please specify)

10. Of the sources that you currently use for travel related information, what works?

511 Monterey Bay Area Survey

11. Of the sources that you currently use for travel related information, what's missing?

- [ ] no information about real time traffic conditions
- [ ] no information about whether buses are operating on-time (or detoured)
- [ ] no cell service in certain locations
- [ ] don't have a data plan for my cell phone
- [ ] can't get information about highways, bus, bikes, carpool and local roads from one location
- [ ] can't get information for long distance trips that cross county boundaries
- [ ] other (please specify)

12. What do you perceive are the top 5 benefits of having a 511 system in the Monterey Bay Area?

- [ ] I can choose to travel a different route, depart at a later time, or eliminate a trip altogether by knowing real time traffic conditions and estimated travel times
- [ ] I can eliminate frustration and needless circling by knowing about parking availability at a destination in advance of my arrival
- [ ] I can enjoy peace of mind and be part of the solution by knowing where to go for emergency travel information in the event of a natural disaster or community wide emergency
- [ ] I can make better travel choices by having information about all travel options (driving, carpooling, bus riding or cycling) in the same place
- [ ] I can make the best travel decisions by having accurate and timely status reports on travel conditions
- [ ] I can modify my commute trip and make better choices with user-friendly and easy-to-access information about travel conditions online or delivered to my phone, email or mobile device
- [ ] I can notify people or make alternate arrangements if I can anticipate being late to a meeting or making a delivery due to traffic
- [ ] I can reduce stress if I know what to expect in terms of traffic
- [ ] I can save money and time by making better travel decisions
- [ ] Other (please specify)

13. Do you have any concerns about implementing a 511 traveler information system? If so, please explain?

511 Monterey Bay Area Survey

5. DEMOGRAPHICS

* 1. In what county do you live?

- ◯ Santa Cruz
- ◯ Monterey
- ◯ San Benito
- ◯ Other (please specify)

* 2. How often do you make trips to other counties?

- ◯ daily (5 days or more a week)
- ◯ 2-4 times a week
- ◯ weekly
- ◯ a few times a month
- ◯ monthly
- ◯ quarterly
- ◯ a few times a year

511 Monterey Bay Area Survey

*** 3. Do you consider yourself a member of, or represent, any of the following groups? (Mark all that apply)**

- [ ] employee
- [ ] self-employed
- [ ] employer/business owner
- [ ] chamber or business association
- [ ] trucker
- [ ] safety and/or first responder
- [ ] visitor/tourist
- [ ] teacher
- [ ] student
- [ ] delivery driver
- [ ] transportation provider
- [ ] sustainable transportation user
- [ ] paratransit user
- [ ] non-driver
- [ ] Spanish speaker
- [ ] retired
- [ ] Other (please specify)

*** 4. What is your age?**

- ◯ under 25
- ◯ 25-40
- ◯ 41-55
- ◯ 56-70
- ◯ 70+

511 Monterey Bay Area Survey

*** 5. How did watching the video affect your decision to answer this survey?**

- ◯ it had a big impact on my decision
- ◯ it somewhat affected my decision
- ◯ it did not affect my decision
- ◯ no opinion

*** 6. Are you willing to be part of a focus group or user-testing group as the project progresses?**

- ◯ yes
- ◯ no

*** 7. Are you interested in receiving updates via email as the project progresses?**

- ◯ yes
- ◯ no

8. If you answered yes to question 6 or 7 above, please provide your contact information.

Name:	
Company:	
ZIP:	
Email Address:	
Phone Number:	

9 Appendix B: “About 511” Document

A project to consider a

511 Traveler Information System

FOR CALIFORNIA'S MONTEREY BAY AREA

Monterey Bay Area 511 Feasibility Analysis

Conducted for the
Santa Cruz County Regional Transportation Commission and
the Transportation Agency for Monterey County

What is 511?

511 is a nationally recognized brand for traveler information accessed by phone, internet and/or mobile devices. As of April 2011, 35 states have 511 traveler information systems.

Although the features of 511 systems vary from location to location, they can provide a wide range of traveler information, including:

- Real-time traffic conditions on highways and roads, including travel speeds, accidents, construction, road closures and travel times.
- Transit schedules and real-time transit arrival information.
- Carpool matching services, and bike and pedestrian resources.
- Transportation impacts from weather, special events and emergency situations.

In California, 511 systems exist in the San Francisco Bay Area, Sacramento, Northern California, Los Angeles, San Luis Obispo and San Diego. A Monterey Bay Area 511 system could close the gap in traveler information systems on the Central Coast.

Benefits of 511

511 systems have been shown to benefit the traveling public by:

- Helping one decide how to travel (i.e., by car, bus, bike, etc.), when or if to travel, and which route to take.
- Improving traffic flow and increasing safety by allowing travelers to avoid congestion and other problems
- Managing emergencies more effectively (such as flooding, fires, and other natural disasters) by providing a single source for traveler information and road conditions.

