Washington State Department of Transportation

UW MS HCDE 517b | Usability Research for WSDOT | March 2025

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→ **Overview**

Methods & Procedures

Findings

Recommendations

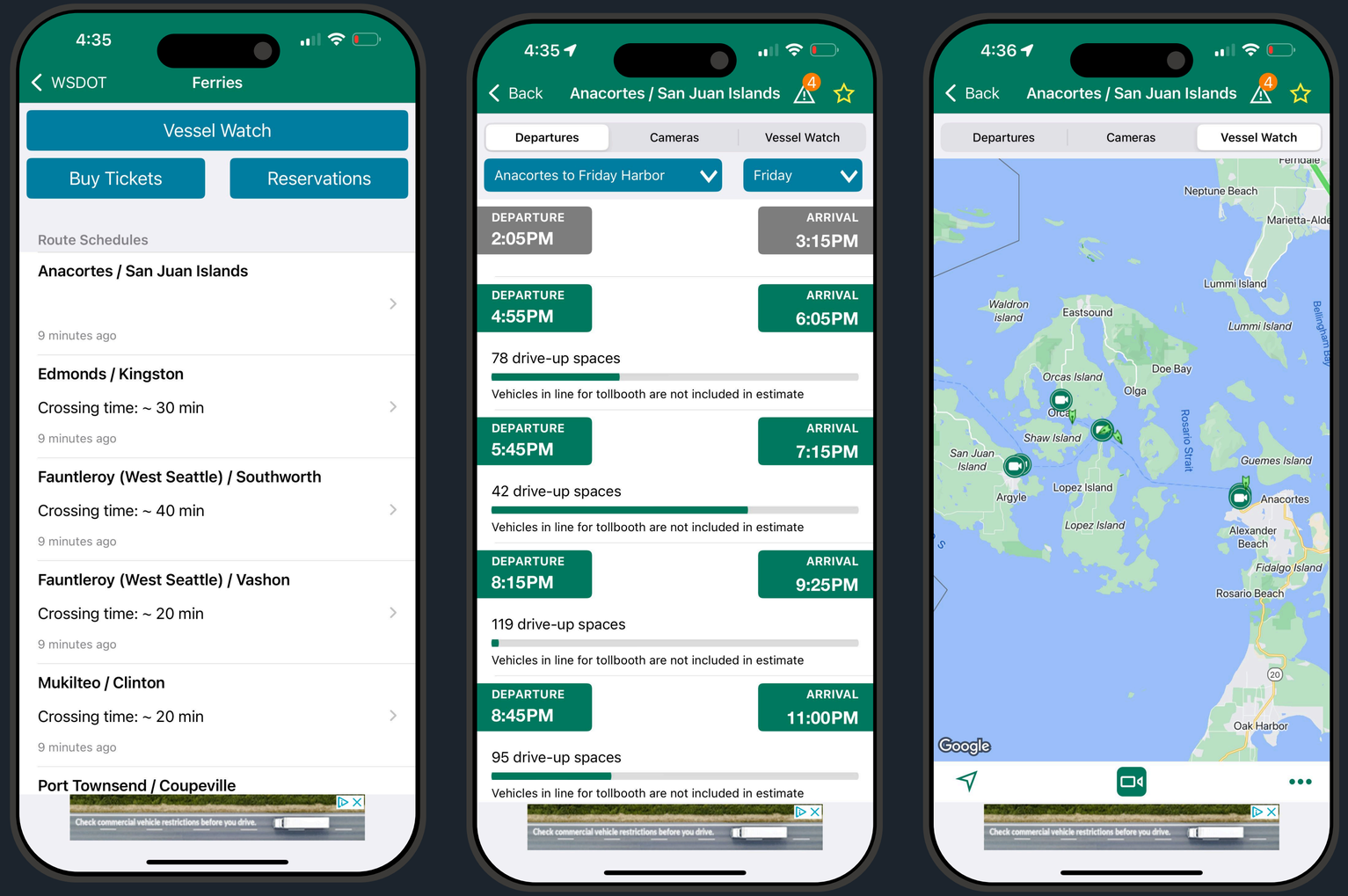
Study Reflection

CLIENT OVERVIEW

Meet WSDOT

Established in 1905, the **Washington State Department of Transportation** (WSDOT) is a governmental agency responsible for constructing, maintaining, and regulating Washington's transportation infrastructure, including state highways, ferries, and airports.





PRODUCT TESTED

WSDOT iOS App

The WSDOT iOS mobile app provides travel information, including traffic maps, mountain pass conditions, border waits, and more. Our testing focused specifically on the app's **ferry feature**, which offers ferry schedules, alerts, and real-time ferry locations.

TARGET AUDIENCE

Ferry Traveler Groups



Daily Commuters



Frequent Voyagers



First-Timers



Occasional Explorers

STUDY OVERVIEW

Purpose & Goals

This research evaluated the Ferries feature, focusing on its effectiveness, efficiency, and overall user experience.

As the first formal usability testing conducted for the iOS mobile app, the study aimed to assess how users interact with features through tasks related to planning trips, checking schedules, and booking tickets.



Evaluate Task Efficiency



Identify Usability Barriers



Assess User Satisfaction



Test Navigation Clarity



Provide Actionable Insights

STUDY OVERVIEW

Research Questions

1. Can users effectively access real-time ferry schedules and crowd levels for their desired route?

2. How intuitive is the app's interface for new users versus frequent ferry users?

3. What are users' usability pain points and confusions when navigating through the Ferries section?

4. Are there any features that users expected to see but do not currently find in the app?





Overview

→ **Methods & Procedures**

Findings

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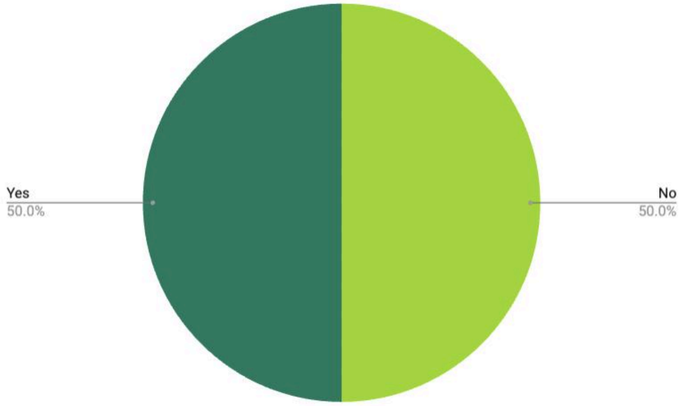
Study Reflection

PARTICIPANT PROFILES

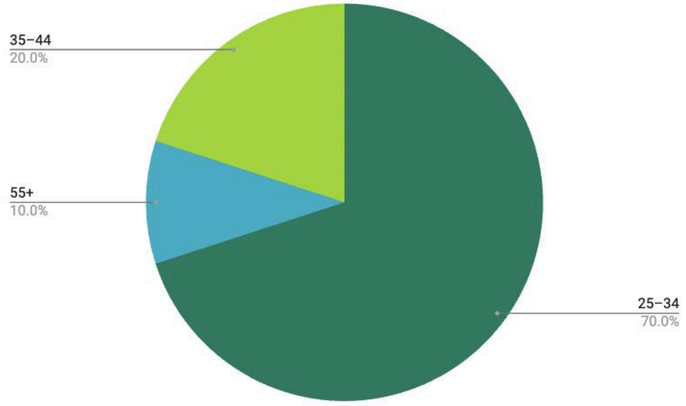
Who We Tested

We tested **10 remote participants**, including frequent ferry travelers, daily commuters, and first-time users of the app. Participants were recruited through an interest form posted to WSDOT social media channels and HCDE slack channel.

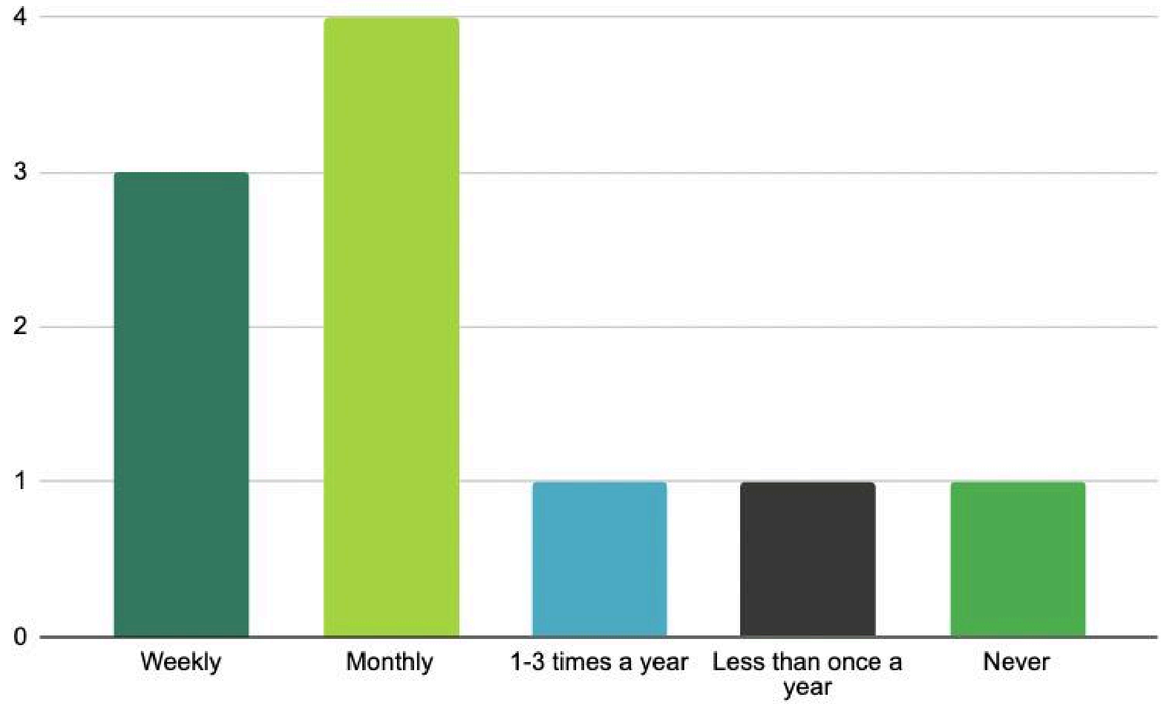
Prior WSDOT App Experience



Age Group



Ferry Use Frequency



METHODS & PROCEDURES

Testing Environment

Remote Usability Testing

We conducted remote sessions via Zoom, where participants shared their phone screens for real time observation of app navigation.

Moderated Sessions

A moderator prompted participants to clarify their actions and thoughts, probing further to uncover the reasons behind observed behaviors.

Real World Scenarios

Participants completed tasks within the WSDOT app's ferry feature, mirroring typical user scenarios.

Think-Aloud Protocol

Participants were encouraged to verbalize their thoughts while performing tasks, capturing their immediate reactions and decision-making processes.

Post-Test Questionnaire

After task completion, participants answered a questionnaire focused on their overall user experience with the ferries section and any additional thoughts.

Task List

SCENARIO 1

- Task 1.1 **Check vehicle space availability** on ferry for the route Anacortes to San Juan Islands
- Task 1.2 **Check schedule of the next ferry** that is arriving **after missing the intended one** from Anacortes to San Juan Island

SCENARIO 2

- Task 2: **Check Ferry Schedules** from Friday Harbor to Shaw Island

SCENARIO 3

- Task 3.1: **Find estimated arrival time** from Bainbridge to Seattle of your family member.
- Task 3.2: Check ferry **schedule for a week from today** for Bainbridge to Seattle

Task List

SCENARIO 3 cont.

- Task 3.3: **Add** a ferry route to **"Favorites"** (Bainbridge to Seattle).
- Task 3.4: Check relevant **alerts/notifications** from Seattle to Bainbridge.

SCENARIO 4

- Task 4.1: **Explore Vessel Watch** page and identify useful information. (Port Townsend to Coupeville)
- Task 4.2: **Book a ferry ticket** (Port Townsend to Coupeville) for multiple passengers.

Post- task Questionnaire

1: Which **task** did you find the **most difficult to complete**, and why?

2: **How intuitive was the navigation** within the ferry section of the app on the scale of 1-5?

3: What **improvement in the app** would make planning your ferry trips easier?

4: Would you use this app in real-world scenarios? (Yes/No/Maybe) - Why?

