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Traveler Info Testing

ANALYSIS OF WEB-BASED WSDOT TRAVELER INFORMATION: TESTING USERS' INFORMATION RETRIEVAL STRATEGIES

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16. ABSTRACT

This report details the findings of a usability study for the Washington State Department of Transportation (WSDOT) of traffic and weather information on the Web. The purpose of this test was to examine the user experience associated with retrieving traveler information, such as road conditions, traffic congestion, pass information, construction, and weather, from the WSDOT Traffic and Weather site.

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EXECUTIVE SUMMARY

This report details the findings of a usability study of the Washington State Department of Transportation (WSDOT) Traffic and Weather information on the Web. The purpose of this test was to examine the user experience associated with retrieving traveler information, such as road conditions, traffic congestion, pass information, construction and weather, from the WSDOT Traffic and Weather site.

The usability team examined the following research questions:

- What types of information do users typically seek out when traveling in Washington? Do they look for traffic, weather or construction information?
- When searching for a specific type of information on the Traffic and Weather site, can users find what they are looking for?
- Once users find the information they are looking for on the Traffic and Weather site, is the information easy to understand?
- Are there other types of information currently not on the Traffic and Weather site, within the scope of WSDOT's mission, that would help users plan a trip?

Methodology

The research team began by reviewing computer-generated analyses of website server logs for the WSDOT rWeather web portal, in order to begin to understand the typical visitor's usage patterns. We then ran a 1,700-participant web-based survey, directed to the probable audience for WSDOT web-based traveler information, to develop a fuller picture of audience expectations and experiences with WSDOT web-based traveler information. Then, after analyzing those data, members of the team conducted detailed usability testing in Seattle and Cheney to investigate more thoroughly the website usage of the WSDOT web portal among residents in different parts in Washington. We tested 12 participants from Western Washington and 4 from Eastern Washington to achieve results consistent with the population distribution of the state. The usability test consisted of three sections: an interview about traveling, a labeling exercise, and a series of tasks using the WSDOT Traffic and Weather site. Usability engineers moderated the test giving directions to the participants, taking notes about the data, and videotaping the sessions. We also conducted a content analysis of the page names and titles of the WSDOT Traffic and Weather site.

Summary of Findings

From the usability study and analysis of the WSDOT Traffic and Weather site, we found that after using the site, participants found the WSDOT Traffic and Weather to be a valuable resource. Consistently, after performing the usability protocols, participants stated that the organization is doing a good job. The usability analysis did find, however, 25 issues that require some improvement. These issues are summarized within four main usability themes. Each theme is defined and followed by an example from the study.

- **Audience appropriateness** – The language and icons on the site should focus on meeting the needs of the variety of audiences using the website

Several components of the site, including language, icons, labels, and organization reflect WSDOT conventions rather than those of the users.

- **Discoverability** – Users should be able to locate the features they are looking for

Participants were frustrated because they could not determine what traveler information corresponded with specific geographic locations. Participants did not notice the interface features currently in place designed to help users determine a geographic location.

While participants could locate the majority of features on the site, they could not find the Route Profiles feature.

- **Consistency** – Labels and page names should be consistent throughout the site

The titles of the pages on the site do not have a consistent naming scheme and the Route Profiles feature is inconsistently labeled.

- **Ease of information gathering** – The site should facilitate complex information gathering without requiring users to be subject experts.

The site provides a wealth of data, but participants struggled to synthesize multiple types of traveler information. Participants stated a need for customizable information specific to their travel itineraries.

Aspects of the Site That Participants Liked

- The wealth and timeliness of information about road and weather conditions.
- The organization's efforts to distribute information on the web. Participants felt that when compared to other states, WSDOT is doing a better job.
- The route profiles feature, while not easy to find, was well liked. Participants thought this resource would be helpful when planning a trip.

Aspects of the Site That Participants Struggled With

- Discovering the Travel Alerts page detailing construction and other project reports.
- Discerning the relevant details from a project report.
- Identifying construction or weather reports on the State map that had relevance to a participant's trip.
- Having to scroll left to right in pages or pop-up windows.

Features Participants Wanted to See Added

- Customized details of specific trips that would integrate WSDOT information with driving directions.
- An increase in the number of traffic cameras in specific areas.
- Links or travel information that could help a participant plan a recreational trip in Washington State.

Conclusions and Recommendations

Based on the findings from the web-based survey and from usability testing, it is apparent that travelers in Washington State are impressed with WSDOT's Traffic and Weather website. The usability issues that we discovered through this study can be fixed with minor modifications to the site. These small changes could lead to large improvements in the site's usability.

To improve the usability of the "WSDOT Traffic and Weather" website (http://wsdot.wa.gov/traffic/), we recommend the following:

- Increase the visibility and number of links to information that would help travelers plan recreational trips.
- Improve the discoverability of the Route Profiles feature (inside Travel Routes).
- Enhance the interface clues that help users determine the geographic location of a project report or weather station.
- Change the labeling for the Travel Routes tab and its subsidiary Travel Alerts link to "construction," "road work" or "accidents"; users were found to look for the terms "construction" or "road work," and to have difficulty in particular locating the information contained within the Travel Alerts section.
- Rewrite the project reports within WSDOT Projects to emphasize the impact to travelers, and to describe the projects in plain language, minimizing jargon terms.
- Instead of a link to a glossary, have definitions appear when a user rolls over the term.
- Redesign the list of pass reports so users are not forced to scroll so extensively. In addition, shorten links to pass pages by making the pass name a link, instead of listing the entire URL.
- Under Additional Info, add links to Washington State tourism attractions.

Based on participant requests, we also recommend that WSDOT investigate the feasibility of the following features:

- Offer WSDOT information to drivers while they are traveling via cellular phones, PDA's or 511 services or in car services such as On*Star.
- Creating a resource that could combine driving directions, at least for heavily traveled routes, with traveler information such as traffic cameras, weather and construction.

Performing ongoing usability studies is an important part of WSDOT's strategy for information dissemination. Ensuring information is easy to find and use will help to satisfy the organization's audiences and increase the visibility of WSDOT's service to the residents of Washington State.

During the usability study, we noted several particular areas for further investigation. We feel more research needs to be done in the area of navigation labeling. While the scope of this project focused on the route profile feature and the road icons, many of the other labels currently on the site would also benefit from further testing to ensure that users can find the information they seek. We also recommend that WSDOT continue to gather opinions from diverse users, including users from all parts of Washington State and from all of WSDOT unique audience groups. Finally, we recommend that the next usability study of this site should be conducted in winter, when traffic conditions tend to be more varied.

INTRODUCTION

This report describes the methods and results from a usability study of web-based traveler information. We investigated the WSDOT Traffic and Weather site due its wealth of resources for travelers and its statewide focus. This report will first define usability, then we will discuss the project's background, including organizational challenges. We will also explain the purpose of the test, and detail the test methodology. Finally, we will report the findings of the study.

Background

According to Dumas and Redish, "usability means that the people who use the product can do so *quickly* and *easily* to accomplish their own tasks" (4; italics theirs).

In the case of WSDOT, the people who use the product are a diverse set of audiences, listed in Table 1 below. In a broad sense WSDOT resources are for anyone using transportation in Washington State.

Table 1: WSDOT's diverse audiences

Audience	Comprised of	Tasks they want to accomplish
Drivers on Washington roads	Vacationers, commuters and commercial drivers	Find out about road conditions, delays or construction projects
Residents of Washington State	Voters, taxpayers and civic leaders	Measure the organization's accountability; determine how the organization is succeeding within its budget
The media	Newspapers, television and radio stations	Report road conditions to the public with the most reliable and up-to-date information
Internal audiences	WSDOT traffic engineers, maintenance crews, contractors and more	Perform day-to-day operations of the organization, keep the roads safe, keep projects on time and within budget

According to the WSDOT Accountability website, the organization's mission is to "keep people and business moving by operating and improving the state transportation systems vital to taxpayers and communities." The organization is responsible for maintaining 7,000 miles of highways and 3,300 bridges and tunnels.

Using the World Wide Web to communicate information has been an effective tool for the organization to fulfill its mission. While the audiences are diverse, WSDOT can use the web to provide information that meets each group's needs. It is also a place to showcase WSDOT's accomplishments such as completing road projects earlier than expected and under budget. Providing organization information on the Web helps WSDOT to be more "transparent and accountable" to the public.

But WSDOT cannot just provide a series of web pages for the public. They must provide a cohesive site which audiences find easy to use. WSDOT has shown a commitment to the study of usability of its web-based information. It is important for this commitment to continue if the

organization wants to provide a central resource that can meet the needs of a variety of audiences.

Challenges

WSDOT currently faces a number of challenges that have far-reaching impact throughout the organization. The department serves a geographically diverse area, the organization is regionally managed but centrally accountable, and while the transportation demands grow, funding continues to be in short supply.

Geographical Diversity and Distributed Population

Population

According to the 2000 Census, the population of Washington State is close to six million (see Table 2). The majority of residents, 77%, live in the 19 counties of Western Washington, primarily in and around Puget Sound. The other 22% live in the 20 counties of Eastern Washington (see Figure 1). For a breakdown of population in Washington State by county, see Appendix C.

Table 2: Population of Washington State, by region

	Number of Counties	Population	Percentage
Washington	39	5,894,121	100
Western Washington	19	4,587,173	77.8
Eastern Washington	20	1,306,948	22.2

Source: U.S. Census Bureau, http://www.census.gov/

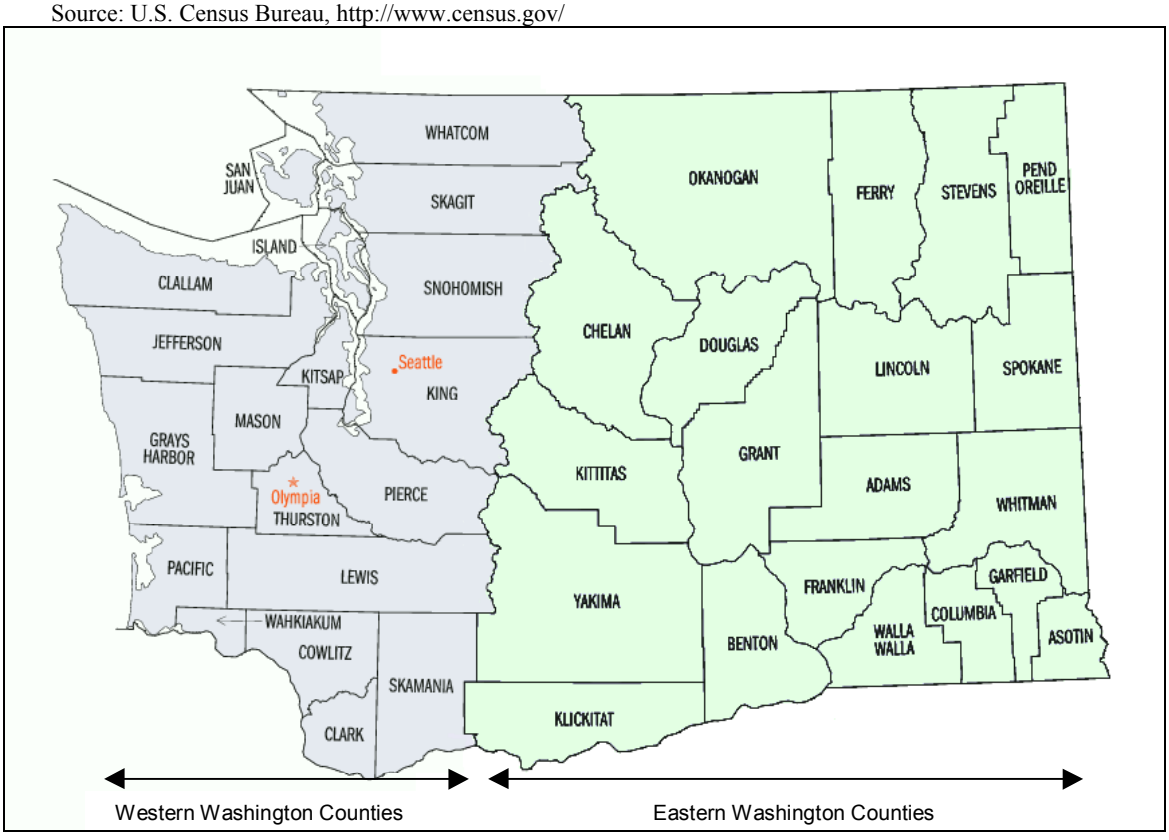

Figure 1: Map of Washington, divided into Eastern and Western

Geography

In addition to its widely distributed population, the geography of Washington State is also diverse. WSDOT aims to serve all parts of Washington State, each with its own needs. The three main categorizations of geography are:

1. **Populated urban areas** – The growing population of urban areas in Washington, specifically in the Puget Sound, bring about a number of challenges for WSDOT, the most visible being traffic. In the past two years, studies released by the Texas Transportation Institute (TTI) listed Seattle as one of the worst cities in the country for traffic, ranked second in 2001 and ranked fifth in 2002. While WSDOT believes that TTI's study had several shortcomings, it is apparent that traffic in the Puget Sound continues to be a substantive challenge.

2. **Rural areas** – Agriculture-based economies have their own unique challenges in regards to transportation and roads, such as community development and environmental impacts. Recognizing these challenges, the US Department of Transportation and the US Department of Agriculture formed an agreement to investigate rural and agricultural transportation in order to improve rural areas and small communities through transportation projects. Washington also has numerous scenic and coastal routes that would best also be categorized within this rubric.

3. **Mountainous regions** – Washington has twelve mountain passes where weather can be extreme in the winter months. Communication with travelers about the state of the roads is essential for safety.

Regionally Managed, Centrally Accountable

An additional challenge for WSDOT's information dissemination is the structure of the organization itself. WSDOT is made up of six regions that work independently to maintain and work on the roads in their respective regions. The regional focus allows WSDOT to provide the best possible service in each area of Washington State. But while a regional focus works for road maintenance, it provides some challenges for information dissemination. Travelers in Washington are not concerned where regions start and finish, but rather what road conditions may impact their trip. Regional boundaries required for operational success should be transparent to the public. One example of a regional focus seen in online traveler information is the traffic.wsdot.wa.gov site, pictured in Figure 2. The operational regions are distinct and travelers would have to combine information from a number of regions for a cross-state trip.

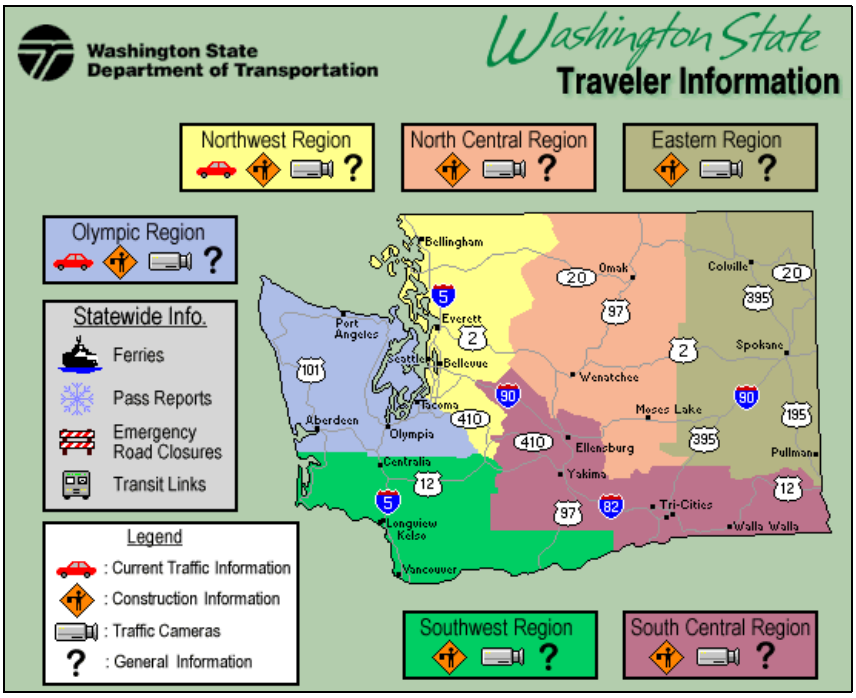

Figure 2: Example of a regionally focused site

The challenge to the organization is to synthesize information from all regions and present a cohesive appearance to the public in order to "demonstrate the agency is organized and accountable" (Merritt, 2001).

WSDOT has been providing online information to the public since 1996. Since then the numbers of web pages posted by individuals and regions has continued to grow. While intended to serve both internal and external audiences, the sheer growth of the website has in turn brought about a number of challenges. One such challenge is the redundancy of information. In the case of traveler information, there are three sites currently offering similar information with a slightly different focus.

- WSDOT Statewide Traveler Information, http://traffic.wsdot.wa.gov/, pictured in Figure 2 on page 7
- WSDOT Traveler Info, known through the organization as the "traveler.htm" site, http://www.wsdot.wa.gov/traveler.htm, pictured in Figure 3 on page 8.
- WSDOT Traffic and Weather, http://www.wsdot.wa.gov/traffic, pictured in Figure 4 on page 9

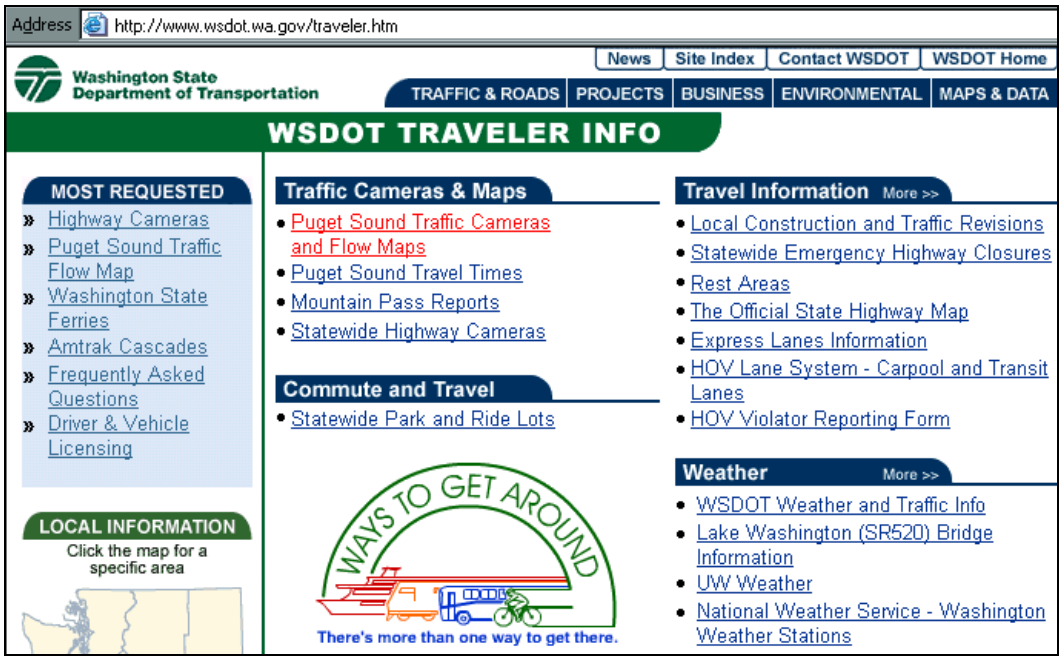

Figure 3: The "traveler.htm" site

Not only does redundancy of information lead to duplication of efforts, it has the potential to confuse users of the site. It can also lead to a dilution of the brand, because users do not necessarily know which site is the official WSDOT page for traveler information.

In response to the challenge of redundant information, WSDOT is in favor of having a traveler information portal that will be the destination for users seeking traveler information in Washington State. The Traffic and Weather site, pictured in Figure 4, is a move to a centrally focused communication device for all travelers in the state. This website is seen throughout the organization as a portal for traveler information. (According to interviews with WSDOT stakeholders: Laura Merritt, Morgan Balogh, Bill Legg, Toby Rickman).

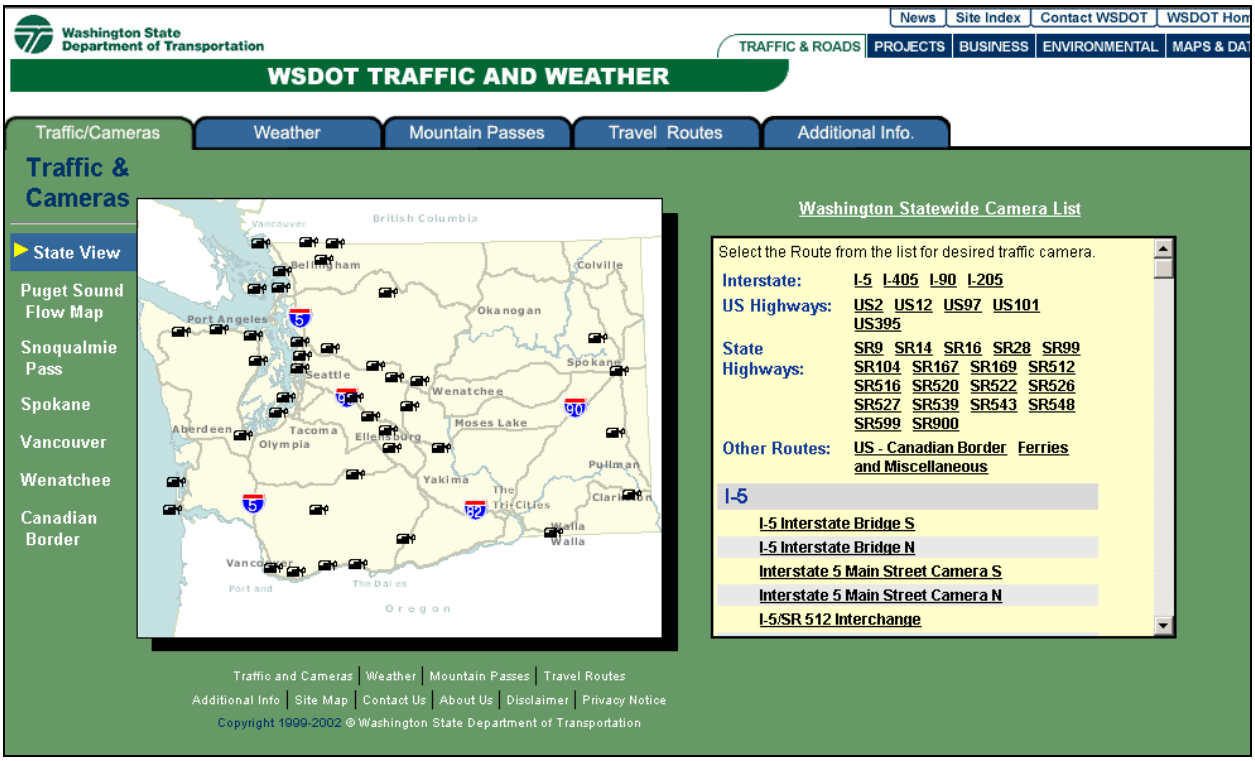

Figure 4: WSDOT Traffic and Weather website (as of August 10, 2002)

Why Is Information Dissemination Important?

