

Department of Transportation

Website Usability Study

Findings and Recommendations

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WSDOT Website Advertising Pilot Project

Table of Contents

<i>Study Summary: The Impact of Advertisements</i> _____	3
Recommendation regarding advertisements _____	10
<i>Study Design</i> _____	11
Participants _____	11
Sessions _____	12
Metrics _____	12
Observers _____	13
<i>Findings and Recommendations</i> _____	13
Task effectiveness, efficiency, and learnability _____	14
User perception and satisfaction _____	22
Global Themes _____	27
<i>Appendices</i> _____	43
Appendix A: Participants _____	43
Appendix B: Pre-Study Questionnaire _____	45
Appendix C: Tasks _____	45
Appendix D: Desirability Exercise _____	49
Appendix E: Verbal Interview _____	49
Appendix F: System Usability Scale (SUS) Survey _____	50

Study Summary: The Impact of Advertisements

This report describes the findings of a formal study designed to assess the impact of commercial advertisements on the usability of the Washington State Department of Transportation (WSDOT) website, (see figure 1). The study was held June 6th through 9th, 2011 at the Washington Department of Information Services (DIS) Usability Lab in Lacey, WA.

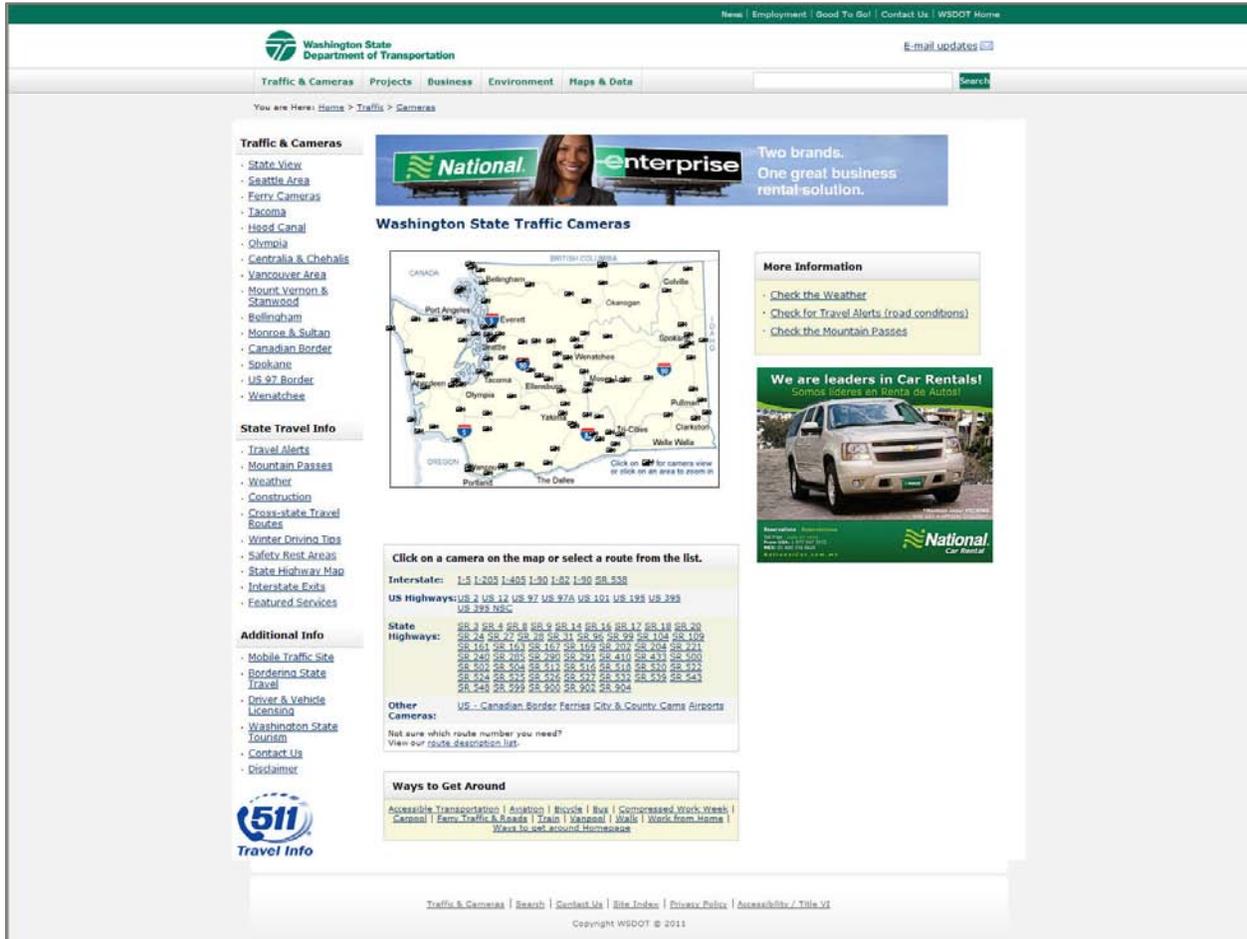


Figure 1: Advertisements on the Traffic Cameras page

DIS recruited 13 representative users of the WSDOT website from a pool of 100 general public volunteers to participate in-person at the usability lab for a 1-1½ hour study session. During their session, each participant worked directly on the WSDOT website completing top tasks. They talked aloud as they worked, and allowed us to video record their face and voice, as well as their movements on the website. They also completed questionnaires and answered verbal interview questions.

The 13 participants were divided into two user groups:

1. The **Control Group** performed top tasks on the current WSDOT website, which already includes advertisements on the Washington State Ferries pages.

2. The **Test Group** performed the same top tasks on a copy of the WSDOT website, on which various advertisements were added to the remainder of the most popular pages:

- Seattle Traffic
- Seattle Travel Times
- Tacoma Traffic
- Mountain Passes
- Statewide Travel Alerts
- Statewide Traffic Cameras
- Canadian Border Traffic

Participants were only told that we were conducting a study on the WSDOT website. They were not given any information about or indication of whether advertisements were present or not. Therefore, regardless of user group, every session was conducted the same way. Since the presence of advertisements on all of the top pages was the only difference between user groups, we can make comparisons between the data collected for each group to develop an understanding of the impact of advertisements on the usability of the WSDOT website.

Throughout each session, we took notes, counted metrics, marked videos, observed and listened to users, and asked questions to gather data that can demonstrate the usability of the website for users' top tasks and users' perception and satisfaction with the website. The table below summarizes the quantitative data we collected. The data is divided by user group and the group with the more positive result is indicated for each metric.

Data Summary and Comparison	Test	Control	All
Average # of attempts	1.31 ✓	1.68	1.5
Success in finding	71%	73% ✓	72%
Success in understanding	80%	85% ✓	83%
Average time on task (minutes : seconds)	2:27 ✓	2:35	2:30
Overall task difficulty	3 easy 6 moderate 1 difficult	6 easy 4 moderate 0 difficult ✓	3 easy 7 moderate 0 difficult
Navigation errors	13 ✓	15	28
Overall perception of WSDOT (out of 30 possible)	21.9	22.8 ✓	22.3
System Usability Scale (SUS) Score (out of 100 possible)	77.14 ✓	72.5	75
Ratio of positive to negative words chosen to describe the website	4.1 to 1	4.6 to 1 ✓	4.4 to 1
Ratio of positive to negative comments made during tasks	1 to 1.1	1 to 0.87 ✓	1 to 0.96

Overall, the two users group had very similar experiences on the website and provided similar perception and satisfaction scores. Based solely on the data collected and with small margins of difference, the test group completed the tasks more quickly and with fewer attempts, experienced fewer navigation errors, and gave the website a higher usability score. The control group was more successful in completing the tasks and had more positive things to say about the website during the tasks.

After completing the tasks we conducted a verbal interview with each participant in which we asked various questions about the advertisements on the website, including whether or not they noticed the advertisements and if advertisements on the website change their perceptions of WSDOT or of the product being advertised.

Combining participant's comments with their actual performance on the tasks, we can answer the questions the study was designed to address.

1. Do users see or click on the advertisements?

Overall, participants ignored the advertisements on the website. They showed behaviors consistent with “banner blindness”, where users almost never look at anything that looks like an advertisement, whether or not it's actually an advertisement.

Since the Washington State Ferries web pages already contain advertisements, all of the participants saw web pages with advertisements at some point during their session. However, the control group only saw those pages on two out of the 10 tasks, (Ferries schedule and VesselWatch), and the test group saw them on every task. None of the participants clicked on an advertisement during the study session. This was expected considering that the participants were given specific tasks to complete. However, users of the WSDOT website do typically visit the site to complete a specific task; like checking traffic conditions and viewing traffic cameras.

Control Group

Out of the six participants that made up the control group, only one reported that they will generally read and sometimes click on advertisements on websites, so long as they have time to browse and the advertisements are not “too annoying.” During the tasks, only one participant commented on seeing an advertisement, on the Ferries Schedule page. After the tasks, three participants said they noticed advertisements on the website; one of them remembered peripherally seeing an advertisement for a car.

Test Group

Out of the seven participants that made up the test group, three reported that they will generally read and sometimes click advertisements on websites, so long as they are just

browsing and the content is applicable to either the website they're on or their interests. One participant said they "avoid them with a passion." During the tasks, two participants commented on seeing an advertisement; one on the Ferries Schedule and VesselWatch pages and one on the Ferries Schedule and Seattle Traffic pages. After the tasks, four participants said they noticed advertisements on the website. Two of the three who didn't notice the advertisements did recall reading the domain message that there were ads on the following web page, but didn't remember actually seeing them there.



Did users notice advertisements, and if so, were they disruptive?

(Video clip)

Recommendation(s):

- The current placement and design of advertisements in use on the website is consistent with users' expectations of advertisements. Continue to differentiate between website content and advertisements in placement and design. If important content is styled like an advertisement, users will ignore it.

2. At what point does the presence of advertisements negatively impact the usability of the WSDOT website, trust in the agency, or perception of a government website?

Overall, about half of the participants reported that advertisements on the website had no impact or a somewhat positive impact on their opinion of WSDOT, assuming that the advertisements followed specific criteria and had been "vetted" by WSDOT. Most of the participants also wanted to know how the advertisement revenue was being spent.

The test website included one flash advertisement in which a car moves across the banner from right to left over and over again. No participant noticed the flash advertisement or commented on it. Participants did comment that pop up advertisements or advertisements that open and close, moving content around, are generally very disruptive. These types of advertisements were not included on the test website.



A couple of the pages had a few too many of the banner ads that you had to wade through, but other than that... it's all pretty consistent, there's not big flash animations loading, layout's consistent, not really a problem. (T2)





While most participants ignored the banner advertisements along the top of the page, their placement made it difficult to find information located to the left or right of them. For example, participants had a difficult time figuring out the crossing time for the Seattle to Bainbridge Island Ferry. Because of “banner blindness”, participants seemed to look above and below the banner advertisement, but very rarely to the side of it, where the crossing time is located, (see figure 2).

Figure 2: Crossing time located to the left of a banner ad

Control Group

All of the control group participants assumed WSDOT was using the advertisements to make money. Two of them were skeptical that advertising revenue is necessary; one said he might not go to the website as much. Most of them wanted to know what the advertising revenue was going towards and presumed that WSDOT had specific criteria for choosing the advertisements.

Test Group

All of the test group participants also assumed WSDOT was using the advertisements to make money. Three of the seven thought it was a positive move to bring in more money. The other four said it reflects negatively on WSDOT that they aren’t managing their money well and shouldn’t be advertising some products and not others. As with the control group, most of the test group participants wanted to know what the advertising revenue was going towards and presumed that WSDOT had specific criteria for choosing the advertisements.

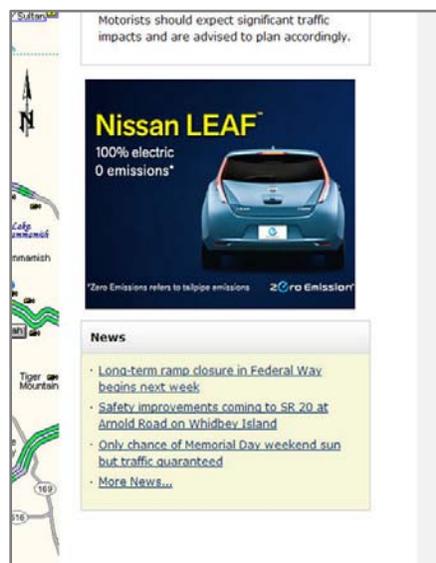


Figure 3: Information below square advertisement

When asked, only one of the seven participants who said they noticed advertisements on the website reported that they found the advertisements disruptive. This test group participant was specifically commenting about the square advertisements on the right side of the page, when they pushed other information down the page, (see figure 3).



Reaction to ads and input on how they should be used
(Video clip)

Recommendation(s):

- Provide easy access to information about how the advertisements are chosen and how the revenue from advertising is used.
- Do not use advertisements that pop up on top of website content or open and close causing content to move around.
- Ensure that the square advertisements in the right column do not detract from website content below them. Only provide specific information related to the current page in the right column and use consistent placement and styles.
- Consider allowing banner advertisements the entire width of the page or leaving the space to the left and right of banner advertisements free of content.

3. Is there any indication to users that the agency is endorsing the products it is advertising?

Participants in the study did not feel that WSDOT was endorsing the products it was advertising. Most of the participants reported that the advertisements have no impact on their opinion of the product, largely because they don't notice the advertisements anyway. However, most of the participants assumed that WSDOT would have selected the products and advertisements to include on the site with some sort of predefined criteria, which would include ensuring the legitimacy of the product or business being advertised.

Recommendation(s):

- In addition to the "ADVERTISEMENT" label currently located below every advertisement box, consider including a statement and/or link to provide more information about how the advertisements were chosen and how the revenue will be used.

4. How does a flash message notifying users that they are leaving the ".gov" domain for a ".com" domain with advertisements affect transparency and usability?

Since advertisements are not allowed within the .gov domain, the addition of advertisements on web pages requires that those web pages be moved to the .com domain. It is recommended that government websites notify users when they click on a link that will take them outside the

.gov domain. This recommendation is based on the assumption that the destination page is a separate, non-governmental website. However, in this case, advertisements existed only on the most popular pages within the WSDOT website. This means that users are clicking between the .gov and .com domains, sometimes multiple times on a single task, without ever leaving the official WSDOT website.