5: You mentioned you had experience with other ferry apps, how does the WSDOT app compare with them?

METHODS & PROCEDURES

Data Collection

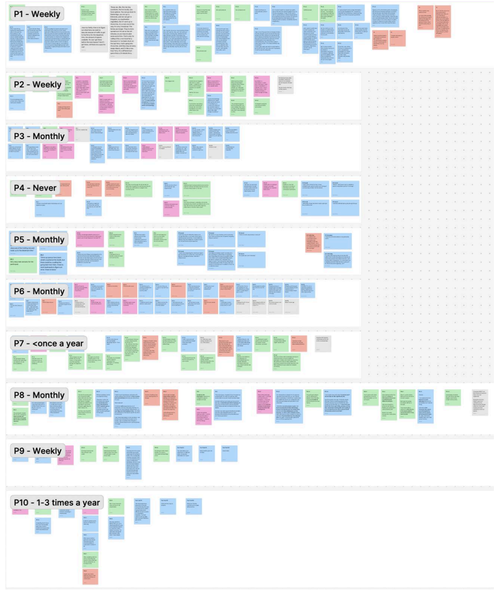
Due to our small sample (n=10), we emphasized qualitative data: screenshots, participant quotes, and observed behaviors.

While we tracked task metrics, they weren't statistically analyzed. We used affinity mapping to group emergent themes across majority participants.

Session Note-taking Template

Task #	Task	Time on Task (seconds)	Task Completion (Y/N)	Errors	Behavior Observations	Quotes	Navigation Path	Feature Expectations
1.1	Let's say you are taking your car on the ferry from Anacortes to the San Juan Islands to reach work. But, you're unsure if there is enough space for your vehicle on the ferry. How would you check how crowded the ferry is?							
1.2	On your drive over to the Anacortes port, the traffic is really bad. You realize you will miss the ferry you initially intended to take. How will you go about checking when the next ferry will arrive?							
2	Let's say you are traveling today from Friday Harbor to Shaw Island. How will you go about checking the ferry schedules?							
3.1	One of your family members recently moved to Bainbridge Island. You live in Seattle, and they're on a ferry that either just departed or will be departing soon from Bainbridge. How would you check their estimated arrival time in Seattle?							

Participant Notes



Group Affinity Mapping





Overview

Methods & Procedures

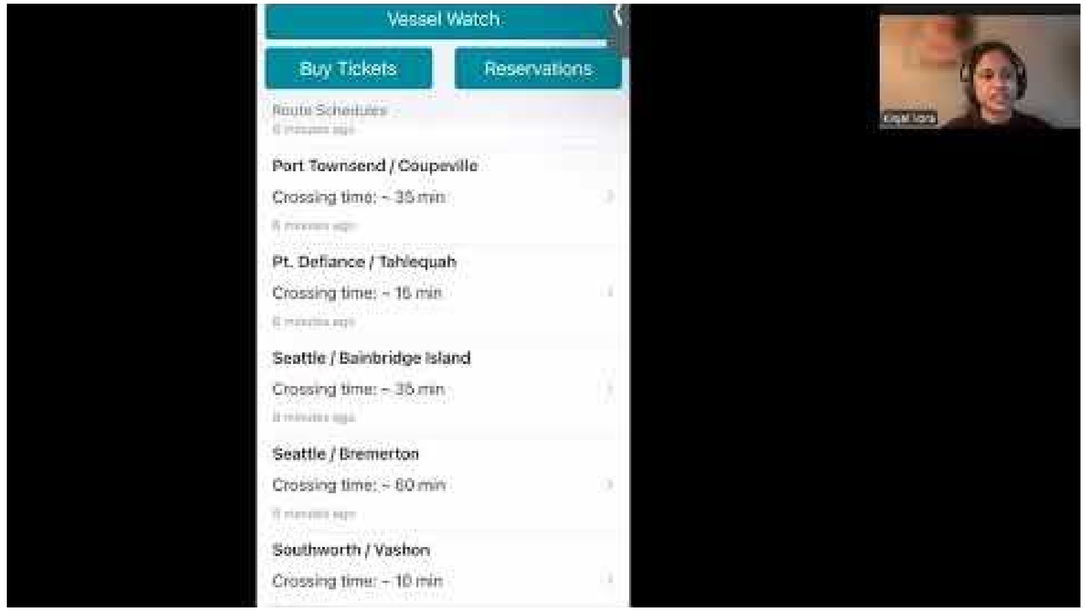
→ **Findings**

Recommendations

Study Reflection

Overall, Participants Express High Desirability and Ease of Use

It’s important to note that a lot of participant feedback was positive, especially in answers to our post-task questions. Many of our participants reported the app was fairly easy to use, and new users said they would be interested in using it in the future.



“That was pretty intuitive. It's straightforward” (P2)

“The ferries section was pretty good... [Vessel Watch] is updating pretty frequently” (P3)

“It’s a great app I use it everyday” (P5)

"I’ve been using since it was made" (P5)

“Pretty intuitive, easy to navigate” (P10)

FINDINGS - **HIGH SEVERITY**

Participants Struggle to Navigate and Interpret Information Structure

Information on the app is spread out and nested in ways that some users found unintuitive, redundant, or tedious, including multi-stop routes and ETA information. On some tasks, participants had to backtrack across multiple pages to find what they were looking for.

*“Takes a little bit of **exploring**”* (P2)

*“This is, what, close to twenty-something connections, **all in one**”* (P3, on San Juan Islands’ dropdown connections)

Information felt *“**scattered**”. “It takes time to **hunt down** and view [information]”. “I wish there was like a **search** thing”* (P6)

*"My eyes are drawn to, **past the first gray** [departures] into the green”* (P6)

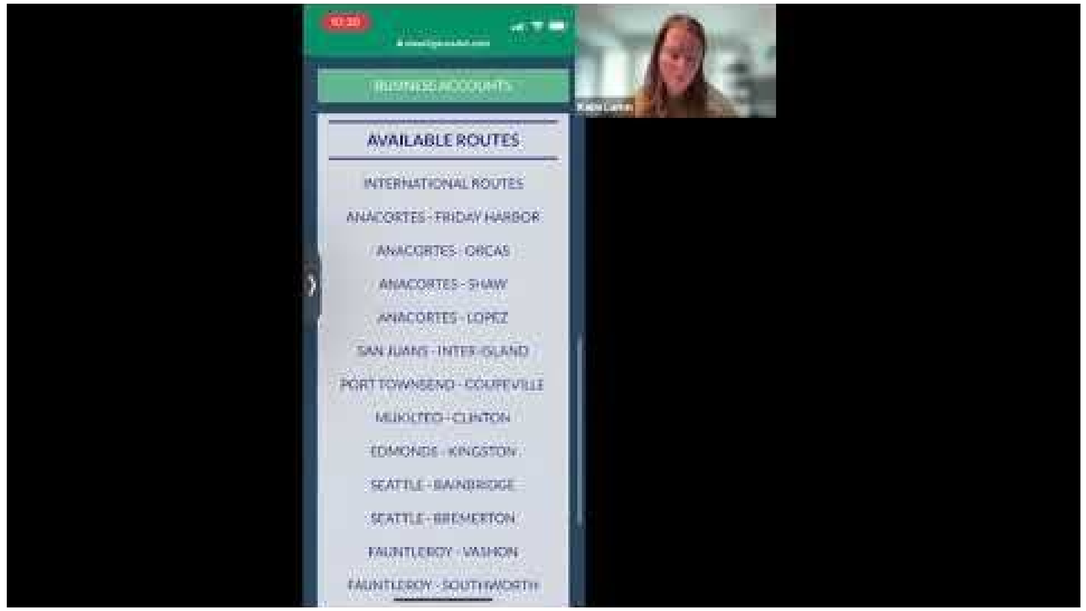
*“**Other routes show an ETA**, but Seattle/ Bainbridge doesn’t. That’s weird.”* (P7)

*“…just **a lot of clicks**.”* (P7)

FINDINGS - **HIGH SEVERITY**

Participants Misinterpreted Visual Elements and Their Affordances

Colors and icons suggested possible actions within the app that users thought they could perform, but couldn’t. Departure slots and times were sometimes mistaken as buttons, and Vessel Watch elements were too small to tap reliably, causing users to overlook it and miss out on details.



*“You **have to be pretty precise** with what you're clicking on”* (P2)

*“Thought that for some reason I'd be **able to click** on [a departure] to take me to [book]”* (P3)

*“I was not actually looking at the progress bar... **it blended in for me**... I thought it was the separator”* (P6)

*“When the boat is on top of where the camera is [in Vessel Watch]... it's **really hard to pick** one or the other”* (P6)

FINDINGS - **LOW SEVERITY**

Ambiguous Terminology Led to Interpretation and Planning Issues

Participants expressed confusion about terms like “Drive-Up Spaces” and the difference between Buying and Reserving tickets. Some also noted that tourists unfamiliar with the Puget Sound could have a hard time navigating the names of routes.

*“If I were a tourist **I would not know that**...I didn’t know that”* (P3 on San Juan dropdown)

*“I’ve had **visitors** get on the **wrong ferry often** because they think all the ferries go to the same place”* (P5)

*“If you're looking to drive on your vehicle, there's 53 more spots **available on the ferry**”* (P4)

P7 expressed confusion about the meaning of drive-on spaces vs. toll booth availability

“How many more cars or non-walk up passengers can ride the ferry?” (P8)

FINDINGS - **LOW SEVERITY**

Participants Desire Information Personalization and Prioritization

The location of information on the app also confused some users, primarily favorite routes and route alerts. Multiple users expected favorited routes to be prioritized over others, and for alerts to be specific to their selected route.

Multiple participants echoed an expectation that favorite routes would be “**at the top**” or “**first**” in departures (P1, P3, P4, P6, P7)

*“It would be kinda **not too intuitive** to be favoriting [Departing Bainbridge] and then it's always going to be Seattle first... especially in the morning, when you're waking up"* (P3)

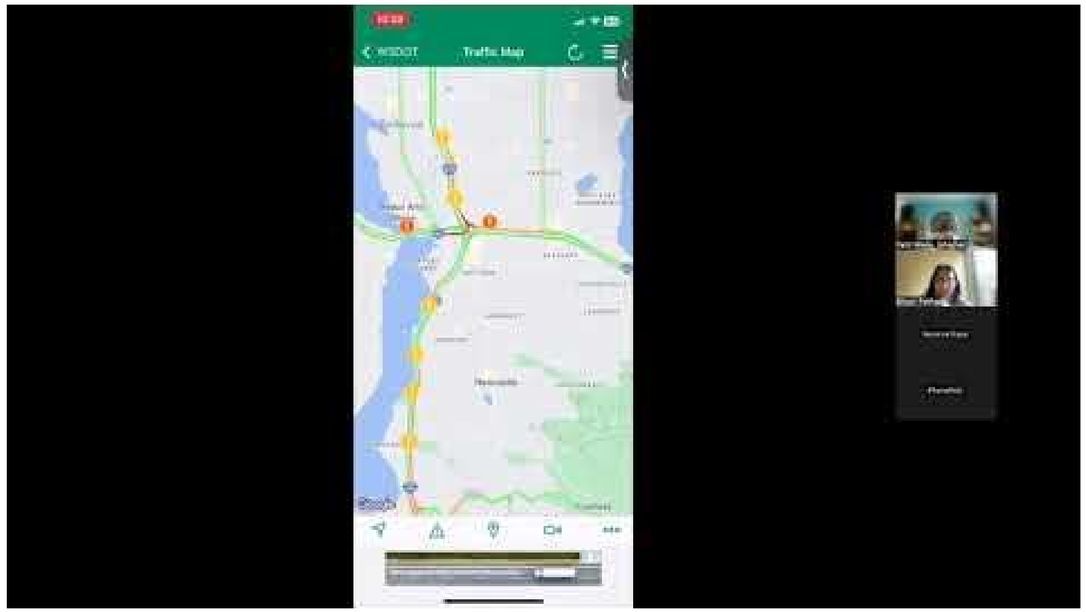
*“It's weird that you're showing me notifications for a route I'm **not currently under**"* (P6)

*“I tapped this part—the triangle alarm-like icon—on the Seattle/Bainbridge page **but it showed San Juan Island**”* (P7)

FINDINGS - **LOW SEVERITY**

Participants Often Resort to Alternative Platforms

Some users referenced external ferry-tracking platforms during their sessions, occasionally opening them mid-task. Their statements also clarified gaps in the WSDOT app that these other platforms filled such as having faster alert data or simpler interfaces.