In March of 2002 a late winter storm hit Washington State closing mountains passes and covering the region in snow. The mountain pass reports are always popular in the winter, averaging 25,000 visitors per day. But on March 20, web users flocked to the site to check out pass reports and view traffic cameras. The website received 68,000 visitors on that day. These numbers highlight how important is up-to-the minute information distributed to Washington drivers and residents.

Another example of the importance of WSDOT resources occurs every day at rush hour around the Puget Sound. The Puget Sound Flow Map, used by both commuters and the media, reports traffic density, shows real time traffic conditions, and a recently added feature estimates a travel time for a route based on traffic information from previous months.

These examples illustrate the importance of WSDOT on the web. All the diverse audience's the agency aims to serve: travelers, taxpayers, the media and employees, have similar needs. They all need to access the agency's information. In addition, this information needs to be easy to find and easy to understand.

Giving these audiences what they need when they need it has a reciprocal impact on the organization itself. Creating dedicated and satisfied web users, throughout the state, can grow an image of WSDOT as being a streamlined and an efficient organization. Once WSDOT entices users with popular traveler information like traffic information, they can build a relationship with these audiences, in turn encouraging residents and voters to learn more about organization.

Performing ongoing usability studies is an important part of WSDOT's strategy for information dissemination. Ensuring information is easy to find and use will help to satisfy the organization's audiences and increase the visibility of WSDOT's service to the residents of Washington State.

Previous Usability Study

In Spring 2001, a usability team investigated a WSDOT website called rWeather, a site providing integrated real-time highway and weather conditions (see Figure 5).

Two of the findings from this study are worth noting:

1. Participants did not use the interactive map. Participants never clicked on map icons for information, and rarely used map navigation features.
2. Participants were dissatisfied with the length of time required to find information (Boon et al).

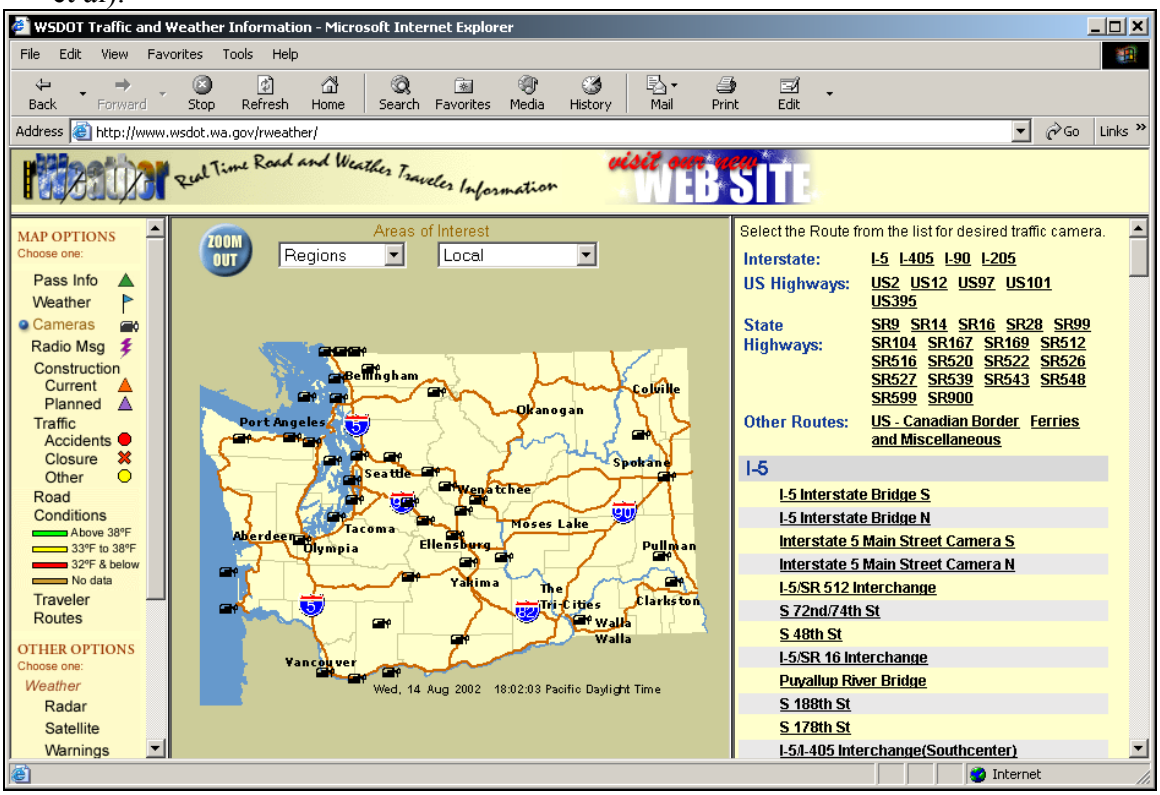

Figure 5: The rWeather site

Based on the findings of the study, the rWeather site was redesigned and renamed the WSDOT Traffic and Weather page (Boon, et al). The redesign alleviated the usability issues discovered in the first study. In the study detailed in this report, participants used the interactive map to navigate within the site. In addition, participants were able to find the information they were seeking in a reasonable amount of time.

These results show that WSDOT's commitment to usability testing of websites can improve the features of the site and also improve the user experience.

Purpose of the Test

The purpose of this test was to examine the user experience associated with retrieving traveler information, such as road conditions, traffic congestion, pass information, construction and weather, from the WSDOT Traffic and Weather site.

WSDOT also wanted to investigate the impact resources such as traveler information have on the public's opinion of the organization. Is the public aware of available resources like the Traffic and Weather site? Does the public feel that this is a valuable resource?

In general, we want to examine the following research questions:

- What types of information do users typically seek out when traveling in Washington?
- When searching for a specific type of information on the Traffic and Weather site, can users find what they are looking for?
- Once users find the information they are looking for on the Traffic and Weather site, is the information easy to understand?
- Are there other types of information currently not on the Traffic and Weather site, within the scope of WSDOT's mission, that would help users plan a trip?

In addition, we will also look at specific features or issues of the site. The following questions are a combination of issues established by the researchers based on survey results, Web usability heuristics, results from previous usability tests on WSDOT sites, and pilot usability tests.

Specifically, we examined the following questions:

- Are icons and labels intuitive for users?
- Can the participants use the map interface to find specific traveler information for different parts of Washington State
- How useful is the 'route profile' feature of the site? Can participants find it and do they think information presented in this way is helpful?

Test Procedures and Methodology

The following section details the methodology used for the usability testing on the WSDOT Traffic and Weather website.

Participants

To become eligible to participate in the test, volunteers needed to be between the ages of 18 and 60, make long distance trips of 50 miles or more within Washington State by car. Volunteers also needed to seek information about travel conditions, and feel comfortable using the World Wide Web. We also wanted volunteers who were not overly familiar with the current WSDOT Traffic and Weather site.

To qualify for the study, volunteers had to access the Internet with a high-speed connection either from home or work, use a PC running Windows 95 or later and use the Internet Explorer web browser. We stipulated specific types of technology because we wanted volunteers to feel comfortable with the system used during the study. We did not want their inexperience with the operating system or browser to affect their opinions of the website. WSDOT is aware of the issues of the site when accessed with the Netscape Navigator browser and are currently working on improving compatibility. (Merritt).

We wanted the test participants to be representative of the population of Washington State. We wanted to recruit at least 12 volunteers from Western Washington and 4 volunteers from Eastern Washington. In order to facilitate the testing of these two groups, we held two different study sessions, one in Seattle and one in Cheney.

Recruiting

From February 15, 2002 to March 15, 2002, we posted an invitation to participate in an online survey to a variety of websites, listed in Table 1.

Table 3: Websites linking to traveler information survey

Site	URL
Bellingham Herald	http://www.bellinghamherald.com/
King 5	http://www.king5.com/livetraffic/
King County Metro	http://transit.metrokc.gov/
The Leavenworth Echo	http://www.leavenworthecho.com/front.html
Seattle Times	http://seattletimes.nwsource.com/
Spokane Net	http://www.spokane.net/channels/frame.asp?ID=travel
The Spokesman Review (Spokane)	http://www.spokesmanreview.com/
University of Washington	http://myuw.washington.edu/
Washington State University	http://www.wsu.edu/parking/
Wenatchee World	http://www.wenworld.com/
WSDOT Puget Sound Traffic	http://www.wsdot.wa.gov/pugetsoundtraffic/cameras/
WSDOT rWeather	http://www.wsdot.wa.gov/rweather/
WSDOT Traffic and Weather	http://www.wsdot.wa.gov/traffic
Yakima Virtual Valley	http://www.yakima.net/

The survey asked 44 questions (see Appendix A: Web-Based Survey) about how individuals look for traveler information from a variety of media before and during traveling in Washington State and what features they would like to see made available in the future (for the results, see Appendix B: Web-Based Survey Results, or the accompanying data book, which contains complete findings and cross-tabulations). After completing the survey, each person was asked to give their name, e-mail address, and phone number if they wished to participate in future studies about traveler information in Washington State.

The survey, which was intended to target probable users of WSDOT web-based traveler information, found its respondents to report that they used the World Wide Web more frequently than any other media, most often four or more times per week. It showed an overall satisfaction with the traveler information currently available: 95.6% of users reported web-based traveler information to be somewhat or very useful; 85.2% reported it somewhat easy or very easy to find information they desire; and 70.4% reported the speed of access to be “very quick” or “fast enough.”[1]

Out of 1,700 survey respondents, 700 agreed to be contacted later. We sent an e-mail asking for volunteers interested in participating in a usability test. For the Seattle test, 70 volunteers responded. For the Cheney test, 6 volunteers responded. All volunteers were asked to complete a

[1] Jared Spool in 2001 reported that when users are asked to rate the speed of a website, the data don’t correlate closely to the actual download time. Instead, his research group found the perceived speed correlates strongly to whether users felt they completed their task successfully. (Spool 2001 1)

screening questionnaire. To see the contents of the e-mail, see Appendix D: Text for Recruiting Participants.

For the Seattle test, we selected 14 individuals, and 12 participated in the study. For the Cheney test, we selected 4 individuals and they all participated in the study. For participating in the study, all participants received a $25 gift certificate to a bookstore as a token of appreciation. Participants were also reimbursed for the cost of parking.

In this report, participants will be labeled with an E, for Eastern if they took the test in Cheney or W for Western if they took the test in Seattle.

Demographics

The participant group was made up of nine men and seven women. For a breakdown of age range, see Figure 6. All participants met the criterion for being frequent travelers in Washington State. All had taken at least 1 to 3 trips over 50 miles within the past year.

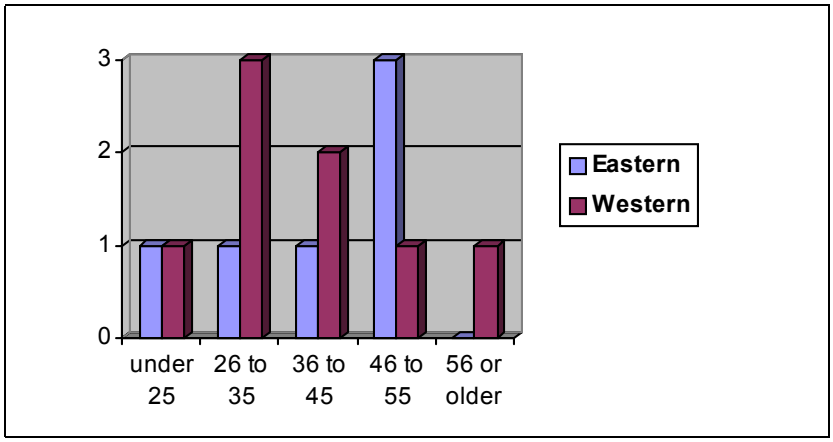

Figure 6: Participants' Ages,

* Two participants did not volunteer their age.

For the usability study our goal was to recruit users from a variety of cities in the state. Table 4 lists the cities that were represented by participants in the study.

Table 4: Cities represented

Western Washington	Eastern Washington
Bellevue	Elk
Lake Forest	Wenatchee
Redmond	Cheney
Renton	Grand Coulee
Seattle	

For additional demographic details about the participants who completed the usability study, see Appendix E: Participant Profiles.

Level of Expertise

Our initial goal was to recruit volunteers who were not experts at using the WSDOT's Traffic and Weather website. We defined a user as an expert if he or she had visited the site over 80 times. In the screening questionnaire, volunteers were asked to list the traveler information websites they visited often. None of the volunteers listed the WSDOT Traffic and Weather site.

When participants arrived to take part in the study, we administered a pre-test questionnaire. The questionnaire contained screen shots of popular websites including the Traffic and Weather site. The participants were instructed to indicate if they had visited these sites in the past and if so, how often. All Western Washington participants indicated they had visited WSDOT's Traffic and Weather website in the past. Out of this group 41%, the majority of participants said they had visited the site 1 –5 times. The next highest percentage, 25%, claimed 6- 20 visits to the site. The remaining two groups of 17 % stated they had visited the site 21-80 times or over 80 times (see Figure 2 below). When asked the same question, 75% of the Eastern Washington participants had never visited the site before and 25% had visited the site 21-80 times.

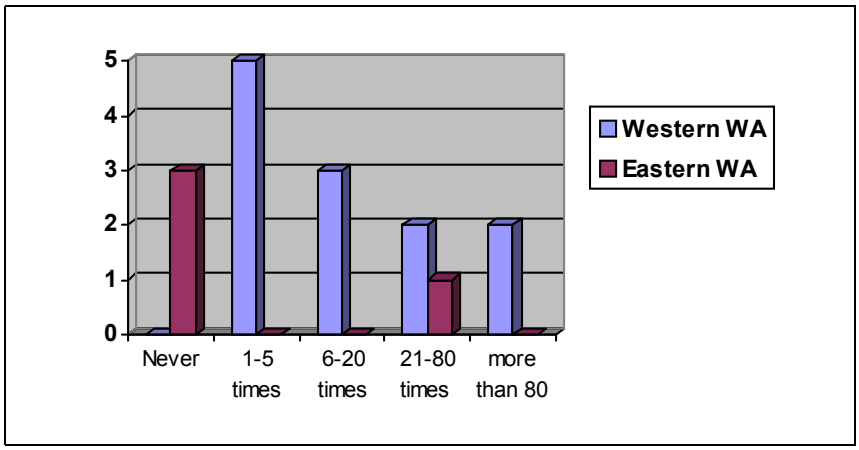

Figure 7: Frequency of visits to the WSDOT Traffic and Weather site

After analyzing the results of the pre-test questionnaire, we noticed that the Western Washington participants claimed to be more experienced with the site than they had indicated during the initial screening. But based on the Western Washington participants comments during the test, it appeared that they were not in fact experts. Some of sample comments, listed in Table 5, confirmed our assumption that the participants had never visited the WSDOT Traffic and Weather site before.

Table 5: Comments indicating participants' familiarity with the site

Participant	Comment
W-P7	"There is a lot of stuff [on the Traffic and Weather site] that I didn't know was out there. Is this a live site?"
W-P8	"I like this [site], is it already live?"
W-P11	(After finishing all tasks), We should probably get Internet service at home to get at this information, this is an incentive"

The inconsistency between the pre-test questionnaire and the comments and performance of users may be attributed to one of the factors listed below.

1. Low-resolution screen shots – In the pre-test questionnaire, participants were shown a screen shot of the home page of the site. The image was in black and white instead of in color. The screen shot may not have provided enough detail for users to identify the site correctly.
2. Familiarity with other WSDOT sites - During the interview and during the test, Western Washington participants mentioned that they were frequent users of the Puget Sound Traffic Cameras. The screen shot of the Traffic and Weather site shows a number of traffic cameras, which may have led users to believe that the sites were related. See Table 6 for a selection of participant comments about the Puget Sound Flow Map.

Table 6: Comments about Puget Sound Flow Map

- W-P2 – "I use the [Puget Sound] traffic cameras a lot."
- W-P3 –"This little flow map is my bible."
- W-P4 – "I like to look at the flow maps for my commute."
- W-P6 – "I'm always looking cause I like to know what's going on with the [Lake Washington] bridges."
- W-P7 – "I look at the Puget Sound Flow Map on a daily basis."
- W-P10 – "I check the [Puget Sound] traffic cameras before I leave for work and before I come home."
- W-P11 – Navigated to the flow map and said "This is my favorite website."
- W-P12 – "There are some cameras [from the Puget Sound area] that are not on [the Traffic and Weather] site, they should throw them up here."

Although some of the Western Washington participants indicated they were frequent and repeat users of the Traffic and Weather site, we are confident, based on their comments and performance during the test, that they were not overly familiar with the site.

Testing Environment

We performed the usability study in two locations. The testing in Western Washington took place at the University of Washington in Seattle. The testing in Eastern Washington took place at Eastern Washington University in Cheney.

The Western Washington test took place at the Laboratory for Usability Testing and Evaluation (LUTE), in the Department of Technical Communication on the University of Washington campus. The lab has an observation room and a testing room. For this test, all activities took place in the testing room. No observers were present. The Eastern Washington test took place in a conference room in the JFK Library on the Eastern Washington University campus. While this room was not specifically set up for usability testing, we created an environment that was suitable for the test.

The order of test activities is listed in Table 7 below. During the study, two usability engineers were present. The moderator sat next to or behind the participant for most of the test. The other usability engineer recorded the session. In Seattle the recorder sat behind a wall and in Cheney the recorder sat in the corner of the conference room.

Table 7: Order of usability test activities

Task	Details	Location of participant
Initial interview	Discusses travel experiences with usability moderator	Sits at table
Labeling tasks	Chooses icons and arranges yellow sticky notes	Sits at table then interacts with white board
Browsing tasks	Thinks aloud while completing tasks on the WSDOT Traffic and Weather site	Sits in front of a computer

In order to protect anonymity, we captured each participant's voice and videotaped over the shoulder in order to record only the actions on the computer screen. Each participant used the same computer system, running Windows 2000, Internet Explorer 5.5 and connected to the Internet via a high-speed connection. In the Cheney test the computer was a laptop, equipped with an external mouse. During the test, the usability engineer recording the session also took notes including comments made by participants. After the study, the tapes were examined to ensure the accuracy of user comments and actions.

At both locations, participants were given the same instructions and explanation about the test. At the start of the test, the two usability engineers introduced themselves to each participant. Participants were instructed they could take a break at any time. At the end of each session, the participant was awarded a gift certificate. A usability engineer cleared the history and saved files were deleted from the cache.

Overview of Test

After arriving, participants were asked to complete two consent forms and a pre-test questionnaire (see Appendix G: Consent Forms and Appendix H: Pre-Test Questionnaire). After being given the opportunity to ask questions, participants were then seated at a table with the test administrator.

The test was divided into three sections:

1. **Interview about travel experience** - participants were asked general questions to solicit specific feedback about their travel experiences in the past year. The interviews allowed us to gather information about the types of trips people take and what sort of information they seek out. Also, interview questions were designed to help the participants recall specific traveling experiences to help them think of the study tasks in a personal way, instead of just a test.
2. **Labeling tasks**
   - Road conditions – participants were asked to choose an appropriate icon to represent a specific road condition. We gave the participant ten icons to choose from. The icons were in color and arranged randomly on a single sheet of paper, see Appendix X: Icon worksheet. We asked participants to choose the one that they would expect to see for a specific situation.
   - Labeling a resource – participants were asked to help design a resource that would detail multiple types of traveler information for a specific route. On a diagram of a mountain pass, the participant organized 12 types of traveler information, written on adhesive memo notes. The participant grouped the notes into one of three categories: information that should be displayed on the map, information that should be linked to, and information that should be discarded, meaning that it was not of interest to the participant. We then ask the participant to come up with a label, or name for this resource. Finally, participants were given a list of other possible labels from which they could choose.
3. **Browsing tasks** – Finally, participants were asked to complete a series of tasks in a booklet, while thinking out loud.

FINDINGS AND RECOMMENDATIONS

In this section, we will present the findings of the study. The findings are organized in two ways. First, we present the findings based on the original research questions. Second, we present the findings grouped into five usability themes. At the end of the section, we also present a summary of comments and suggestions from participants based on their experience with the WSDOT Traffic and Weather site.

