CEP 460

Mukilteo Sign Inventory - Final Report

Max Brooke, Victor Lomholt, Frannie Myers,

Thomas Nguyen, Eva de la Peña, William Khadivi

Note: The contents of this report reflect the views of the students who are responsible for the accuracy of the observations and data presented. The contents do not necessarily reflect the views or policies of the City of Mukilteo.

Source: AA Roads

Table of Contents

Executive Summary

The City of Mukilteo Public Works Operations Department is responsible for maintaining city-owned infrastructure, facilities, and buildings. One aspect of this is public signage, which is key for coherent, effective, and efficient visual communication to drivers, cyclists, and pedestrians. If managed effectively, proper signage leads to safer outcomes for civilians, reduced damage to infrastructure due to vehicle collisions, and more efficient wayfinding throughout the City.

In collaboration with the Livable Cities Year program, six undergraduate students from the CEP 460 *Planning in Context* course worked directly with the City of Mukilteo Public Works Operations Departments to inventory and research city signage. To complete work tasks, students were trained to operate city-owned software and were instructed on methods for adequate data collection in the field. Key data collected by students for this project included sign location (concerning the roadway, identified by GPS in ArcGIS Field Maps) and type, reflectivity, height, direction, width, photographic image, sign writing, and condition. This data was recorded through personal mobile devices and City-owned iPads, with students utilizing tape measures and rangefinders to collect accurate data. Data logs were submitted by students in the field and stored in the database ArcGIS Field Maps.

Over one twelve-week academic quarter, students conducted multiple fieldwork sessions lasting approximately three hours per session. During each session, students documented city-owned signs in the field by hand and on foot within the framework of the identified mapping strategy as outlined by the City of Mukilteo. This strategy prioritized cataloging signage in southern Mukilteo, as there have historically been fewer updates. Students identified signage problem areas and submitted work orders via the city-owned ‘SeeClickFix’ digital application.

This project required additional work outside the field, including identifying signage practices in other municipalities, a study of fatalities and injuries on Mukilteo roadways, and reviewing sign inventory practices in other municipalities.

Mid-quarter and final reports were presented to the Mukilteo Public Works Operations Department in which students highlighted findings, communicated progress, and provided recommendations to update existing signage and related traffic safety infrastructure.

Introduction

The Mukilteo Public Works Operations Department is currently updating its asset tracking and sign inventory system. The sign inventory database had its last major inventory update approximately five years ago, and as such, the need for updating the database in a consistent and thorough manner was identified. An inconsistency in sign mapping practices in this period meant many signs were either inconsistently documented or completely missing from the database.

To do this, the department tasked the Mukilteo Sign Inventory Student Team with mapping city-maintained road signs throughout the city, utilizing both the Mukilteo Public work Department's internal Sign Inventory ArcGIS interface and the 'FixIT' App.

Updating and standardizing the ArcGIS inventory allows the city to fully utilize the updated & spatially-referenced sign data, for more accurate offsite reference and identification of issues.

The process of mapping and inventorying the signs involves identifying the condition of the signs and determining whether repairs or replacements are needed.

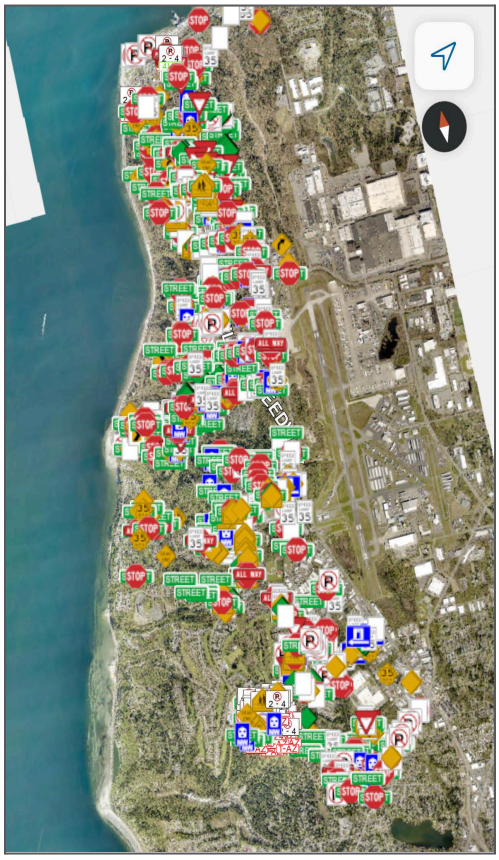
When sign databases are updated and overlaid with geographic information systems such as ArcGIS, these systems can be used as a boon to creating fully comprehensive asset management systems. By counting and locating signs, monitoring their conditions, and tracking any changes and additions over time, this updated sign system can be used by construction, maintenance, and engineering personnel for maintenance and recommendations. The inventory can also be used by traffic engineers to find unwarranted signage, to determine whether additional signs may be needed, and to monitor and improve the practice of field maintenance by identifying the frequency at which inventory efforts must occur.