*"In **Google Map**s... usually you can click on the routes... and it gives you an idea of where you can buy a ticket or where you can ride to that location"* (P3)

*"I go to **Bluesky** to check if there are any notifications because I find that social media is a lot faster for updating conditions than this app."* (P5)

"I can't tell what's going on...wish I could turn off construction unless it was actually impeding traffic. INRIX is a local traffic app" (P5 on Traffic Map)

*"My initial response, honestly, is to use the **Marine Tracker** app."* (P6)

*"I use the **Ferry Friend** app because the WSDOT app hasn't been updated in a while and there are too many clicks."* (P9)



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Study Reflection

Route Schedules

RECOMMENDATIONS - **HIGH IMPACT** / **LOW EFFORT**

1 Integrate a ‘Search’ bar or a dropdown for travel from ‘A’ to ‘B’

Pain Point: Users need to scroll through the entire route schedules page to find the routes. Additionally, users found it very difficult to locate the island ferry routes that are a part of the Anacortes/San Juan Islands main route.

Recommendation: Integrating a ‘Search’ bar or a dropdown to plan travel from ‘A’ to ‘B’ will help users locate the ferry destinations that are embedded in other routes

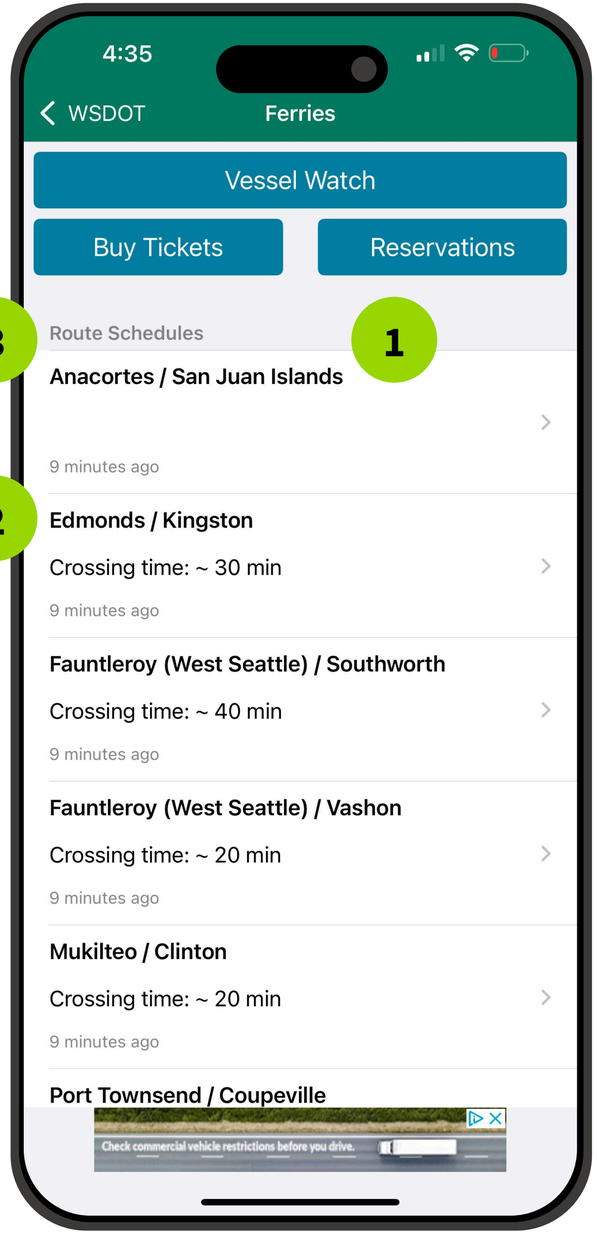
2 Modify UX copy to Point A <-> Point B

Recommendation: Replacing it with a two way arrow “<->” will eliminate user confusion.

3 Include an alert banner recommending users to reserve spots to get on their preferred sailing

Pain Point: Users mentioned trip planning as critical for longer and less frequent ferry routes

Recommendation: Including an alert banner will encourage users to reserve their spots



RECOMMENDATIONS - **HIGH IMPACT** / **HIGH EFFORT**

4 Sorting routes based on user's location from the port will reduce user error and lead to faster task completion

Pain Point: Users expected their experience to be synced to their location since they share their location permission access with the app.

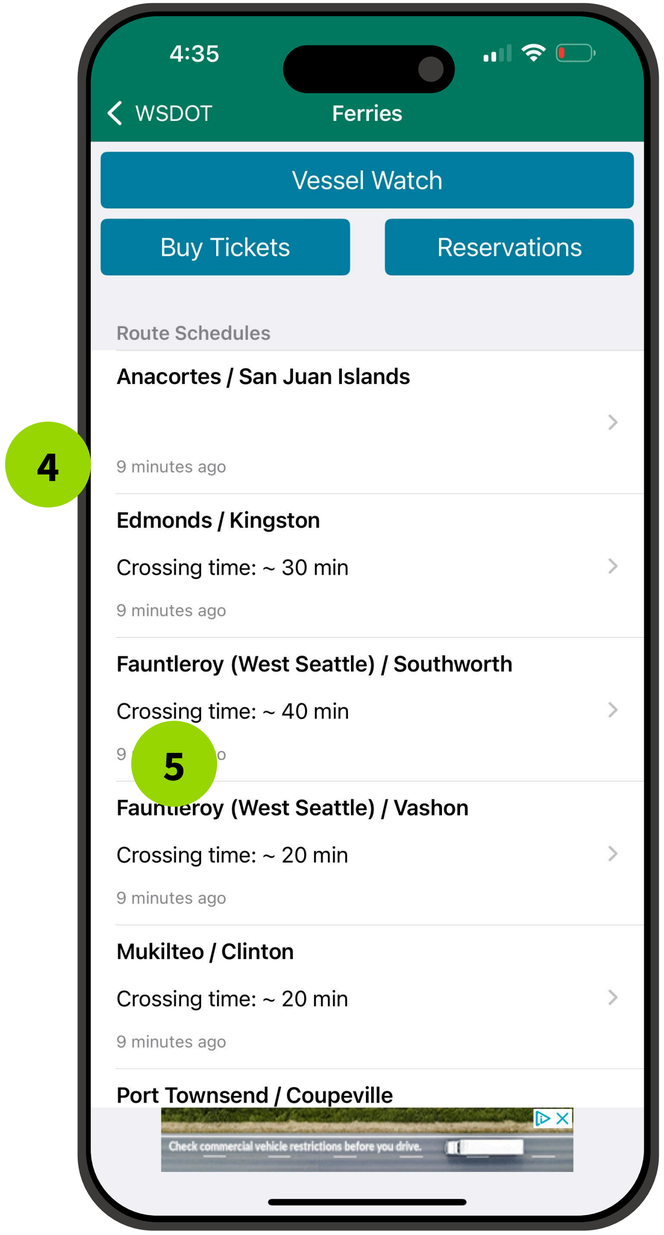
Recommendation: Sorting routes based on user's location would lead to a more personalized user experience, reduce user errors and lead to faster task completion

RECOMMENDATIONS - **LOW IMPACT** / **HIGH EFFORT**

5 Indicating user's distance from the port will reduce cognitive load

Pain Point: Users had to make a mental note of the time taken to get to the port.

Recommendation: Indicating user's distance from the port in the UX copy would lead to reduced cognitive load and fasten decision making



RECOMMENDATIONS - **HIGH IMPACT** / **LOW EFFORT**

6 Displaying the next departing ferry on top will reduce time on task

Pain Point: Users found it confusing to see the departed ferries first thing on the page

Recommendation: Scrolling to the next departing ferry as the user lands on this page will reduce user confusion and lead to less time taken for the task.

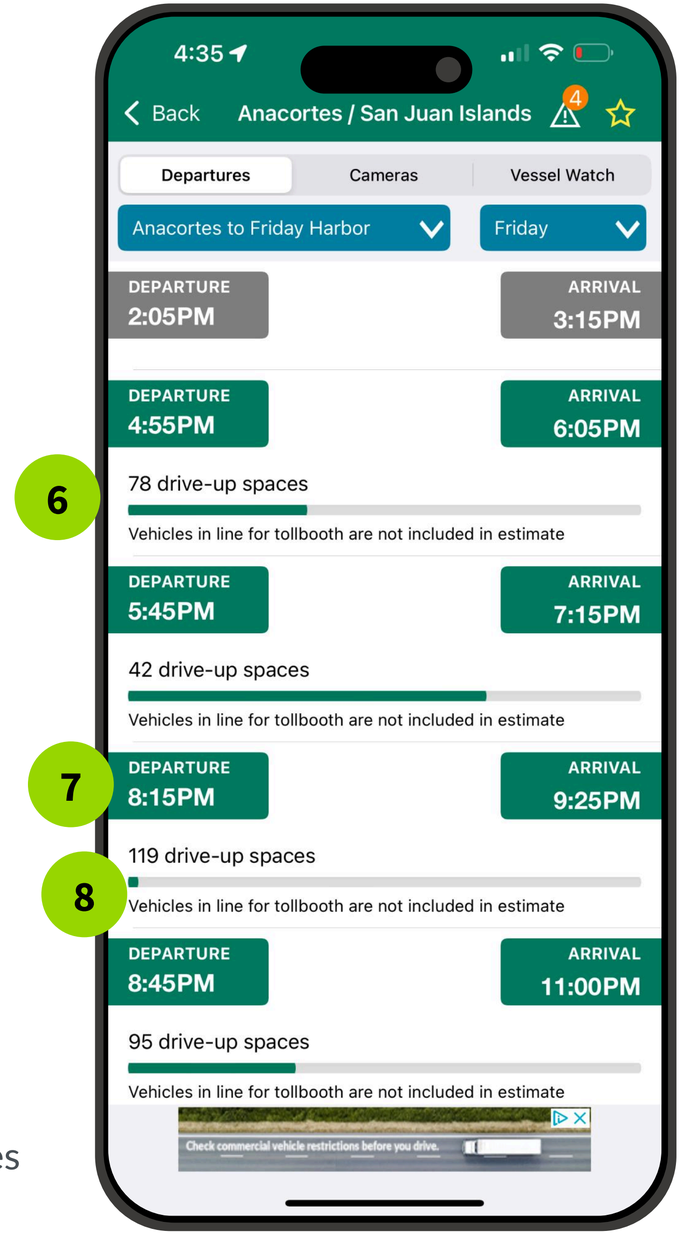
7 Improving the UI for departure, arrival timings and drive up spaces will improve information hierarchy and readability

Pain Point: Users assumed that Departure and arrival were buttons and the loading bar as a separator between timings

Recommendation: Improving the visual design of the information - departures, arrival time and drive-up spaces will improve readability

8 Using color changes to indicate high/low availability of drive up spaces will improve how information is read

Pain Point: Users mentioned trip planning as critical for longer and less frequent ferry routes
Recommendation: Including an alert banner will encourage users to reserve their spots



RECOMMENDATIONS - **HIGH IMPACT / HIGH EFFORT**

9 Displaying current status of the ferry will fasten decision making

Pain Point: The page does not display information on actual statuses of the ferries, leading users to different pages to find the same information

Recommendation: Including current statuses (at the port, delayed by 10 mins, etc) will fasten the ferry choice decision for the user