Findings and Recommendations, Organized by Research Questions

One of the overall findings from the study is that participants found the WSDOT Traffic and Weather to be a valuable resource. They believe the organization is doing a good job.

We recommend that WSDOT increase the visibility of the WSDOT Traffic and Weather site by:

- Promoting it on other widely-used WSDOT sites such as the Puget Sound Flow Map.
- Secure a URL that is easier for users to remember and type.
- Reduce the duplication of similar resources on WSDOT site, such as the "traveler.htm" site and http://traffic.wsdot.wa.gov/.
- Investigate methods to improve results on search engines.

In this section, each research question is listed, followed by an explanation of the findings and any recommendations.

1. What types of information do users typically seek out when traveling in Washington?

   When traveling in Washington State, participants tend to seek out information for winter non-routine trips. Participants are interested in winter driving conditions and weather forecasts, especially for winter trips over a mountain pass. In addition, participants tend to look for information for non-routine trips where they are not familiar with the route. They are also interested in details about recreational travel and look for information while planning trips. Some participants mentioned they would like to have up to date traveler information available in the car.

   We recommend that WSDOT:

   - Continue to provide up-to-date traveler information online.
   - Investigate the feasibility of offering traveler information via cellular phones or PDA's and via in car services such as On*Star.
   - Increase the link to information that would help travelers plan recreational trips.

2. When searching for a specific type of information, can users find what they are looking for?

   For almost all tasks, users successfully found the information they were seeking with the following exceptions:
   a. Participants found the travel alerts page detailing construction and road projects confusing.
   b. Most participants (75%) did not locate the Route Profiles until prompted to do so.
   c. Tasks that specifically relied on geographical knowledge of the state were challenging for some users. Most participants (75%) did not notice interface clues in place to help determine the location of project reports and weather stations.

We recommend that WSDOT:
- Test a new labeling scheme for the Travel Routes tab and Travel Alerts link, including participant suggestions of "Road work" and "Construction"
- Improve discoverability of the Route Profiles feature. Our study concluded that the lack of discoverability is not attributed to the label.
- Draw users attention to the interface elements that provide geographical clues with a link from the project report list.

3. Once users find the information they are looking for on the Traffic and Weather site, is the information easy to understand?

   In general, users could easily understand the information with the following exceptions:
   - Participants found the project reports confusing; they cited too many technical details and not enough geographical clues
   - Participants were confused by the links on the weather stations, they anticipated seeing more details but instead saw a glossary list
   - A participant thought the mountain pass reports were hard to scan.

We recommend that WSDOT:
- Rewrite project reports to emphasize the impact to travelers, and to describe the projects in plain language. Continue to provide more technical details for interested users, but move this information further down in the report. In addition, develop a template so project reports highlight the information most relevant to travelers at the top of each report consistently throughout the site.
- Instead of a link to a long glossary list, have the definitions appear when a user rolls over the term.
- Redesign the Mountain Pass Tab to list all passes without having to scroll. In addition, shorten lengthy links to individual pass pages, instead of listing the entire URL make the pass name a text link.

4. Are there other types of information currently not on the Traffic and Weather site, within the scope of WSDOT's mission that would help users plan a trip?

- Participants requested a resource that would retrieve customized traveler information based on a specific trip. They want driving directions, similar to MapQuest, coupled with WSDOT traveler information.
- Participants would like to see a stronger link to travel and tourism resources in the State.
- Participants wanted to know more about rest stops and gas stations, but only if the site remains free of advertising
- Participants made requests for additional traffic cameras south of Seattle on I-5 and 99 and on other roads throughout the State.

We recommend that WSDOT:

- In the future, consider creating a resource that could combine driving directions, at least for heavily traveled routes, with WSDOT traveler information such as traffic cameras, weather and construction.
- On Additional Info. tab, add links to other Washington State tourism attractions.
- Participants wanted to know rest stop information. A link to rest area information is currently on the Additional Info tab. Promote the link so it appears on the Travel Routes page.

Study Findings, Organized by Theme

Implementing usability findings has occasionally been challenging for large, distributed organizations; corporations have found it useful to divide usability findings thematically, in order to assist in the delegation of tasks (Rude 2001, 5). In order to assist WSDOT to delegate responsibilities for implementing recommendations from this report, the following section organizes the findings based on five usability themes (the four discussed above and an additional 'miscellaneous' category).

Audience Appropriateness

We define audience appropriateness as how successful the language and interface elements on the site match audience expectations. The findings are detailed in Table 8.

Table 8: Audience appropriateness findings and recommendations

Number	Finding	Recommendation
1.1	"One lane closed" icon does not match user expectations.	Change the current icon with two arrows to a merge sign.
1.2	Participants found the project reports difficult to use. They contained too much detail, information unnecessary for a traveler, organizational specific language and acronyms. They did not provide enough geographical clues to the person who is not familiar with specific city/street names in Washington.	Rewrite project reports so they are geared towards a general audience focusing on travel. Emphasize location by referencing how far the project is from a city. Detail impact of project on travel if delays are expected. Preserve technical details like cost, contractor, and contact information, but move lower in text of report. Spell out acronyms.
1.3	The labels "Travel routes" and "Travel Alerts" were not immediately apparent to a number of users; they expected to see the word "Construction".	Test a new labeling scheme for the Travel Routes tab and Travel Alerts link that reflects user expectations.
1.4	Participants clicked on a heading in the weather station pop-up, such as "Conditions" expecting to see more details; instead the glossary list appeared.	Instead of a link to a glossary list, have the individual terms appear when the user rolls over the term.

Discoverability

We define discoverability as how successful users are at locating the features they are looking for. The findings are detailed in Table 9.

Table 9: Discoverability findings and recommendations

Number	Finding	Recommendation
2.1	While participants did not agree on a new label for the Route Profile feature, the label most often chosen by participants is the current name: route profile.	Investigate the issue of discoverability of the Route Profile feature.
2.2	Only 25% of participants found the Route Profile feature before being prompted to do so.	Improve discoverability of Route Profile feature.
2.3	Participants use different pathways to find the same information.	Keep multiple pathways to get to the same information.

Consistency

We define consistency as labels and page names remaining the same throughout the site. The findings are detailed in Table 10.

Table 10: Consistency findings and recommendations

Number	Finding	Recommendation
3.1	Some participants (13%) found the wind field on the weather station pop-up blank. They could not tell if this meant there is no wind or no current reading.	If no data is available, have the page display the text: No data.
3.2	The project reports are not consistent; some are very detailed while others have minimal information.	Standardize project reports.
3.3	When linking to the Route Profile feature there are inconsistencies in labeling. From the Stevens Pass page the feature is labeled "US2 Travel Info."	Use consistent labeling throughout the WSDOT site.

Ease of Information Gathering

We define information gathering as the how easily users can gather the information they are looking for. The findings are detailed in Table 11.

Table 11: Ease of information gathering findings and recommendations

Number	Finding	Recommendation
4.1	Participants search for information for recreational and sporadic trips.	Since travelers are interested in finding information for recreational or sporadic trips, WSDOT should add content or links that assist recreational travelers, such as travel

Number	Finding	Recommendation
		sites, events, state campgrounds, and other information.
4.2	Some participants had to reselect the geographical area on Current and Forecast pages in the Weather tab.	Consider renaming the 'Forecast' link to 'Regional Forecasts,' which is more indicative of its function and may help users to differentiate between the two links.
4.3	Some Western participants (25%) were concerned because they could not tell which way the camera was pointing.	On the screen that shows the traffic camera output, tell users how to determine which direction the camera is capturing.
4.4	Most participants (75%) could not resolve project reports with their geographical location. They did not notice the interface clues (red circles) currently in place.	Improve user geographical awareness by including a link in the project reports that tells users about the red circles.
4.5	One participant was interested in seeing traffic patterns similar to the Puget Sound Flow map, including traffic density and speeds, in other areas.	For heavily traveled routes, like Snoqualmie Pass, implement a display similar to the Puget Sound Flow Map that shows traffic density.
4.6	While 88% of participants successfully found a link to traveler information in another state, 12% could not.	Add additional links to traveler information in bordering states in the site index. Add additional links on the Route Profiles page by adding rollovers and links to the maps of British Columbia, Idaho, and Oregon that border Washington.
4.7	While participants liked the Route Profile feature, they wanted to see additional information added or displayed this way, including construction, elevation and gradient, camera icons directly on the route, and traffic density.	Investigate the feasibility of adding more information to the Route Profile feature.
4.8	One participant wanted to click on a ferry icon on the Puget Sound Flow Map to open the Ferries page.	Make ferry icons on Puget Sound Map clickable.
4.9	Participant mentioned that the Mountain Pass reports were too cluttered. He wanted a list of all passes when the window opened.	Ensure all primary information, like pass names and current status, appear in the list when the window

Number	Finding	Recommendation
		opens. Shorten long links to pass pages to conserve screen real estate; instead of listing entire URL, make the pass name a text link.
4.10	While participants liked the WSDOT Traffic and Weather site, they would like to see additional information added to the site, specifically a resource that would integrate driving directions with WSDOT traveler information.	Although not a part of WSDOT's immediate mission, our study showed that creating a resource that combines driving directions with WSDOT traveler information would be very popular with users.

Miscellaneous

The findings in this category are other issues to consider. The findings are detailed in Table 12:

Table 12: Miscellaneous findings and recommendations

Number	Finding	Recommendation
5.1	In general, participants thought the WSDOT Traffic and Weather site was a valuable resource. They think the organization is doing a good job.	Increase the visibility of the WSDOT Traffic and Weather site.
5.2	Participants want up-to-date information while driving.	WSDOT should investigate the feasibility of offering comprehensive traveler information via cellular phones. Deploying 511 services would most likely satisfy traveler needs for information while driving.
5.3	A participant felt frustrated having to scroll left and right in a pop-up window.	For pop-up windows and screens that contain scroll bars, remove the need for users to scroll from left to right. This can be accomplished by setting a relative screen size in percent, instead of an absolute size in pixels.
5.4	Participants wanted to compare two Route Profiles in separate windows, but could not open more than one at a time.	Allow users to open more than one Route Profile at a time.
5.5	Eastern Washington participants struggled with the task of checking for traffic congestion in Seattle.	When performing usability tests on the Puget Sound Flow Map in the future, using participants who are not familiar with Seattle geography may yield rich results.

TASK DETAILS

The following section details the specific tasks that the participants in the usability test completed. Each task description is followed by a summary of the findings, quotes from the participants and any recommendations for improvement.

Interview

We asked the participants some general questions about their travel destination in Washington State. We were interested in what types of trips they took and what type of information they sought out for their travels.

Table 13: Travel Scenarios from Western Washington Participants

Reasons for travel	Destinations	Seek information
Travel for business or education*	Ferndale; Boise ID, Ellensburg; Olympia; Pullman; Walla Walla; Winthrop	Pass conditions in the winter
Travel for pleasure and recreation	Yakima; Chelan; Wenatchee; Winthrop; Pullman; Mt. St. Helen's; Mt. Rainier; Snoqualmie Falls; Whidbey Island; La Conner; Anacortes; Long Beach; San Juan Islands	Construction information; pass conditions in the winter; weather reports; traffic cameras to get information about weather for snow shoeing; ferry schedules
Visit friends or relatives living in other parts of the state or NW	Bellingham; Boise, ID; Ellensburg; Long Beach; Portland OR; Pullman Spokane	Pass conditions in the winter; weather forecasts

* One participant who traveled for business mentioned almost all these destinations

Table 14: Travel Scenarios from Eastern Washington Participants

Reasons for travel	Destinations	Seek information
Travel for business	Spokane; Tri-Cities; Bellevue; Central Washington	Construction; weather forecast in the winter
Travel for pleasure and recreation	George; Idaho; Metaline Falls; Olympic Peninsula	Travel magazines; AAA; MapQuest
Visit friends or relatives living in other parts of the state or NW	Puget Sound	Weather forecast in the winter

Findings

Based on the interviews, we learned the following:

- **Participants seek information about winter conditions** - Most of Western Washington participants (67%) and half of Eastern Washington participants (50%) stated they were interested in winter conditions such as pass and weather reports. In addition to road conditions, participants mentioned seeking out information that would help them plan winter recreational activities, such as snow conditions.
- **Familiar trips require less information** – Participants stated that they did not look for traveler information for trips that were routine, with the exception of pass and weather information during the winter.
- **Unfamiliar recreational trips require more information** – Participants stated that when traveling for pleasure, they tended to seek out more information about road conditions for planning a trip. From this finding, we deduce participants tend to take more of an active interest in planning for recreational trips scheduled for the future, like vacations. Users are more interested in planning vacations and the planning itself becomes a fun activity.

Participants used the following resources to find traveler information:

- Resources used by Western participants–websites (including WSDOT's), commercial radio, highway advisory radio (HAR), and television.
    - Western Washington participants mentioned they were dissatisfied with commercial radio and television reports.

Table 15: Western Washington comments about radio

W - P4 "Radio is too slow"
W - P5 "I like information on demand, radio and TV reports take too long."
W - P8 "I sometimes listen to reports on radio, but by that time it's already too late by then because I am already on the road…"

- Resources used by Eastern participants – websites, television, travel magazines, AAA.

Participants were interested in the following

- Access to traveler information while driving – Out of the 12 Western Washington participants, 3 mentioned that they would like to have traveler information delivered through a cell phone and one mentioned he would like to see an in vehicle service, like On*Star.

The interviews illustrated the difference between Western and Eastern Washington participants. While both groups looked for winter weather information, Western participants were far more interested in pass conditions. As a group, Eastern participants looked for information less than the Western participants did. However, they did mention consulting traditional sources of travel information such as AAA or travel magazines. While the WSDOT Traffic and Weather site does not specifically link to travel resources in the state, the larger WSDOT organizational page links does. The "traveler.htm" site links to a number of Washington's tourist activities.

Recommendations

From the interviews, we present the following recommendations:

- Although only requested by 25% of participants, WSDOT should investigate the feasibility of offering comprehensive traveler information to drivers while traveling. Deploying 511 services would most likely satisfy traveler needs for this type of information.
- Since travelers are interested in finding information for recreational or sporadic trips, WSDOT should add content or links that assist recreational travelers, such as travel sites, events, and state campgrounds. Some of this information is already linked to other WSDOT pages, such as "traveler.htm". Providing these links from the WSDOT Traffic and Weather site would help keep people coming back to the site for travel related information and in turn help to raise the visibility of the organization.

Labeling Tasks

In this task, we asked participants to choose icons and labels for specific features on the site. We wanted to determine if information presented on the site corresponded to the users' expectations.

The WSDOT Traffic and Weather site uses a number of icons to indicate different types of traveler information. The icons appear on a map of Washington State. Users click on an icon to get more information. For example, when a user clicks a sun icon a pop up window shows more detailed weather information.

Based on the results from pilot studies, the icons on the Traffic Alerts page were difficult for some users. The Traffic Alerts page is pictured in Figure 8 below.

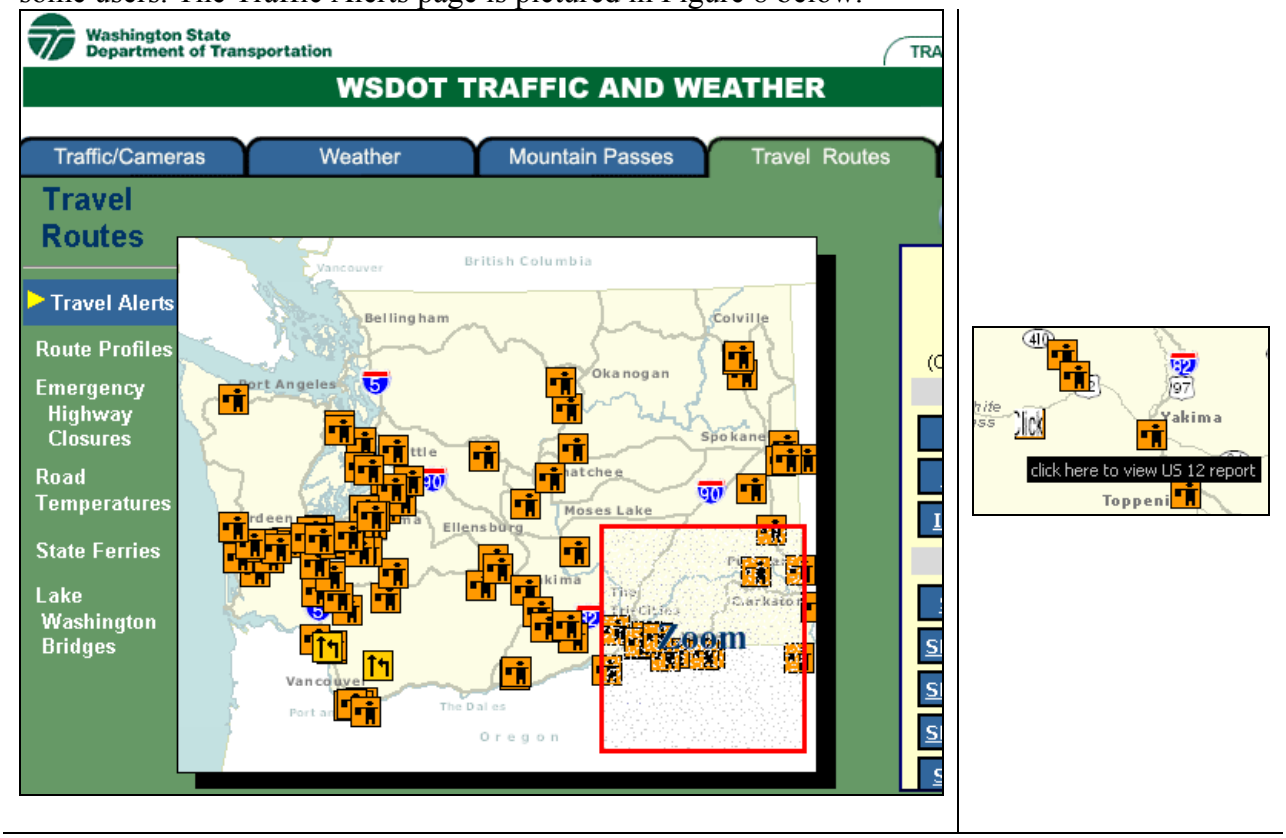

Figure 8: Icons on the Travel Alerts page

To increase readability of icons, it is often helpful to add a text label. In the case of the Travel Alerts page, this is not possible due to their small size and high frequency. Another way to help users interpret the icons is to use explanatory rollovers. Currently the site is using the rollover functionality to tell users the specific location of the project, see the right side of Figure 8. Because the function of the rollovers is already in use, it is critical that the graphical icons are easy to interpret.

Icons

We gave participants three road situations and asked them to choose the icon that they thought was the *best* fit for each situation. The participants were given a page of icons to choose from (see Appendix I: Icon Worksheet). Below, Table 16 shows the icons and meanings currently in use in the Travel Alert section of the current WSDOT Traffic and Weather site.

Table 16: Current Icons and their meanings

Road Closed	Construction/Maintenance	Lane Closed
		

Each user indicated which icon they thought best corresponded to each road condition. The results are detailed below in Table 17.

Table 17: User interpretation of icons

Road condition	Selected Icon	%		%		%
Road Closed		72%		22%		6%
Road Work		41%		31%		28%
Lane Closed		81%		13%	 * Participant stated he would choose this icon if the color was orange	6%

Findings: Road Closed

The majority of participants, 72%, chose the icon currently in use on the site, a red circle with a white line. The second highest at 22% was an orange arrow on the black background. Several participants indicated that they would choose this icon because if a road were closed they would expect to see a detour. The last icon, a flagger, was chosen by 6% of participants.

Participant Comments

- W-P3 chose the orange arrow on the black background "because it looks like a detour arrow."
- W-P10 picked orange flagger, "I'd like a detour or something, this one (the red circle with a white line) means you can't go through, which is different that a road closure to me."
  Note: In the interview it came to light that this participant had a background of working for a mapping software company and said he had spent a great deal of time analyzing the roads of Washington State, which could explain his literal interpretation of road signs.
- W-P11 initially chose red circle, stating "I know this means do not enter."
  Changed mind to the detour sign. "I know this means detour and if there is a road closed, I assume there would be a detour."

Recommendations

- Keep the current icon.

The second choice by participants was the detour sign, an orange arrow on a black background. While this is the sign you may encounter on the road, it would also have the word "Detour" written on the sign. Since the icons on the Traffic and Weather site are too small to contain words, keeping the "Do Not Enter" icon is the best choice.

Findings: Road Work

We asked participants which icon they would expect to see for road construction or maintenance. They chose a worker with a shovel on an orange background (41%), a worker with a flag on an orange background (31%), and a worker with a shovel on a yellow background (28%).

Recommendations

- Keep the current icon.

The results for this task did not reveal an overwhelming majority for any icon. The participants did not make any comments when selecting one of these three icons; therefore we do not have data that suggests there is a lack of discoverability of any of the icons. We recommend keeping the current icon of a worker with a flag.

Findings: Lane Closed

We asked participants which icon they would expect to see if a lane was closed, participants overwhelmingly chose the merge symbol (81%). They also made several comments about the icon with the two arrows currently in use on the site. Only 13% chose the current icon in use. One participant stated he would choose the yellow merge symbol if it were in orange to indicate it was a temporary road condition.