All of the participants were able to satisfactorily articulate the difference between a .gov webpage and a .com webpage.

Control Group

Five of the six control group participants said they may notice if they leave the .gov domain, but that they don't care. All of the participants said that they would not want to be notified every time they left the .gov domain. One participant commented that they would only want to be notified when their destination is outside of WSDOT's control.

Since the control group participants used the live WSDOT website, they never actually saw a notification when they went to a Ferries page that contained advertisements.

Test Group

To test the effect of notifying users every time they leave the .gov domain, participants in the test group were presented with a flash message, see figure 4.

The first time participants were presented with the message they paused and quickly skimmed the text. One participant thought that something had gone wrong with the website. Every subsequent time participants were presented with the message they quickly clicked the link to continue to the destination page. Most of the participants were frustrated by the second or third time they received the message.

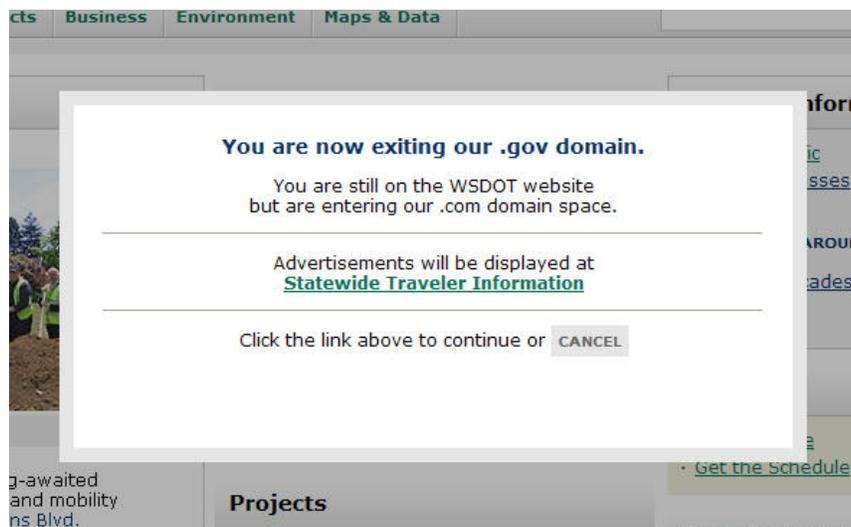


Figure 4: Flash message on test website

After completing the tasks, six of the test group participants said they would not want to be notified every time they left the .gov domain, but three of them did want to be notified when

they left the WSDOT website. When the flash message appeared during the tasks, a couple participants thought that it was telling them that they were leaving the WSDOT website.



I thought I was leaving the site. If I didn't click the link, would I still get the information? (T8)



Of the three test group participants who didn't notice the advertisements, two recalled that the flash message told them there would be advertisements on the following web page, but they didn't remember actually seeing them there. Therefore, the flash message does increase the transparency of the advertisements on the website.



User's reaction to pop up warning message
(Video clip)

Recommendation(s):

- Consider only notifying users when they are leaving the WSDOT website.
- Alternatively, consider a less disruptive way to notify users that they are leaving the .gov domain; using a clear indicator next to the link or on the breadcrumbs. Ensure users do not mistakenly think they are leaving the WSDOT website.

Recommendation regarding advertisements

After observing and gathering data about how the addition of advertisements on the WSDOT website affects usability, it is our determination that given the implementation of the above recommendations, the impact is minimal. Most of the usability issues experienced during the study were present whether or not the advertisements were present and were experienced by members of both user groups.

It is not recommended that WSDOT increase the number of advertisements beyond two per page, or begin implementing pop up advertisements or advertisements that move content around.

The remainder of this report more closely examines the study design, the data collected during the study, and the global themes and usability issues identified. Recommendations for overall website improvements are included. The implementation of these recommendations will make it easier to use the WSDOT website whether or not advertisements are present.

Study Design

In order to assess the impact of commercial advertisements on the usability of the WSDOT website (see Figure 1), a formal usability study was conducted. The study design allowed for observing user's typical behaviors while performing their top tasks, assessing the overall usability of the website, and addressing the following predefined goals:

- Producing data that measures the effect of advertisements on the most popular pages of the WSDOT website.
- Providing recommendations to minimize the impact of advertisements on the usability of the website.
- Identifying possible guidelines for the appropriate type, amount, size and location of advertisements on the website.
- Identifying problems users may be experiencing when using the website and providing recommendations for overall site improvement.
- Identifying possible website enhancements based on user needs.
- Establishing baseline usability data for measuring progress in future studies.

Participants

All participants were recruited from the same pool of candidates and provided a similar representation of the website's general public users. A link to an online survey was posted on the WSDOT homepage in which users of the website volunteered information about themselves, the way they use the website, and their willingness to participate in a website study. Nearly 400 people responded to the survey, 13 of which were successfully recruited and scheduled to spend 1 ½ hours testing the website in the DIS Usability Lab in Lacey, WA.

Participants were divided into two groups:

1. The **Control Group** performed top tasks on the current WSDOT website, which already includes advertisements on the Washington State Ferries pages.
2. The **Test Group** performed the same top tasks on a copy of the WSDOT website, on which various commercial advertisements were added to the remainder of the most popular pages:
 - Seattle Traffic
 - Seattle Travel Times
 - Statewide Travel Alerts
 - Tacoma Traffic
 - Mountain Passes
 - Statewide Traffic Cameras
 - Canadian Border Traffic

For detailed information about the users who participated in the study, see [Appendix A](#).

Sessions

To ensure accurate and consistent testing, we conducted every session using the following steps:

1. Upon arriving at the Usability Lab, the facilitator asked the participant to complete a Pre-Study Questionnaire, (see [Appendix B](#)).
2. The facilitator then introduced the participant to the plan for the session, using the same script for every session to ensure each participant was given the same information. Participants were advised that their session would be video recorded and asked to sign a consent form. Participants were also asked not to use the website's Search during their session.
3. Each participant then worked with the website using a set of 10 pre-written tasks while thinking aloud. The tasks were written to encompass the top tasks completed by WSDOT's website users, (see [Appendix C](#)).
4. After completing all 10 tasks, the facilitator asked each participant to complete the Desirability Exercise, (see [Appendix D](#)).
5. The facilitator then conducted a short verbal interview with each participant to encourage further discussion about the impact of advertisements on their experience and impressions of the website and WSDOT, (see [Appendix E](#)).
6. Finally, the facilitator asked users to complete the System Usability Scale (SUS) Survey, (see [Appendix F](#)). The SUS survey is used to calculate a single number measuring the overall usability of the system, or website. The score is a ranking from 0-100, 100 being highly usable.

Metrics

During each session, team members collected data by taking hand-written notes, video recording each session using TechSmith Morae, and marking video files with counts and references. We focused on collecting the following types of data while participants worked with the website:

- Task effectiveness, efficiency and learnability
 - Attempts – The number of times a user changed paths by selecting the back button, returning home to start over, or employing a trial and error approach.
 - Task completion – Users' success or failure finding and understanding information on the website.
 - Time on task – The total time it took to complete the task.
 - Task difficulty – A combination of task completion and time on task.
 - Navigation errors – The number of times a user tried to click on something that wasn't a link or did not correctly use the website navigation.

- User perception and satisfaction
 - Comments – The ratio of positive to negative comments users make while using the website.
 - Desirability – A word exercise to help users describe their experience using the website.
 - System Usability Scale (SUS) – Standard survey that measures users’ perceptions of the usability of a system or website.

Observers

Next door to the Usability Lab is an observation room. The observation room contains two television screens and a large conference table. The participant’s computer desktop is visible on one screen and the participant’s face and voice on the other. We believe it is very important for all stakeholders to experience what the website is like for the real user. It is just about impossible to see the true user perspective without observing actual users completing relevant tasks.

We invited WSDOT staff to visit the usability lab and observe each study session. In total, 20 of them took us up on the offer, with many staff members attending more than one session. They represented multiple departments within WSDOT, including:

- | | |
|----------------------------|--------------------------------------|
| • Communications | • Intelligent Transportation Systems |
| • Environmental Services | • Maintenance and Operations |
| • Freight Systems Division | • Public Private Partnerships |
| • Information Technology | • Public Transportation |

This is far superior to typical observer involvement and indicative of WSDOT’s commitment to understanding the user experience. For those who were unable to attend, we created video clips and have linked to them in this report. It is essential to see the user experience when designing online resources. By continuing to invest in usability, WSDOT will increase users’ ability to find information faster with higher levels of satisfaction, reduce the impact of advertising on the usability of the website, and save money by addressing costly fixes early.

Findings and Recommendations

Study findings and recommendations are presented here in three sections. First, we use metrics, video markers, and observation to gather data that can demonstrate the effectiveness, efficiency, and learnability of the website for user’s top tasks. Next, we use questionnaires and interviews to gather data that can demonstrate users’ perception and satisfaction of the website. Finally, we combine all the data collected to understand the global usability themes and issues across the site and identify areas for improvement.

All of the data collected has been broken down by user group; the test group, who used a copy of the WSDOT website with advertisements, and the control group, who used the live WSDOT website.

Task effectiveness, efficiency, and learnability

Table 1 below provides an overview of the data collected; summarized by user group and for all participants.

	Test	Control	All participants
Average # of attempts	1.31	1.68	1.5
Success in finding	71%	73%	72%
Success in understanding	80%	85%	83%
Average time on task (minutes : seconds)	2:27	2:35	2:30
Overall task difficulty	3 easy 6 moderate 1 difficult	6 easy 4 moderate 0 difficult	3 easy 7 moderate 0 difficult
Navigation errors	13	15	28

Table 1: Task effectiveness metrics

Attempts

For each task, the team tracked the number of attempts it took the participant to find information on the site. Numbers of attempts are a measure of the findability of information and of users' confidence in finding information.

For details on the criteria the team used in order to identify an attempt, see Table 2 below.

Each of the following was counted as an attempt:	When:
Selecting the back button	A user makes several selections that appear to be the same path, but then hesitates and clicks back one or more times to return to a previous page and make a different choice.
Returning home	During a task, a user makes several clicks down a path and then clicks on home to start over.
Trial and error	User makes several selections to a section of a site, but are not finding what they need, so they click on another link or links within the same category, blindly searching for the answer.
Verbal statements	Sometimes an attempt will be apparent due to something the user says, such as "no, that's not it," or "let me try somewhere else," etc.

Table 2: How to identify an attempt

Table 3 provides the overall average number of attempts, maximum average, and minimum average for each user group and for all participants.

	Test	Control	All participants
Average attempts	1.31	1.68	1.5
Maximum average attempts on a single task	2.2 (task 8)	2.8 (task 8)	2.5 (task 8)
Minimum average attempts on a single task	1 (tasks 4,6 & 7)	1 (tasks 1 & 2)	1.1 (tasks 1 & 4)

Table 3: Average number of attempts

The highest average number of attempts for both user groups, and participants overall, was on task 8, Statewide Traffic Cameras. Overall, the control group had a slightly higher average number of attempts and the test group was able to complete more tasks in the first attempt. These figures are so close that based on number of attempts, we see no impact by the presence of advertisements.

Figure 5 shows the average number of attempts per task for each user group and all participants.

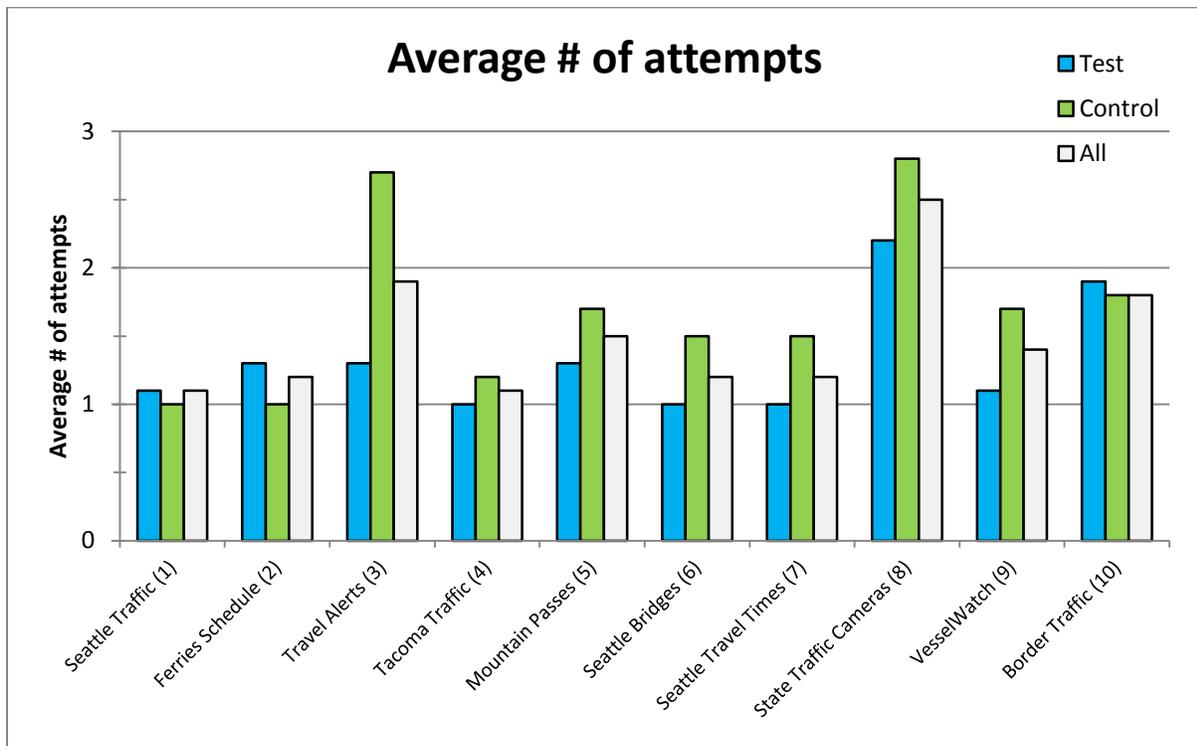


Figure 5: Average number of attempts per task

The only significant difference between the control and test groups for average number of attempts occurred on task 3, Travel Alerts. The control group, on average, took twice as many attempts as the test group to complete the task, 2.7 and 1.3 respectively. The two control group participants who took multiple attempts to complete this task couldn't figure out how to

see all the travel alerts from Olympia to Portland. They never quite felt like they found the complete information. Both of these participants wanted to follow the Olympia flow map all the way down to Portland, but commented that the map skipped large portions of the route.