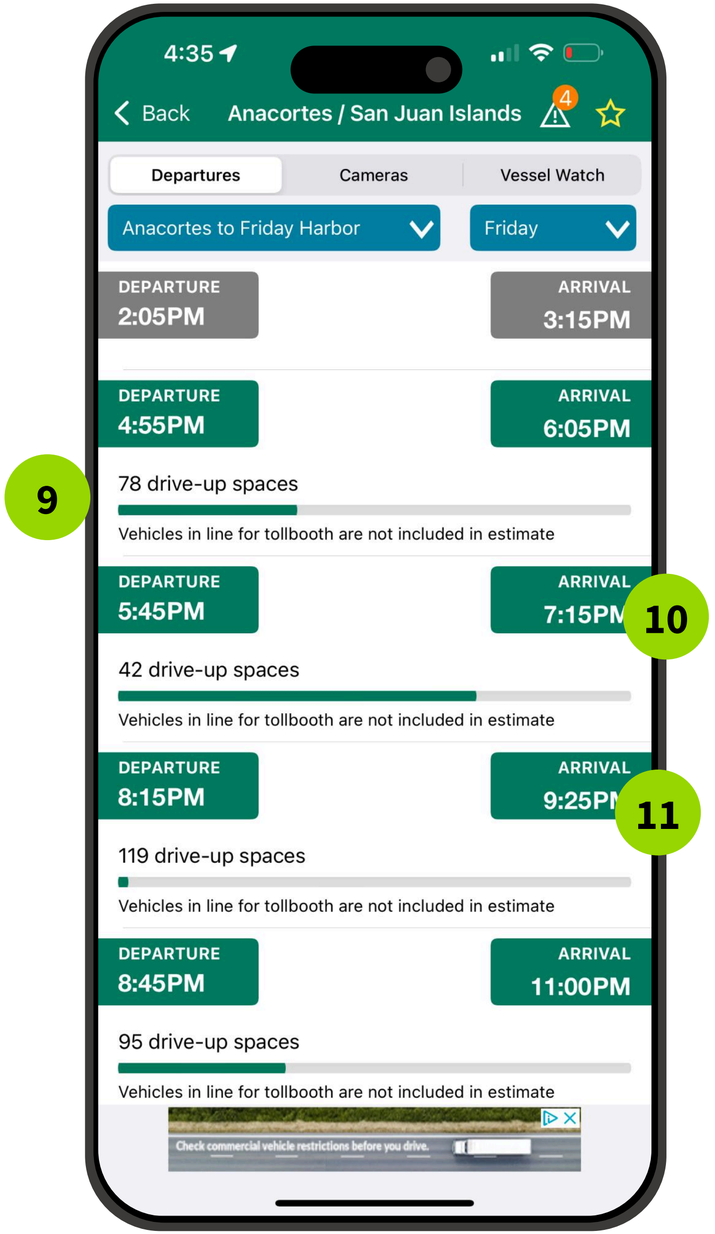
10 Adding a touchpoint against each ferry schedule that takes them to the vessel watch of the chosen ferry

Pain Point: Users feel unsure about whether they are selecting the right ferry in the vessel watch and need to tap around to find out.

Recommendation: Adding a button next to the active ferries can lead the user directly to the vessel on the map, eliminating the time taken to spot the ferry.

11 Adding ‘Reserve Now/Buy Ticket’ button against active ferries will reduce time on task

Recommendation: A ‘Reserve Now/Buy Ticket’ button against the active ferries will reduce the number of duplicate steps and time of task. This may require further usability testing.



RECOMMENDATIONS - **LOW IMPACT** / **LOW EFFORT**

12 A preview of the critical alerts on this page will help users with their trip planning

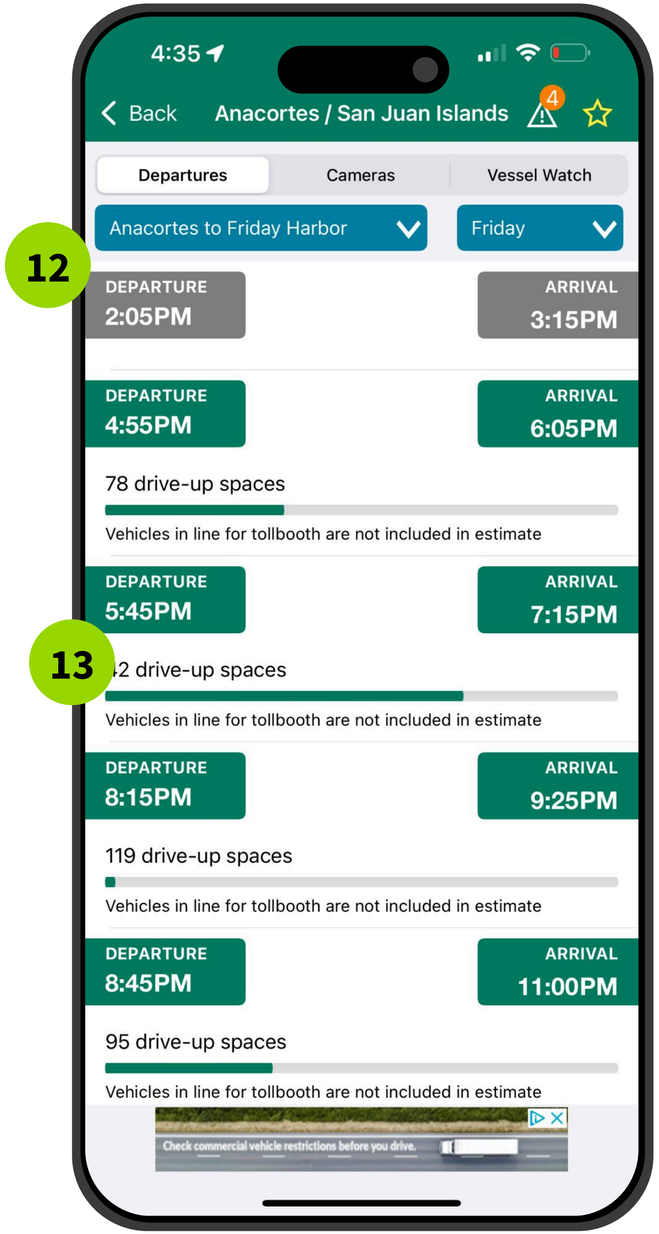
Pain Point: The alerts are currently embedded in the alerts page and not super apparent

Recommendation: Including a preview of the critical alerts that can disrupt the trip planning can be included at the top of the page.

13 Including departure cut-off information will reduce guesswork

Pain Point: Users tend to mentally plan their trip, back working from the departure times mentioned on this page

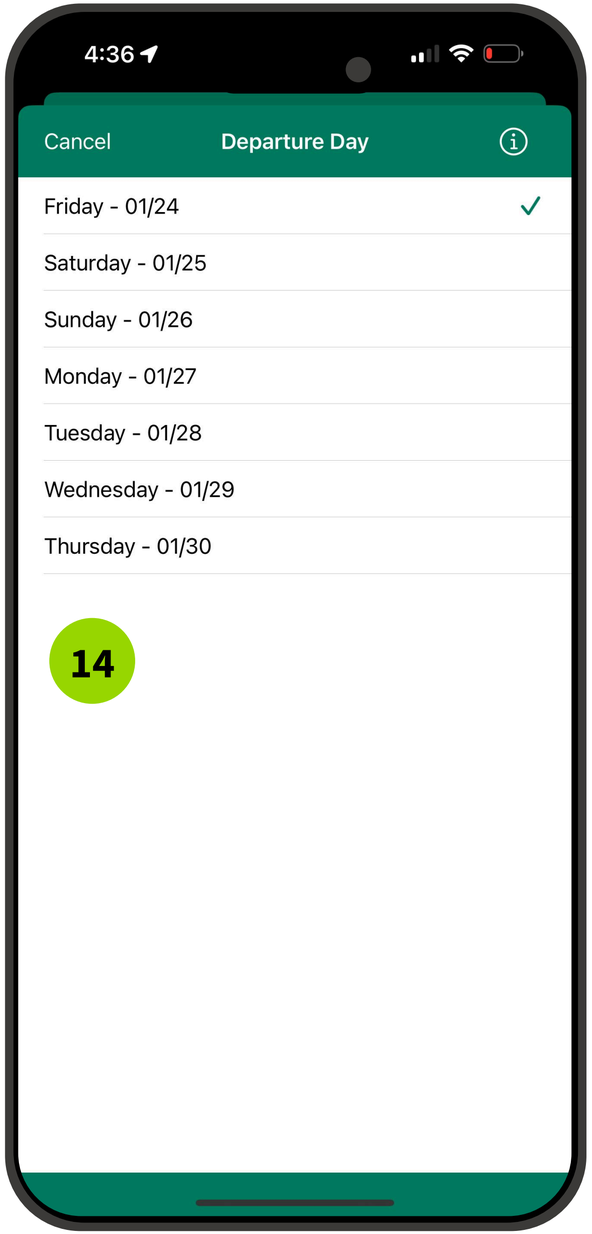
Recommendation: Including the departure cut-off time for the ferries will reduce guesswork for the user and help them arrive at the port in-time for boarding



14 Adding a timetable feature will allow users to check schedules beyond just the week ensuring consistency with the website

Pain Point: Currently, the users can only check schedules up to a week.

Recommendation: Adding the timetable similar to the website will allow users to check schedules beyond just the week and plan their trips in advance



Vessel Watch

RECOMMENDATIONS - **HIGH IMPACT** / **LOW EFFORT**

1 Improve Icon Scalability for Better Visibility

Pain Point: The ferry and camera icons remain tiny even after zooming in, making them difficult to interact with. Participants expected the icons to scale proportionally with the map.

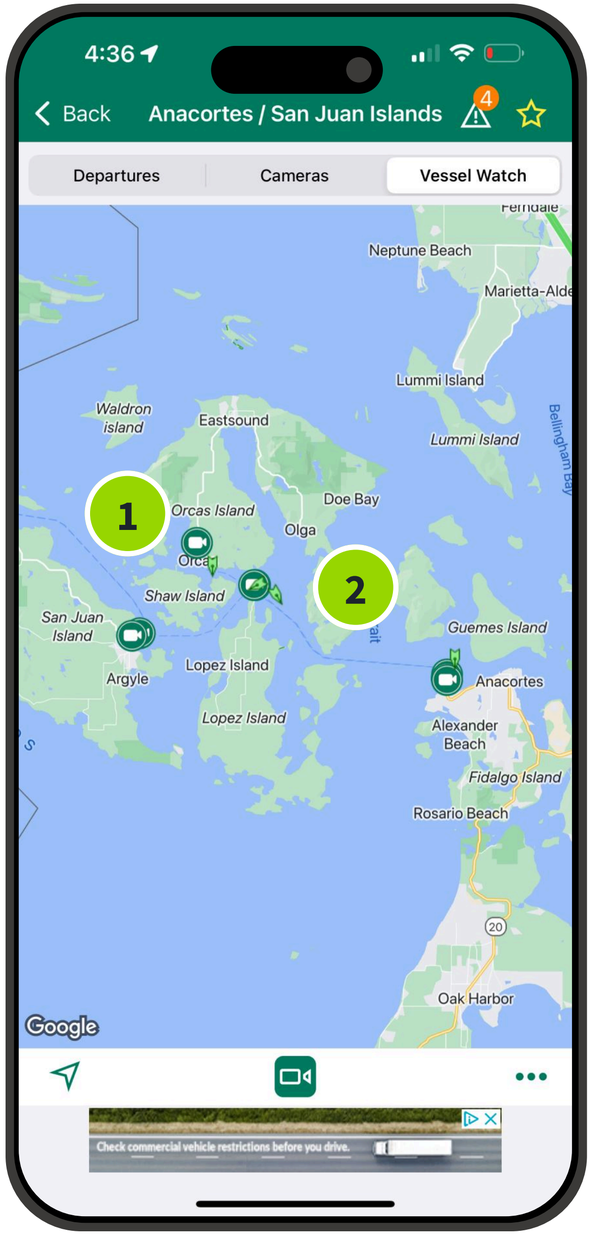
Recommendation: Implement dynamic scaling for ferry and camera icons so they adjust in size as users zoom in on the map. This will improve accessibility and interaction.

2 Enhance Ferry Status with Color Differentiation

Pain Point: Participants found it difficult to quickly understand the status of ferries.