Participant Comments

The following comments from participants focus on a dislike for the current symbol:

- W-P8 pointed to current icon and said, “I don't like this, it makes it look like someone is running into someone else, instead of the nice gradual 'Please Merge'.”
- W-P11 “I have never seen this sign in my life,” pointing to the current sign.
- W-P10 chose the current icon; see previous comment about his experience.

Recommendations

- Change the icon to a merge sign.

Our testing indicated a lack of discoverability of the current icon. Participants overwhelmingly chose the merge symbol. While this may not be the sign a driver would encounter on the road, it is the icon that the audience for the website understands. Our primary recommendation is to replace the current icon with a merge sign. In addition, WSDOT may also consider changing the color of this icon to orange to indicate a temporary state.

Labels

Labels are similar to icons, they too help to tell a user what type of information is available, but instead of being graphical, labels are words or phrases. Each link on the WSDOT page is a label. Users evaluate the labels to determine where to click to find the information they are looking for. Rosenfeld and Morville state that the goal of a label is to communicate information efficiently without taking up too much space on the page or too much effort by a user (72). Labeling systems also reveal the site's organization. Determining the labels that resonate with users is an important piece of a well-designed site. Labels should use the language of the users and steer clear of organizational jargon. For the usability test, we focused on the labels for one feature of the site, currently known as Route Profiles.

In the second part of the labeling task, we wanted to encourage users to come up with a label for the feature currently called Route Profile. During pilot testing, we noticed that participants did discover this feature. Our initial supposition was that the label for this feature was not intuitive to users. The following task was created to see if users would generate names that are more intuitive.

During the same pilot test, once participants were directed to this feature they thought the information was highly valuable. We wanted to make the Route Profile feature more discoverable since users found it so valuable.

The Route Profile feature, pictures in Figure 9 below, shows a well-traveled section of road in Washington State, in the case I-90 from Seattle to Ellensburg.

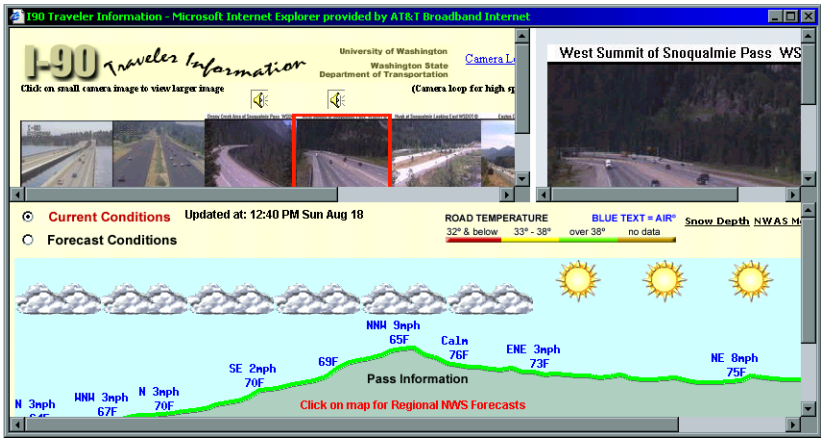

Figure 9: Route Profile of I-90

We presented participants with a sketch of this section of road on a whiteboard. Participants were given 12 adhesive memo notes with different types of traveler information they might expect to see on this type of diagram.
In order to encourage participants to start thinking about this feature, we had them design their own profile on a white board. We drew the stretch of I-90 from Seattle to Ellensburg and had participants prioritize what types of information they would be like to be displayed on this page.

The participants were then asked to think of a name for this feature. After they had named the feature, we gave them a list of other potential labels. The participants could state a preference for one of the labels on the list or state that they preferred their own. These labels had been gathered by the usability engineers in an informal survey of potential users of the website (see Table 18 for the complete list.) The participant could also stick with the name they had initially offered or come up with a new suggestion after looking at the list.

Table 18: List of potential labels

Road conditions
Highway profiles
Freeway details
Travel alerts
Route profiles
Highway planner

Findings

The suggestions of participants are summarized in Table 19 below. As you can see from the second column, participants came up with several unique names for the feature. Unfortunately, the suggestions were all different. Participants W-P2, W-P8 and E-P3 offered similar suggestions of "travel(er) information," but this label is too general since the entire website is concerned with information for travelers.

Table 19: Summary of user suggestions for route profile feature

Participant	Label Suggestion	Choose From List
W-P1	N/A	N/A
W-P2	Traveler Information	None; chose 'Traveler Information'
W-P3	None	Travel Alerts, Traffic Conditions
W-P4	None	Highway Planner
W-P5	Trip Map	Route Profile
W-P6	Annotated Profile	Route Profile
W-P7	Snapshot	Route Profile
W-P8	Travel Information	Highway Planner, Travel Planner
W-P9	Common Itinerary	Highway Planner, Route Profile
W-P10	Road Sections	Highway Profile
W-P11	(Name of road) Trip Page	Route Profile
W-P12	Road or Route Profile	Route Profile
E-P1	Travel Advisory	Road Conditions, Highway Profile
E-P2	Washington Road Traveler's Resource	Highway Planner
E-P3	Travel information resource	Highway Planner, Road Conditions
E-P4	Travel Washington.com	Travel Alerts, Road Conditions

Upon presenting the participants with our list, the most frequently chosen labels were:

- Route profile (6)
- Highway planner (5)
- Road conditions (3)
- Highway profile (2)
- Travel alerts (2)

Upon analyzing the suggestions of the participants, we have concluded that the label of the route profile feature may not be the reason users cannot find this feature. The lack of discoverability may be attributed to the location of the link instead of the label. As you can see in Figure 10, to find Route Profiles, a user must first click on the Travel Routes tab which displays a high density of icons and then select the Route Profiles link in the secondary navigation bar on the left.

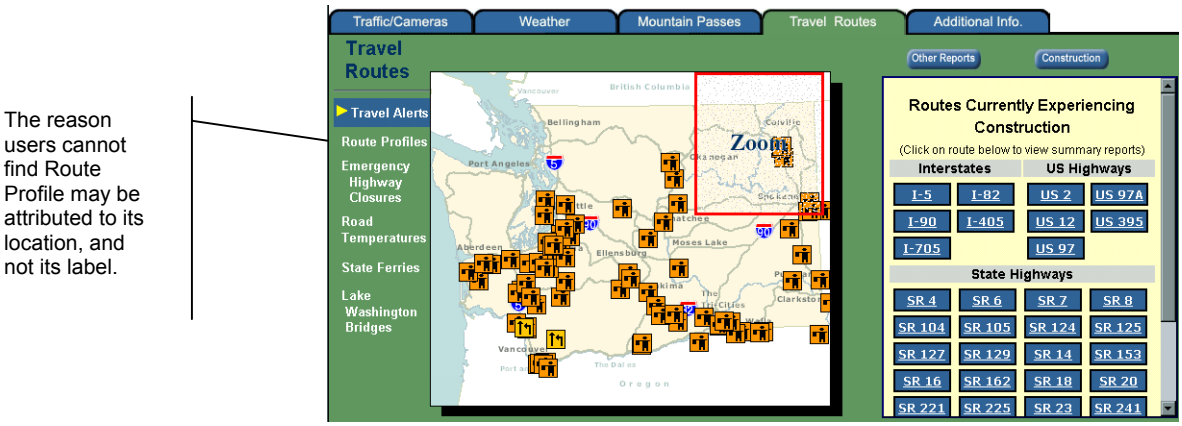

Figure 10: Travel Routes tab

Participant Comments

W-P12 – "I like the word profile cause it shows the actual profile of the road."

Recommendations

- Keep current label of "Route Profile" but investigate the issue of discoverability.

Browsing Tasks

The participants performed the following series of tasks while seated in front of a computer. The participants were given instructions on the Think Aloud Protocol, a central methodology in usability testing. He or she was also given an exercise to practice thinking aloud while looking for information on a website. To see the scenarios used in this portion of the test, see Appendix K: Usability Study Tasks.

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Task A: Driving Across Washington

For the first task, participants were given a scenario that would take them across Washington State for a business trip and also include some recreational side trips. We designed the scenario to integrate some of the main features of the site: traffic, weather, construction, and mountain pass information.

Findings

For this task, we compared how long it took users to find specific information. The time on task for each group is compared in Table 20.

Table 20: Time on task for participants

Task	Feature	Western	Eastern
		Time (in minutes)	
1. Weather forecast	Forecasted weather	0.49	1.20
2. Traffic congestion on the pass	Zoom feature, traffic cameras	0.59	.58
3. Wind speed	Detailed Weather Information	0.37	.55
4. Construction	Traffic Alerts	2.09	3.00
5. Traffic congestion in Spokane/Seattle	Traffic cameras	0.35	1.45
6. Delays along US 2	Traffic Alerts, weather, etc.	1.38	1.30
7. Raining along US 2	Route Profiles	1.14	1.20
8. Traveler information about Idaho/Oregon	Additional Info tab	1.07	.45

In addition to recording the time it took each participants to complete a task, we also asked them to rate the ease of use of each feature in a post-test questionnaire (see Appendix J: Post-Test Questionnaire).

Even though some features may take longer to use than others, it was important to gather information about not just actual time but the participant's perception of how easy or difficult a feature was to use. Tasks that participants find difficult are especially important for WSDOT to address. WSDOT can respond to its audiences by making these tasks easier, and improving the usability of the site.

Task A.1: Weather Forecast

As with many features on the WSDOT Traffic and Weather site, there is more than one way for users to access the same information. Participants found information about the weather forecast in a variety of ways. Their paths are listed in Table 21.

Table 21: Participants' actions for task A.1

Participant	Path
W-P1, W-P2, W-P3, W-P10, W-P12	Select Weather tab, zoom on map, from text list select weather station
W-P4, W-P5, W-P9	Select Weather tab, zoom on map, click on icon on map to select weather station
W-P6, W-P7, W-P8, W-P11, E-P1	Select Weather tab, click on Forecast link, zoom on map
E-P2	Select Traffic tab, select Weather tab, from text list select weather station
E-P4	Select Weather tab, zoom on map to Spokane area, look at list of weather stations, click Zoom Out button, see Ellensburg on statewide view, zoom in, select weather station from list on the right

Findings

All users found the forecasted weather information. Out of the 16 participants, 5 experienced some confusion with the current and forecast links. When users select the Weather tab, current weather is displayed. From here participants zoomed in to an area on the map. They then noticed the Forecast link on the left. This action takes participants back to a state view with regional forecasts. The participant would have to reselect the area of interest, as shown in Figure 11.

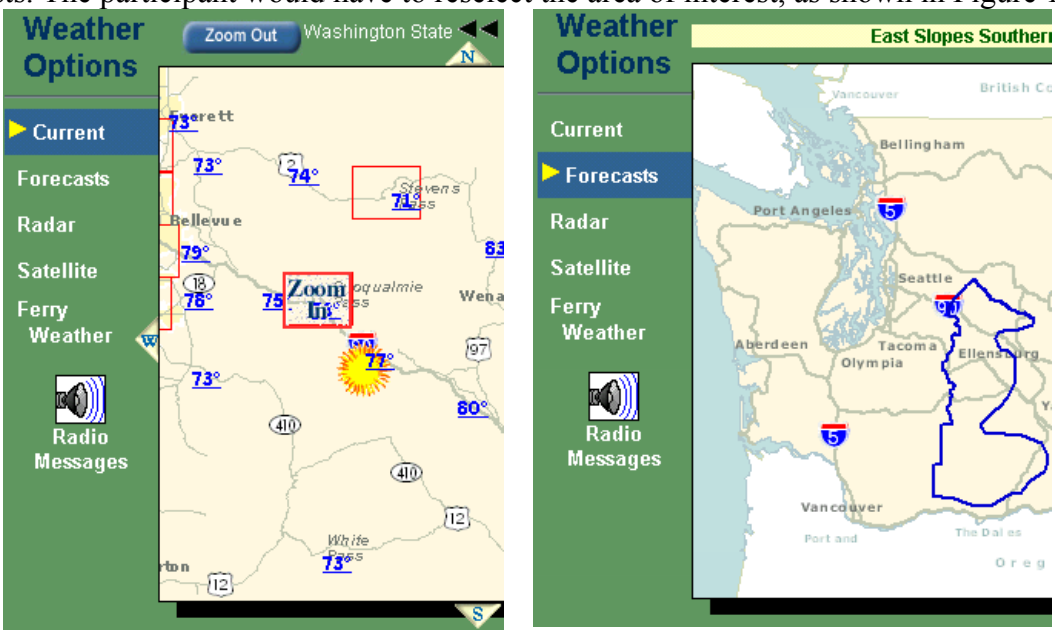

Figure 11: Current and forecast weather

Participant Comments

- W-P3: “Oh, I like that, that it lets me pick and zoom and immediately shows the temp – cool.”

Recommendations

- Keep multiple pathways to get to the same information.
- Since the Weather tab has both current and forecasted information, consider renaming the ‘Forecast’ link to ‘Regional Forecasts,’ which is more indicative of its function and may help users to differentiate between the two links.

Task A.2: Congestion on the Pass

Participants were then asked to look for traffic congestion by locating a specific camera. For Western participants the camera was at Franklin Falls near Snoqualmie Pass. For Eastern participants the camera was at the intersection of I-90 and US 2 outside Spokane. This task would require participants to use the zoom feature of the map or a text link to find a specific traffic camera. Participants' actions are listed in Table 22 and Table 23.

Table 22: Western participants' actions for task A.2

Participant	Path
W-P1, W-P4, W-P5, W-P6, W-P10, W-P11	From the Traffic Cameras page, zoom in on Snoqualmie Pass and then use the roll over to find specific camera
W-P2, W-P3, W-P12	Navigate to Mountain Pass page, click on Snoqualmie, then start over and return to traffic cameras
W-P8	From the Traffic Cameras page, zoom in on Snoqualmie Pass and select from text list of cameras
W-P7	Navigate to Mountain Pass page, click on Snoqualmie, look at traffic camera, never finds the Franklin Falls camera
W-P9	From the Traffic Cameras page, zoom in on Snoqualmie Pass, look at individual cameras, but never finds the Franklin Falls camera

Table 23: Eastern participants' actions for task A.2

Participant	Path
E-P2, E-P3	From Traffic/Camera page, click on I-90 from list, click on I-90/US-2 interchange from the list
E-P1	Select Additional Info tab, click on Commute & Travel info and new window opens, click on Traffic and Roads and returns to Traffic and Weather site and zoom on Spokane and finds camera
E-P4	From Traffic/Cameras page, click US-2 from list, click on I-90/US-2 interchange from the list

Findings

Out of 16 participants, 14 found a specific traffic camera (88%).

- Two Western participants did not find the camera. Neither participant rolled over or clicked on the icon for Franklin Falls.
- The other finding was that 25% of Western participants were concerned because they could not tell which way the camera was pointing.
- One participant wanted more information than just the traffic cameras; she stated a desire to see data similar to the Puget Sound Flow map, including traffic density and speeds.

Participant Comments

- W-P4: "Camera view doesn't indicate direction of view…looks like Westbound, doesn't let you know if it's east or west. If I hadn't driven that road millions of times, I wouldn't know. The highway is so divided there."
- W-P6 "I'm not sure which way the camera is pointing."
- W-P9 "This map right here (Snoqualmie Pass zoom) gives me no data, It tells me where I can click to view the data, but I much prefer the colored lines the red, black, yellow, green format..."
- W-P11 "I'm not sure which way the camera is pointing, I think it's westbound."
- E-P3 "That was pretty easy."
- E-P4 "This is pretty nifty, I like this website."

Recommendations

- On the screen that shows the traffic camera output, tell which direction the camera is pointing or tell users how to tell which way the camera is pointing. WSDOT currently provides this feature on the Puget Sound Flow Map (see Figure 12).
- For heavily traveled routes, like Snoqualmie Pass, implement a display similar to the Puget Sound Flow Map that shows traffic density.

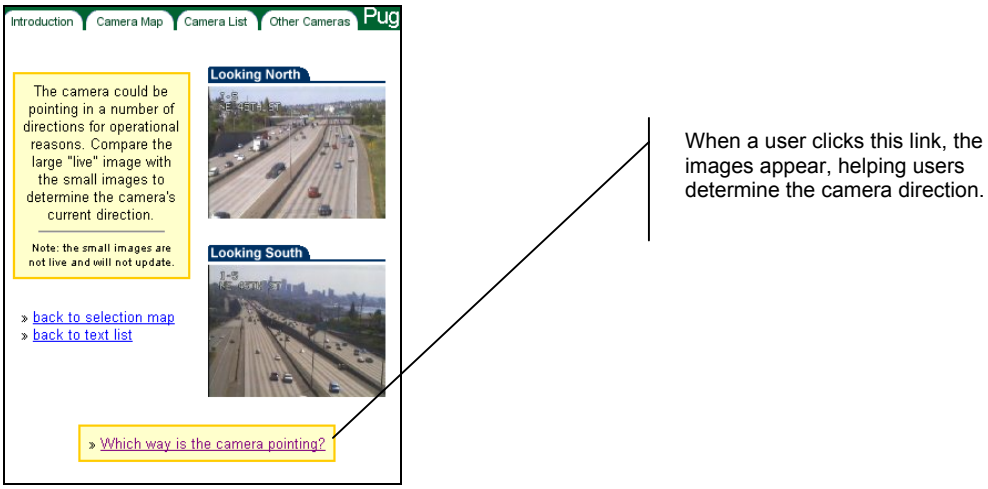

Figure 12: Camera direction shown on Puget Sound cameras

Task A.3: Wind Speed

Participants were asked to find the wind speed at a specific location. We wanted to see if participants could locate more detailed weather information. This task required the participant to click on a weather station – not just read the temperature off the map. The results are detailed in Table 24.

Table 24: Participants' actions for Task A.3

Participant	Path
W-P2, W-P3, W-P4, W-P5, W-P6, W-P7, W-P10, E-P1, E-P3, E-P4	From Weather tab, zoom in, click on weather station from list and locate wind speed
W-P1, W-P8, W-P11, W-P12	From Weather tab, zoom in, click on weather station on map and locate wind speed
E-P2	From Weather tab, click on weather station from list and locate wind speed
W-P9	From Weather tab, use search box to find city name, click on weather station from search results

Findings

All participants found the information they were looking for. The current interface supported the different ways users looked for wind information, clicking on the map, limiting the text list by zooming and then clicking on the text link, and searching for the weather station.

- Two users found the Wind heading on the weather station pop-up but there was no reading, as shown in Figure 13.

Participant Comments

- E-P3: “Hmm Ellensburg/Bowe does not have any wind showing, I wonder what that means.”

Recommendations

- Keep multiple pathways to get to the same information.
- If no data is available, have the page display the text: No data.

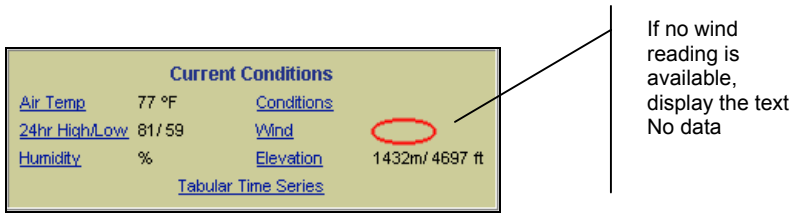

Figure 13: Weather station information with no wind reading

Task A.4: Construction

For this task, we wanted to see how users gathered information about construction along a portion of a trip from the project reports on the website. See Figure 14on page 44 to see a sample project report.

The participants found the information by employing one of the methods, listed in Table 25.

Table 25: Participants' actions for Task A.4

Participant	Path
W-P2, W-P3, W-P4, W-P5, W-P8	Select Travel Routes tab, zoom in on map and use the left, right, up, down arrows to check for construction along a route
W-P6, W-P7, W-P11, W-P12	Select Travel Routes tab, zoom to an area of construction, then use back button, then zoom in a different area
W-P1	Select Travel Routes tab, from the state view click on projects that appeared to occur on route
E-P1	Select Travel Routes tab, select I-90 from list, reads list of reports, zoom in on map and click on individual icons
W-P9	Browse around site, looking for "construction," look for a search feature, select Travel Routes while still looking for search feature, select I-90 from list, zoom on map, select icon on map and zoom out
W-P10	Select Traffic/Cameras tab, go to the WSDOT home, back to Traffic and Weather site, click on Travel Routes
E-P2	Select Traffic/Cameras tab, look through camera list, click Travel Routes tab, zoom on map, select projects from list
E-P3 – task failure	Select Traffic/Cameras, click Projects in upper right global navigation, select South Central Region, back to Projects page, looks through Under Construction list, back to Traffic/Cameras page, click through traffic cameras on route. Never finds Travel Routes page
E-P4	Select Additional Info. tab, click on Transportation Commission link, returns to Traffic/Cameras page, select Travel Routes link, zoom to Ellensburg, and click I-90 from list

Findings about Project Reports

Participants found this task difficult to complete, as shown by the time in Table 20 on page 37. This task took the most time for users to complete, with the average for Western and Eastern participants being 2.09 and 3 minutes respectively.

- Participants found the project reports too detailed. They contained detailed information unnecessary for a traveler including organizational specific language and acronyms.
- The project reports are not consistent; some are very detailed while others have minimal information.

Figure 14 below is an example of a project report currently found on the WSDOT Traffic and Weather site.