Task Completion: Finding and Understanding

The specific criteria for measuring task completion, based on both finding the information and understanding the information, is defined in Table 4 below.

For each task, we measured:	As:	When users:
Finding	Success Partial Success Failure	Reached the intended destination within 2 attempts, with no hints from the facilitator. Reaching the intended destination within 3 attempts, and/or with 1 hint by the facilitator. Either never reaching intended destination or reaching it with 4 or more attempts and/or 2 or more hints.
Understanding	Success Partial Success Failure Not Found	User has stated all parts of the answer correctly and is confident about the accuracy of their answers. User has stated some parts of the answer correctly or user expresses uncertainty/doubt about the answers. User has not stated the answer correctly. Measuring understanding is not possible because the user did not reach the intended destination.
Skip		Skipped the task due to time restraints

Table 4: Task Completion definitions

After comparing task completion scores for each user group, we found that there was very little difference between user’s ability to find and understand information related to their top tasks based on whether the website has advertisements or not, with a slight advantage going to the control group.

Figures 6 (Finding Information) and 7 (Understanding Information) provide an overview of all of the participants’ task completion scores. These charts help to show, at a glance, which tasks users struggle with more than others.

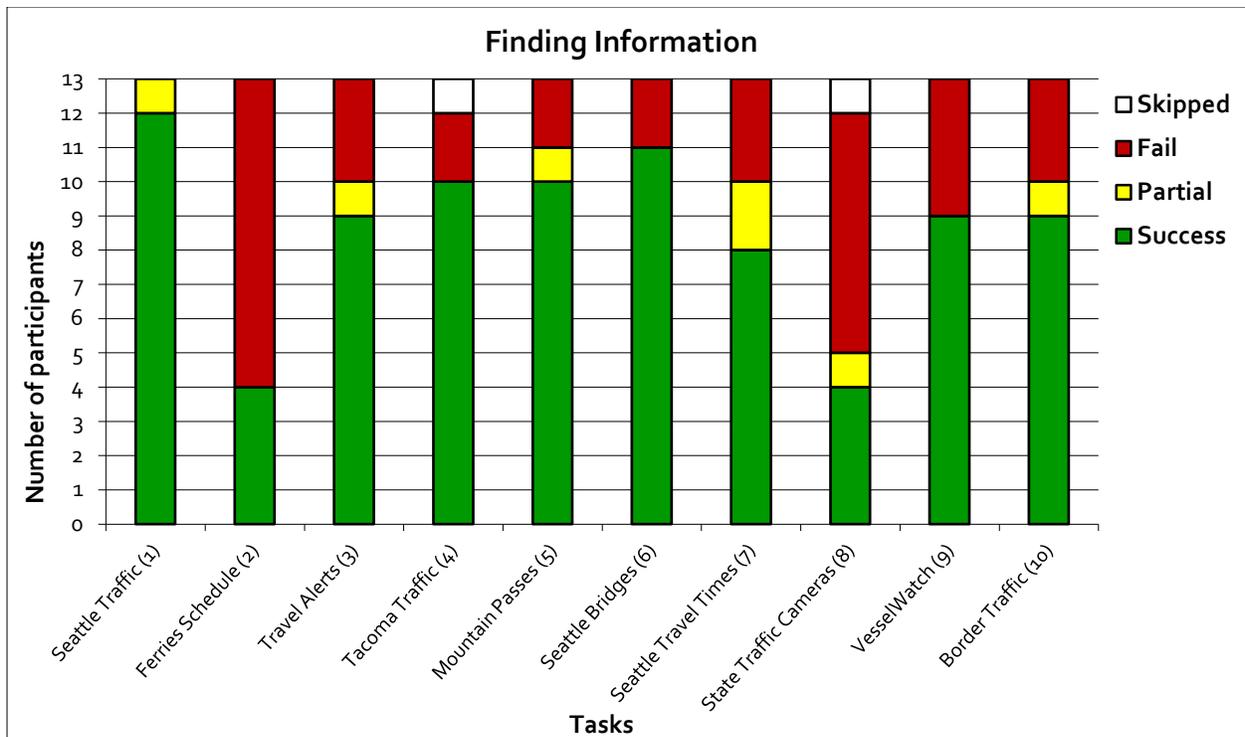


Figure 6: Finding information

The two tasks that participants had the most difficulty completing successfully were task 2, Ferries Schedule, and task 8, State Traffic Cameras.

In task 2, 12 out of 13 participants provided the correct Ferry departure time for the scenario they were given. However, only three of the 12 correctly used the summer schedule. 75% of the participants did not notice that there were different schedules for spring and summer when choosing their ferry route on the schedule page. Additionally, once clicking into their route, the page tells them they are on the spring schedule, but doesn't provide any dates to help them figure out they have clicked into the wrong place.

In task 8, we asked participants to find SR 291, a small highway north of Spokane. As expected, no participant already knew where the highway was located. It proved to be difficult for participants to find a road on a map when they have no idea where it is in the State. Most of the participants knew they needed to find a statewide route list, but only half successfully found it. In general, if participants were unable to find the route list, they did find the State Highway Map, which always proved useless.

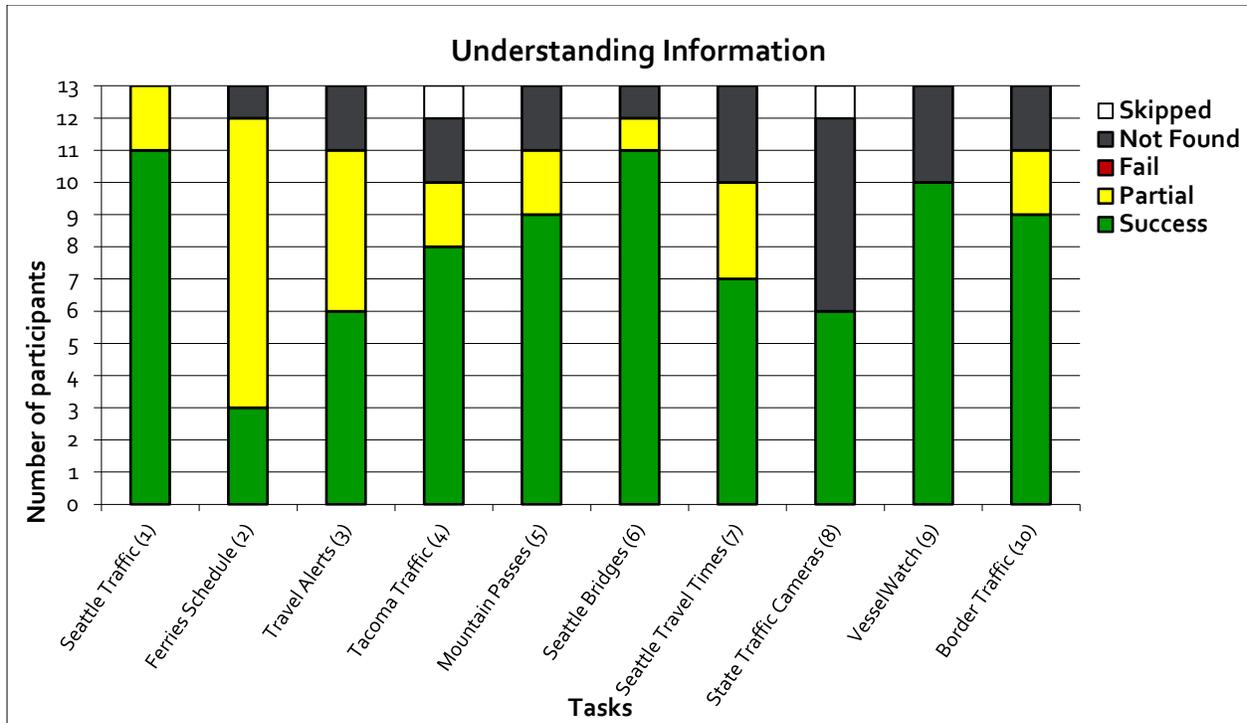


Figure 7: Understanding information

Aside from tasks 2 and 8, discussed above, the main reason that participants, even if able to find the answer, did not fully understand the answer (yellow = partial understanding), was that traffic, construction, alert, and flow data all play into a user’s complete understanding of what is happening on the road along their planned route. Participants frequently visited more than one area of the website, (i.e., alerts, flow maps, cameras), in an attempt to get the complete information and often commented that they weren’t sure if they found all the information.

Time on Task

Time on task is a reflection of how long the participant worked on the task. The timer was started as soon as the participant was finished reading the task and ended when they had provided their answer to the task or quit the task. We cut the timer off after 10 minutes. Only one participant (part of the control group) hit the cutoff time on one task. Table 5 below shows the key findings for time on task for each user group and all participants.

(minutes : seconds)	Test	Control	All participants
Average time on task	2:27	2:28	2:27
Maximum time on a single task	6:11, task 3	10:00, task 3	10:00, task 3
Longest average time on a single task	3:14, task 8	3:23, task 10	3:16, task 8

Table 5: Time on task

The average time for all users on all tasks was 2 minutes 27 seconds and was virtually the same for both user groups. In fact, given that the test user group was presented a pop up message every time they left the .gov domain, they actually spent less time completing the tasks, on average. The maximum time spent on a single task was on task 3, Travel Alerts, for both user groups. The longest average time per task was on task 8 for the test group and task 10 for the control group.

Figure 8 shows average time on task, by task, for each user group and all participants.

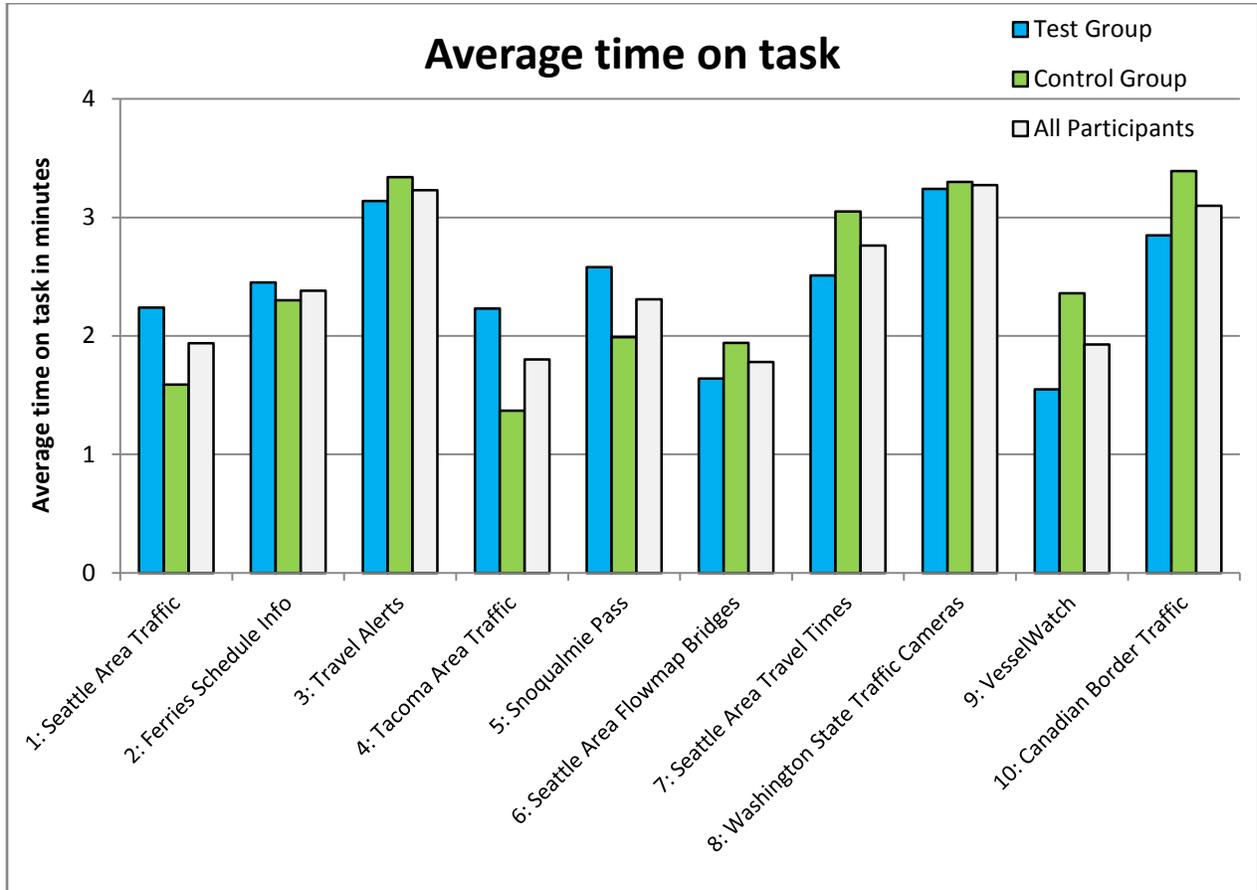


Figure 8: Average time per task

Task Difficulty

Task difficulty was derived from a combination of attempts, task completion, and time on task. This metric analyzes how easy or difficult it was to complete the task within a certain amount of time. This is an objective measurement and does not factor in users' perceptions of the task difficulty.

Degree of difficulty is broken down into easy, moderate, and difficult, as defined in Table 6 below.

We measured each task as:	When users:
Easy	Were able to complete the task by finding and understanding the information <ul style="list-style-type: none"> In 1-2 attempts In less than 3 minutes Without help from the facilitator
Moderate	Were able to complete the task by finding and partially understanding the information <ul style="list-style-type: none"> In 3 attempts In less than 5 minutes Received up to 1 hint from the facilitator
Difficult	Were unable to complete the task: <ul style="list-style-type: none"> Did not find or understand the information Made 4 or more attempts Took more than 5 minutes Received 2 or more hints from the facilitator

Table 6: Definitions for easy, moderate and difficult tasks

Table 7 breaks down task difficulty by user group and for all participants.