Recommendation: Use distinct colors for ferry statuses to provide instant visual feedback

- Green: Departed
- Yellow: Stationed at port
- Grey: Arrived

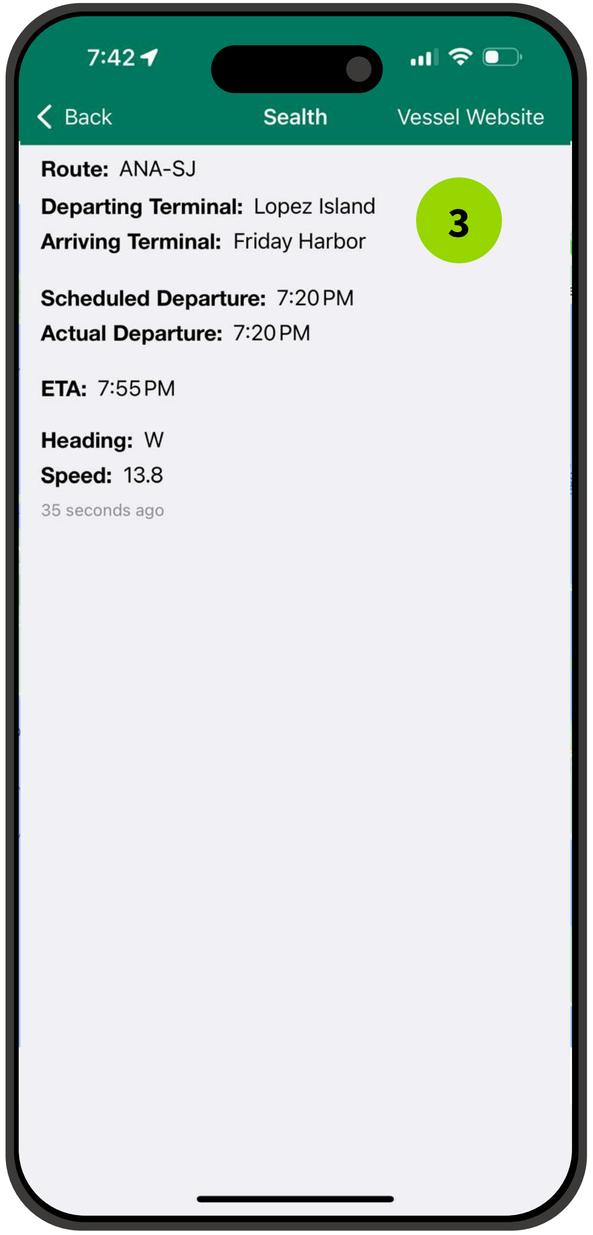


RECOMMENDATIONS - **LOW IMPACT** / **LOW EFFORT**

3 Revisualizing the Ferry Info Screen for improved readability

Pain Point: Participants and App/Play Store reviews highlighted the need for a ferry image, vessel number and accessibility details to help with easier identification at the dock and choosing the ferry, alongside departure and arrival details. However, they didn't prioritize information like heading and speed as much.

Recommendation: Reimagine the layout of the ferry info screen to better highlight key details users need at a glance while deprioritizing less critical information.

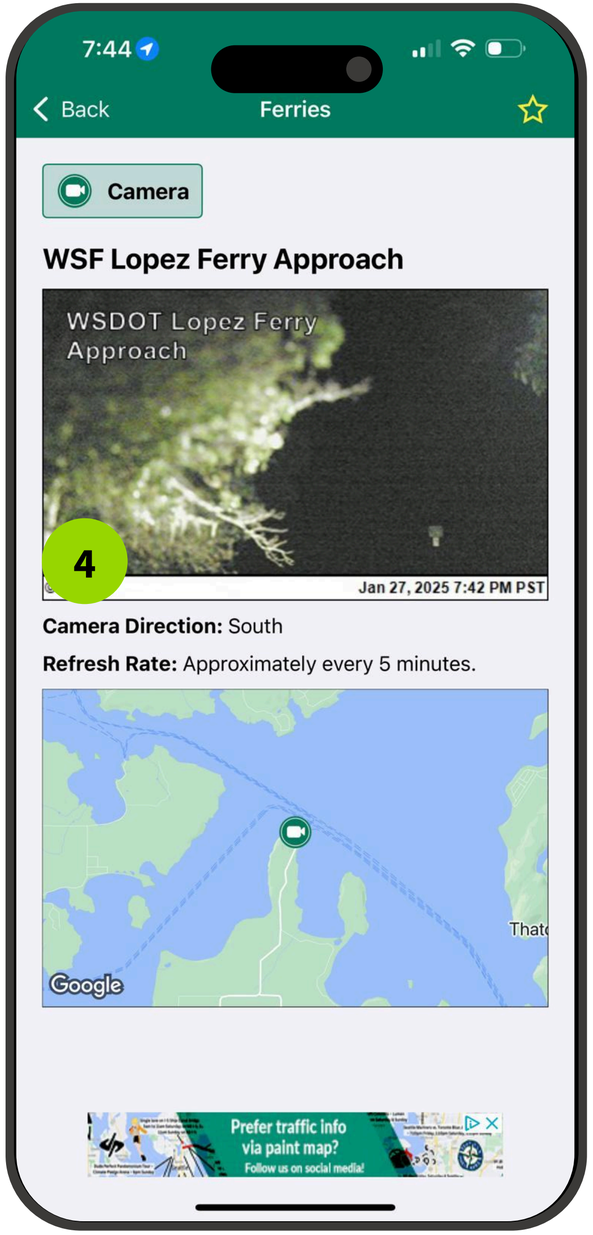


RECOMMENDATIONS - **LOW IMPACT** / **LOW EFFORT**

4 Intuitive UX Copy for Camera Direction

Pain Point: Participants found "North" and "South" unclear as camera directions, making it difficult to gauge the actual viewpoint.

Recommendation: Use more intuitive labels, such as "Facing Dock" and "Away from Dock," to make camera orientation easier to understand at a glance.



Buying Tickets & Reservations

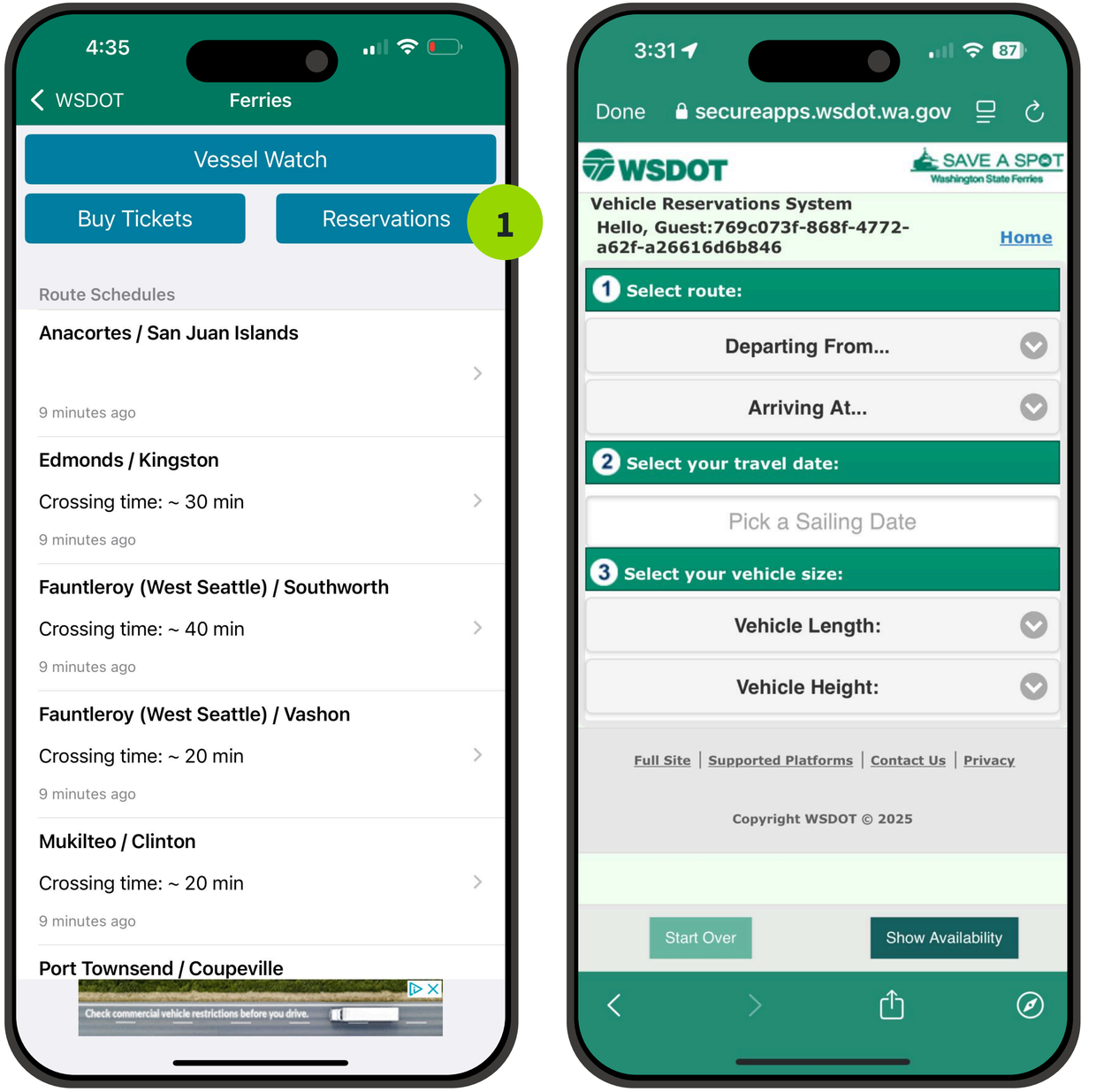
RECOMMENDATIONS - **HIGH IMPACT** / **LOW EFFORT**

1

Update Button Name to "Vehicle Reservations"

Pain Point: Users found the difference between buying a ticket and making a reservation unclear, leading to confusion.

Recommendation: Since the Reservations page is specifically for vehicle reservations, renaming the button to "Vehicle Reservations" provides clarity and prevents misunderstandings.



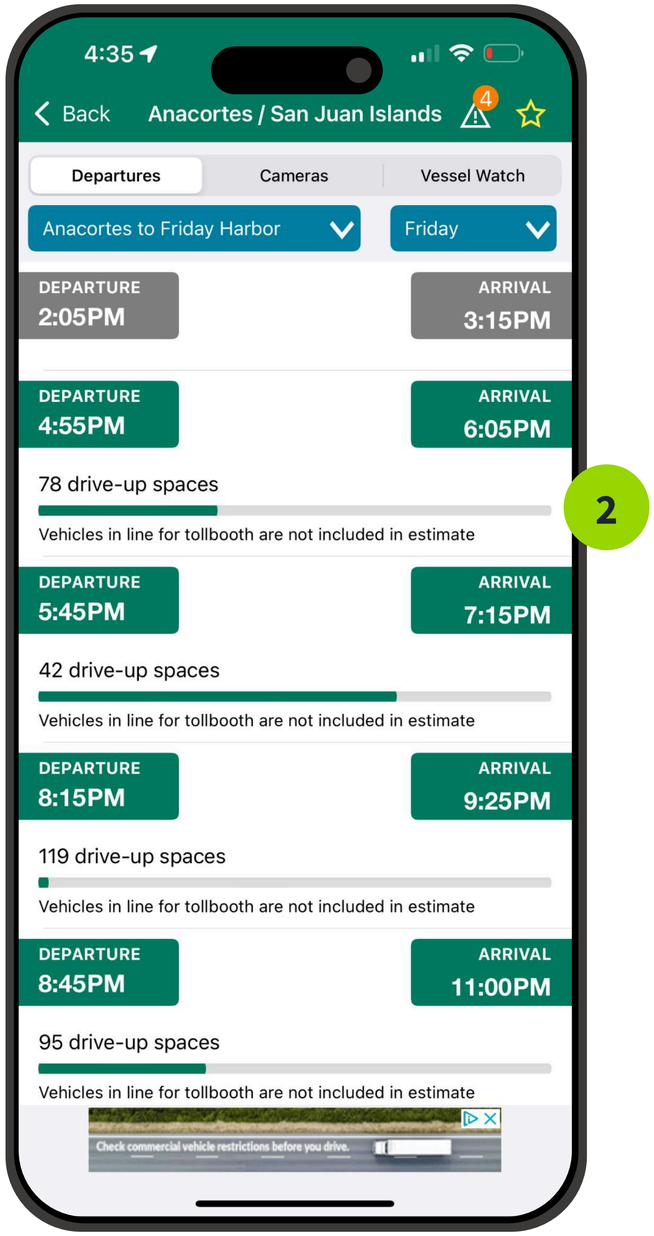
RECOMMENDATIONS - **HIGH IMPACT / HIGH EFFORT**

2 Place the “Buy Tickets & Reservations” Button Near “Drive-up Spaces”

Pain Point: Users had to navigate back to the ferry main page to make a reservation or buy a ticket, creating unnecessary friction.

Recommendation:

- Add the “Buying Tickets & Reservations” button closer to the Drive-up Spaces section for a seamless booking experience.
- Users can check available spaces and immediately proceed with booking without leaving the page.
- Allow users to tap on a specific ferry departure to go directly to the ticket booking page for that departure, streamlining the process.