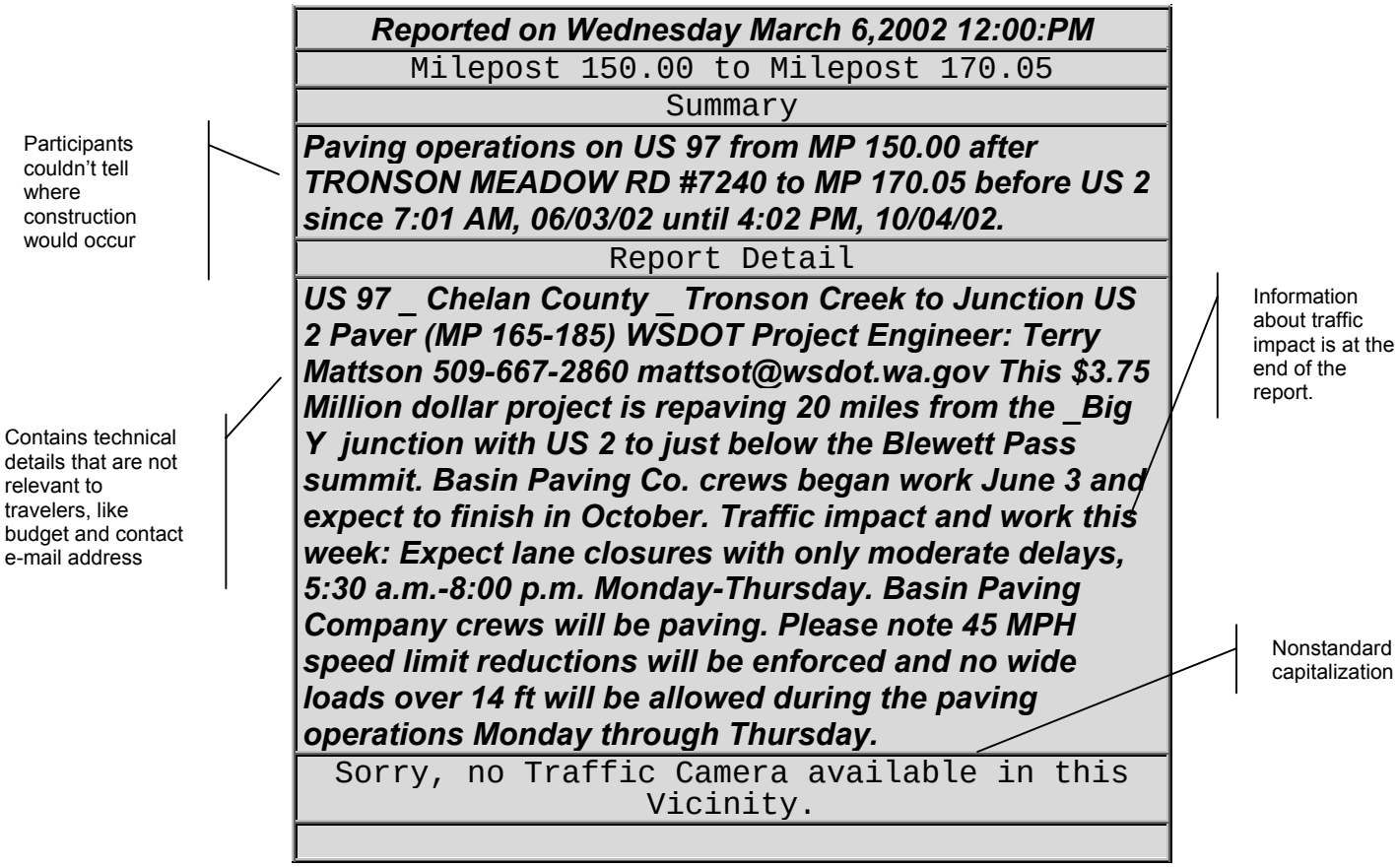

Figure 14: Example of a project report

Participant Comments about Project Reports

- W-P1: “Some of these are old and I'm not sure where those [projects] are on here.”
- W-P5 “There’s a lot of abbreviations and stuff that I don't understand. Oh, that really helps to know that it costs 3.7 million dollars… that's really helpful for my trip, and that the Central Washington Asphalt Co is doing it. Did I mention that I am sarcastic?”
- W-P11 Comments on acronym in project report: “Hmmm, CMSTPMP, I wonder what that means.”

Findings about Geography

- Participants could not correspond construction projects with a location.
    - The project reports did not provide enough geographical clues for a traveler who is not familiar with specific city and street names in Washington.
    - Out of 16 participants, 75% did not notice the interface clues of red circles that would help them establish a geographic location. The red circles were helpful for the 25% of participants who saw them.

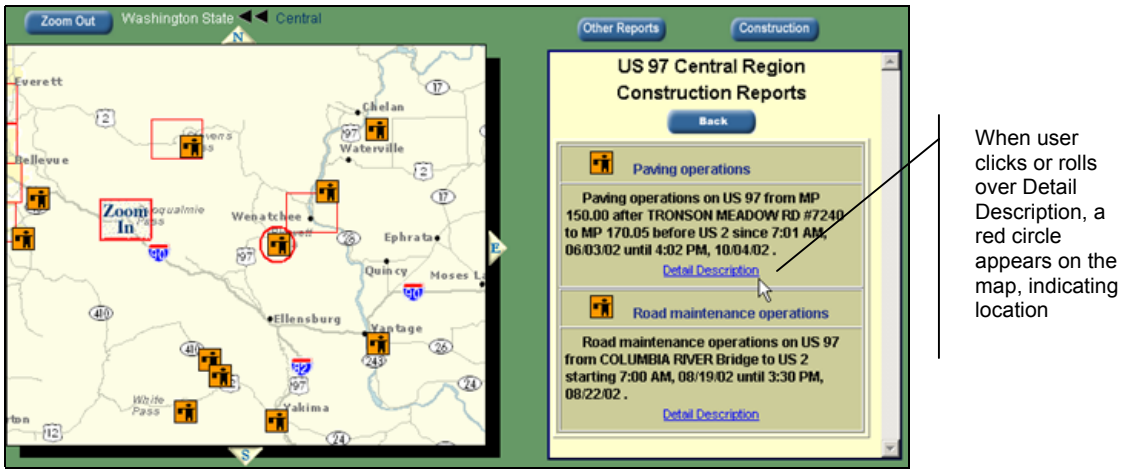

Figure 15: Red circle indicates construction location

Participant Comments about Geography

- W-P4 “’Elmira City’ - I do not have a foggy clue where that is at.”
- W-P6 “I have no idea what exits they are talking about… I don't know if mile marks start from west or from east?” “I don't know if that's part of my route or not…”
- W-P7 “Not being familiar with the actual area it says Barker Road, but I’m not sure that would effect me or not.”
- W-P9 “These are all really detailed, considering that I-90 is a big road. I don't know where any of these are really, not enough to know if any of them apply to me.”
- W-P11 “Exit 293, wherever the heck that is.” (Tries to rely on his memory of how many miles places are to make sense of the info in the report more). “So these

are all westbound, I know Ellensburg is about milepost 100, so these are past Ellensburg…. Okay, I'm getting a little bit beyond my comfort zone."
- W-P12 "Exit 290 Barker Road? Of course it doesn't tell me what the city is."
- E-P1 "Sunset Highway, that's in Spokane. Oh wait, Sunset Way, that might be Seattle. Oh, my mistake."
- E-P2 "I think this [project report] is an old one. I'm not exactly sure where these [projects] are."
- E-P3 "Sunset interchange, I don't know where that is."

Findings about Labels

- The term travel routes/travel alerts was not immediately apparent to a number of users; they expected to see the word construction.

Participant Comments about Labels

- W-P3: "Ok, when I clicked on Travel Routes, I would have had no idea that that had to do with construction...it's a little cumbersome, but once you figure it out, like these east, west, north, south arrows, then you notice it."
- W-P9 "I am looking for something that says road construction. I don't know whether some of them apply to me."
- W-P10 "I'm trying to find where construction is, I don't see anything about road construction. [After selecting Travel Routes] That was not very obvious to me. I thought that was pretty bad."
- E-P4 While looking for term "construction", she asks, "Is there a search on this thing?"

Recommendations

- Rewrite project reports so they are geared towards a general audience whose focus is travel. Emphasize location by referencing how far the project is from a city. Detail impact of project on travel if delays are expected. The technical aspects of the report, like cost and contractor are important for other audiences, but they should occur lower in the project report. This allows WSDOT to serve the needs of each group, drivers can see the travel impact right away and internal audiences can scroll to read more of the details.
- Standardize project reports. Create templates to assist WSDOT staff responsible for posting project reports that contain required and optional fields.
- Improve user geographical awareness by including a link in the project reports that tells users about the red circles.
- Test a new labeling scheme for the Travel Routes tab and Travel Alerts link that reflects user expectations.

Task A.5: Traffic Congestion

For this task, we wanted to see if participants could locate and use a series of traffic cameras. For Western Washington participants we asked them to determine the traffic congestion in Spokane. All Western Washington participants used the Traffic/Cameras tab, zoomed into the Spokane area and clicked on several cameras to establish if traffic congestion was an issue.

We asked Eastern Washington participants to determine the traffic in Seattle. The participants found the information by employing one of the methods listed in Table 26.

Table 26: Eastern Participants' actions for Task A.5

Participant	Path
E-P1	From Traffic Alerts page, zoom on Seattle. After being prompted to look again for Traffic, Select Traffic/Cameras tab, select icon in Seattle from State map view, click on icon, looks at one traffic camera
E-P2	From Traffic/Camera tab, look at text list of cameras. Click on Seattle area, Puget Sound Flow Map opens, goes back to main Traffic/Cameras page, once again click on Seattle area, Puget Sound Flow Map opens, goes back to main Traffic/Cameras page, click on Seattle area, Puget Sound Flow Map opens again. Click on City of Seattle camera link
E-P3	From Traffic/Cameras page, click on Seattle area, Puget Sound Flow Map opens
E-P4	From Traffic/Cameras page, click on Seattle area, Puget Sound Flow Map opens. Click on City of Seattle cameras, goes back to Traffic/Cameras page statewide view, click on Puget Sound area again, flow map opens, click on Traffic Conditions on the top

Findings

All Western Washington participants completed this task with ease taking an average of 35 seconds to finish. As shown earlier in Table 6, most Western participants had experience with looking for traffic congestion in Puget Sound. Eastern Washington participants took an average of 1.45 minutes to complete the task. A contributing factor to the difference in time is the amount of information available in each city. There are far more traffic cameras in Seattle than in Spokane.

Participant Comments

- W-P1 “I don't think they have a flow map like we do here in Seattle.”
- E- P2 “Where is the place that showed me this was traffic cameras… how do I get downtown Seattle?”

Recommendations

All participants could find the location of traffic cameras for the two cities. But we noticed that it took Eastern Washington participants longer to complete the task and it was more difficult for them to reconcile the information from the various traffic cameras. So while we do not have any recommendations to improve the usability for the WSDOT Traffic and Weather site, this finding may be relevant for the Puget Sound Flow Map site. When performing usability tests on the Puget Sound Flow Map in the future, using participants who are not familiar with Seattle geography may yield rich results.

Task A.6: Delays along US 2

For this task, participants were asked to look for any information that may delay their trip along a specific route. We were interested in seeing how users would combine different types of data, although the participants mostly focused on construction. The methods for completing this task are listed below in Table 27.

Table 27: Participants' actions for Task A.6

Participant	Path
W-P4, W-P6, W-P7, W-P8, W-P10, W-P11, W-P12, E-P3	Select Travel Routes tab, construction, zoom in and out along US-2
W-P2, W-P3, W-P5	Select Mountain Pass tab, select Stevens Pass report
E-P2	Select Travel Routes tab, select US-2 from list, zoom on map, select Traffic/Cameras, select Travel Routes, select Route Profiles, click on US-2
W-P9	Select Mountain Pass tab, select Stevens Pass report, and investigate other links such as \avalanche info and emergency closures
E-P4	Select Travel routes, construction, zoom in and out along US-2, select Road Temperatures link, locates US2 and reads temperature
E-P1	Skipped task

Findings

Overall, participants focused on construction information, and the findings for this task corroborate the findings for Task A.4. Participants did not seek out information about weather, but since the usability study was conducted in the summer months, if could be that travelers were less concerned about weather conditions.

- Participants found the project reports difficult to use. They contained too much detail, information unnecessary for a traveler, organizational specific language and acronyms. They did not provide enough geographical clues to the person who is not familiar with specific city/street names in Washington.
- One participant made a reference to a feature like the route profile, where all information could be found about one stretch of road, but even if he did find the route profile feature, it does not contain construction information.

Participant Comments

- W-P1 “I’m not sure where Elmira is.”
- W-P4 “Rather see cost and phone number last instead of first… The effect on traffic should be listed at top of detailed advisories…”
- W-P6 “I don't know where some of the cities are, I don't know where the streets are or how the miles markers are done. I don't need the cost of the project…”
- W-P9 “I’d like to see something where I can say where's US 2 and see everything that applies to it…”
- E-P3 “Pretty thorough description [of the project], more than I ever wanted to know.”
- E-P4 Participant refers to the travel alerts page: “Where was I before?” while reading a project report, “They say it’s a project but I think it means construction.”

Recommendations

- Rewrite project reports so they are geared towards a general audience whose focus is travel. Emphasize location by referencing how far the project is from a city. Detail impact of project on travel if delays are expected. The technical aspects of the report, like cost and contractor are important for other audiences, but they should occur lower in the project report. This allows WSDOT to server the needs of each group, drivers can see the travel impact right away and internal audiences can scroll to read more of the details.
- Add construction information to route profiles.
- Improve the discoverability of the Route Profile feature.

Task A.7: Weather Along US2

In addition to looking at construction, we also asked participants to look for specific weather information on the same road. This information is provided on the Route Profiles feature. We wanted to see if participants could find this feature and if not, how did they gather the information to complete this task. Table 28 details how participants completed the task.

Table 28: Participants' actions for Task A.7

Participant	Path
W-P4, W-P6, W-P7, W-P8, W-P9, W-P10, W-P11	Select the Weather tab and zoom in on the area
W-P5, W-P12	From Travel Alerts tab, select Route Profile
E-P1, E-P2	From the Weather tab, looked at state wide view for cloud icons
W-P2	From the Stevens Pass page, click US2 Travel Info link
W-P3	Select specific weather stations
W-P1	Used radar and satellite
E-P3	From the Traffic/Cameras tab, click on several cameras along route
E-P4	Select Weather tab, select Travel Routes tab, select Traffic/Cameras tab, look at cameras along US2, select Weather tab, and click on Radar, Satellite.

Findings

As shown in Table 20, this task took Western and Eastern Washington participants an average of 1.14 and 1.20 minutes respectively to complete this task.

- Only 4 of the 16 participants (25%) could find the Route Profile feature.
- One participant complained about having to scroll left and right in order to access information.
- When linking to the Route Profile feature there are inconsistencies in labeling. From the Stevens Pass page the feature is labeled “US2 Travel Info”

Participant Comments

- W-P6 “I sure would love it if they would make these box resizable… I hate these things where you have to scroll around.”
- W-P11 “I’m looking for a smart quick way for route weather report.”
- E-P2 “I don't think I should have to look up every city between Seattle and Spokane on US2.”

Recommendations

- Improve the discoverability of the Route Profile feature (see Task B for more details on this recommendation).
- For pop-up windows and screens that contain scroll bars, remove the need for users to scroll from left to right. This can be accomplished by setting a relative screen size in percent, instead of an absolute size in pixels.
- Use consistent labeling throughout the WSDOT site.

Task A.8: Traveler Information for Other States

This task was developed due to the online survey. A number of comments made by users stated they would like to see a link to traveler information to other states, specifically in the Pacific Northwest. Since the current site does have a link to Idaho and Oregon DOT sites, we wanted to see if users could find this information. Western participants were asked to find information about Idaho and Eastern participants were asked to find information about Oregon. Table 29 details the success of the task.

Table 29: Participants' actions for Task A.8

Participant	Found link to other state's DOT page
W-P3, W-P4, W-P5, W-P6, W-P7, W-P8, W-P9, W-P10, E-P1, E-P2, E-P3, E-P4	Yes
W-P1, W-P2	No

Findings

Most of the participants (88%) found the link. Participants who found the link did so in an average of 45 seconds. The two participants who did not find the link searched for an average of 1.30 minutes. Both looked at the site index but did not find a link.

Participant Comments

- W-P1 "I don't see any links, but that would be nice."
- W-P2 "I would just go somewhere else."

Recommendations

- Add additional links to traveler information in bordering states in the site index.
- Add additional links on the Route Profiles page by adding rollovers and links to the maps of British Columbia, Idaho, and Oregon that border Washington.

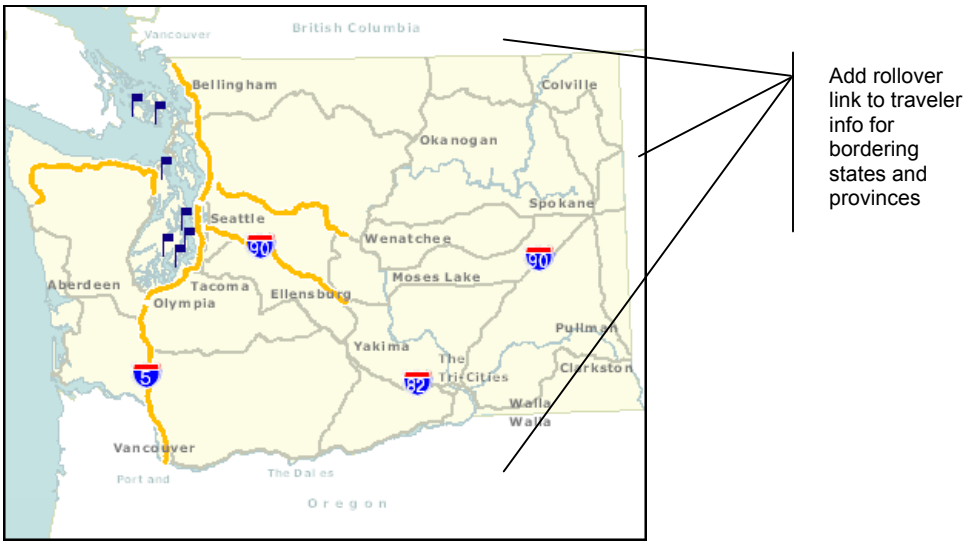

Figure 16: Adding links for bordering states and provinces

Task B: Comprehensive Road Conditions (aka Route Profiles)

For this task, participants were explicitly directed to access the route profiles feature of the site. The findings and recommendations in this section detail the experiences participants had with route profile feature.

Discoverability - In Task A, participants could have completed the task by using the route profile feature. Only 25% of users found the feature without being directed to do so. Out of the remaining 75%, a number of participants made reference to the feature but never found it.

- W-P11 “Hmm route profile,” but does not click on the link, then says “I'm thinking that you guys might have made a smart quick way for a route weather report, but I don't know if you have done that or not.”
- W-P4 After being directed to Route Profile, “Is travel routes and route profiles actually on the current site? I had no idea they were here. I've been on this site a lot.”

Comparing routes – We asked participants to decide which mountain pass to take: Snoqualmie or Stevens. Some participants wanted to have two routes open at once to compare them, which is not possible.

- W-P2 “Makes it kind of hard to use…to try and correlate the two real easy.”

Findings: Things Participants Liked

While completing the tasks, participants liked several features, listed in Table 30.

Table 30: What participants liked about Route Profiles

Feature	Comment
• Route Profiles feature, in general	W-P8 - "I think this is pretty cool." W-P9 – "Gives me a nifty profile map in a small window, forecast conditions - that's nice, that's handy." W-P11 – "Wow. Cool. There it is." E-P1 – "That's pretty. It gives you everything you need."
• Current and weather status on the road	W-P1 - "It's nice to have weather along the way."
• The link to the icing tutorial	W-P3 - "This is informative."
• Road temperature	W-P12 - "I like having the Road temp and Air Temp. Road temp is good to make sure road isn't freezing because of precipitation also sticking to the road." E-P3 – "It's handing to have the [road] temperature profile going over the pass."

Findings: Things Participants Wanted to Improve or Add

While completing the tasks, participants mentioned several features they would like to see improved on the Route Profiles feature, listed in Table 31. Table 32 details what participants would like to add to Route Profiles.

Table 31: What participants wanted to improve about Route Profiles

Issue	Comment
• Inconsistency in labeling the route	W-P4 - "I'm seeing Dryden Road and I've been back and forth over that pass and I'm not sure where that's at. You have [names of] towns before the pass, but a road afterwards."
• Layout of the camera images	W-P5 "That's kind of weird to have all of the pictures next to each other without a space between them, that's kind of odd to my eye."
• Camera images unavailable	W-P12 "That camera [that is unavailable in Ellensburg] has been out of order for six or seven months."

Table 32: What participants wanted to add to Route Profiles

Feature	Comment
• Construction information to the route	
• Elevation and gradient information	W-P4 "I would be interested in elevation and gradient information for my motor home."
• Camera icon on route	W-P5 "It would be nice if somehow the cameras could be shown along the map with some kind of icon … so you can where pictures the fit along the map."
• Traffic density	W-P6 "Color coded traffic congestion would be nice, I would expect it to be green [in summer]."

Recommendations

We offer the following recommendations for the route profiles feature.

- Allow users to open more than one Route Profile at a time.
- Improve discoverability of Route Profile feature.
- Investigate the feasibility of adding more information on the Route Profile feature.

Task C: A Trip to the Peninsula

For this task, we wanted to see if participants could find information about ferries from the Traffic and Weather site. They found the information in a variety of different ways shown in Table 33.