	Test	Control	All participants
Easy	3 easy tasks	6 easy tasks	3 easy tasks
	Task 1, Seattle Area Traffic Task 6, Seattle Area Bridges Task 9, Vessel Watch	Task 1, Seattle Area Traffic Task 2, Ferries Schedule Task 4, Tacoma Area Traffic Task 5, Mountain Passes Task 6, Seattle Area Bridges Task 9, Vessel Watch	Task 1, Seattle Area Traffic Task 6, Seattle Area Bridges Task 9, Vessel Watch
Moderate	6 moderate tasks	4 moderate tasks	7 moderate tasks
	Task 3, Travel Alerts Task 4, Tacoma Area Traffic Task 5, Mountain Passes Task 7, Seattle Travel Times Task 8, State Traffic Cameras Task 10, Border Traffic	Task 3, Travel Alerts Task 7, Seattle Travel Times Task 8, State Traffic Cameras Task 10, Border Traffic	Task 2, Ferries Schedule Task 3, Travel Alerts Task 4, Tacoma Area Traffic Task 5, Mountain Passes Task 7, Seattle Travel Times Task 8, State Traffic Cameras Task 10, Border Traffic
Difficult	1 difficult task	0 difficult tasks	0 difficult tasks
	Task 2, Ferries Schedule	NONE	NONE

Table 7: Task difficulty

Based on task difficulty, tasks 2, 4, and 5 were more difficult for the test group to complete than the control group. Task 2 is a Ferries task, so both user groups saw advertisements on those pages. Therefore, the differences cannot be attributed to the presence of advertisements.

Tasks 4 and 5 took the test group longer on average to complete, but required fewer attempts. A portion of the extended time on task for the test group is attributed to the domain message displayed for test group participants every time they click on a link from the .gov domain to a page with advertisements (the .com domain).

In task 4, Tacoma traffic, two test group participants relied heavily on the travel alerts for SR 16, rather than looking at the Tacoma flow map. These participants required more time to locate and decipher travel alerts than participants who viewed the flow map.

In task 5, Mountain Passes, one test group participant took over 5 minutes to complete the task because they were distracted by a link to I-90 Construction Impacts on the Mountain Passes page before finding the Snoqualmie Pass Report. This participant did comment on seeing the banner ad on the top of both pages. In the post study interview, this participant commented that the banner ads were not disruptive, but that the square ads in the right column could be if they push important information down the page.

Navigation Errors

A navigation error occurred when a user tried to click on something that was not a link or the navigation menu did not perform how the user expected. Table 8 below shows the key findings for navigation errors.

	Test	Control	All participants
Total number of errors	20	16	36
Clicked on non-clickable item	7	10	17
Clicked on same navigation item	6	5	11
Technical errors with the website	7	1	8

Table 8: Navigation errors

There were a total of 36 navigation errors made during the study. Of the 36 errors made, almost half were made when users tried to click on something that was not a link. Almost a third occurred when users clicked on a link that took them to the page they were currently looking at, but they didn't realize it. The remaining eight errors were technical errors with the website, (i.e. maps not loading, camera images not changing). There were more technical errors for the test group because of the test environment. No technical errors were counted

against the user. Navigation errors made throughout the study were similar regardless of user group and attributed to website design and sense of place, not the presence of advertisements.

User perception and satisfaction

Table 9 below provides an overview of the data collected from participants through questionnaires, the desirability exercise, and observation; summarized by user group and for all participants.

	Test	Control	All participants
Overall perception of WSDOT (out of 30 possible)	21.9	22.8	22.3
System Usability Scale (SUS) Score (out of 100 possible)	77.14	72.5	75
Ratio of positive to negative words chosen to describe the website	4.1 to 1	4.6 to 1	4.4 to 1
Ratio of positive to negative comments made during tasks	1 to 1	1 to 1	1 to 1

Table 9: User perception and satisfaction metrics

Perceptions of the agency and website

In the pre-study questionnaire, before completing any tasks, we asked participants to rate their perception of key aspects of WSDOT’s mission and goals statements, **on a scale of 0 (strongly disagree) to 5 (strongly agree)**. Overall, participants came into the study with a positive perception of the agency and the website, since all six statements were rated above a three on average.

Table 10 below shows the average participant rating for each statement, broken down by user group and for all participants.

	Test	Control	All participants
I trust that WSDOT uses taxpayer dollars efficiently.	4.14	4.00	4.08
The information on WSDOT’s website is always accurate.	3.86	4.00	3.92
The information on WSDOT’s website is always up-to-date.	3.29	4.17	3.69
WSDOT delivers projects on time and on budget.	3.71	3.50	3.62
WSDOT is innovative.	3.57	3.50	3.54
WSDOT is accountable and admits when they’ve made a mistake.	3.29	3.67	3.46

Table 10: Perceptions of the agency and website



The only statement with a significant difference between the test and control group ratings was, “The information on WSDOT’s website is always up-to-date.” The test group rated this statement almost a point lower, on average. Two test group participants gave this statement a 2; one reported almost never using the WSDOT website, the other made a couple comments during their session that any traffic or flow information they find on the website while at home is different by the time they get on the road.

Overall, we did not observe any preconceived ideas of the agency or the website that would affect the validity of the comparison between the two groups as it relates to advertisements on the website.

System Usability Scale (SUS)

Upon completion of the session, each user rated their experience using the website by taking the System Usability Scale (SUS) survey. The scale measures a high-level subjective view of the usability of a system or website on the scale of 0 to 100, where 0 means highly unusable and 100 means highly usable. The SUS score is valuable when comparing the usability of different websites. In this case, the only difference between the two websites used by the user groups was the presence of advertisements on all the top pages, rather than just the Ferries pages.

Table 11 below shows the average SUS score for all participants and each user group. Figure 9 shows the SUS scores broken down by participant.

	Test	Control	All participants
System Usability Scale (SUS) Score	77.14	72.5	75

Table 11: Average SUS scores

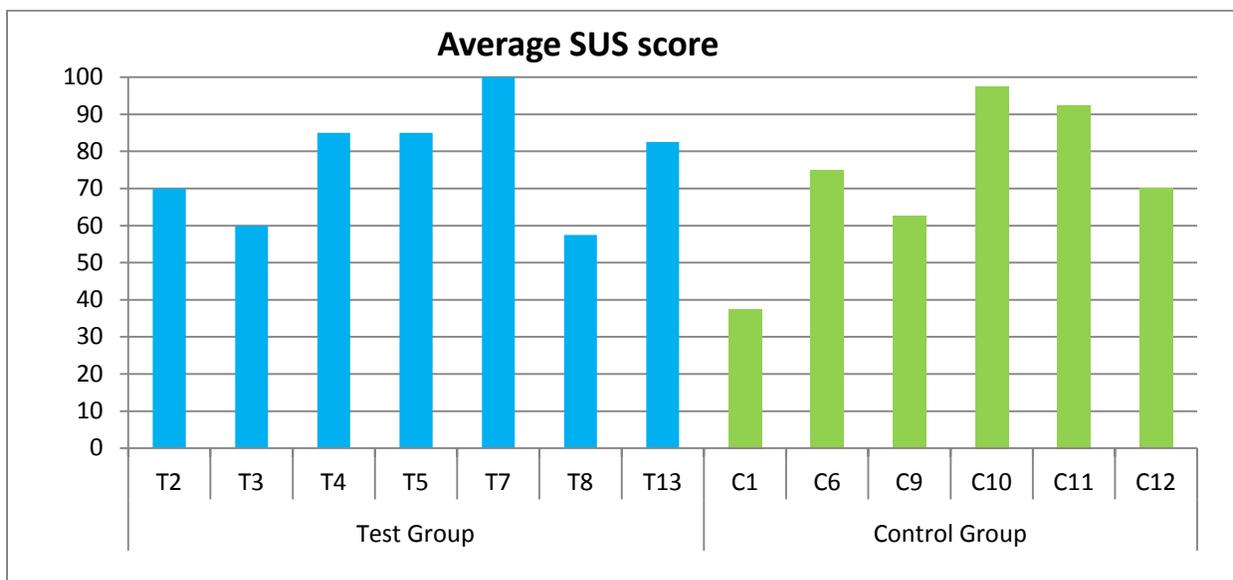


Figure 9: Average SUS scores by participant

The average SUS score from all participants in the study was 75. Average scores are usually between 65 and 70¹, so the website performed above average. The control group gave the site a slightly lower, but still above average, score of 72.5. The test group gave the site a slightly higher score of 77.14.

Based on participant’s perception of the usability of the website, the presence of advertisements in no way diminishes usability.

Desirability

During the desirability exercise, we asked participants to select adjectives that best describe their experience going through the tasks on the WSDOT website, (for the complete list of adjectives used, see [Appendix D](#)). Figure 10 is a word cloud created from the words participants chose to describe their experience using the website, giving more weight to those they highlighted as their top five. The more often a word was selected, the bigger the font.

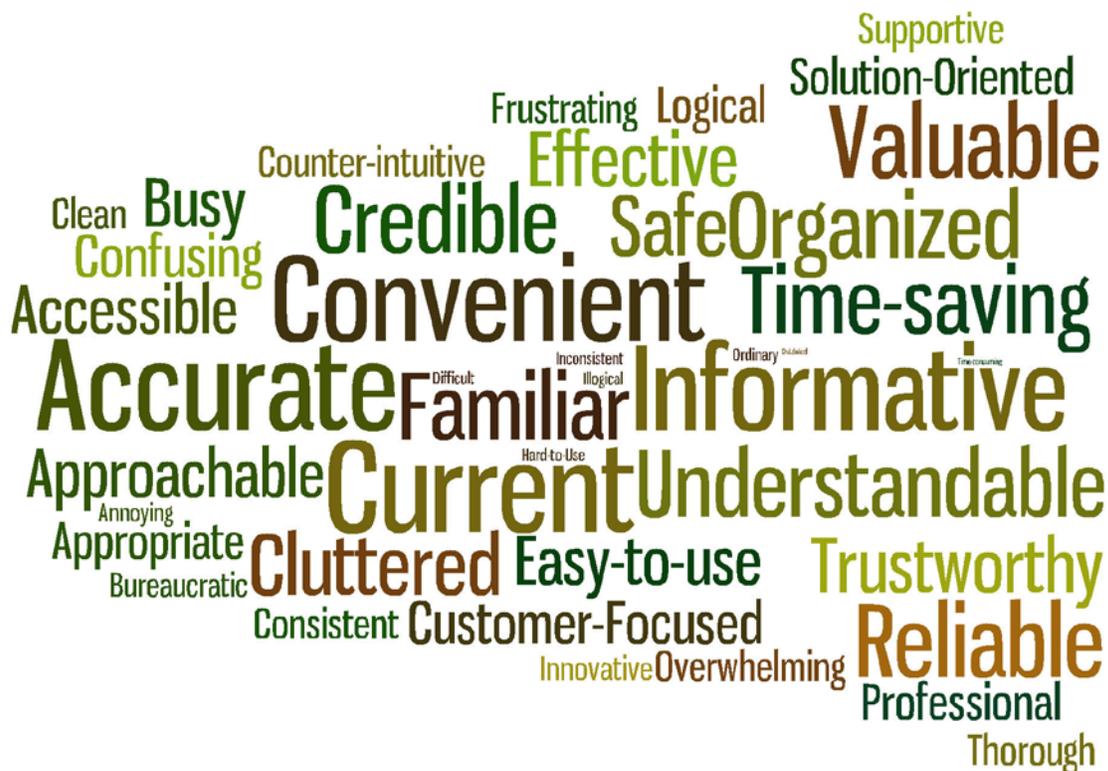


Figure 10: Desirability Exercise word cloud

Participants most often selected and highlighted four words; *accurate*, *convenient*, *current*, and *informative*. Based on comments by participants when asked to talk about the five words they

¹ Bailey, Bob. “Getting the Complete Picture with Usability Testing” Usability Update Newsletters. March, 2006. <http://www.usability.gov/pubs/030106news.html>

highlighted, most users felt that the website contained a lot of information and that they could rely on it being correct. However, users felt that the amount of information also made the website feel cluttered and busy at times.

No participant in the study selected the words *distracting*, *misleading*, *unorganized*, or *wasteful*.

Table 12 below gives the ratio of positive to negative words chosen, the number of times the top 10 words chosen were selected, (if a participant highlighted a word as part of their top 5, the word was counted twice), and a three additional words in which there were differences between the control and test groups.

	Test	Control	All participants
Ratio of positive to negative words chosen	4.1 to 1	4.57 to 1	4.36 to 1
Accurate	8	5	15
Current	6	9	15
Convenient	7	7	14
Informative	5	9	14
Reliable	5	7	12
Valuable	6	6	12
Time-saving	5	6	11
Understandable	7	4	11
Organized	8	3	11
Credible	6	5	11
Safe	7	3	10
Counter-intuitive	4	1	5
Bureaucratic	4	0	4

Table 12: Desirability Exercise specifics

There are a few significant differences between the words most often chosen by the control group participants and the words most often chosen by the test group participants. The test group chose slightly fewer positive words, on average, than the control group. The two negative words the test group chose more often were *counter-intuitive* and *bureaucratic*.

- *Counter-intuitive* was chosen by one control group participant and two test group participants. Both test group participants highlighted it as one of their top five. In one

case, the participant’s comments made *counter-intuitive* seem like a positive word to them, saying that there was functionality available, like the VesselWatch, which they didn’t expect on the website. In the other case, the participant commented that the website is not logical because critical things are not put where people see them. In particular, this participant felt that not all of the maps had legends.

- *Bureaucratic* was chosen by two test group participants and zero control group participants. Both test group participants highlighted it as one of their top five. When asked to explain their choice, one participant couldn’t elaborate more than that the website is “structured like bureaucrats run it” (T3). The other participant commented that the site uses industry jargon and that the average citizen is not concerned with many of the sections of the site, except for Traffic & Cameras. This participant, a Transportation Planner, said when referring to the terminology used on the website, “That’s us. That’s how we talk” (T8).