RECOMMENDATIONS - **HIGH IMPACT** / **HIGH EFFORT**

3 Improve Clarity with a Clear Title & Easily Accessible Ticket Purchase Button

Pain Point: Users expected a booking interface but were met with a long informational page, causing confusion.

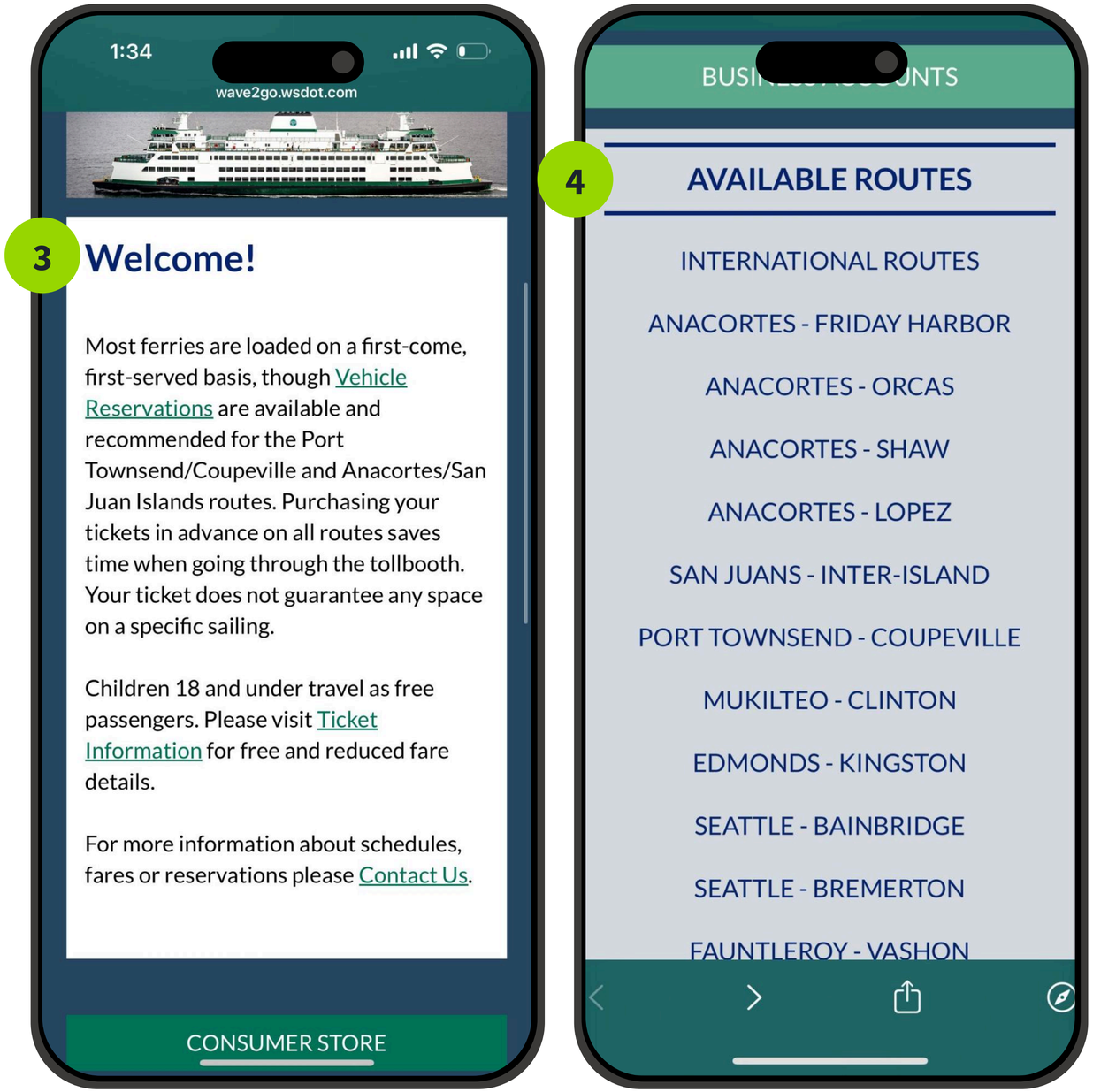
Recommendation:

- Change the title from "Welcome!" → "Buy Tickets" for clarity
- Move the “Available Routes” to the top for better visibility.

4 Make the Route List Clearly Clickable

Pain Point: The route list appears as plain text, making it unclear that it is interactive.

Recommendation: Add underlines or convert routes into button-style CTAs to indicate they are clickable.

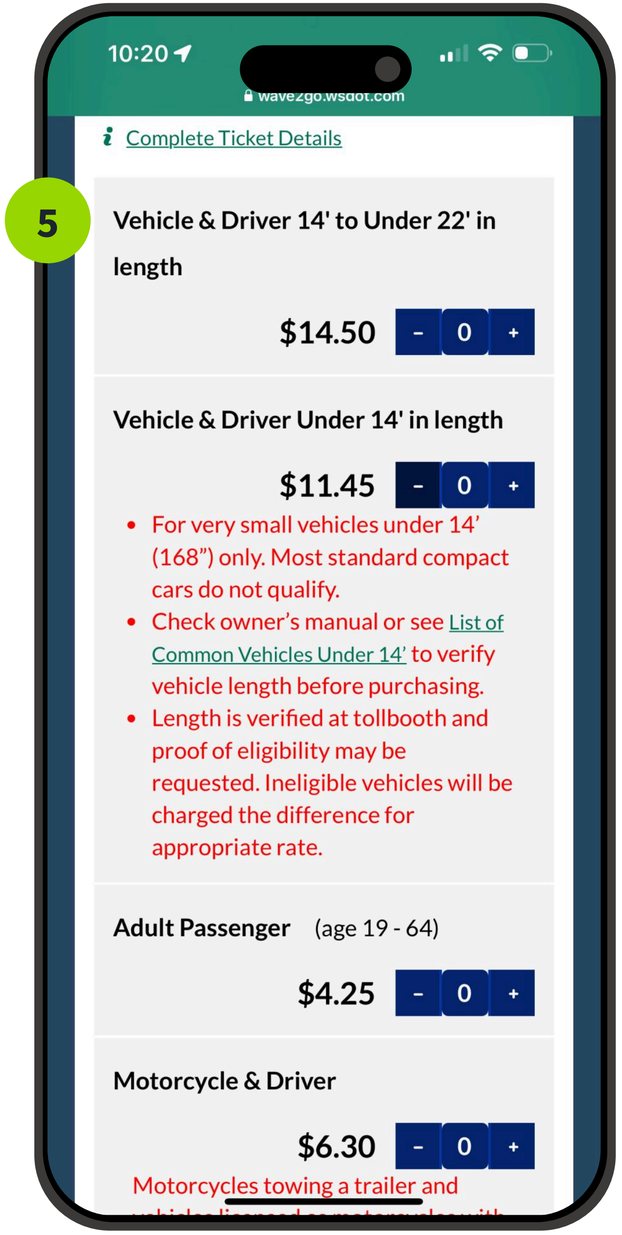


RECOMMENDATIONS - **HIGH IMPACT** / **HIGH EFFORT**

5 Separating Vehicle & Passenger Ticketing

Pain Point: Users found it confusing as vehicle, driver, and passenger information were mixed together.

Recommendation: Clearly separate Vehicle, Driver, and Passenger sections to improve readability and ensure a smoother booking experience.



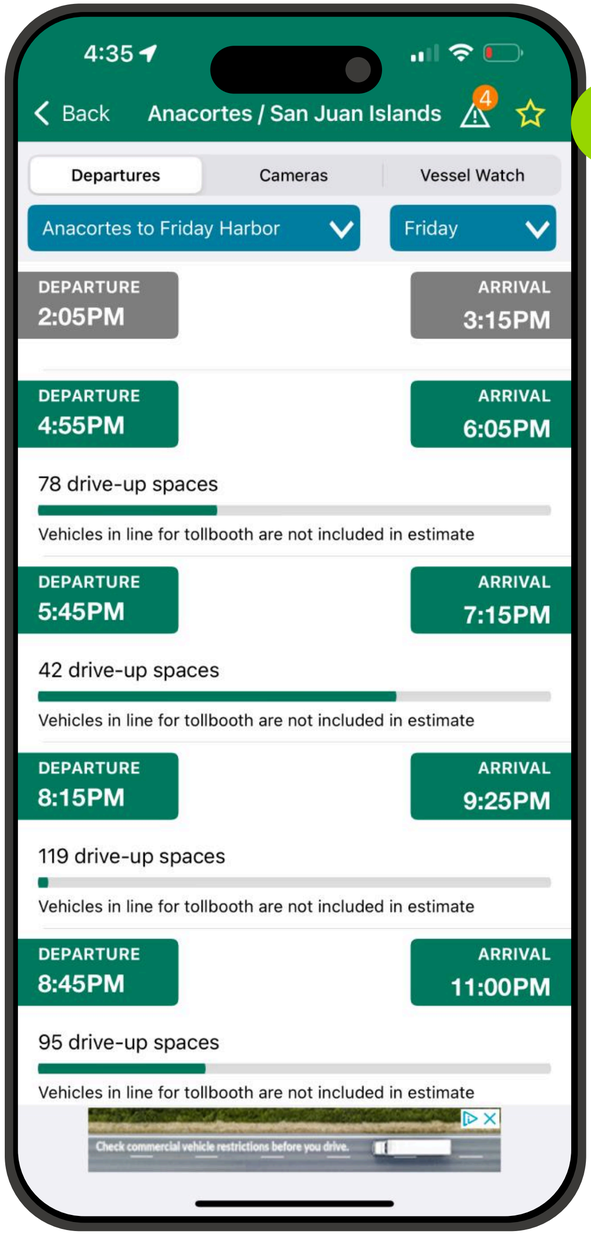
Favorite route

RECOMMENDATIONS - **HIGH IMPACT** / **LOW EFFORT**

1 Provide Feedback After Selecting a Favorite Route

Pain Point: After selecting the favorite icon, users received no feedback, making them unsure if their selection was successful.

Recommendation: Display a toast notification (e.g., “Schedule has been saved as a favorite route”) to confirm when a route is successfully added to favorites.



RECOMMENDATIONS - **HIGH IMPACT / HIGH EFFORT**

2 Prioritize Favorite Routes in the List

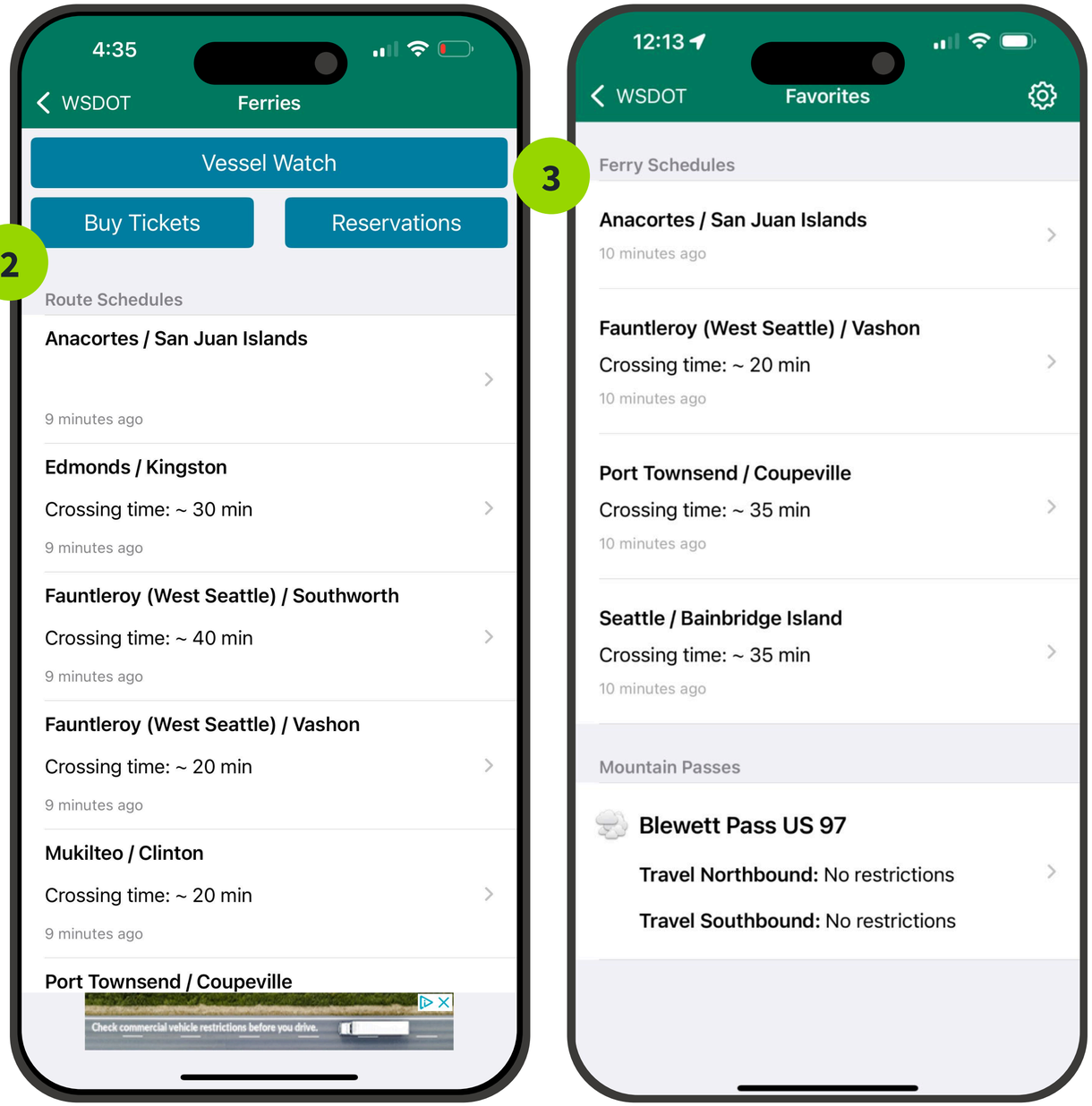
Pain Point: In the main ferry list, users found it difficult to quickly locate their favorited routes since they were mixed with all routes in alphabetical order.