Table 33: Participants' actions for Task A.8

Participant	Path
W-P1, W-P3, W-P5, W-P6, W-P7, W-P9, W-P11, E-P2, E-P4	From the Travel Routes tab, click on State Ferries link
W-P2, W-P12	Click on the WSDOT home page and click on Ferries link
W-P8, W-P10	Click on Additional Info tab, select Site Index and select Ferries from the alphabetical listing
W-P4	From the Traffic Cameras tab, click on Puget Sound Traffic, tries to click on the ferry icon but it does nothing, browses to what he calls "the old site" (http://www.wsdot.wa.gov/pugetsoundtraffic/) and click on the ferry icon.
E-P1	From the Travel Routes tab, rolls over map and Puget Sound appears. Click on the water and the State Ferries page appears
E-P3	Click on Maps & Data, browses back to the Traffic Cameras tab, select Site Index, select the letter "F," click on Ferry Schedules.

Findings

Although participants used different pathways to find information about the ferries, they all succeeded and read the ferry schedule with ease. One participant struggled when he tried to click on a ferry icon on the Puget Sound Flow Map and it did not take him to the ferry page (see Figure 17).

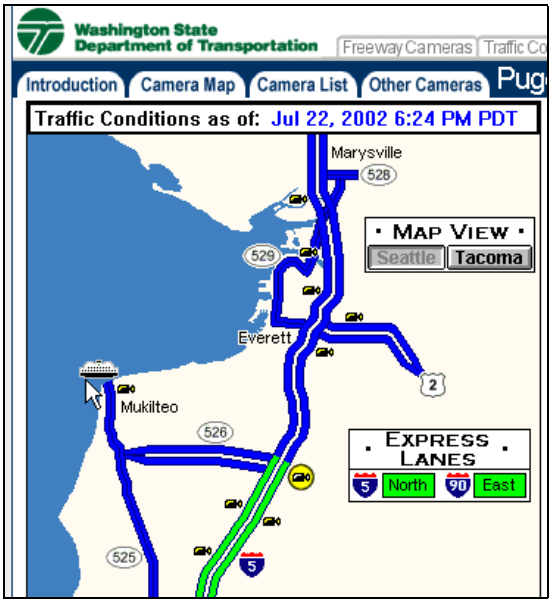

Figure 17: Ferry icons on Puget Sound traffic sites

Participant Comments

- W-P4 “You have the ferry icon on the flow map, but you can't click on the ferry from certain screens, if you go to the old site it works.”
- W-P10 “I'm not seeing any links on here to the ferries, but I know it's here somewhere...I'll go to the site index, since I'm at a loss.”

Recommendations

- Keep multiple pathways to get to the same information.
- Make ferry icons on Puget Sound Map clickable.

Task D: A Skiing Trip

For this task, we wanted to see if participants could gather information about a recreational trip, in this case skiing. Although this task is not specifically discussing traffic conditions, in the survey a number of respondents indicated they used the WSDOT Traffic and Weather to check out the snowfall at ski areas. We asked participants to compare the conditions at Stevens and Snoqualmie Passes. See Table 34 for more details.

Note: This task may have had different results if the test had been performed in the winter months with more realistic conditions; for the majority of the test the weather was in the 50's and 60's.

Table 34: Participants' actions for Task D

Participant	Path
W-P3, W-P4, E-P2, E-P3, E-P4	Select Mountain Passes tab, read pass reports
W-P5, W-P10, W-P11, E-P1	Select Weather tab, zoom in on Snoqualmie, zoom in on Stevens, read temperatures on map
W-P1, W-P7	Select Weather tab, read temperatures from the weather station list
W-P2	Select Weather tab, click on various weather stations, click on conditions to see more detail
W-P8	Select Weather tab, zoom in on Snoqualmie, zoom in on Stevens, click on Mountain Passes
W-P9	Select Mountain Passes tab, select Stevens Pass form left pane, click on Travel Route tab, select Route Profile, select US 2 from list
W-P12	Select Weather tab, zoom in on Snoqualmie, zoom in on Stevens, read temperatures on map, browse to Route Profiles
E-P1	Click on Site Index, back to Traffic and Weather site, zoom on Stevens pass

Findings

Participants used a number of the resources on the Traffic and Weather site to gather information about skiing conditions including the traffic cameras, mountain pass reports, and weather information.

1. One participant clicked on the word "Conditions" on the weather station expecting to see more details about the conditions; instead the glossary list appeared.
2. One participant mentioned that the Mountain Pass reports were too busy.

Participant Comments

- W-P9 - "I don't find the list of passes thing the most outstanding thing I see. I see the report, and really want to know what pass I am looking at first, because I don't care about a majority of these…"
- E-P3 –"Unfortunately, sometimes on Stevens and Blewitt passes snow caps over the [traffic camera] lens and you can't see if it is still snowing."

Recommendations on Mountain Pass Tab

- Ensure that all names of mountain passes appear in the list when the window is opened. As of right now you have to scroll to see Stevens and Snoqualmie, the most traveled passes.
- Shorten long URLs by making the pass name a link or include a text link for "More Info."

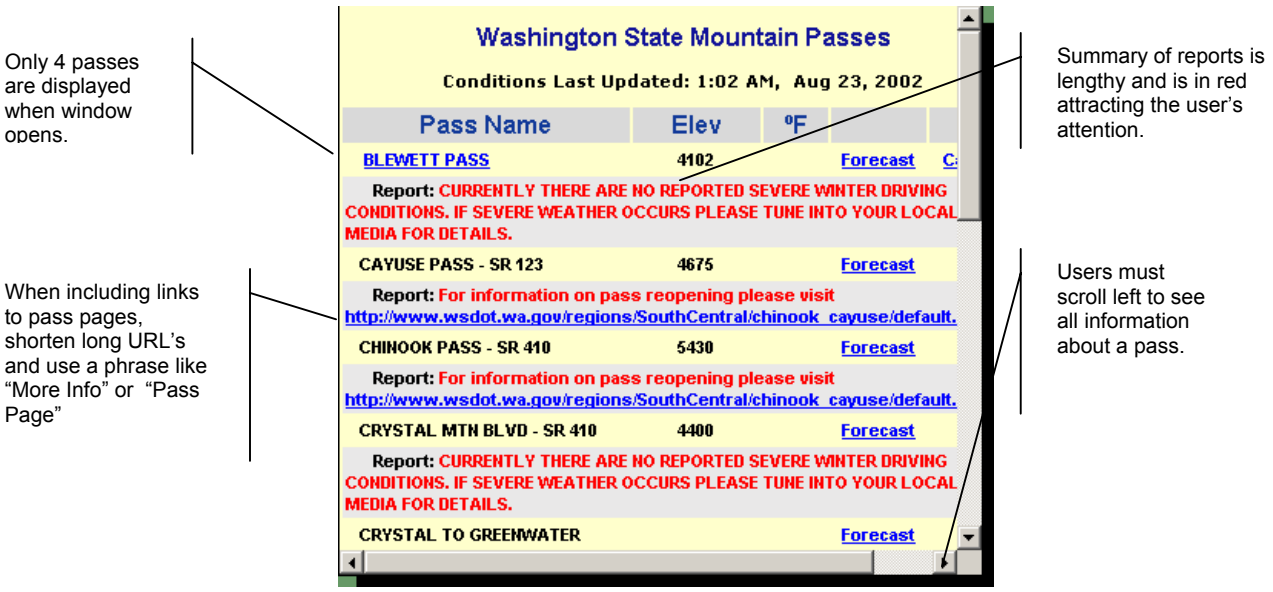

Figure 18: List of mountain passes

Other Recommendations

- Provide clues that something in the interface that tells you it is a glossary, like a rollover. – on the weather stations.

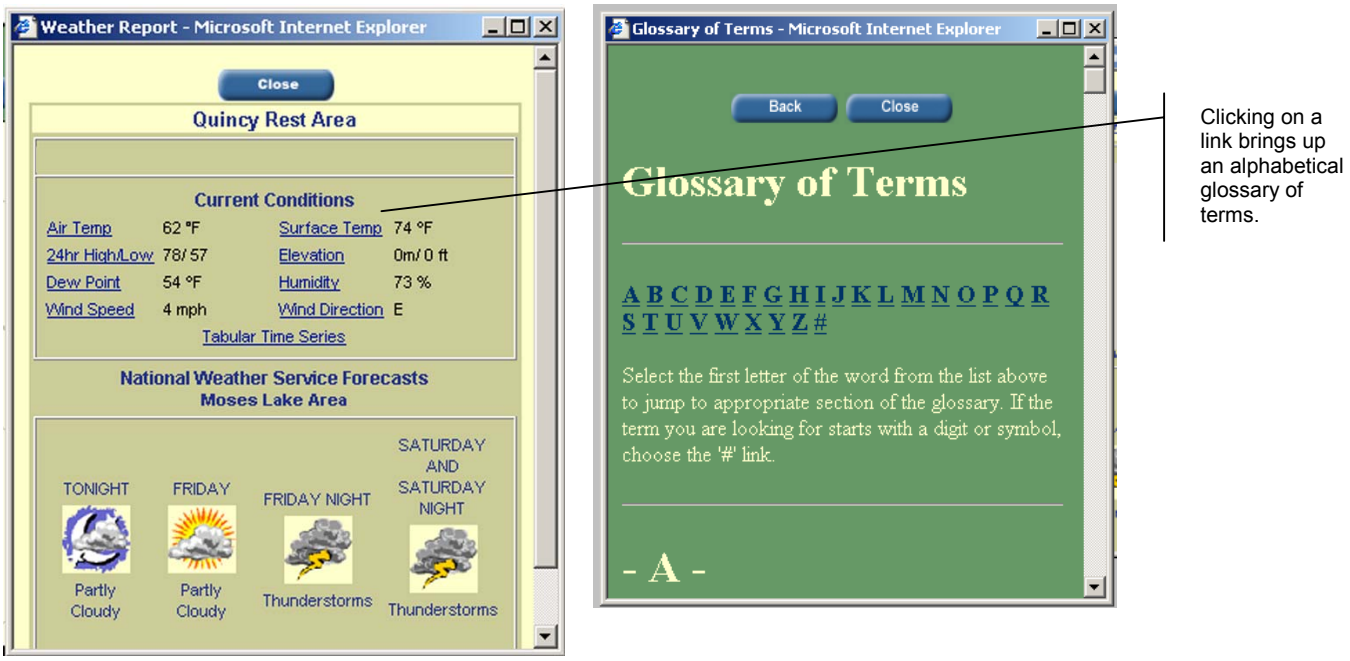

Figure 19: Glossary of conditions for a weather station

Task E: Additional Comments

For this task we gave users the opportunity to look around the WSDOT Traffic and Weather site and offer any additional comments. Participants made comments in three areas: what they liked, what they thought needed improvement, and what they would like to see added to the site. All participants made comments in at least one area if not all three. The types of comments made by participants are summarized in Table 35. For a complete list of participants' comments, see Table 36 and Table 37.

Table 35: Percentage of participants' comments

	Number of participants	Percentage of participants
Commented on things participants liked	9/16	57%
Commented on things participants wanted to improve	7/16	44%
Commented on things participants would like to see added	12/16	75%

Findings: Things Participants Liked

The participants made 19 comments about what they liked. Listed below are the topics that participants mentioned and how often:

- Wealth of information on the site (5)
- The Traffic and Weather site, in general (3)
- Traffic cameras at the Canadian border (3)
- Traffic cameras in general (2)
- Puget Sound Flow Map (2)
- Route profiles (2)
- Interface of the website, pop-up windows (1)
- The construction page on the Traffic and Weather site (1)

Recommendations: Things Participants Liked

In general, participants thought the WSDOT Traffic and Weather site was a valuable resource. Participants who claimed to have used the site before, or, in the case of the Western Washington participants, had vast experience with the Puget Sound traffic cameras, mentioned they had not seen many of the resources on the Traffic and Weather site.

- Increase the visibility of Traffic and Weather:
  - Promote it on the Puget Sound Flow Map
  - Increase media coverage
  - Create a URL that is easier for users to remember and type and mirror the site there
  - Reduce the duplication of similar resources on WSDOT site, such as traveler.htm, traffic.wsdot.wa.gov
  - Investigate methods to improve results on search engines (meta-tags, etc.)

Findings: Things Participants Wanted to Improve

The participants made 11 comments about what they wanted WSDOT to improve. Listed below are the topics participants mentioned and how often:

- The construction page on the Traffic and Weather site (3)
- Language that is too technical in project reports (1)
- Not being able to tell how the text matched up to the geography (1)
- Backwards compatibility of WSDOT websites (1)
- Wording of tabs, Additional Info. (1)
- Traffic cameras that are not repaired (1)
- Typo on the Additional Info Tab, the word Earthquakes is spelled wrong (1)
- Mountain Pass reports are too busy (1)
- The fact that some rest stops had closed in the Eastern part of the state (1)

Recommendations: Things Participants Wanted to Improve

1. Increase the sense of place for the Traffic Alerts page – come up with interface ideas that can help tell users where they are on the site.
2. Simplify project report language
3. Simplify Mountain Reports, take out the red, and make them more streamlined.
4. On Additional Info tab, under the heading Weather, change EarthQuakes to Earthquakes.
5. Participant mentioned that the traffic camera for Ellensburg in the route profile has been broken for "almost a year." If a camera will be down for a while, remove the feed from the website.

Findings: Things Participants Would Like to See Added

The participants made 20 comments about what they wanted WSDOT to add to the site. Listed below are the topics participants mentioned and how often:

- A resource that could give provide driving directions with integrated WSDOT traveler information, similar to MapQuest (5)
- Rest stop information and gas station information, but only if there is no advertising (4)
- Additional traffic cameras on 99, 509 or other places (3)
- Links to Washington travel and tourism information (3)
- Access to information while driving, like On*Star (1)
- Knowing when new traffic cameras will be added to the site (1)
- Additional route profiles for Ellensburg to Spokane, Ellensburg to Yakima (1)
- WSDOT website translated into another language, like Spanish (1)
- Links to Greyhound or other bus lines (1)

Recommendations: Things Participants Would Like to See Added

1. On Additional Info. tab, add links to other Washington State tourism attractions. Similar links now reside on another WSDOT page (http://www.wsdot.wa.gov/traveler.htm), but since the WSDOT Traffic and Weather site is seen as the portal for traveler information, it would be helpful to duplicate the links.
2. Investigate the feasibility of providing WSDOT travel information via cell phones or in car services, such as On Star
3. Link WSDOT Traffic and Weather site to the WSDOT bus page (http://www.wsdot.wa.gov/choices/bus.cfm) and add a link to the Greyhound site (http://www.greyhound.com/).
4. Add other routes to Route Profiles page, such as Ellensburg to Spokane, Ellensburg to Yakima, Spokane to Pullman, and others.
5. Participants wanted to know rest stop information. A link to rest area information is currently on the Additional Info tab. Promote the link so it appears on the Travel Routes page in the left navigation bar after Lake Washington Bridges.
6. For the future, consider creating a resource that could combine driving directions, at least for heavily traveled routes, with WSDOT traveler information such as traffic cameras, weather and construction.

Participant Comments

Table 36: Western Participants' Comments

Participant	Things the participant liked	Things the participants wanted to improve	Things the participant wanted to see added
W-P1	• No comments	• No comments	• "Something that would be nice is if you could say, I'm leaving from my house and going to Grand Coulee Dam. How do I get there and what is the construction along the way? Instead of trying to figure out where these little cities are, like for MapQuest, it would give you the directions and merge that with construction information, that would be a nice feature." • "It would be nice to access information in the car, like On*Star - where you could see a little map."
W-P2	• No comments	• About construction: "You can't just look at the big [construction] map, you have to step down [zoom] for the details - that was kind of confusing."	• No comments

Participant	Things the participant liked	Things the participants wanted to improve	Things the participant wanted to see added
W-P3	• Relies heavily on the Puget Sound Flow Map…"This little flow map is my bible when I go home at night. I like the new estimated travel time, it was off 15 minutes, but things happen so fast, I know they update every minute or two, which is great." • "Cameras at the border crossing are a nice feature."	• "I like the look of it a lot better, but with the construction site - it just doesn't do it. It's so busy."	• "I really think more cameras are needed on 99 and 509. That's the biggest beef I've had, it's wonderful but more cameras...in the Federal Way area and on 99."
W-P4	• No comments	• "This site does not work good with older computers, I work for the federal government [which has computers with older browsers, such as] IE 3 or 4 and this site just comes up with errors. You can't access from a majority of federal government computers because older machines are still in use…" • Should change the Additional Info to Additional Links, "The word 'Links' is in most people's vocabulary, I thought Additional Info meant how to contact them…"	• No comments

Participant	Things the participant liked	Things the participants wanted to improve	Things the participant wanted to see added
W-P5	• No comments	• "I think that there might be some terms and abbreviations used that are not lay people terms." • "I like how they have the individual highways and freeways listed over here [in highway list of right pane] because this [the Travel Route map] is too busy."	• "Rest stops… I am a big fan of rest stop information, so that would be something I'd like." • "It might be nice to know where there is gas available, without getting commercialized…"
W-P6	• "I like that information pops up in a different window…"	• "I had a lot of trouble telling from text where things were because I don't know the geography well enough, I was confused for a long time about how mile markers went, some indication of how to go from text to graphic to know how something effects me."	• No comments
W-P7	• "The traffic cameras are great, I look at the Puget Sound Flow Map on a daily basis." • "I would definitely use the border cameras to check out the wait through the peace arch, are those new?" • "There is a lot of stuff I didn't know was out there, this is a live site? I found some things I am going to use."	• No comments	• "It would be really helpful if there were cameras on 99."

Participant	Things the participant liked	Things the participants wanted to improve	Things the participant wanted to see added
W-P8	• "I like this, is it already live?"	• No comments	• No comments
W-P9	• No comments	• No comments	• "I would like a more detailed map, so I could get detailed driving instructions…"
W-P10	• No comments	• No comments	• "It would be nice to link to the Washington tourist information, under travel routes or additional info."
W-P11	• "I just want to compliment the DOT for the number of cameras and these new live 30-second cameras. The only thing I need now is a PDA in my car so that while I'm driving 30 seconds after something happens I can avoid or detour." • "I'd just like to say that in general that I'm impressed with how much information is on there, I really am. We should probably get Internet service at home to get at this information... this is an incentive."	• No comments	• "You know what would be nice, the rest stops on the route. It would also be nice to know where the gas companies are. But then we should probably make those companies pay to advertise, but we don't want a whole lot of advertising on the site." • "It might be nice, going into Mt Rainer National Park [to know if] there's fees and things,...like the new narrows bridge." • "I've seen them installing cameras down south. When are those going to be ready? I wish I could find out information about when the cameras will be ready."

Participant	Things the participant liked	Things the participants wanted to improve	Things the participant wanted to see added
W-P12	• "Canadian border, that's kind of a cool feature [to see] how long the line up is here." • "I've used the site off and on over the past few years just planning trips. What I really like is the route profile feature and having the ability to look at current and forecast conditions." • "I really like how the page has expanded."	• "It's slightly irritating how cameras often go down and stay down." • Participant found a typo on the Additional Info page, EarthQuakes – the 'Q' should not be capitalized • "I don't like these mountain pass reports as much. Rather than having everything in one window, I have to use these stupid scroll bars to go up and down and left and right. The old mountain pass report page was better - it seemed a lot cleaner and more open"	• "Maybe some more information on Route Profiles, like RT 82 through Yakima that has a lot of traffic. Also route profile stuff for Ellensburg and Spokane, especially for people going to the Gorge." • "One feature that might be neat, maybe coming up with a set of driving directions for heavily traveled routes. Like MapQuest, but with only the necessary information." • "I'd like to see an increasing in the number of cameras that are on all of these sites."

Table 37: Eastern Participants' Comments

Participant	Things the participant liked	Things the participants wanted to improve	Things the participant wanted to see added
E-P1	• No comments	• "Everything you folks on the west side look at is not the way it looks like on the east side.... Is the State Legislature playing games again and shutting down rest stops? Over here it's a frustration because of the voter issue, there are more voters on the west side so we're getting state rest stops shut down or threats of, thereof. "	• "Do you have a bilingual site? We have a lot people who live in this state who may need this information in another language." • "It would be interesting to see points of interest, like state campgrounds or if a rest stop is closed. But you don't want the site to be too busy, you don't need 50 million links. It looks good right now."
E-P2	• No comments	• No comments	• "Something useful would be kind of like what MapQuest has, where you can input a city, start place and end place and it can kind of route if for you." • "It would be useful to know where gas stations are along the way."

Participant	Things the participant liked	Things the participants wanted to improve	Things the participant wanted to see added
E-P3	• "I haven't seen the construction site before, it must have been a while since I've looked at this [website], that's very good." • "I like that you can hear the radio reports (HAR) on the route profile. I haven't noticed that before." • "This certainly has all the information I'd ever need in Washington." • "I wasn't too impressed with Oregon's [DOT site]. They need some help. Washington has done a tremendous job. I think the way it's displayed here - that really looks pretty good."	• No comments	• "It might be helpful to include Greyhound and the other bus line that runs through Eastern Washington."
E-P4	• "I like how you can link to just about anything [to do with transportation]." • "I like how it's not just Washington State but you can go to Oregon and Idaho and even Canada." • "I think the Traffic/Cameras are really useful. They come in handy when looking for actual weather conditions. I also like	• No comments	• "What I like, cause I use MapQuest a lot, is to get driving directions to and from somewhere."

Participant	Things the participant liked	Things the participants wanted to improve	Things the participant wanted to see added
	to be able to pick a city from a list" • It's pretty good. I'm impressed."		