A positive word that was chosen more often by the test group than the control group was *safe*. This word was selected by three control group participants and five test group participants. None of the control group highlighted the word as part of their top five, and two of the test group did. One commented that the information on the website was “dedicated to keeping you safe on the road” (T5). The other felt that they were less likely to get a virus because they were using a government website.

Comments

The team tracked positive and negative comments as participants worked with the website during the study. Positive comments, such as “This is cool!” or “That is wonderful, it’s got everything, very good!” often indicated that the participant was confident about their actions on the website. Negative comments, such as “This isn’t very user friendly” or “I’m having trouble doing this”, were often a sign that the participant was not certain about their actions with the site or that they had found all of the information they needed. Table 13 below shows the total number for positive and negative comments.

	Test	Control	All participants
Positive comments	10	15	25
Negative comments	11	13	24
Ratio of positive to negative comments	1 to 1.1	1 to 0.87	1 to 0.96

Table 13: Participant comments

Participants made a total of 25 positive comments and 24 negative comments during the study. This represents a ratio of 1 positive comment to every 0.96 negative comments, or virtually 1:1.

Typically in website studies, participants comment much more often on the negative things they see than the positive, so participants had surprisingly few negative things to say about the WSDOT website, regardless of user group.

Note that the team only measured comments as participants worked on their tasks. Any comment made during the post-study interview or Desirability Exercise was not included.

Global Themes

The usability issues and themes identified throughout the study are provided here, along with data, video clips, and recommendations for addressing these issues and improving the overall usability of the website. Unless otherwise noted, these themes were usability issues regardless of the user group, or the presence of advertisements on the website. The recommendations, therefore, are overall website recommendations, and should be considered whether the agency moves forward with advertising on the website or not. However, we believe that improving the overall usability of the website will go a long way with users who are questioning the need for advertisements on the website and will reduce their perceived impact on the website.

Main Navigation

The main navigation bar divides the website into five main categories; Traffic & Cameras, Projects, Business, Environment, and Maps & Data. The only category in which all of the most visited pages and user's top tasks are located is Traffic & Cameras. However, participants rarely clicked on it, including two participants who never used the main navigation during their sessions at all. Participants used the boxes on the right of the homepage instead, see figure 11.

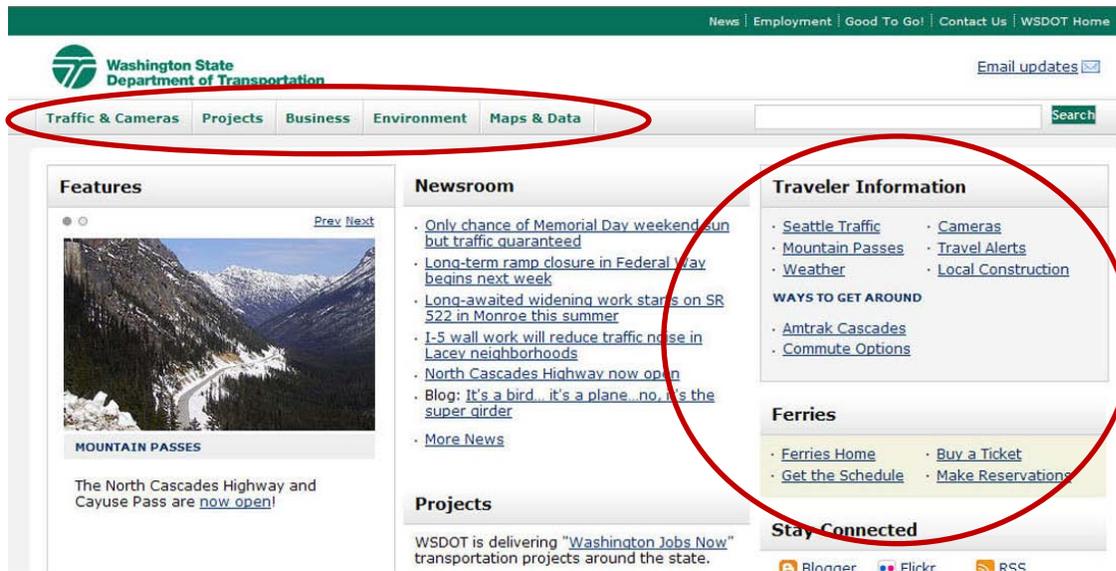


Figure 11: Homepage navigation options

Since users rely so heavily on the Traveler Information box on the homepage, many are frustrated because Seattle is the only city listed in the box, and they have to go to Seattle Traffic first to get to any other location. Five of the 13 participants used the Seattle Traffic link to get to traffic information for other locations.



[How users navigate to traffic information outside of Seattle](#) (Video clip)

The only other main navigation item used in this study was Maps & Data. A few participants clicked on this link during task 8, when they were faced with finding a state route of which they'd never heard before. Four participants found the State Highway Map in the Maps & Data section and thought they had found what they needed. After clicking on View Map, they all knew right away that the map, divided into multiple pdf documents, was not going to help them. Many of them then clicked straight back to Traffic & Cameras, having tried another portion of the site and been unsuccessful.

It's been my experience when I'm on the DOT Website that there's a reason that I go to traffic and cameras because it's the easiest one for me to find what I need. When I click on some of this other stuff it completely throws me into something that I have no interest looking at. (C9)

Given that users rarely click on Traffic & Cameras in the main navigation, they have difficulty finding any traffic related information that is not somehow referenced in the Traveler Information or Ferries boxes on the homepage. Task 10 asked participants to find information on wait times at the Canadian Border on I-5. Nine out of 13 participants commented that they were looking for "border crossing" on the homepage, usually first looking in the Traveler Information box. Eventually, participants scanned the entire homepage and commented that there should be a direct link to border crossing information on the homepage.

Recommendation(s):

- Currently, the main navigation bar does very little to help users navigate the website. Consider implementing a mega-nav in which users are given the breadth of options within each category from a drop down box/menu.
- Provide access to the main traffic page from the Traveler Information box on the homepage, or change the Seattle Traffic link to a drop down menu in which users can choose the specific location for which they're looking.
- Rename the main navigation label *Maps & Data*. It is misleading to users given that most of the web pages on the site have maps and data incorporated in them.
- Consider reorganizing the main navigation on the website to more appropriately address the needs of the majority of the website's users. For example, combine the project and business related information and expand the traveler information.

Sense of Place

On the WSDOT website, there are two different types of “sense of place” that are important to instill in the user.

1. **Website sense of place** is a user’s ability to quickly identify the page and section of the website at which they are currently looking. Websites with good sense of place are easier for users to navigate and understand, and set up appropriate expectations.

During the study, the facilitator asked users to articulate their website sense of place by saying what page of the website they were on and how they could tell. Nine of the 13 participants successfully identified their location in the website by referencing the breadcrumbs. Four of them, (three from the test group), either cited the browser page title or tried to remember where they clicked to get to their current page.

While the breadcrumbs proved helpful when identifying location within the website, participants had some difficulty successfully completing some tasks on the website because they weren’t sure where they were. For example, four participants unknowingly clicked on a link, sometimes more than once, in the left navigation that went to a page that they were currently on; three participants on the Ferries *Current Schedule* link and one on the *Mountain Passes* link. With no sense of place element added to the left navigation, participants did not know they were already on that page and expected to go somewhere different. Mismatching link labels and their destination page titles also contributed to these errors.



[Sense of place](#) (Video clip)

Similarly, one participant got caught in a loop between Seattle Area traffic and the State View, clicking back and forth, not realizing which pages they were already on or had already been to.

Another example of a type of sense of place element that is missing from the website is on the Ferries Schedule pages. We asked participants to plan a ferry trip for a Thursday in late June, (task 2). All of the 13 participants found the Ferries Schedule page, but only four of them correctly chose the summer schedule. The remaining nine participants didn’t scroll down the page and see that there was a summer schedule with a date range within which their ferry trip was to be planned. Once users click into the wrong schedule, no date ranges are specified. Therefore, users do not know that they are in the wrong place.

Since breadcrumbs are the only working sense of place element on the website, there is some evidence that pages with banner ads may make the breadcrumbs less visible because they are above the banner, while the rest of the content is below it.

Recommendation(s):

- Add sense of place elements and styles to the main navigation menu and left navigation menu.
- Stretch the banner advertisement across the width of the page. Place primary site navigation, including breadcrumbs, above it. Place secondary, left navigation below it.
- Use specific information to identify the page the user is on; for example, instead of just labeling the Ferries schedule pages as spring and summer, also provide the dates.
- Ensure that link labels and their destination page titles match.

2. **Geographic sense of place** on the WSDOT website is the user's ability to quickly identify the geographic location of the traffic alert, camera, or other information the website is providing. Since users come to the website primarily seeking location-specific information, sense of place on maps becomes just as important as sense of place within the website.

Most of the participants in the study experienced confusion during their session because they were reading traffic alerts or looking at camera images and couldn't tell where on the map the alert or camera was located. For example, of the six participants, (3 control, 3 test), who were able to find the camera image for SR 291, only one was able to articulate where the route is located. Three of the six identified the area on the statewide camera map that was highlighted

Washington State Traffic Cameras

Click on a camera on the map or select a route from the list.

Interstate: [I-5](#) [I-205](#) [I-405](#) [I-90](#) [I-82](#) [I-90](#) [SR 538](#)

US Highways: [US 2](#) [US 12](#) [US 97](#) [US 97A](#) [US 101](#) [US 195](#) [US 395](#) [US 395 NSC](#)

State Highways: [SR 3](#) [SR 4](#) [SR 8](#) [SR 9](#) [SR 14](#) [SR 16](#) [SR 17](#) [SR 18](#) [SR 20](#) [SR 24](#) [SR 27](#) [SR 28](#) [SR 31](#) [SR 96](#) [SR 99](#) [SR 104](#) [SR 109](#) [SR 161](#) [SR 163](#) [SR 167](#) [SR 169](#) [SR 202](#) [SR 204](#) [SR 221](#) [SR 240](#) [SR 285](#) [SR 290](#) [SR 291](#) [SR 410](#) [SR 433](#) [SR 500](#) [SR 502](#) [SR 504](#) [SR 512](#) [SR 516](#) [SR 518](#) [SR 520](#) [SR 522](#) [SR 524](#) [SR 525](#) [SR 526](#) [SR 527](#) [SR 532](#) [SR 539](#) [SR 543](#) [SR 548](#) [SR 599](#) [SR 900](#) [SR 902](#) [SR 904](#)

More Information

- [Check the Weather](#)
- [Check for Travel Alerts \(road conditions\)](#)
- [Check the Mountain Passes](#)

Figure 12: red box on Traffic Cameras page

by a red box as the region of the state where the camera, and thus the route, is located, (see figure 12). However, the red box is provided as a mechanism to zoom into certain regions of the state on the map. It changes as the user mouse's over the map and has nothing to do with the current image being displayed. There are no indications of the location of the current camera image.

The only way to determine the location is to go back to the statewide camera list and read the description.

Similarly, the camera images on the mountain passes pages are inconsistent and it is difficult for users to tell which camera is providing the current image. Following task 5, the facilitator asked participants if they could identify how many cameras were located along I-90 through Snoqualmie Pass. Eight of 10 participants who saw the pass report correctly answered that there are seven cameras, and referenced the links below the camera image, (see figure 13). However, many of them expressed confusion by the fact that

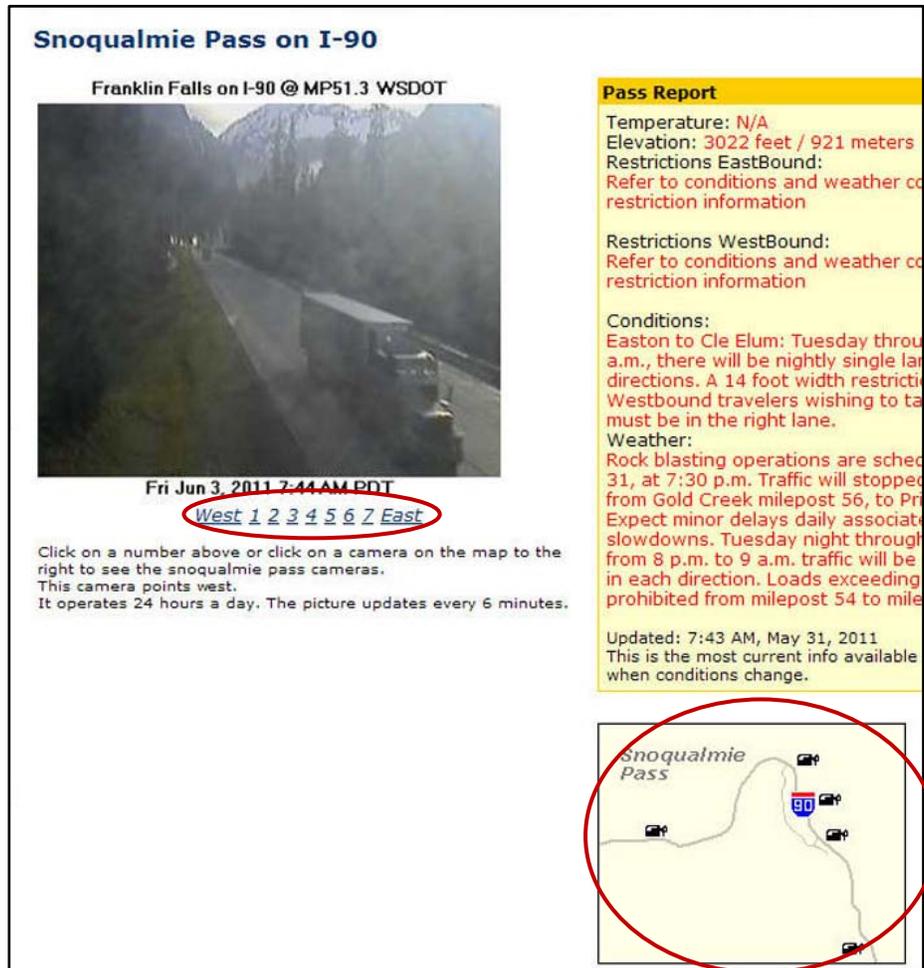


Figure 13: camera image links on the Snoqualmie Pass page

there were only five cameras identified on the map below the pass report. Since there is no connection between the camera image currently displayed and the camera icons on the map, users cannot tell which camera they're currently viewing or where the other two cameras, (available via the links below the image), are located. The "West" and "East" links associated with the camera links below the image were confusing to participants as well. Participants did not know what to expect these links to do and many thought they represented the direction the camera was facing, or cameras west of the summit and east of the summit.