This project began through training with the City of Mukilteo Public Works Operations Department, and the student team began inventory updates at the southern border of the City of Mukilteo. Objectives of this project included providing as many updates as possible to the 67 miles of streets maintained by the City's Public Works Department, (City of Mukilteo, n.d.) researching best practices around signage and inventory efforts, and accumulating findings and recommendations into presentations for the Public Works Department through a lens of safety and wayfinding.

Product and Scope

The final product requested by the client was an updated digital inventory of signs owned by the City of Mukilteo. Specific data points were captured during site visits regarding sign typology, direction, size, height, condition, and reflectivity. Rangefinders, iPads, and tape measurers owned by the City of Mukilteo as well as personal Iphone/Samsung cameras were utilized to provide exact documentation of sign conditions. The software used for cataloguing signs was ArcGIS Field Maps, which was selected by the client prior to kicking off this collaboration with CEP 460. ArcGIS Field Maps automatically created this map, shown below,

utilizing data points that were entered by students during field work. Students were given higher priority access on the City of Mukilteo's Fix-It app to report immediately concerning issues with the signs, such as obstructed visibility or possible missing signs. The timeline of project work lasted over the length of the academic quarter, which amounted to roughly two months. Site visits were initiated through an in-person training at the City of Mukilteo Public Works Facility and were then considered independent student work to be completed throughout the project timeline. These in person site visits were completed concurrently with other parts of the project, such as research and recommendations for sign updates and improvement;, these additional project components were added beyond the initial scope of the project in order to both provide additional feedback to the client and to meet the theoretical planning requirements for the CEP 460 Planning in Context course.



ArcGIS Sign Inventory Field Map Source; City of Mulkiteo

Audience/client

The main point of contact for this project was Public Works Director Matt Nienhuis. In mid-October, the student team met with Matt and members of the Public Works team for a training session and visited sites where students were provided with a tutorial on how to inventory signs. The project's primary audience was the Mukilteo Public Works Department, specifically the staff responsible for managing the city's infrastructure and ensuring the safety and efficiency of its roadways. This team relies on accurate, up-to-date data about city-maintained road signs to prioritize maintenance, comply with safety regulations, and allocate resources effectively. Secondary stakeholders may include city planners, local government officials, and residents who benefit from well-maintained road infrastructure and use the city's Fixit App. The team's success in this project hinged on working in the city's southern neighborhoods and adding the signs there to the overall database.

Methodology

The group was first trained and briefed on both mapping apps, ArcGIS Field Maps and the City of Mukilteo Fix It App, then was issued equipment for field work:

- Safety vests
- iPads
- Tape measures
- Rangefinders

The student team conducted field visits within the city limits and on city roads. This excluded the state roads such as SR 525 and private roads. Teams were usually split in groups of two or three to maximize efficiency and to accommodate team availability.

Each visit was often two to four hours, which was limited by cellular battery, time of day, and weather conditions.

The site visit involved the group driving up to the city, park in a neighborhood and walk around the neighborhood collecting street sign data. Any undocumented signs would be manually entered through ArcGIS Field Maps. Any missing signs, signs that were not up to standard, or dirty signs were reported in the Fix It app via work orders.

Results and conclusions

The updated zones included Zone 6, Zone 7, Zone 8, and Zone 9. The client identified these zones as priority zones. The client noted that the northern zones, Zones 1-5, were more likely to have been updated.

The field work was used with two apps, City of Mukilteo Fix It App and ArcGIS Field Maps. With the apps, the group mapped new signs that were not on the app. The group combined had submitted for a total of 25 work orders submitted on the Fix It App.

Zone Subdivisions. Source: Mukilteo Public Works

App Icons That The Group Used. Source: App Store

Field observations and recommendations

As a result of work conducted in the field and additional research, the main takeaways that the group has come up with are as follows:

1. When working in a group it is important to develop a clear scope of assigned work tasks and methods between all team members.
2. Making sure work zones are clearly delineated and progress is kept up to date.
3. While working between zones communication and coordination is essential to avoid confusion and overlapping work.

If possible, updating the field map app to provide filtering by year updated would provide the convenience for sign inventory workers.

When working in the field, a sign previously identified took roughly 2 minutes to update. Many signs that had previously been flagged for repair on the original field map had been either replaced or cleaned without a corresponding update to the field map database.

The main concern in the field was a lack of documentation for newly added signs or removed signs rather than signs in need of repair. The team encountered many signs that had been erected but not inventoried on the sign inventory system. As such, implementing a sign inventory procedure to any new signage erected is recommended to keep the inventory up to date.