CONCLUSIONS

Based on the findings for our study, it is apparent that travelers in Washington State are impressed with WSDOT's Traffic and Weather website. Participants liked the wealth of information on the site and found most features of the site easy to use. While we found that participants liked the resources provided by WSDOT, we did discover a number of usability issues that hinder some of the site. These issues are grouped into a number of common web usability themes: audience appropriateness, discoverability, consistency, and ease of use. A number of other issues were grouped under a miscellaneous category. A majority of the issues from this study can be fixed with minor modifications. These small changes could lead to large improvements in the site's usability.

Future Work

During the usability study, we noted several areas for further investigation. We feel that more research needs to be done in the area of labels. While we focused on the route profile feature and the road icons, many of the other labels currently on the site would benefit from testing to ensure that users can find the information they are looking for. We also recommend that WSDOT continue to gather opinions from diverse users, including users from all parts of Washington State and from all of WSDOT unique audience groups. An additional area that the organization might want to investigate is how online resources, like the Traffic and Weather site, affects the public's opinion of WSDOT. Finally, we recommend that the next usability study of this site should be conducted in winter when traffic conditions tend to be more varied. The usability testing that contributed to this report was conducted in spring and summer. Performing usability tests during the winter months might bring other issues to light.

We recommend that WSDOT continue its usability research in the future, perhaps considering the integration of usability methodologies into the web development process itself. The Web may be the most powerful marketing tool available to the organization. Promoting this and other WSDOT sites can help garner public support and ultimately help WSDOT's successfully fulfill its mission and achieve its goals.

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APPENDICES

Appendix A: Web-Based Survey

The form below shows the questions included in a web-based survey distributed between February 15th and March 14th, 2002, targeted at potential users of WSDOT web-based traveler information. The form was filled out by 1,700 users, and statistical analysis of the results were used to inform the planning of subsequent usability testing. A data book accompanying this report contains the complete survey results, tables of frequencies, and statistical analyses of the results.

WA Traveler Information User Survey

Thank you for your willingness to help. This is a study for the Washington State Department of Transportation, conducted by University of Washington researchers to improve the quality of traveler information in the state. All answers will be anonymous, and any information collected will be used solely to improve traveler information. The survey should take no more than 3-5 minutes to complete.

By filling out this survey, you affirm that you are age 18 or older.

By 'traveler information' we mean information in any media (e.g. TV, radio, Internet) about road conditions, congestion, accidents, pass information, construction, or public transportation (including ferries, trains, buses, etc.).

Question 1. Do you use traveler information?

- ■ I do use traveler information.
- ■ I do not now use (nor do I plan to use) traveler information.

CURRENT TRAFFIC INFORMATION HABITS

When I look for information about road conditions, traffic, pass information, construction, or public transportation, I tend to use the following media:

	frequently	often	sometimes	rarely	never
Question 2. the World-Wide Web	■	■	■	■	■
Question 3. Commercial Radio	■	■	■	■	■

Question 4. Highway Advisory Radio	■	■	■	■	■
Question 5. TV	■	■	■	■	■
Question 6. Electronic Highway Message Signs	■	■	■	■	■
	frequently	**often**	**sometimes**	**rarely**	**never**
Question 7. Newspapers	■	■	■	■	■
Question 8. Telephone	■	■	■	■	■
Question 9. Other	■	■	■	■	■

Question 10. When you seek traveler information, how familiar are you with the route and general road conditions?

■ very familiar

■ somewhat familiar

■ average

■ somewhat unfamiliar

■ very unfamiliar

Question 11. How often do you look for traveler information?

■ 4 or more times per week

■ 1-3 times per week

■ 1-3 times per month

■ less than once a month

■ never

Question 12. I tend to use traveler information to plan for trips that are: (check all that apply)

- ☐ fewer than five miles
- ☐ five to ten miles
- ☐ between ten and twenty-five miles
- ☐ twenty-five to fifty miles
- ☐ more than fifty miles

CURRENT PERSPECTIVES ON WEBSITES

Question 13. I have visited:

- ● 0 traveler information websites (skip down to question 18)
- ● 1 traveler information website
- ● 2-4 traveler information websites
- ● 5-7 traveler information websites
- ● 8 or more traveler information websites

Question 14. I generally find traveler information on websites:

- ● very useful
- ● somewhat useful
- ● average
- ● not very useful
- ● not at all useful

Question 15. When I try to find information on traveler information websites, it's usually:

- ● very easy to find what I want
- ● somewhat easy to find what I want
- ● average
- ● somewhat difficult to find what I want
- ● very difficult to find what I want

Question 16. I generally find that traveler information websites load:

- ● very quickly
- ● fast enough
- ● average
- ● a bit slowly
- ● very slowly

Question 17. What sort of traveler information do you generally look for on the Web? (check all that apply)

- ☐ Traffic congestion
- ☐ Construction locations
- ☐ Help planning a route
- ☐ Weather/road conditions
- ☐ Setting up carpools
- ☐ Buses and trains
- ☐ Ferries
- ☐ Border crossings
- ☐ Other

IN AN IDEAL WORLD

In an ideal world, if access, cost and information quality were not issues, I would prefer to get my traveler information from:

	before traveling	while traveling	both	neither
Question 18. The Web on a personal computer	●	●	●	●
Question 19. Wireless Web, cellular phone, or PDA	●	●	●	●
Question 20. An in-vehicle electronic service (like OnStar)	●	●	●	●
Question 21. Commercial radio	●	●	●	●
Question 22. Highway advisory radio	●	●	●	●
	before traveling	**while traveling**	**both**	**neither**
Question 23. TV	●	●	●	●
Question 24. Electronic highway message signs	●	●	●	●
Question 25. Newspapers	●	●	●	●
Question 26. Telephone	●	●	●	●
Question 27. Other	●	●	●	●

In an ideal world, if access, cost and information quality were not issues, I would prefer to get traveler information about:

	before	while	both	neither
Question 28. Traffic congestion	●	●	●	●

Question 28. Traffic congestion	■	■	■	■
Question 29. Construction locations	■	■	■	■
Question 30. Help planning a route	■	■	■	■
Question 31. Weather/road conditions	■	■	■	■
Question 32. Setting up carpools	■	■	■	■

	before traveling	**while traveling**	**both**	**neither**
Question 33. Buses and trains	■	■	■	■
Question 34. Ferries	■	■	■	■
Question 35. Border crossings	■	■	■	■
Question 36. Other	■	■	■	■

Question 37. How eager are you to see traveler information made available for wireless digital devices (such as PDAs)?

■ very eager

■ somewhat eager

■ average

■ not very eager

■ not at all eager

IN YOUR OPINION

Question 38. This question is optional. We are trying to understand how

traveler information on the Web works for you. Try and recall a previous experience you have had trying to use traveler information. Use the space below to describe that experience.

DEMOGRAPHICS

Question 39. Your Zip Code:

Question 40. Age:

- ● under 25
- ● 26 to 35
- ● 36 to 45
- ● 46 to 55
- ● 56 to 65
- ● 66 years or older

Question 41. Gender:

- ● female
- ● male

Question 42. Yearly household income:

- ● under $15,000
- ● $15,000 to $24,999

- ● $25,000 to $34,999
- ● $35,000 to $44,999
- ● $45,000 to $59,999
- ● $60,000 to $79,999
- ● $80,000 to $99,999
- ● $100,000 to $149,999
- ● over $150,000

Question 43. Do you participate in carpools or van pools?

- ● Yes
- ● No

Question 44. Do you use public transportation?

- ● Yes
- ● No

Thank you for completing the survey.

May we contact you to ask further questions about your experiences with traveler information in Washington? After clicking 'Submit' below, please consider giving us name and either a telephone number or e-mail address where you can be reached.

The information you provide will not be used for any purpose besides research on this project, and we will not be able to link your name to the answers you have submitted above.

Appendix B: Web-Based Survey Results (Overview)

This Appendix displays the table of frequencies, the raw data results from the web-based survey conducted in February-March 2002. A data book accompanying this report contains the complete survey results, tables of frequencies, and statistical analyses of the results.

	Yes		No	
	Count	%	Count	%
Do you use traveler information?	1687	(99.2%)	13	(.8%)

	Frequently		Often		Sometimes		Rarely		Never	
	Count	%	Count	%	Count	%	Count	%	Count	%
When I look for traveler information, I tend to use the following media: the World-Wide Web	1354	(78.1%)	264	(15.2%)	88	(5.1%)	17	(1.0%)	10	(.6%)
When I look for traveler information, I tend to use the following media: Commercial Radio	529	(31.0%)	468	(27.5%)	420	(24.6%)	195	(11.4%)	92	(5.4%)
When I look for traveler information, I tend to use the following media: Highway Advisory Radio	116	(7.0%)	165	(9.9%)	427	(25.7%)	601	(36.2%)	352	(21.2%)
When I look for traveler information, I tend to use the following media: TV	116	(6.9%)	180	(10.7%)	438	(26.0%)	541	(32.1%)	412	(24.4%)
When I look for traveler information, I tend to use the following media: Electronic Highway Message Signs	211	(12.5%)	338	(20.1%)	684	(40.6%)	377	(22.4%)	75	(4.5%)
When I look for traveler information, I tend to use the following media: Newspapers	35	(2.1%)	64	(3.8%)	205	(12.1%)	427	(25.3%)	957	(56.7%)
When I look for traveler information, I tend to use the following media: Telephone	40	(2.4%)	68	(4.0%)	169	(10.0%)	386	(22.8%)	1033	(60.9%)
When I look for traveler information, I tend to use the following media: Other	36	(2.4%)	19	(1.3%)	117	(7.8%)	251	(16.7%)	1082	(71.9%)

	Very Familiar		Somewhat Familiar		Average		Somewhat Unfamiliar		Very Unfamiliar	
	Count	%	Count	%	Count	%	Count	%	Count	%
When you seek traveler information, how familiar are you with the route and general road conditions?	1157	(66.8%)	441	(25.5%)	106	(6.1%)	21	(1.2%)	7	(.4%)

	4+ times per week		1-3 times per week		1-3 times per month		less than once per month		never	
	Count	%	Count	%	Count	%	Count	%	Count	%
How often do you look for traveler information?	1160	(66.9%)	371	(21.4%)	160	(9.2%)	35	(2.0%)	7	(.4%)

	<5 miles	5-10 miles	10-25 miles	25-50 miles	>50 miles
	Count	Count	Count	Count	Count
I tend to use traveler information to plan for trips that are:	298				
I tend to use traveler information to plan for trips that are:		682			
I tend to use traveler information to plan for trips that are:			1145		
I tend to use traveler information to plan for trips that are:				797	
I tend to use traveler information to plan for trips that are:					852

	0		1		2-4		5-7		8+	
	Count	%	Count	%	Count	%	Count	%	Count	%
I have visited: (X traveler information websites)	14	(.8%)	371	(21.7%)	1016	(59.4%)	164	(9.6%)	146	(8.5%)

	very useful		somewhat useful		average		not very useful		not at all useful	
	Count	%	Count	%	Count	%	Count	%	Count	%
I generally find traveler information on websites:	1095	(64.1%)	538	(31.5%)	58	(3.4%)	14	(.8%)	3	(.2%)

	very easy		somewhat easy		average		somewhat difficult		very difficult	
	Count	%	Count	%	Count	%	Count	%	Count	%
When I try to find information on traveler information websites, it's usually:	671	(39.3%)	784	(45.9%)	190	(11.1%)	58	(3.4%)	6	(.4%)

	very quickly		fast enough		average		a bit slowly		very slowly	
	Count	%	Count	%	Count	%	Count	%	Count	%
I generally find that traveler information websites load:	250	(14.6%)	971	(56.8%)	378	(22.1%)	103	(6.0%)	7	(.4%)

	congestion	construction	route planning	weather/road conditions	carpools	buses/trains	ferries	border crossings	other
	Count	Count	Count	Count	Count	Count	Count	Count	Count
What sort of traveler information do you generally look for on the Web?	1545								
What sort of traveler information do you generally look for on the Web?		588							
What sort of traveler information do you generally look for on the Web?			617						
What sort of traveler information do you generally look for on the Web?				1216					
What sort of traveler information do you generally look for on the Web?					30				
What sort of traveler information do you generally look for on the Web?						495			
What sort of traveler information do you generally look for on the Web?							514		
What sort of traveler information do you generally look for on the Web?								242	
What sort of traveler information do you generally look for on the Web?									123

	before	while	both	neither	5

	Count	Count	Count	Count	Count
In an ideal world, I would prefer to get my traveler information from: The Web on a PC	1095	13	590	17	
In an ideal world, I would prefer to get my traveler information from: Wireless Web, cellular phone, or PDA	73	461	758	333	1
In an ideal world, I would prefer to get my traveler information from: An in-vehicle electronic service (like OnStar)	29	663	469	431	1
In an ideal world, I would prefer to get my traveler information from: Commercial radio	53	720	610	267	1
In an ideal world, I would prefer to get my traveler information from: Highway advisory radio	46	873	391	334	
In an ideal world, I would prefer to get my traveler information from: TV	832	8	101	713	
In an ideal world, I would prefer to get my traveler information from: Electronic highway message signs	29	1329	171	148	1
In an ideal world, I would prefer to get my traveler information from: Newspapers	414	10	52	1161	
In an ideal world, I would prefer to get my traveler information from: Telephone	213	104	285	1033	
In an ideal world, I would prefer to get my traveler information from: Other	55	19	133	1156	

	before	while	both	neither
	Count	Count	Count	Count
In an ideal world, I would prefer to get traveler information about: Traffic congestion	273	91	1321	13
In an ideal world, I would prefer to get traveler information about: Construction locations	542	67	998	61
In an ideal world, I would prefer to get traveler information about: Help planning a route	767	24	638	206
In an ideal world, I would prefer to get traveler information about: Weather/road conditions	384	78	1188	41
In an ideal world, I would prefer to get traveler information about: Setting up carpools	522	4	89	951
In an ideal world, I would prefer to get traveler information about: Buses and trains	767	22	438	400
In an ideal world, I would prefer to get traveler information about: Ferries	697	50	623	267
In an ideal world, I would prefer to get traveler information about: Border crossings	464	107	752	301
In an ideal world, I would prefer to get traveler information about: Other	132	12	186	941

	very eager		somewhat eager		average		not very eager		not at all eager	
	Count	%	Count	%	Count	%	Count	%	Count	%
How eager are you to see traveler information made available for wireless digital devices (such as PDAs)?	451	(26.5%)	381	(22.4%)	441	(26.0%)	257	(15.1%)	169	(9.9%)

	<=25		26-35		36-45		46-55		56-65		>=66	
	Count	%	Count	%	Count	%	Count	%	Count	%	Count	%
Your age:	199	(11.6%)	578	(33.7%)	457	(26.6%)	355	(20.7%)	104	(6.1%)	23	(1.3%)

	Female		Male	
	Count	%	Count	%
Your gender:	526	(31.1%)	1165	(68.9%)

	<$15K		$15K-$24K		$25K-$34K		$35K-$45K		$45K-$60K		$60K-$80K		$80K-$100K		$100K-$150K		>$150K	
	Count	%	Count	%	Count	%	Count	%	Count	%	Count	%	Count	%	Count	%	Count	%
Your yearly household income:	38	(2.4%)	52	(3.3%)	101	(6.4%)	121	(7.7%)	219	(14.0%)	321	(20.5%)	285	(18.2%)	310	(19.8%)	120	(7.7%)

	Yes		No	
	Count	%	Count	%
Do you participate in carpools or van pools?	271	(15.8%)	1440	(84.2%)

	Yes		No	
	Count	%	Count	%
Do you use public transportation?	738	(42.9%)	981	(57.1%)

Appendix C: Population in Washington State

Table 38: Population in Washington State, by county

Region	County	Population	Region	County	Population
Washington State		5,894,121			
Western Washington		4,587,173	Eastern Washington		1,306,948
	Clallam	64,525		Adams	16,428
	Clark	345,238		Asotin	20,551
	Cowlitz	92,948		Benton	142,475
	Gray's Harbor	67,194		Chelan	66,616
	Island	71,558		Columbia	4,064
	Jefferson	25,953		Douglas	32,603
	King	1,737,034		Ferry	7,260
	Kitsap	231,969		Franklin	49,347
	Lewis	68,600		Garfield	2,397
	Mason	49,405		Grant	74,698
	Pacific	20,984		Kickitat	19,161
	Pierce	700,820		Kittitas	33,362
	San Juan	14,077		Lincoln	10,184
	Skagit	102,979		Okanogan	39,564
	Skamania	9,872		Pend Oreille	11,732
	Snohomish	606,024		Spokane	417,939
	Thurston	207,355		Stevens	40,066
	Wahkiakum	3,824		Walla Walla	55,180
	Whatcom	166,814		Whitman	40,740
				Yakima	222,581

Source: U.S. Census Bureau, http://www.census.gov/

Appendix D: Text for Recruiting Participants

Email Script

Subject Line: Improving traveler information: Take part in a study

I am part of a team at the University of Washington investigating our state's traveler information on the World Wide Web. We are looking for individuals in the area to participate in a usability study

You are being contacted because you recently indicated in an online poll that you would be willing to answer some questions about your experiences with traveler information on the Web.

The study will be taking place in the Laboratory for Usability Testing and Evaluation (LUTE) on the University of Washington campus. The test is approximately an hour long. During this time, you will be asked to perform some tasks on the Web, complete a questionnaire and answer a series of follow up questions.

If you are interested in participating, please respond to this e-mail (ejrose@u.washington.edu) and you will be sent a questionnaire to complete. If you qualify for the study, we will then contact you to schedule a time that works with your schedule.

We appreciate your interest in improving Washington State traveler information. For participating in our study, you will receive a $25 gift certificate to Barnes and Noble.

If you are not interested in participating in this particular study, but want to be considered for the next one, simply do nothing and you will remain on our mailing list.

If you are no longer interested in hearing about similar information sharing opportunities, respond to this e-mail with the word REMOVE in the subject line.

Appendix E: Participant Profiles

Table 39: Western Washington Participant Profiles

	Trips of 50+ miles	Comfort with maps	Operating System and Browser	Internet Connection	Web use	Comfort with web	Frequency of looking for travel info on the web	Age	Gender
W-P1	4-6	Very	Windows/IE	Cable/DSL	Most of the day, every day	Very	4 or more times per week.	N/A	Male
W-P2	10+	Very	Windows/IE	Cable/DSL	Several times a day, almost every day	Comfortable	1 –3 times per month	46-55	Male
W-P3	4-6	Very	Windows/IE	Cable/DSL	2-6 times per week	Very	4 or more times per week.	46-55	Female
W-P4	10+	Very	Windows/IE	Cable/DSL	Several times a day, almost every day	Very	4 or more times per week.	N/A	Male
W-P5	4-6	Very	Windows/IE and Netscape	Cable/DSL	Several times a day, almost every day	Very	4 or more times per week.	26 – 35	Female
W-P6	1-3	Very	Windows/IE	T1 or T3	Several times a day, almost every day	Very	1-3 times per week	46-55	Male
W-P7	4-6	Comfort able	Windows/IE	Cable/DSL	2- 6 times per week	Comfortable	1-3 times per month	26-35	Female
W-P8	7-10	Very	Windows/IE	T1 or T3	Several times a day, almost every day	Very	1-3 times per week	26-35	Female

	Trips of 50+ miles	Comfort with maps	Operating System and Browser	Internet Connection	Web use	Comfort with web	Frequency of looking for travel info on the web	Age	Gender
W-P9	4-6	Very	Windows/IE	T1 or T3	Several times a day, almost every day	Very	4 or more times per week	30's	Female
W-P10	10+	Very	Windows/IE	Cable/DSL	Most of the day, every day	Very	1-3 times per week	36-45	Male
W-P11	4-6	Very	Windows/IE	T1 or T3	Several times a day, almost every day	Very	4 or more times per week	36-45	Male
W-P12	10+	Very	Windows/IE	Cable/DSL	Most of the day, every day	Very	1-3 times per month	under 25	Male

Table 40: Eastern Washington participant profiles

	Trips of 50+ miles	Comfort with maps	Operating System and Browser	Internet Connection	Web use	Comfort with web	Frequency of looking for travel info on the web	Age	Gender
E-P1	10+	Very	Windows/IE and Netscape	Modem	2-6 times per week	Very	1-3 times per month	36-45	Male
E-P2	10+	Very	Windows/IE and Netscape	Cable/ DSL	Several times a day, almost every day	Comfortable	1-3 times per month	26-35	Female
E-P3	10+	Very	Windows/IE	Satellite	Several times a day, almost every day	Very	1-3 times per week	56-65	Male
E-P4	1-3	Comfortable	Windows/IE	Modem	2 – 6 times per week	Very	Less than once a month	under 25	Female

Appendix F: Usability Test Script

The moderator of the usability test will read the following text.

Pre-test

Welcome statement and introduction:

Thank you for volunteering for this usability study. Today we will be looking at traveler information for Washington State on the World Wide Web.

Overview of the test

I will first ask you to complete some forms, we will then go next door where you will be seated at a computer and asked to look for some information on the World Wide Web. After completing the tasks, we will conclude with a questionnaire asking you about your experiences and some additional follow up questions. The test should take no longer than one hour.

Before we start, I have some consent forms for you to complete.

> Administer:
> Informed consent form
> Video taping consent form

Do you have any questions?

> Sign and provide copies of forms.

Please also complete this questionnaire

> Administer:
> Pre-test questionnaire

Test

For our study today we will be performing three activities. First, I will ask you about some of your experiences traveling in Washington State. I will then ask you to label and organize some information on a whiteboard. We will then move over to the computer. I will ask you to look for some information using a website. Finally you will fill out a questionnaire about the website you just used

Do you have any questions before we start?