Another example of the lack of sense of place on maps is on the travel alerts pages, (see figure 14). Similar to camera images, travel alerts can be selected from the map and specifics of the alert are then displayed in the right column. However, unless the specifics of an alert are displayed (by clicking "More"), there is not any connection between the alert and the map. Users must figure out which alert goes with which icon on the map. This is often difficult because alerts icons on the map frequently overlap. Alerts do specify mileposts, but three users commented that they do not typically know where mileposts are located, so the alert

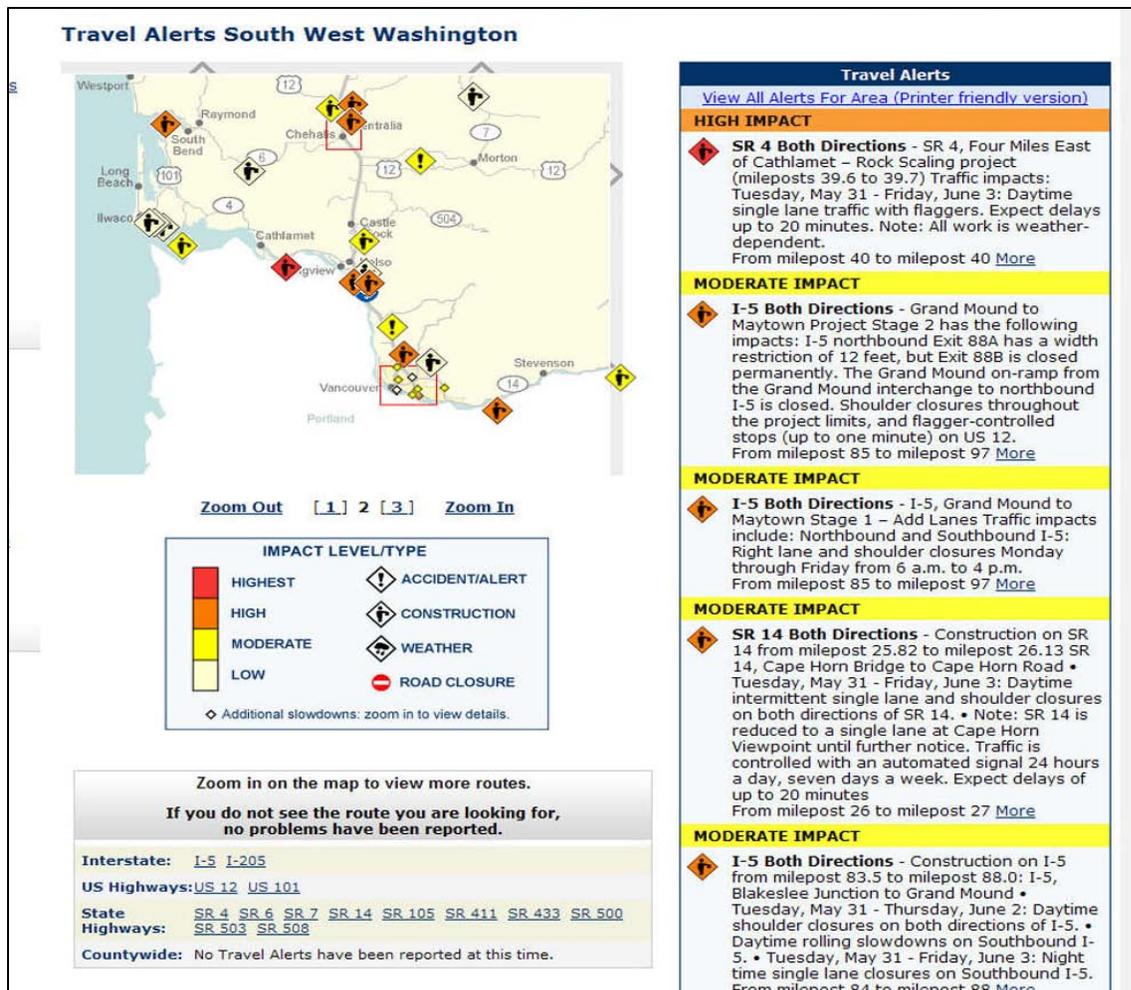


Figure 14: Southwest Washington Traffic Alerts page

specifics do little to help them understand the alert location. While we are aware that there is a need for alerts to be written in a specific way for the 511 traffic system to read them, identifying mileposts in the alert is useless for website users if they are not also identified on the map.



How does the Travel Alerts page work for users?

(Video clip)



This only makes sense to me when I'm familiar with the area....I don't know where the mileposts are at. If it gave me the exit number and the name of the exit as well...(C9)



Similarly, the VesselWatch map and chart would benefit from the addition of some sense of place. A few users were better able to read the chart below the map than the map itself. Some correlation between the two would serve all types of user navigation styles.

Recommendation(s):

- Use visual elements to connect the camera image being displayed to the camera icon on the map with which it is associated.
- On the Mountain Passes pages, in addition to connecting the camera image and icon, also associate them with the selected link under the camera image. Remove the “click on the number above...” language below the camera image, and locate the map and camera image closer together on the page.

Left Navigation

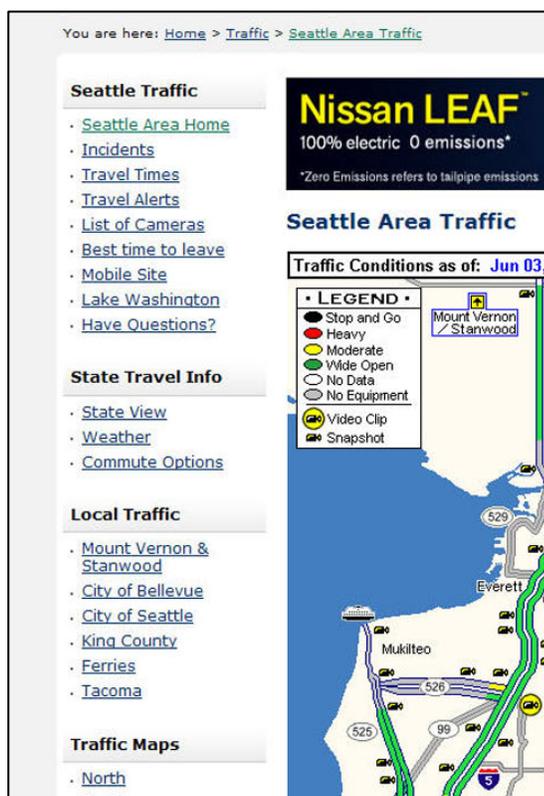


Figure 15: Left navigation menu

Since users typically click on the Seattle Traffic link in the Traveler Information box on the homepage, the first left navigation menu they see is specific to the Seattle Area, not Traffic & Cameras. Since website users are familiar with drilling down into information, they typically assume that they have drilled down to the Seattle area and can use the left navigation to go back out a level and find traffic information for other locations. Judging from the breadcrumbs, this is correct. However, the top section of the left navigation menu on the Seattle Area Traffic page is specific to Seattle, see figure 15. This causes users to get lost and leads to the expectation that links in the left navigation menu specific to Seattle are actually for a larger area; for example, a few users were surprised to find out that the Travel Times only encompassed the Seattle Area.

Complicating matters, we saw that content placed to the sides of the banner advertisement is difficult for users to see. The heading for the left navigation menu, Seattle Traffic, is getting lost next to the banner.

A couple users questioned the order of items in the left navigation. Because they could not decipher a logical order, they assumed there wasn't one and commented that it should be in alphabetical order.

There are instances on the website when a link in the left navigation menu goes to an external website; *Canadian Border Wait Times*, for example. A few participants in this study clicked on one of these external links and didn't realize at all that they had left the WSDOT website. Users do not expect links in the site navigation to take them to different websites.



Left navigation gives users trouble
(Video clip)

Recommendation(s):

- Decide on a clear structure for the pages within Traffic & Cameras. Use an expanding menu style on the left navigation menu that allows users to see the secondary and tertiary level pages at a glance.
- Move the left navigation menu down so that it starts below the banner advertisement.
- If there is no clear order of items, from the user perspective, put items in alphabetical order.
- Do not put links to external websites in the left navigation menu.
- Make it obvious when a link goes to an external website. Typically, website users expect external links to be located in the right column and labeled Additional Information or Related Information.

Organization

Participants commented frequently that there is a lot of good information on the website, often more than they were aware of before they participated in the study session. A few participants followed up that comment by saying that the information is not broken out very well. Users of the WSDOT website are typically looking for information pertaining to a certain geographic location or route. They are not typically looking for a certain type of information, like flow maps, alerts, or cameras. They are instead interested in seeing all the types of information related to their location or intended route.

Seven of the participants searched multiple areas of the Traffic and Cameras section to get the complete information regarding travel delays along their specific route. At least four of these participants were still not confident that they had found the complete information.



Users don't feel confident that they've found all the information needed
(Video clip)

If a user is familiar with finding information in one area of the website, (i.e., cameras, flow maps, alerts), they continue to look in that one area only. Many participants hadn't previously realized the amount of information available on the website because they only typically go to the area they know how to find. By breaking up the traffic related information, users are missing a lot.

A common and frustrating side effect of breaking out camera, traffic, and alert data into separate areas is that the route list on the Statewide Alerts page, (see figure 16), is different than the route list

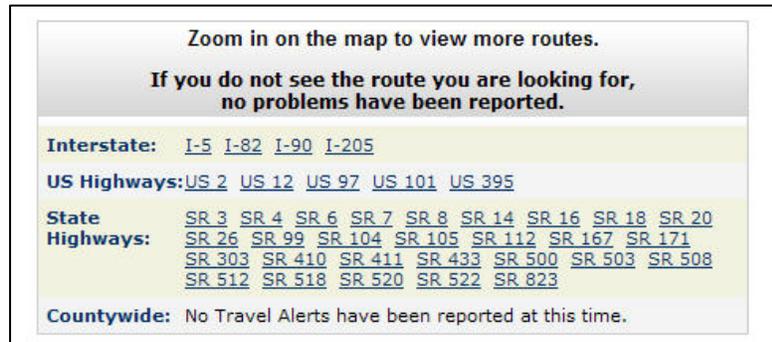


Figure 16: Statewide Alerts route list

on the Statewide Cameras page. Both

lists only pertain to their type of data. The Traffic Alerts page only lists routes that currently

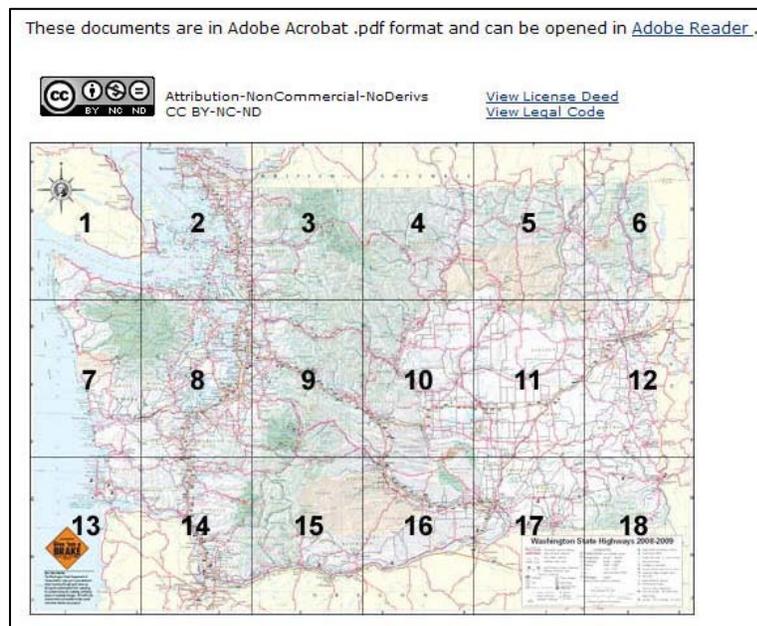


Figure 17: State Highway Map

have alerts associated with them.

The route list on the Cameras page is more extensive and static, but still only includes routes that have cameras installed.

In task 8, we asked participants to find a route that they had never heard of before. Participants were unable to find a page on the website that listed all state routes, even though that's what most of them expected. Half of the participants, (3 control, 3 test), found the route list on the

Statewide Cameras page. The

other half were only able to find the route list on the Statewide Alerts page, (which did not include the route in question), and the State Highway Map, (see figure 17), which proved very unhelpful. Participants tried to search through the Highway Map or a flow map to find the route visually and at random, but none were successful.



OK it's not on here [Travel Alerts page]. State Route 291? Hmmm.

Well that didn't help me. Oh I thought I was so smart!! (T4)



According to the breadcrumbs, there looks to be two top level sections that are not included in the main navigation; Ferries and Regions. There is currently no indication on the homepage that these main sections exist and no consistent way to navigate to them. The Local Information map in the footer seems to be the only way to get to the Regions section of the site. With no consistent representation in the main navigation, these sections of the site become orphaned and difficult to find.

 **For some reason, I don't know why, but getting to the Ferries home...it just doesn't come up quickly for me. I don't know why. Every time I open up the Website, for some reason, to find the ferry button is not easy, I don't know why. I would think that ferries would be right up there at the top. (T5)** 

Recommendation(s):

- Combine all traffic-related information, (i.e., cameras, alerts, and flow maps), for each location or geographic area to help users get all the information that is available.
- Provide a list of all routes in the state. Offer any available information about the route, including camera images and current traffic. If there is no flow map, camera, or alert associated with the route, at least provide information, possibly a visual map, of where the road is located.
- Represent every top level section of the website in the main navigation and breadcrumbs.