Recommendation: Favorite routes should be pinned to the top of the route list for easy access, rather than being sorted alphabetically.

3 Allow Users to Favorite Specific Departure Times

Pain Point: Users who take the same ferry at a specific time daily (e.g., 5 PM after work) had to scroll through the schedule every time to find their preferred departure

Recommendation: Enable users to favorite specific departure times, allowing them to quickly access their preferred ferry schedule without excessive scrolling.





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Recommendations

→ **Study Reflection**

STUDY REFLECTION

What Went Well

Successful participant recruitment

We recruited 10 participants, 3 over our recommended sample size for usability testing. This was enough to gather considerable qualitative data.

Representative tasks

Our tasks covered some a lot of in-app ground. We took users through the main screens we hoped to research and tasks that represent critical real-world uses.

Consistent thematic patterns from user data

Though our individuals entered the study with unique perceptions of the app, their data yielded consistent themes. These findings form a solid starting point for future research.

STUDY REFLECTION

What We’d Do Differently

Broaden platform coverage to Web, Android and Buy/Purchase screens

Instead of focusing only on iOS, we would expand testing to Web, Android, and purchasing screens to capture a more complete user experience across diverse users.

Test in real-world contexts

In addition to controlled environments, we would conduct testing in real-world settings, such as when users are actually taking the ferry to work, to better understand how they interact with the app.

Increase sample size & dive into quantitative analysis

Rather than relying solely on qualitative insights, we’d recruit more participants and incorporate quantitative metrics to measure usability and validate our findings with data.

Future Research Directions

Quantitative Methods

Heat-mapping and tracking the **number and distribution of participant taps** across screens could help us measure backtracking.

Competitive Analysis

Compare other platforms our participants use (Ferry Friend, INRIX, etc.). See where changes in analogous features could benefit WSDOT's app.

Iterate Vessel Watch

Vessel Watch's level of information and visual language were controversial among participants. Iteratively **test small changes** to both.

Test Out Personalization

Employ **A/B testing** with the placement and filtering of information like favorites and alerts based on individual user needs.

Scale Up

Repeat this study with a **larger sample size**. This could more thoroughly identify the most universally difficult tasks.



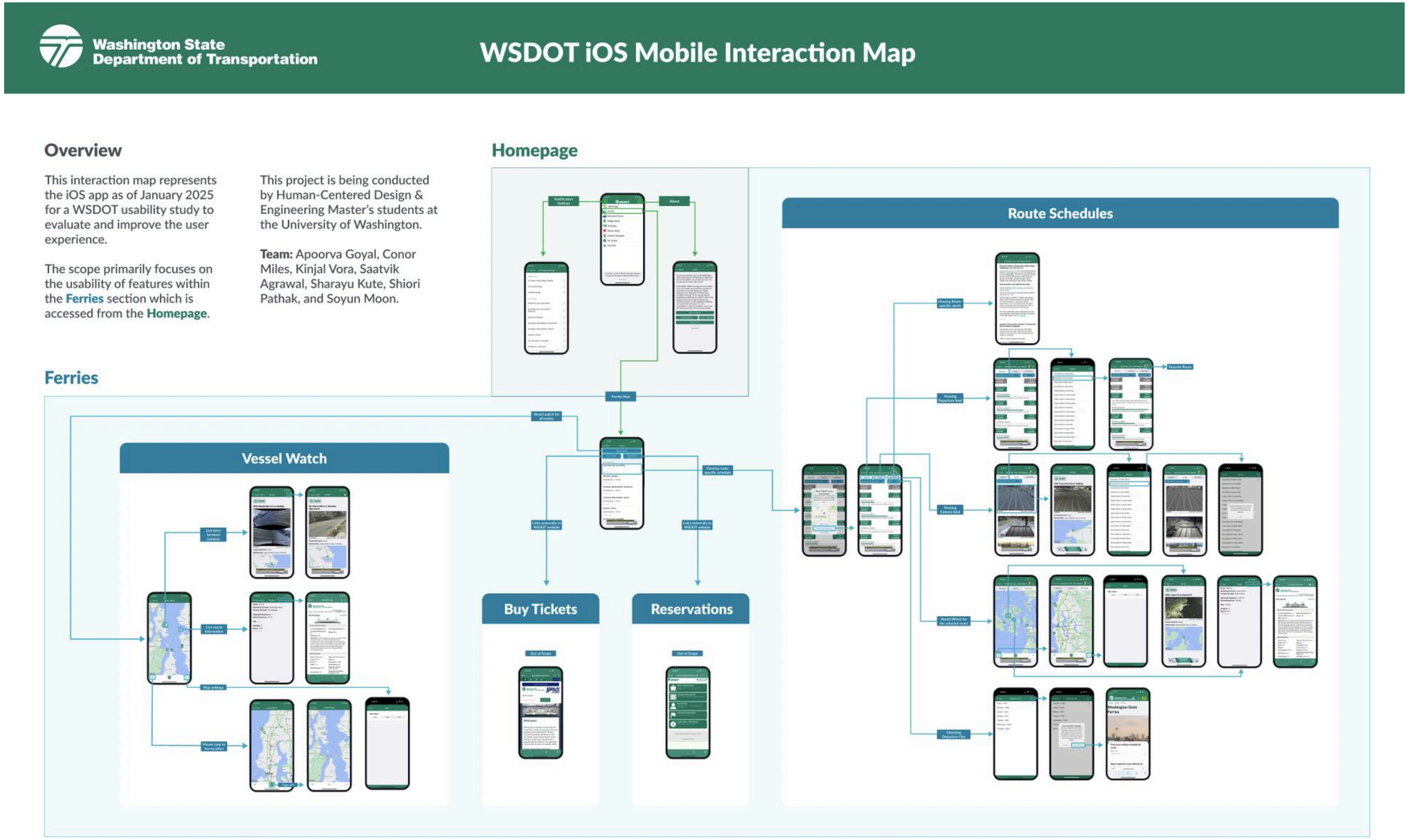
Thank You!

Q&A

Appendix

Interaction Map

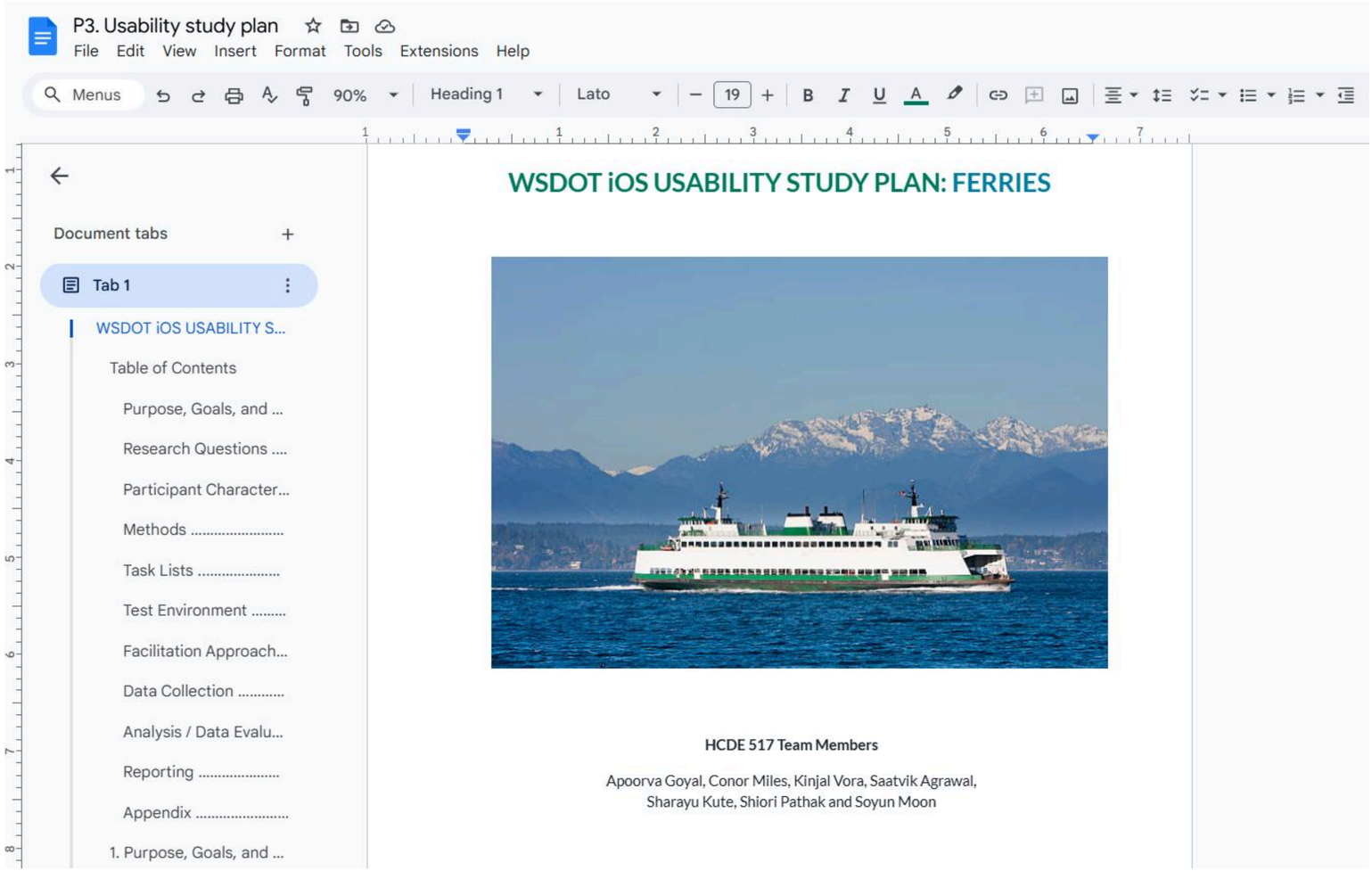
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Usability Study Plan [LINK >]

Contains:

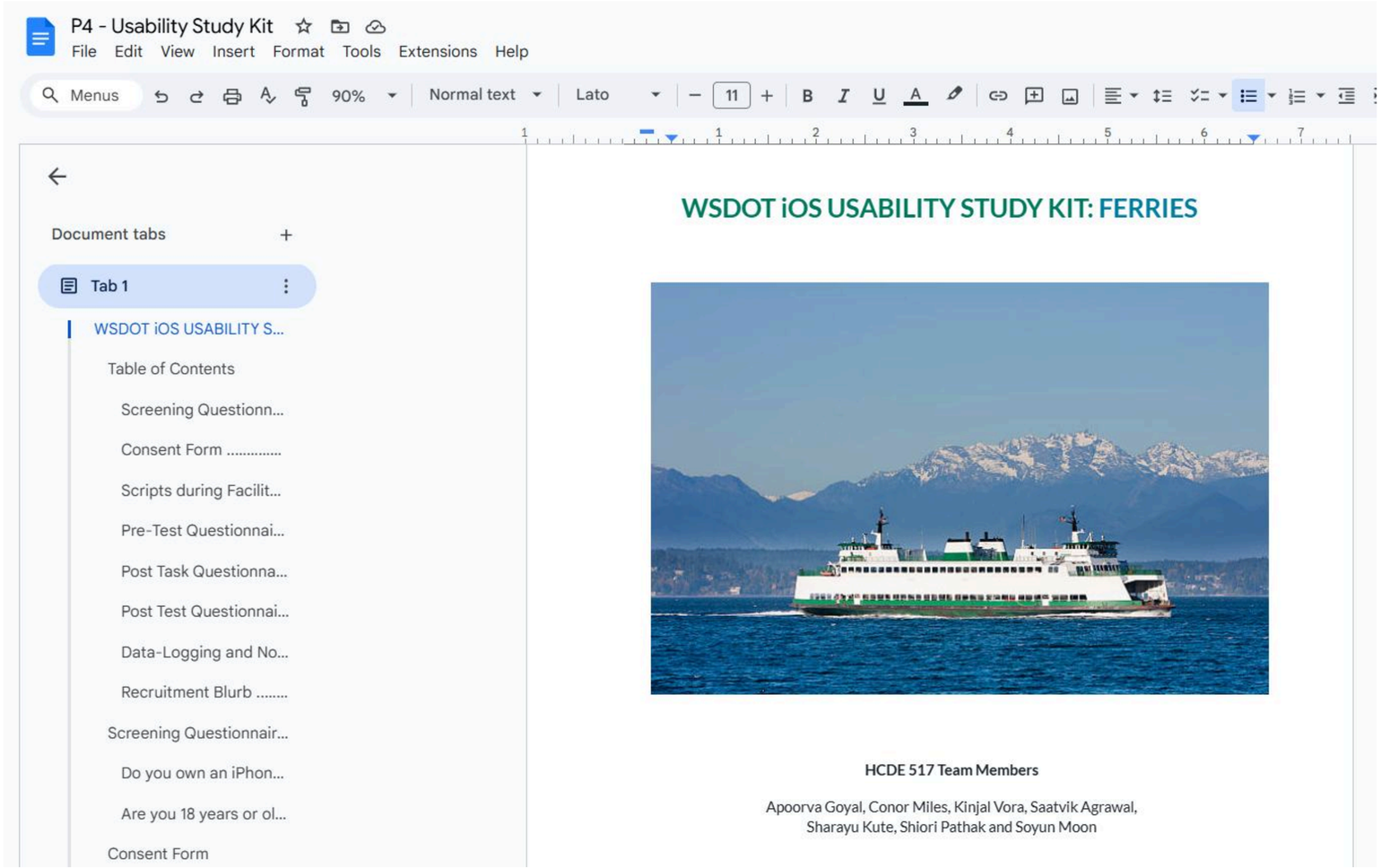
- Study Goals
- Research Questions
- Data Collection Methods
- Data Evaluation Methods



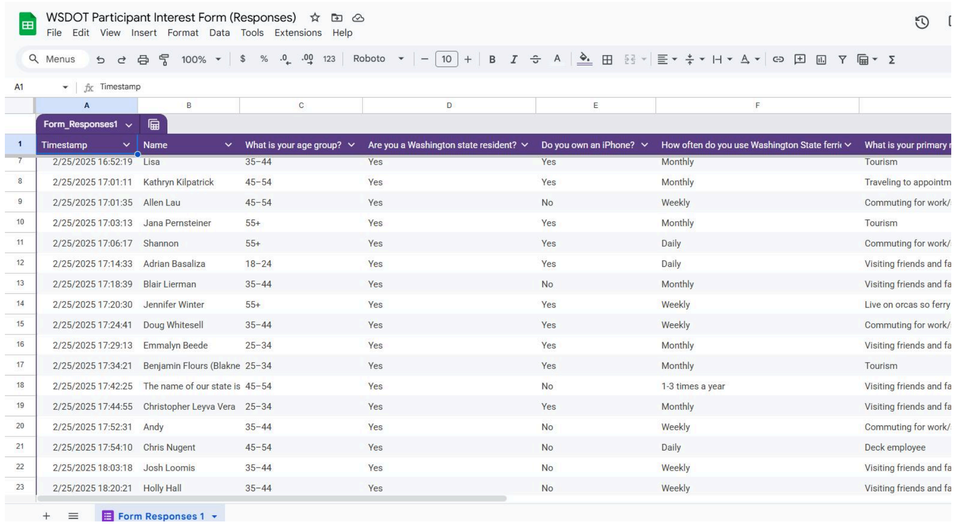
Usability Study Kit [LINK >]

Contains:

- Screening Survey
- Pre-test questionnaire
- Task list
- Post-task questionnaire
- Post-test questionnaire

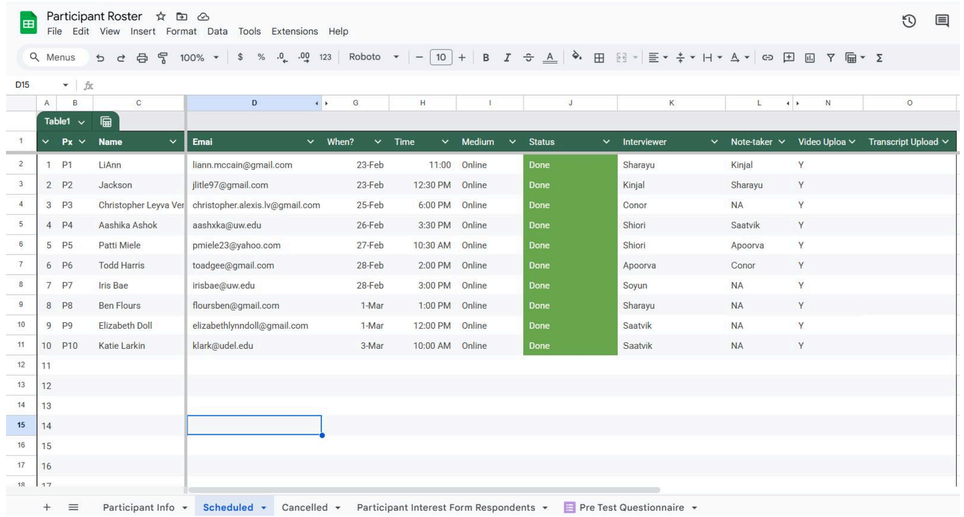


Participant Recruitment



Participant Interest Survey Results

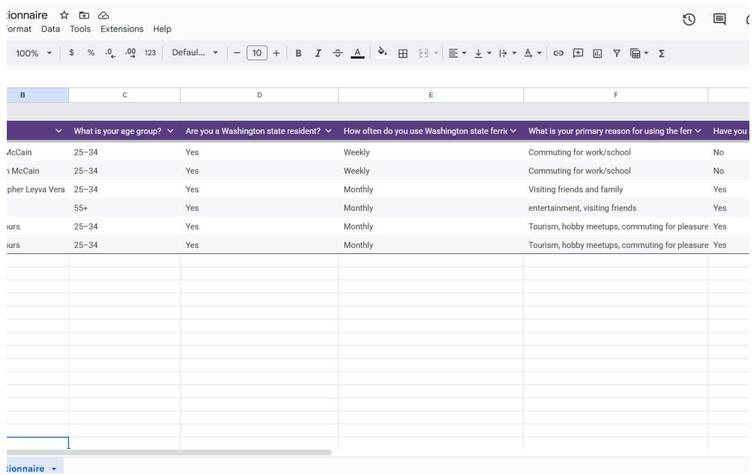
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Final Participant Roster

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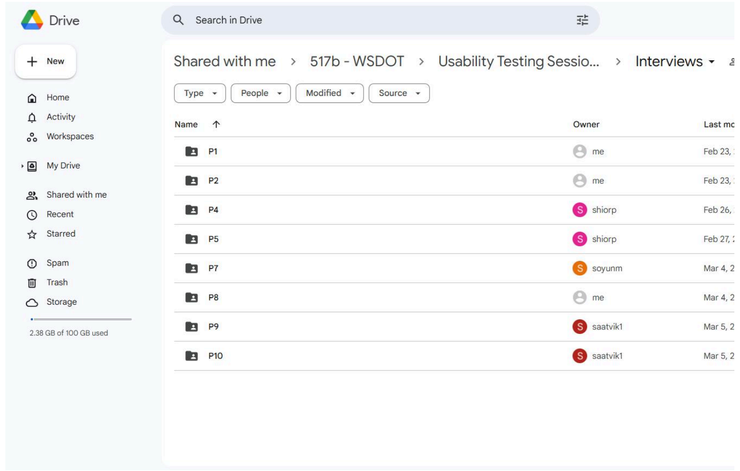
Usability Testing Sessions



What is your age group?	Are you a Washington state resident?	How often do you use Washington state ferrie	What is your primary reason for using the ferr	Have you
25–34	Yes	Weekly	Commuting for work/school	No
25–34	Yes	Weekly	Commuting for work/school	No
25–34	Yes	Monthly	Visiting friends and family	Yes
55+	Yes	Monthly	entertainment, visiting friends	Yes
25–34	Yes	Monthly	Tourism, hobby meetups, commuting for pleasure	Yes
25–34	Yes	Monthly	Tourism, hobby meetups, commuting for pleasure	Yes

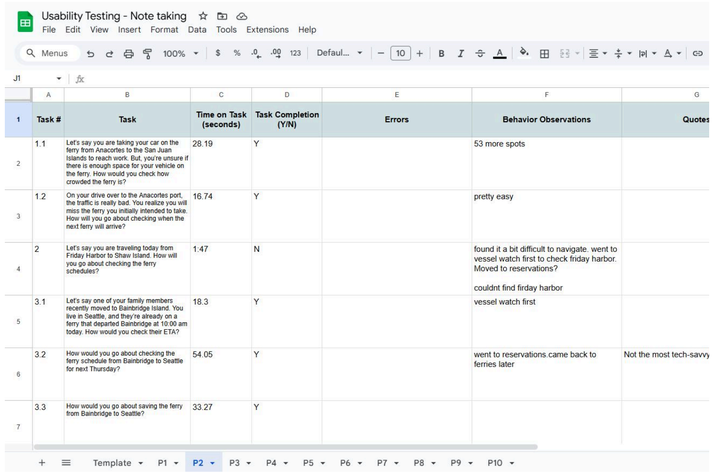
Pre-test Questionnaire Results

LINK >



Usability Sessions

LINK >



Usability Testing - Note taking

Task #	Task	Time on Task (seconds)	Task Completion (Y/N)	Errors	Behavior Observations	Quotes
1.1	Let's say you are taking your car on the ferry from Anacortes to the San Juan Islands to reach work. But, you're unsure if there is enough space for your vehicle on the ferry. How would you check how crowded the ferry is?	28.19	Y		53 more spots	
1.2	On your drive over to the Anacortes port, the traffic is really bad. You realize you will miss the ferry you initially intended to take. How will you go about checking when the next ferry will arrive?	16.74	Y		pretty easy	
2	Let's say you are traveling today from Friday Harbor to Shaw Island. How will you go about checking the ferry schedules?	1:47	N		found it a bit difficult to navigate. went to vessel watch first to check friday harbor. Moved to reservations? couldnt find firday harbor	
3.1	Let's say one of your family members recently moved to Bainbridge Island. You live in Seattle, and they're already on a ferry that departed Bainbridge at 10:00 am today. How would you check their ETA?	18.3	Y		vessel watch first	
3.2	How would you go about checking the ferry schedule from Bainbridge to Seattle for next Thursday?	54.05	Y		went to reservations came back to ferries later	Not the most tech-savvy
3.3	How would you go about saving the ferry from Bainbridge to Seattle?	33.27	Y			

Template P1 P2 P3 P4 P5 P6 P7 P8 P9 P10

Note Taking

LINK >

Affinity Mapping [LINK >]