Our Project

This project will assess the need for a traveler information service for the Monterey Bay Area and identify major features, and resources required to implement a potential system. Models to be considered include building a 511 from scratch, franchising another system or bundling existing resources from public and private providers of traveler information. If found to be feasible, an implementation plan will be prepared for this project.

Contacts

For additional information, contact Tegan Speiser, Santa Cruz County Regional Transportation Commission staff, (831 460-3200, tspeiser@sccrtc.org) or Kaki Cheung, Transportation Agency for Monterey County staff, (831 775-4413, kaki@tamcmonterey.org) or view the project website www.511montereybay.org.

10 Appendix C: Interview Protocol

Santa Cruz/Monterey 511 Needs Assessment Interview Guide - June 15, 2011

Introduction:

Thank you for agreeing to be interviewed as part of the Monterey Bay Area 511 Feasibility Study. The study is a joint project of the Santa Cruz County Regional Transportation Commission (RTC) and the Transportation Agency for Monterey County (TAMC). Through this study, the RTC and TAMC will assess the need for a traveler information system for the Santa Cruz/Monterey County area, as well as identify the most desirable features of such a system for this region.

We're interested in talking to you because of your role as [insert appropriate information here for each interview]. Did you have a chance to read the background information we sent you a few days ago? [If not:] That's okay—after the first few questions, I am going to give you a little more background on 511 to help you answer some of my questions.

Transportation System and Information Use:

I'll start with some basic questions about your transportation choices.

1. First, please tell me a little about yourself (your role within your organization, etc.).
2. How do you or your constituents travel around? (constituents - substitute appropriate audience, see table on page 2) use?
3. What kind of transportation information do you or your (constituents) use?
4. How do you or your (constituents) get transportation information now?
5. What concerns does your organization have about the availability of transportation information? How does the availability/lack of availability affect you or your (constituents)?
6. What transportation information do you wish you had access to if it were available?

511 Background:

I would like to tell you a little about 511 traveler information systems in general, so you can get a clearer picture of what the RTC and TAMC are considering—this might be somewhat redundant to the written information we sent out or to what you already know, but it is a good introduction to the next set of questions.

511 is a nationally recognized number for traveler information accessed by phone, internet and/or mobile devices. As of April 2011, 35 states have 511 traveler information systems.

Although the features of 511 systems vary from location to location, they can provide a wide range of traveler information, including:

- Real-time traffic conditions on highways and roads, including travel speeds, accidents, construction, road closures and travel times.
- Transit schedules and real-time transit arrival information.
- Carpool matching services, and bike and pedestrian resources.
- Transportation impacts from weather, special events and emergency situations.

In California, 511 systems exist in the San Francisco Bay Area, Sacramento, Northern California, Los Angeles, San Luis Obispo and San Diego. A Monterey Bay Area 511 system could close the gap in traveler information systems on the Central Coast.

Potential 511 System:

Now I'd like to ask you some questions specifically about a potential 511 system for the Monterey Bay Area.

7. If funding were not an issue, what would the ideal 511 system look like to you?
8. What do you think are the minimum elements of a 511 system for it to be useful?
9. How would you or (constituents) choose to access or use such a system (for example by phone, internet or mobile device)?
10. How could your organization develop or promote a 511 system? (See table below for general prompts.)

Information Sources:

Now I'd like to ask you some questions about how you would learn about services like 511:

11. What sources of information do you rely on to learn about new services like 511? Newspaper, TV, radio, websites, other media? (Please drill down to specifics, like which radio stations, etc.)
12. If we were to implement a 511 system, what type of paid advertising would be most effective in reaching you/your constituents to let them know about it?
13. Are there other methods you would recommend for letting you/your constituents know about the availability of a 511 system?

Close:

Thank you for taking the time to talk with me regarding a 511 system.

Do you have any questions about this project before we finish? [Answer basic questions, or refer to Tegan Speiser, Santa Cruz County Regional Transportation Commission staff, (831 460-3200, tspeiser@sccrtc.org) or Kaki Cheung, Transportation Agency for Monterey County staff, (831 775-4413, kaki@tamcmonterey.org).]

Thank you again!

Organization and Type of Audience/Potential Role

Type	Audiences	Sponsor	Partner	Data Provider	Marketing Support
Public transportation agencies	Constituents, riders	X	X	X	X
Private transportation providers (taxi, delivery services, etc.)	Drivers	X	X		X
Health and safety agencies		X	X	X	
Law enforcement agencies		X	X	X	
Local government		X	X	X	X
Nonprofit social services organizations	Clients		X		X
Advocates (environmenta, bike, seniors, etc.)	Members/constituents		X	X	X
Colleges/schools	Employees, students		X		X
Employers	Employees, customers		X		X
Business organizations	Member businesses		X		X
Agriculture	Growers	X	X		X
Hospitality/tourism	Local businesses Customers	X	X		X