Content and Layout

Based on the Desirability Exercise, participants felt that the content on the website was accurate, convenient, current, and informative. However, they also commented that the website layout is busy, cluttered, and sometimes confusing. Participants cited too much information on the sides of each page and little consistency as their reasons.

When we asked users to find current traffic data, a few commented that they were looking for “real time” data. Participants gave positive comments anytime they found “real time” data, especially on the VesselWatch page.

 **You can do that?! Cool!** 
(T13)

Participants commented that the border crossing times are helpful. Many also mentioned the Travel Time Reader Boards on the highway and commented that they were helpful.

In task 7, we asked participants how much longer it would currently take to drive from Bellevue to Seattle over the 520 Bridge instead of the I-90 Bridge. Eight participants were able to successfully find the Travel Times chart. However, reading the chart proved time-consuming and difficult. The primary issue was the page layout. The chart's column headers disappear when users scroll down the page to find their route. The road icons in the first column are not helpful in finding the route and make it more difficult to read. After users find their route, they

have to scroll back up the page to read the column headers and they lose their route again. Task 7 even allowed participants to see the Bellevue to Seattle routes and the column headers at the same time, (see figure 18), yet participants still got lost in the chart while scrolling up and down.

The chart legend is also difficult to find because it is located below the chart, requiring more up and down scrolling. Also, the legend is not identified as a legend, but is instead preceded by the bold title, "What do the colors on the numbers mean?" The colors are defined slightly differently than on the flow maps; particularly the use of blue was not familiar to users.

A few participants commented that the traffic information, especially travel times, that they look up on the website is out of date by the time they get to the location on the road. They cited issues with using the WSDOT mobile application because they can't use it while driving. One participant even commented that the flow data on the mobile app is different from the data on the website.



Figure 18: Top and bottom of Travel Times chart

participant even commented that the flow data on the mobile app is different from the data on the website.

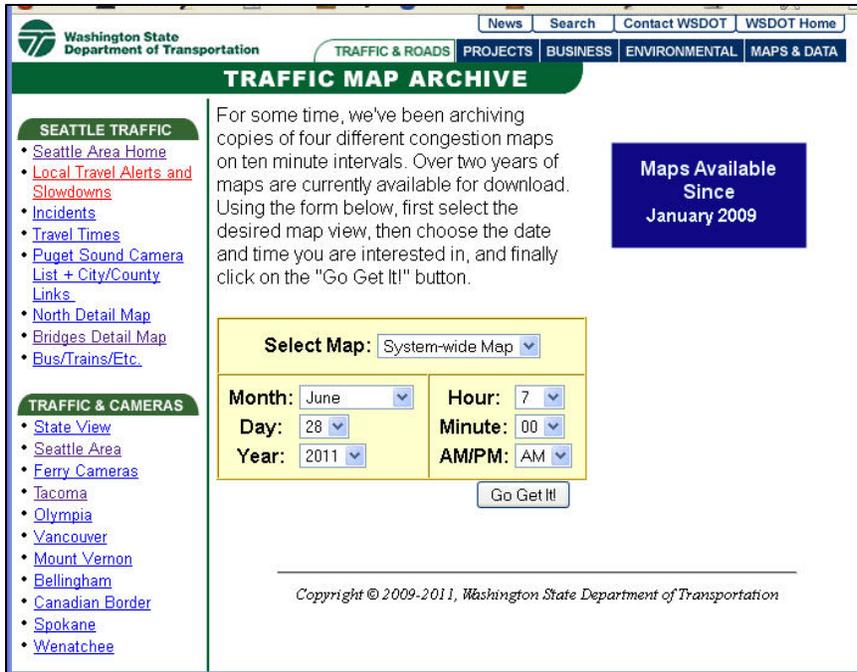


Figure 19: Traffic Map Archive page

To get a better idea of current travel times, two participants went to the Traffic Map Archives, (see figure 18), to look up historic travel times along their route. This type of use was unintended by WSDOT, who suspected inquiries into the map archives to be more specific to what actually happened in the past, rather than predicting the future. Though these participants reported using the archives often to get

an idea of how the traffic will be at a similar time and day in the future, they commented that they still have difficulty finding the archives and that the page is still in the old website layout.



Finding travel archives is definitely annoying, and it shows an older version of the website which kind of yells lack of consistency. (C12)



Using all means to find traffic information
(Video clip)

One participant clicked on the *Best Time to Leave* link when looking for Travel Times. Though hard to find, this page provided more of the type of functionality for which many of the participants were looking, allowing participants to enter their route and time constraints to determine the best time to leave, (see figure 20).

Best Time To Leave

Where are you starting from?

Where are you going?

What time do you need to get there? :

Figure 20: Best Time to Leave page

Recommendation(s):

- Consistently indicate to users when data is “real time.” Provide a consistent way to get to real time data by geographic location.
- Combine the various trip planning tools, (i.e., Travel Times, Wait times, Map Archives, and Best Time to Leave), into one area.
- Allow users to sort or filter the Travel Times chart. Replace the road icons with text that is formatted so it is easy to skim over. Do not allow column headers to disappear as the user scrolls down the chart.

Maps

Maps on the WSDOT website provide the most information and are the single most value-added elements. We have previously discussed the need for a geographic sense of place, particularly on maps, so users are better able to locate their route and identify traffic information that will affect them. Also important in helping users get the most out of the maps is making sure that they are styled and behave consistently.

A few participants used the arrows and buttons along the edges of the maps to navigate directionally to the next area’s map. Moving south and north from Seattle, participants noticed and commented when areas of the state were skipped over and not represented with a map; Nisqually, for example. Navigating between maps looks and acts differently depending on the map, (see figure 21).

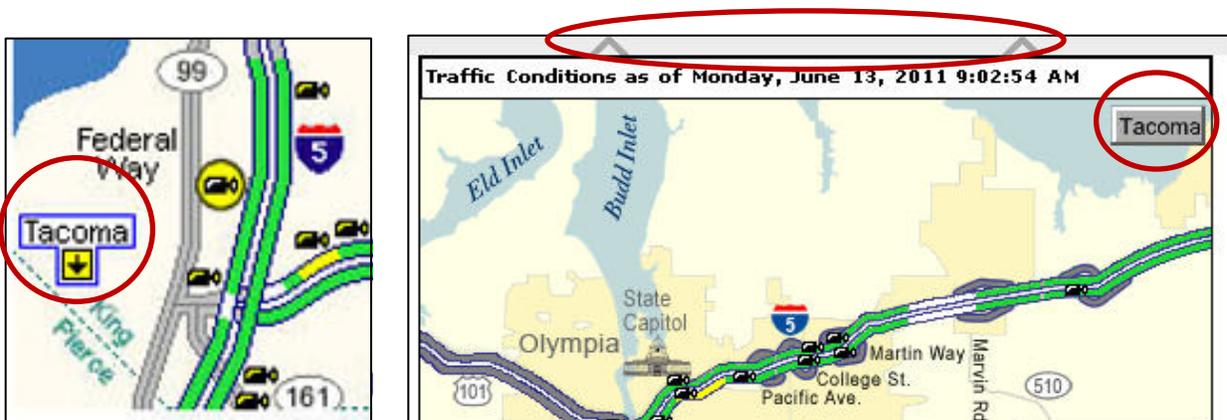


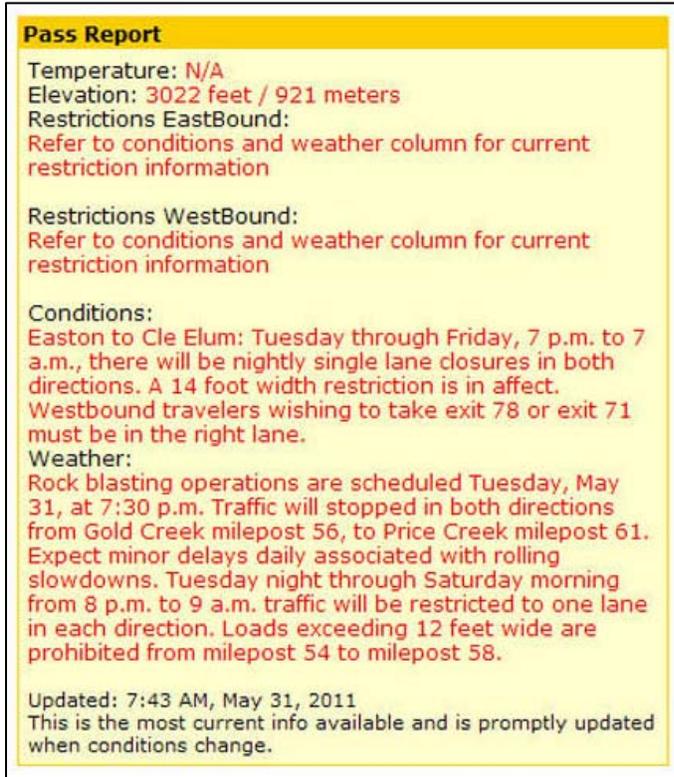
Figure 21: Seattle flow map vs. Olympia flow map

For example, from the Seattle flow map (left), users can click on the button that says Tacoma and has a yellow arrow underneath it, to see the Tacoma flow map. However, from the Olympia flow map (right), users can click either the gray Tacoma button (with no arrow) or the bar at the top of the map with two arrows pointing north to see the Tacoma flow map. None of these options are styled the same, yet they all do the same thing.

Navigating between maps gets even more confusing for users when buttons, styled like the gray Tacoma button above, take them to external websites; the *Issaquah* button on the Seattle flow map, clicked by a control participant, and the *Southbound Wait Times* button on the Canadian Border map, clicked by two control group participants.

Throughout the session, it became clear that the colors used on the flow maps have become familiar for users and set the tone for the colors used on the rest of the website. Four participants commented that the boats on the VesselWatch map must be on time because they are green and that any route in the chart below the map that is delayed will turn red. However, the boats on the map are always green, unless they are currently at the dock, and delayed boats are not indicated in the chart by any color.

We asked participants who saw the Snoqualmie Pass Report, (see figure 22), why they thought the text was red. Eight out of the 10 participants said that it was a warning of some kind or an



alert out of the ordinary. They all felt that the website was trying to get their attention by making the text red. This is consistent with other elements of the website that are styled red. However, the text color on the Pass Reports never actually changes, so has no intention of conveying longer than average delays.

Figure 22: Snoqualmie Pass Report

Colors are also used on travel alerts maps to help users identify the type of alert. However, the color scheme and definitions do not match those in use on the flow maps, (see figure 23).

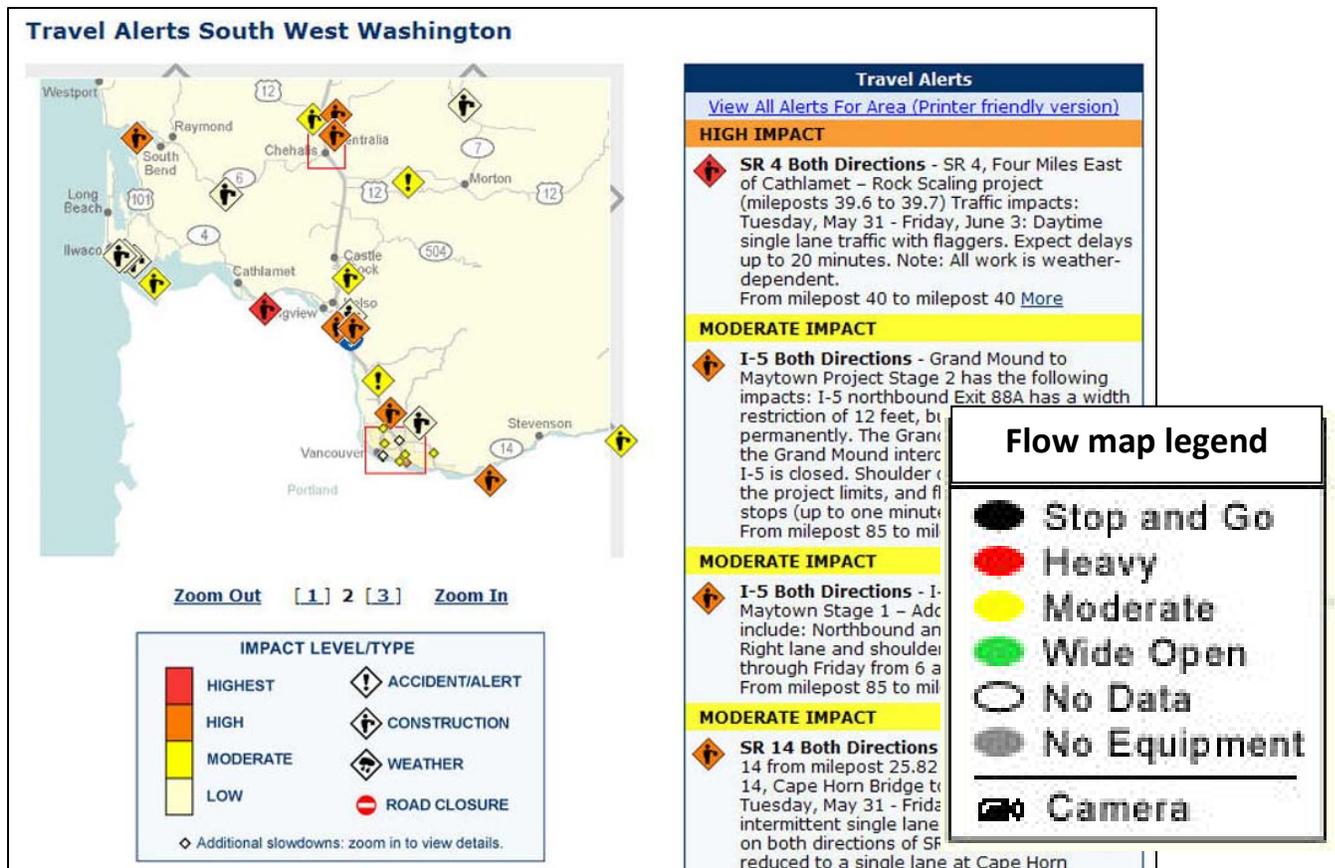


Figure 23: Travel Alerts colors vs. flow map colors

Rather than matching the green to black color scheme already in use on the flow maps, the travel alerts are colored light yellow to red, with the addition of orange. Complicating matters, the High Impact header is orange while the alert icon associated with it is red. It is unclear whether this is a high impact or the highest impact. Similarly, the moderate impact header is yellow while the icon is orange.