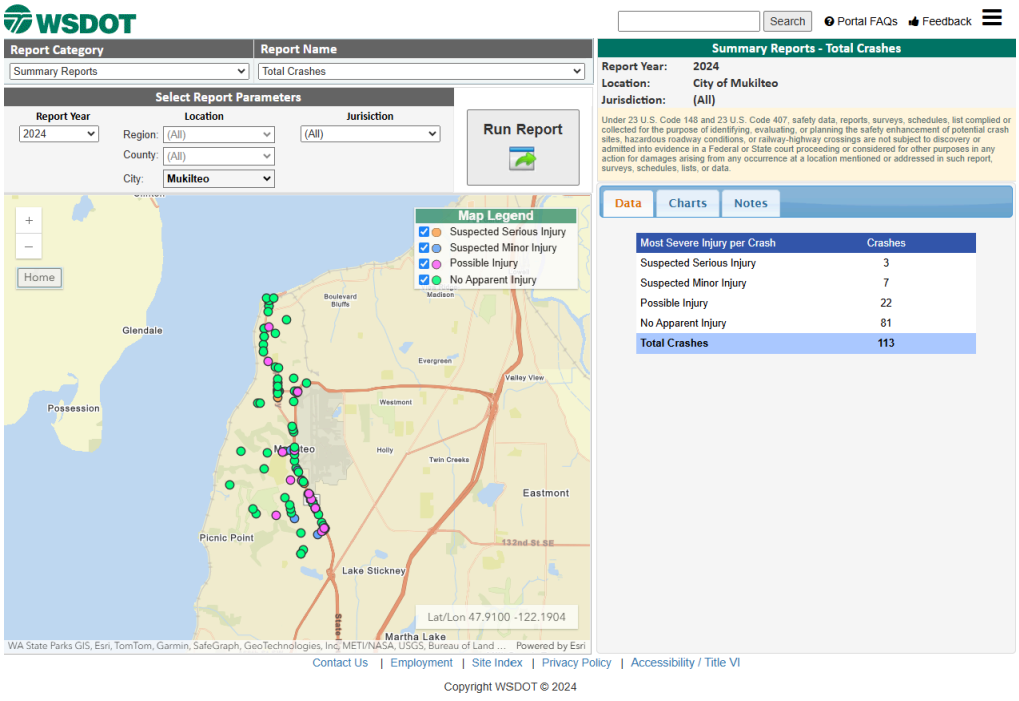
Issues with existing inventoried signs were minimal, and dealt with quickly by submitting a FixIt request. Most issues with existing signage were found in residential areas, where traffic is minimal. Damaged or otherwise defective signs which are located on more visited streets are

likely reported by citizens, highlighting the importance of keeping an accurate record of new signage which may not immediately be an area of concern for citizens to report.

Other research and Information

During the final presentation, which took place on December 2, 2024, the student team presented a series of recommendations to the City of Mukilteo based on case study research. These case studies, both local and national, included:

- Crashes recorded on the Mukilteo Speedway, Mukilteo's busiest thoroughfare (WSDOT, n.d.)
- Vehicles recorded per day on the Mukilteo Speedway



Crash Map. Source: WSDOT

- Comparing the crash and vehicle counts on Mukilteo Speedway to the same information on a comparable thoroughfare/state highway: Aurora Ave in Seattle
- Adding community identity signs, based on a study of San Diego, CA (San Diego Design Week, n.d.)
- Traffic calming installations, based on a study of Seattle (City of Seattle, n.d.)

- A traffic-related neighborhood yard sign recommendation, based upon a study of Redmond, WA (City of Redmond, n.d.)

An example of daylighting, a method of traffic calming. Source: City of Seattle

The findings of the case studies, as outlined above, resulted in the following recommendations to meet the goal of increasing pedestrian and vehicular safety within the City of Mukilteo.

1. The city could design and produce neighborhood safe driving sign templates for Mukilteo residents to request via an online portal. Neighborhood signs could be provided free of charge or for a small fee, with a limit on the maximum number of orders per household.
2. Identify high collisions locations and propose traffic calming strategies to reduce speeds and collisions these include the following:
    - Add more concrete barriers / curbs
    - Add more signalized crosswalks for pedestrian safety
    - Reduce speed limits
    - Safety beyond signage

3. Identification of 1-3 additional landmark sites in Mukilteo and the development of an RFP and public commentary process for sign development on these proposed sites.

Works Cited

AA Roads. 2010. “Mukilteo Highway Signs.” Last modified October 13, 2010, https://www.aaroads.com/guides/wa-525/.

City of Mukilteo, n.d. “Operations & Maintenance | Mukilteo, WA.” Accessed December 12, 2024, https://www.mukilteowa.gov/259/Operations-Maintenance.

City of Redmond. n.d. “Traffic & Pedestrian Safety Program.” Accessed November 30, 2024, www.redmond.gov/256/Traffic-Pedestrian-Safety-Program.

City of Seattle. n.d. “Traffic Calming.” Accessed November 30, 2024, https://www.seattle.gov/transportation/projects-and-programs/programs/home-zone-program/traffic-calming.

San Diego Design Week. n.d. “Iconic Signage and a City’s Identity.” Accessed November 30, 2024, https://2020.sddesignweek.org/programs/talks-interviews-panels/iconic-signage-and-a-citys-identity-live/

WSDOT. n.d. “Crash Data Portal.” Accessed December 1, 2024, https://remoteapps.wsdot.wa.gov/highwaysafety/collision/data/portal/public/.