Interview

I'm interested in knowing more about your experience traveling in Washington State. Can you tell me about any trips you have taken in the past year: where did you go and was the travel for business or pleasure?

Did you look for information about the travel conditions before you left? If so, where did you look?
Do you commute? If so, do you look for information about roads or traffic when you commute? If so, where?

Any thing else you'd like to tell us about your travel experiences in Washington State?

Thank you.

Labeling exercise

The next activity is what we call a labeling exercise. First I am going to show you a number of pictures of road signs. I will then give you a road condition. Please tell me which picture you thing best describes the road condition.

Administer:
Icon Worksheet

1. Ok, the first one is: "A road is closed"
2. The next one is: "Road work or maintenance"
3. And the last one is: "One lane is close"

Ok, thank you.

The second labeling task involves organizing some information on a white board. This is a diagram of a stretch of road from Seattle to Ellensburg going over Snoqualmie pass. We are building a web page for this stretch of road. Over here we have 12 types of information written on yellow stickies. I would like you to look at this information and then organize it into 1 of 3 categories based on your preference.

1. Information you would like to see displayed right on the diagram of the road
2. Information you would like to see linked to, so you still think it is important but don't have to have it right in front of you.
3. Information that you do not need – meaning it is not important to you and will not be part of this resource.

Ok, thank you.

For the last part of this task we want you to brainstorm. Can you think of a name for the resource we have just built? What would you call it?

Here is a list that some other people have come up with. I'd like you to tell me if you like one of these names on the list better or do you prefer your own.

Ok, thank you.

For the last part of the study, we will use the computer.

Introduce think-aloud protocol

During this test you will be asked to perform a number of tasks. During each task, you will be asked to locate some information from a website. For each task, I will ask you to look for some information. While looking for it, I would like you to think aloud, meaning as you search for information just verbalize what you are thinking.

Before starting the test I would like you to practice thinking aloud.

Administer:
Think-aloud exercise

Please use this site (msn.com) to search for movie listings in your neighborhood. Remember to think aloud as you do this.

Ok, good. When we start the test, I will ask you to think aloud while performing each task. If you forget, I may remind you by saying 'keep talking.'

This is not a test of you as a Web user, but rather of the website. If you can't complete a task, keep looking. You can ask questions about the test, but if you are looking for assistance on completing a task, I may tell you to keep looking.

Begin test

Do you have any questions before we start?

Administer:
Usability Tasks

Post-test

Would you like to take a break before we continue with the last part of the study? If not, please complete this questionnaire. Feel free to consult the website to remind you of a feature or specific task.

Administer:
Post test questionnaire

Thank you for volunteering for this usability study. In appreciation we are presenting you with this gift certificate.

Appendix G: Consent Forms

University of Washington Informed Consent Form

A Usability Study of Traveler Information on the World Wide Web

Investigators:

Geoffrey Sauer, Assistant Professor, Technical Communication, (206) 685-3409
Beth Kolko, Associate Professor, Technical Communication, (206) 685-3809
Mark Haselkorn, Professor, Technical Communication, (206) 543-2577
Emma Rose, Research Assistant, Technical Communication (206) 280-5873
Mary Ann Krug, Research Assistant, Technical Communication (206) 729-2318
Matthew Tevenan, Graduate Student, Technical Communication (206) 295-9222
Chris Mulligan, Student, Technical Communication (206) 380-8746

Investigators' Statement

You are being asked to participate in a research study examining traveler information on the World Wide Web. This consent form provides information about the study to help you decide whether or not you wish to participate.

Please read this form carefully. Feel free to ask questions about the purpose of the research, the procedures of this investigation, the possible risks and benefits, your rights as a volunteer and any other questions about the research or this form. When all your questions have been answered, you can decide if you want to be in the study or not. You are also free to leave at any time.

Purpose and Benefits

The purpose of this study is to examine Washington State traveler information on the World Wide Web. We will ask people who seek traveler information to provide us with descriptions of their experience on a website. We will also ask for their feedback and opinions about the site. We hope the results of this study will help designers create better websites.

Procedures

If you choose to participate in this study, we will ask you to find information on a website. We will also ask you to "think aloud" (meaning to talk out loud while you look for information), complete two questionnaires and give us feedback about the experience. These study procedures will talk about one hour.

Videotaping

We would like to videotape you as you navigate the website and "think aloud." We will position the video camera to record the computer screen, but the back of your head, your hands, and voice may also be recorded. We may want to keep the videotape or use some portions of the videotape in an educational, research or academic setting. If we do use or keep the tape, we would like to contact you to give you the opportunity to review the tape and edit it before giving your written permission. Please indicate below whether or not we can re-contact you. Giving your permission to re-contact you does not obligate you to give us permission to use or keep the videotape.

____ I give my permission for the researchers to re-contact me to request that I review the videotape, edit it, and provides my written permission to keep the tape for five years or to use it publicly.

____ I do NOT give my permission for the researchers to re-contact me to request that I review the videotape, edit it, and provides my written permission to keep the tape for five years or to use it publicly.

Risk, Stress or Discomfort

This study will not expose you to risk, stress or discomfort that exceeds using a computer, being videotaped, or completing questionnaires. Some people may become frustrated when they try to find information on a website. Some people may be self-conscious when thinking aloud or when they are videotaped.

Other Information

Taking part in this study is voluntary and you can stop at any time. All information about your participation in this study is confidential. We will code the study records. The link between the code and your name will be kept in a secured location, separate from the study information. Only the researchers will have access to that information. We will destroy that link and the videotapes in 5 years. If we publish the results of this study, we will not use your name. In appreciation for being in this study, we will give you a $25 gift certificate to a major bookstore.

_____

Signature of Investigator Date

_____

Signature of Investigator Date

Subject's Statement

The subject of this study has been explained to me and I volunteer to take part in this research. I have had the opportunity to ask questions and understand that any future questions I have about the study will be answered by the investigators listed above. If I have questions about my rights as a research subject, I can call the Human Subjects Division at (206) 543-0098. I will receive a copy of this consent form.

_____

Signature of Participant Date

_____

(please print name)

University of Washington
Video Recording Publication Consent Form

Usability Study of Traveler Information on the World Wide Web

Researchers:

Geoffrey Sauer, Assistant Professor, Technical Communication, (206) 685-3409
Beth Kolko, Associate Professor, Technical Communication, (206) 685-3809
Mark Haselkorn, Professor, Technical Communication, (206) 543-2577
Emma Rose, Research Assistant, Technical Communication (206) 280-5873
Mary Ann Krug, Research Assistant, Technical Communication (206) 729-2318
Matthew Tevenan, Graduate Student, Technical Communication (206) 295-9222
Chris Mulligan, Student, Technical Communication (206) 380-8746

Researchers' Statement

During the usability study we recorded the session for the purpose of data collection. The video camera was positioned to record the actions taking place on a computer screen but on occasion the image may have also included the back of your head, hands and voice. Out of the hours of footage, a number of clips may be used to supplement the study's written report provided to the funding agency.

We will not loan or give the videotapes or copies of the videotapes to anyone else. Portions of these videotapes may be presented in research, academic or educational settings. While your name will not be included in these presentations, someone who knows you may recognize your voice.

These videotapes may be transcribed in part or whole. Information gained from these videotapes may be used in publications or presentations in public academic settings. Information from these transcripts may also be used in future studies. Your name will not be included in these transcripts, excerpts from these transcripts, or used in any publications or presentations.

_____

Printed name of researcher Signature of researcher Date

Uses of Recordings

You have been given an opportunity to review the videotape(s) and we request your permission for the research team to use the videotape in the following way:

- ❑ Academic or research public presentations
- ❑ Educational settings
- ❑ Internal WSDOT employee presentations
- ❑ Keep the tapes for research purposes for up to 5 years

Subject's Statement

I give my permission to the researchers to use the items as described in this consent form. I understand that my name will not be used in connections with any presentation or publications. I will not receive any compensation for the use of the recordings. I will receive a copy of this consent form.

_____

Printed name of subject Signature of subject Date

Appendix H: Pre-Test Questionnaire

Participant Number: _____
Date _____

1. How many times in the past year have you made long distance car trips greater than 50 miles within or through the state of Washington?
   None
   1 – 3 times
   4 – 6 times
   7 – 10 times
   More than 10 times

2. How comfortable are you with using highway maps?
   Very comfortable
   Comfortable
   Uncomfortable
   Very uncomfortable

3. What operating system do generally use?
   Microsoft Windows 95 or later version
   Mac OS
   Linux/Unix
   Other _____
   I don't know

4. What type of connection do you generally use to access the Internet?
   Dial-up modem
   Cable, ISDN, or DSL line
   T1 or T3 line
   Other _____
   I don't know

5. What Internet browser do you generally use?
   Microsoft Internet Explorer
   Netscape Navigator
   Microsoft Internet Explorer and Netscape Navigator equally
   Other _____
   I don't know

1. On average, how often do you use the World Wide Web?
   Never
   One time a week
   Two to six times a week
   Several times a day, almost every day
   Most of the day, every day

2. How comfortable are you with using the World Wide Web?
   Very comfortable
   Comfortable
   Uncomfortable
   Very uncomfortable

3. Do you use the World Wide Web to look for travel information (for example: road, traffic, or weather conditions)?
   Yes
   No

4. If so, how often do you seek out travel information on the World Wide Web?
   4 or more times per week
   1 – 3 times per week
   1 – 3 times per month
   Less than once a month
   Never

5. Your Zip Code _____

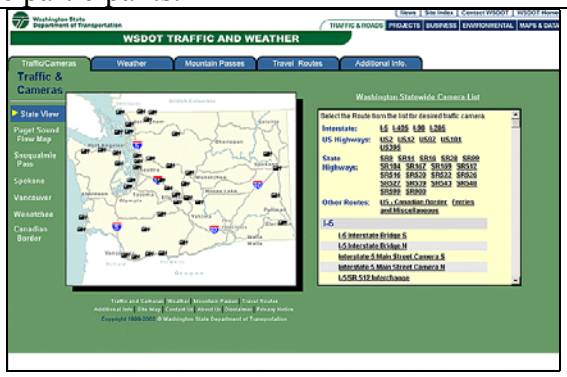
6. Your Age
   under 25
   26 to 35
   36 to 45
   46 to 55
   56 to 65
   66 years or older

7. Do you participate in carpools or vanpools?
   Yes
   No

8. Do you use public transportation?
   Yes
   No

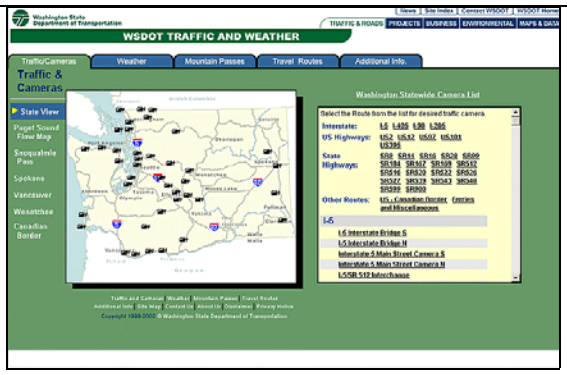
In the past year how many times have you visited the four websites pictured below?

The following choices were presented to the Seattle participants:

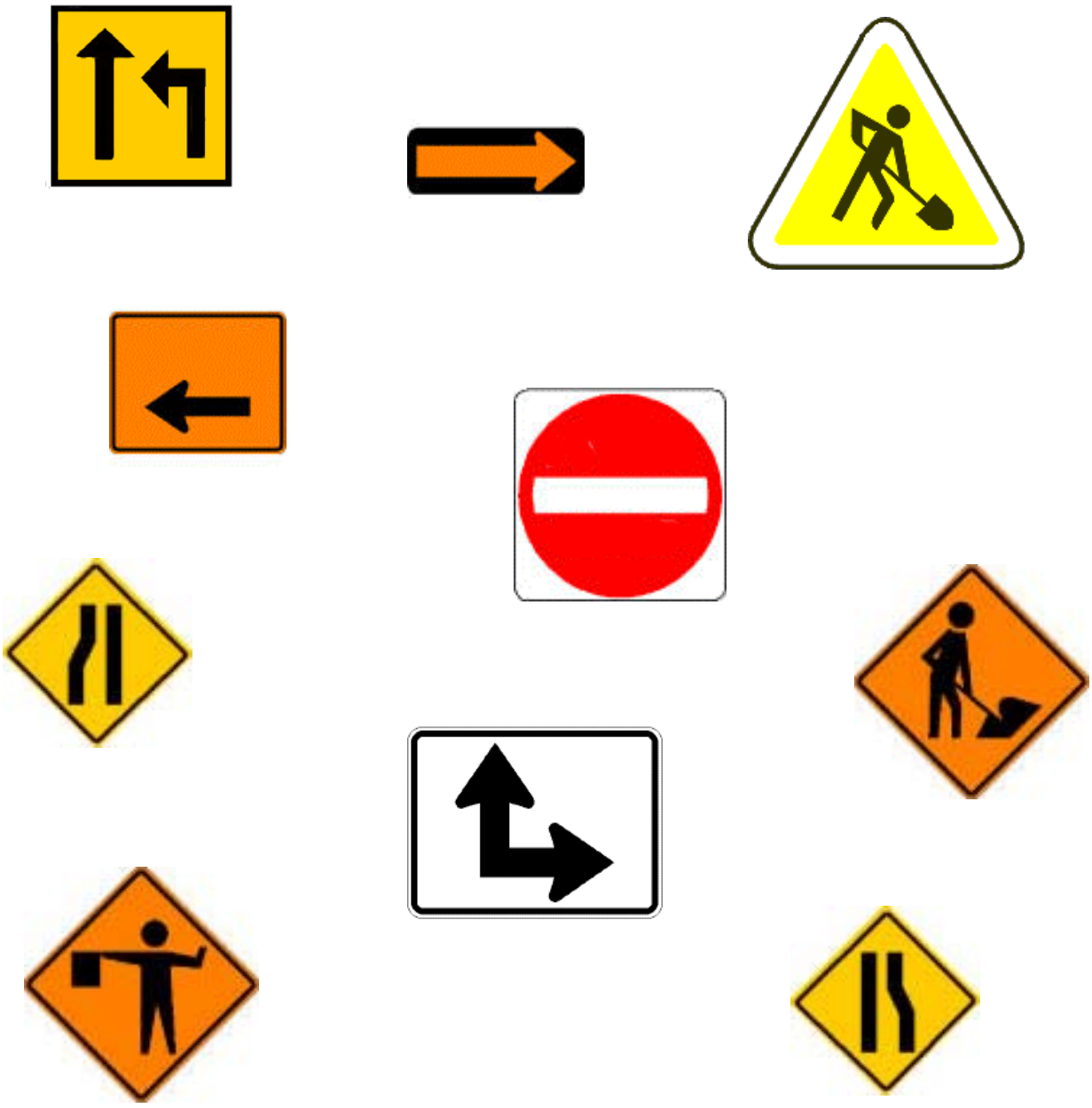
	
None 1 – 5 times 6 – 20 times 21 – 80 times more than 80 times	None 1 – 5 times 6 – 20 times 21 – 80 times more than 80 times
	
None 1 – 5 times 6 – 20 times 21 – 80 times more than 80 times	None 1 – 5 times 6 – 20 times 21 – 80 times more than 80 times

In the past year how many times have you visited the four websites pictured below?

The following choices were presented to the Cheney participants:

	
None 1 – 5 times 6 – 20 times 21 – 80 times more than 80 times	None 1 – 5 times 6 – 20 times 21 – 80 times more than 80 times
	
None 1 – 5 times 6 – 20 times 21 – 80 times more than 80 times	None 1 – 5 times 6 – 20 times 21 – 80 times more than 80 times

Appendix I: Icon Worksheet



Appendix J: Post-Test Questionnaire

Participant Number: _____
Date _____

Reflections on the test

After spending some time on WSDOT's Traffic and Weather Website, please reflect on your experience and answer the following questions. Feel free to expand on any of your answers in the comments section below each question.

When using the interactive map of Washington State to search for specific information about a city or region, I found the map to be:

1 2 3 4 5 6 7
Easy to use Neutral Difficult to use
I did not use the interactive map

Comments: _____

When using navigation features such as the tabs across the top of the page and the text links on the left of the page, I found the navigation to be:

1 2 3 4 5 6 7
Easy to use Neutral Difficult to use
I did not use the tabs or text links

Comments: _____

When looking for specific traffic cameras or weather stations, I found the text links to be:

1 2 3 4 5 6 7
Easy to use Neutral Difficult to use
I did not use the specific traffic cameras or weather stations.

Comments: _____
When looking at a route profile (such as US 2 or I 90), I found this feature to be:

1 2 3 4 5 6 7
Easy to use Neutral Difficult to use

Comments: _____

When looking for information about construction in Washington State, I found the information:

1	2	3	4	5	6	7
Easy to use			Neutral			Difficult to use

Comments: _____

In general, while searching for information, I found that the site:

1	2	3	4	5	6	7
Easy to use			Neutral			Difficult to use

Comments: _____

In terms of the amount of time it took to find answers to the questions, I feel:

1	2	3	4	5	6	7
Very Satisfied			Neutral			Very dissatisfied

Comments: _____

How much do you like or dislike the design of WSDOT's Traffic and Weather Information page?

1	2	3	4	5	6	7
Like very much			No opinion			Dislike very much

Comments: _____

Your opinion

Please state how much you agree or disagree with the following statements:

	strongly agree	agree	no opinion	disagree	strongly disagree
I find information about road temperature important when making plans to drive over mountain passes.					
It is easy to find information about mountain passes.					
The next time I have to cross a mountain pass in winter, I would consult the WSDOT Traffic and Weather site to look for information.					
The route profiles that detail conditions for an entire route (like US 2 or I-90) are helpful and easy to use.					
It is easy to find information about construction projects on Washington roads.					

Are there other types of information currently not on the Travel and Weather site that may be helpful when planning trips in Washington State? If so, please list them here:

_____
_____
_____
_____
_____

If you have any other comments you would like to share with us about WSDOT's Travel and Weather site below, please do so here:

_____
_____
_____
_____
_____

Appendix K: Usability Study Tasks

Task A: Traveling Across Washington

Overview

You are traveling on a business trip for your company. You will be going round trip from Seattle to Spokane in order to attend a business seminar in the Spokane area. On the trip to Spokane, you will stop in Ellensburg for a day. You will go kayaking with some friends and stay at their place for the night before continuing to Spokane the next day. After completing the seminar series you will spend the night in Spokane before beginning your return trip to Seattle.

Before You Depart

You plan to leave Seattle early tomorrow morning, and arrive in Ellensburg before noon to spend the rest of the day kayaking with your friends. You want to see what the weather will be like so you can determine what to pack for the kayaking trip.

Go to this Web page: http://www.wsdot.wa.gov/traffic

1. What will the weather be like for kayaking in Ellensburg tomorrow afternoon? Is there a chance of rain?

Preparing to Leave

On the morning of your trip you are preparing to leave. You will be leaving Seattle and traveling East on I-90. Two hours ago a television newscast reported traffic congestion on I-90 near Franklin Falls in Snoqualmie Pass. Check to see if there is any traffic congestion over Snoqualmie Pass.

2. Is there any traffic congestion in Snoqualmie near Franklin Falls?

You arrive in Ellensburg. Before you and your friends leave to go kayaking, you decide to check to see what the wind conditions are like.

3. What is the current wind speed in Ellensburg?

You enjoy your afternoon kayaking on the Yakima River with your friends.

The Next Morning

It is now early morning on the second day of your trip. You are getting ready to leave for Spokane. You have a busy schedule to keep. You want to check to see if you should expect delays on your drive.

4. Is there any road construction on I-90 between Ellensburg and Spokane?

5. Is there any traffic congestion in Spokane?

Heading Back Home

After spending a productive day in Spokane, it is time to return to Seattle. A friend has recommended driving back over Stevens Pass, instead of Snoqualmie on route US 2. You would like a change of pace, but don't want any extra delays.

6. Will there be any causes for delays along route US 2 (such as, (hazardous conditions, construction, etc)?

7. Is it raining anywhere along route US 2? If so, where?

Upon Arriving Home

You arrive safely back home to find a message from your boss. The message informs you that you the seminar you just completed is to be a biannual event. You decide that next year you will take a couple of extra days to visit relatives in Idaho.

8. Can you find any information on the site that will help you plan a trip to Idaho?

Task B: Comprehensive Road Conditions

Traveling from Seattle to Eastern Washington, you want to compare the highway conditions for the span of 1-90 and Route 2. You want to see which road looks safer for winter conditions. Under the "Travel Routes" tab, click on "Route Profiles" located in the left-hand navigation column.

1. What types of information would you be concerned about for your trip?

2. Which route looks safer to you and why?

Task C: A Trip to the Peninsula

You have decided to take a weekend trip from Seattle to the Olympic Peninsula. You plan to leave Friday afternoon and come back Sunday. You plan to take a ferry to Bainbridge Island and then drive around scenic US 101 to the city of Forks.

1. What time does the ferry depart Seattle on a Friday afternoon?

2. What is the current temperature for Forks, and what is the forecasted temperature for tomorrow at this time?

Task D: A Winter Skiing Trip

It is February. You would like to ski at either Snoqualmie Pass or Stevens Pass for two days. The deciding factor will be the weather conditions at the two ski areas.

1. What is the temperature at each ski area?

2. Is it snowing in either of the ski areas?

Task E: Other Features

Spend a couple of minutes looking around the website. Try and think of other information that might help you plan a trip or a feature that you are interested in examining in more detail.

Is there information, not on the site that could help you plan a trip in Washington?
Do you have any other comments?