A final inconsistency with the maps on the website that causes usability issues across the board is the placement and treatment of map legends. Perhaps most importantly, legends are not consistently placed where users can see them while looking at the map. For example, the VesselWatch legend is located in the middle of the left navigation menu, while the Ferries Schedule legend is located on the bottom of the right column. Participants had difficulty finding both legends and their ability to successfully complete the tasks was impacted. Conversely, legends on the flow maps were much easier for participants to find, generally located in the top corner of the map itself.

Recommendation(s):

- Provide clear, consistent directional links between maps/geographic areas.
- Style map elements consistently based on their behavior; a button to another WSDOT map should not look the same as a button to an external website. Use consistent styles to set up appropriate user expectations.
- Use a consistent color scheme throughout the website, modeled after the colors currently used on the flow maps. Be aware that green text and icons on the website will indicate to users that there is little impact or that things are on schedule. Red text and icons will indicate that there are delays, high impacts, or warnings.
- Place map legends where they are visible while looking at the map.

Appendices

Appendix A: Participants

Control Group

	C1	C6	C9	C10	C11	C12
Gender	Male	Male	Female	Female	Male	Male
Age	55-64	65 +	35-44	55-64	45-54	18-34
Education	Master's	Master's	Some college	Bachelor's	High school	Some college
Occupation	Budget Mgr	Retired	Test Coordinator/QA	Adm. Assistant	Foreman	I.T. Mgmt
Commuter	Yes	No	Yes	Yes	Yes	Yes
City of residence	Lacey	Seattle	Olympia	Yelm	Yelm	Tacoma
City of employment	Tacoma	Seattle	Seattle	Olympia/ Tumwater	Alaska	Redmond, Lacey
Average, one-way commute	26-50 miles	N/A	50 miles+	26-50 miles	50 miles+	26-50 miles
Commute method	Vanpool	N/A	Personal vehicle	Personal vehicle	Bus	Personal vehicle
WSDOT web usage frequency	Almost every day	> 1 time per day	1-2 times per week	Almost every day	Almost every day	> 1 time per day
Traffic	X		X	X		X
Cameras	X	X	X	X	X	X
Weather	X	X		X		
Alerts	X	X	X	X		X
Ferries		X				
Mt passes	X	X	X		X	X
News	X	X			X	
Social media usage		Facebook, Email updates		Blogger	Flickr, Email updates	Twitter, Flickr
Mobile usage	Cell phone		Smart phone			Android

Test Group

	T2	T3	T4	T5	T7	T8	T13
Gender	Male	Male	Female	Male	Male	Female	Female
Age	35-44	55-64	65 or older	65 or older	18-34	55-64	45-54
Education	Bachelor's degree	Bachelor's degree	Bachelor's degree	Some college	High school	Master's degree	Bachelor's degree
Occupation	Search/Analytics Specialist	Transportation Engineer	Retired	Non-Profit Regional Officer & Community Events Organizer	Customer Service	Transportation Planner	Data Analyst
Commuter	Yes	No	No	Yes	Yes	Yes	Yes
City of residence	Fife	Tumwater	Olympia	Bothell	Shelton	Kalama	Federal Way
City of employment	Seattle	Lacey,		Bothell, Seattle, Bellevue, Auburn, etc.	Olympia	Kelso	Olympia
Average, one-way commute	26-50 miles			10-25 miles	26-50 miles	10-25 miles	26-50 miles
Commute method	Light Rail	Personal vehicle		Personal vehicle, Ferry	Personal vehicle	Personal vehicle	Carpool
WSDOT web usage frequency	Almost every day	1-2 times per week	Almost never	1-2 times per week	Almost every day	Almost every day	Almost every day
Traffic	X	X	X	X	X	X	X
Cameras		X		X	X	X	X
Weather							X
Alerts	X	X		X	X		X
Ferries				X	X		
Mt passes			X	X		X	
News	X						
Social media usage	Flickr, Blogger, YouTube, Facebook, Email updates				Twitter, Flickr, YouTube		Email updates
Mobile usage	iPhone				Samsung		

Appendix B: Pre-Study Questionnaire

- How often do you visit the WSDOT website?
 - Never
 - 1-2 times per year
 - 1-2 times per month
 - 1-2 times per week
 - Almost every day
 - More than 1 time per day
- Why do you typically visit the WSDOT website? *(check all that apply)*
 - Check traffic
 - Check weather
 - Check for travel alerts or road conditions
 - See ferry schedules or make ferry reservations
 - Get mountain pass conditions
 - Find Good to Go! Electronic tolling information
 - Find transportation news
 - Other (please specify)
- Please rate your opinion about the following statements:

	Strongly Disagree					Strongly Agree
The information on WSDOT's website is always up-to-date.	0	1	2	3	4	5
The information on WSDOT's website is always accurate.	0	1	2	3	4	5
I trust that WSDOT uses taxpayer dollars efficiently.	0	1	2	3	4	5
WSDOT is accountable and admits when they've made a mistake.	0	1	2	3	4	5
WSDOT is innovative.	0	1	2	3	4	5
WSDOT delivers projects on time and on budget.	0	1	2	3	4	5

Appendix C: Tasks

Task 1: Seattle Area Traffic

You are departing from SeaTac Airport on a flight in a few hours.

Use the website to find out if there is anything that may delay your drive from north Seattle to the airport.

Answer: current info from either Travel Alerts page and/or Seattle Traffic page

Pathway(s):

- Seattle Traffic (Traveler Information)
- Traffic & Cameras > Seattle Area
- Travel Alerts

Issues/Requirements:

- Can users read and understand the traffic maps?
- What terms do users use for traffic?
- Which path (Travel Alerts, Seattle Traffic, or both) will users take?
- Is the information provided on the Travel Alerts and Seattle Traffic pages consistent?

Task 2: Ferries Schedule Information

You need to take the ferry from Seattle to Bainbridge Island in the evening on Thursday, June 23rd for a dinner party that starts at 6:00 pm.

Find out which ferry you should take to get there in time.

Answer: Leave Seattle at 4:40pm (cannot take the 5:30 ferry because it takes 35 minutes to cross)

Pathway(s):

- Ferries Home (Ferries) > Current Schedule > Seattle/Bainbridge Island (Spring 2011)

Issues/Requirements:

- Can users find and understand the ferries schedule?
- Do users realize that they need to look at the summer schedule, not the current spring schedule?

Task 3: Travel Alerts

You are driving from Olympia to Portland today.

Find out if there are any travel delays along the way.

Answer: current info from the Travel Alerts page

Pathway(s):

- Travel Alerts
- Traffic & Cameras > Statewide (Travel Alerts) > Southwest Washington box on the map

Issues/Requirements:

- Can users read and understand the travel alerts map?
- Do the icons make sense?
- Do the alerts make sense? Do they contain too much jargon?

Task 4: Tacoma Area Traffic

You are driving from Tacoma to Gig Harbor for a sail boat race. You are going to use the Tacoma Narrows Bridge (SR 16).

Will you hit any traffic along the way?

Answer: current info from the Tacoma Traffic page

Pathway(s):

- Traffic & Cameras > Tacoma

Issues/Requirements:

- Can users read and understand the traffic map?
- Do they understand that the gray over the bridge means there is no equipment there? Can they still tell what traffic is like on the bridge?
- Is the flash ad more distracting than other ads?

Task 5: Snoqualmie Pass Conditions

You are planning to travel from Seattle to Spokane on I-90 using Snoqualmie Pass tomorrow. Even though it's not wintertime, you know that there are reasons other than snow that can delay your trip over Snoqualmie pass.

Find out if you are likely to encounter delays traveling over the pass tomorrow.

Answer: current information from the Snoqualmie Pass page

Pathway(s):

- Mountain Passes (Traveler Information) > Snoqualmie Pass
- Traffic & Cameras > Snoqualmie (Mountain Passes)

Issues/Requirements:

- Is the red text in the pass report distracting/necessary/helpful?
- Can users see/find other pass cameras easily?

Task 6: Seattle Area Flow map Bridges

You live in Bellevue and are about to leave to take your family to today's Mariner's game. Before you leave, you decide to check the WSDOT website to make sure that I-90 is the best way to get there.

Use the website to find details about road conditions on the I-90 Bridge from Bellevue to Seattle.

Answer: current information from Seattle Traffic or Bridges page(s)

Pathway(s):

- Traffic & Cameras > Seattle Area
- Traffic & Cameras > Seattle Area > Bridges

Issues/Requirements:

- Do users find/need the detail map for bridges or do they just use the Seattle Area map?

Task 7: Seattle Area Travel Times

How much quicker can you and your family get to Seattle by taking the I-90 Bridge, as opposed to the 520 Bridge?

Answer: number of minutes difference from the Seattle Travel Times page

Pathway(s):

- Traffic & Cameras > Seattle Area > Travel Times

Issues/Requirements:

- Is the table easy to read?
- Do users reference the HOV column?

- Do users click on each route from the table to get more information?

Task 8: Washington State Traffic Cameras

Find out what the conditions currently look like on State Route 291 at Swenson Road.

Answer: View the SR291 & Swenson Road traffic camera

Pathway(s):

- Traffic & Cameras > State View OR Statewide Cameras (Cameras) > SR 291 (State Highways) SR 291 & Swenson Road

Issues/Requirements:

- Can users find the Statewide Route Description and Camera List page?
- Can users find a specific route on this page?
- Do they notice or comment on the ads along the right side of this page?

Task 9: VesselWatch

It is the day of the dinner party. You are almost ready to take the ferry from Seattle to Bainbridge Island.

Find out if the ferry that is on its way to pick you up in Seattle left Bainbridge Island on time.

Answer: Identify the boat currently on its way to Seattle and if it left Bainbridge Island as scheduled

Pathway(s):

- Ferries Home > VesselWatch > Seattle/Bainbridge
- Traffic & Cameras > VesselWatch

Issues/Requirements:

- Do users notice the ad across the top of the page/map?
- Can users read and understand the map?
- Do users zoom in to the Seattle/Bainbridge route map?

Task 10: Canadian Border Traffic

It is 5:00 on a Friday evening, and you and a friend have just left for a summer weekend getaway to Vancouver, B.C. It will take you 2 hours to get to the border on I-5.

About how long will you likely have to wait in line to get across the border?

Answer: about 15-18 minutes

Pathway(s):

- Traffic & Cameras > Canadian Border >
- Average border delay graphs (Traveler Notice)
- Average travel delays (More border information)

Issues/Requirements:

- Can users read and understand the map?

Appendix D: Desirability Exercise

Immediately after completing all 10 tasks, the facilitator gave each participant a list of 50 adjectives (60% positive, 40% negative), and asked them to check every word in the list that they felt described the website they just used. Participants then narrowed down the list to their top 5 adjectives. Those 50 adjectives are:

- | | | |
|-----------------------|------------------|-----------------------|
| 1. Accessible | 18. Difficult | 35. Organized |
| 2. Accountable | 19. Distracting | 36. Outdated |
| 3. Accurate | 20. Easy to use | 37. Overwhelming |
| 4. Annoying | 21. Effective | 38. Professional |
| 5. Approachable | 22. Efficient | 39. Reliable |
| 6. Appropriate | 23. Familiar | 40. Safe |
| 7. Bureaucratic | 24. Friendly | 41. Solution-Oriented |
| 8. Busy | 25. Frustrating | 42. Supportive |
| 9. Clean | 26. Hard to Use | 43. Thorough |
| 10. Cluttered | 27. Illogical | 44. Time-consuming |
| 11. Confusing | 28. Inconsistent | 45. Time-saving |
| 12. Consistent | 29. Ineffective | 46. Trustworthy |
| 13. Convenient | 30. Informative | 47. Understandable |
| 14. Counter-intuitive | 31. Innovative | 48. Unorganized |
| 15. Credible | 32. Logical | 49. Valuable |
| 16. Current | 33. Misleading | 50. Wasteful |
| 17. Customer-Focused | 34. Ordinary | |

Note: The word lists were printed without numbers and the order was randomized for each participant.

Appendix E: Verbal Interview

1. Based on your experience using this website today, what are your general impressions?
2. Was there any aspect of the site that you found frustrating to use?
3. Was there any aspect of the site that you liked in particular?
4. How do you feel about the design of the site?
5. Did you notice advertisements on the website? If yes, were they disruptive? Did you read them?
6. Do you generally read advertisements on websites? Do you ever click on them to find out more information?
7. If WSDOT advertised a product on their website, what type of impact would it have on your opinion of the product? (Positive, Negative, None) What type of impact would it have on your opinion of WSDOT?
8. What is the difference between a .gov and a .com URL? Do you know or care if you are on a .gov vs. a .com URL? Would you want to be notified every time you leave the .gov domain?

Appendix F: System Usability Scale (SUS) Survey

The System Usability Scale survey was given as the post-study questionnaire and asked the following rating questions:

	Strongly Disagree			Strongly Agree	
1. I think that I would like to use this Web site frequently	1	2	3	4	5
2. I found this Web site unnecessarily complex	1	2	3	4	5
3. I thought this Web site was easy to use	1	2	3	4	5
4. I think that I would need the support of a technical person to use this Web site	1	2	3	4	5
5. I found the various functions in this Web site were well integrated	1	2	3	4	5
6. I thought there was too much inconsistency in this Web site	1	2	3	4	5
7. I would imagine that most people would learn to use this Web site very quickly	1	2	3	4	5
8. I found this Web site very cumbersome to use	1	2	3	4	5
9. I felt very confident using this Web site	1	2	3	4	5
10. I needed to learn a lot of things before I could get going with this Web site	1	2	3	4	5

The SUS survey is used to calculate a single number measuring the overall usability of the system, or website. The score is a ranking from 0-100, 100 being highly usable. To calculate the SUS, first determine the value for each item. Each item's value ranges from 0 to 4. For all odd items (1,3,5,7,9), take the scale position minus 1. For all even items (2,4,6,8,10), take the scale position minus 5. Multiply the sum of the scores by 2.5 to obtain the SUS.