Virtual Site Tour (VST)

Improving design, collaboration, and accessibility in restoration projects

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INTRODUCTION

Challenge

Fish passage and stream restoration is a collaborative, interdisciplinary effort bringing together engineers, biologists, geomorphologists, comanagers, and policymakers. Success requires a great deal of coordination and shared language.

Objective

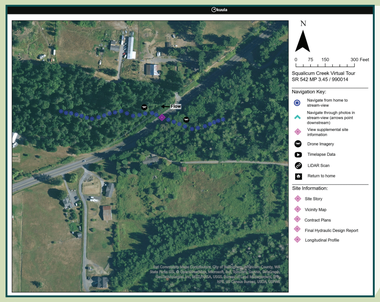
WSDOT State Hydraulics Office seeks to apply new and existing technologies to improve communication, collaboration, and documentation, and to address gaps in accessibility and inclusion.

Approach

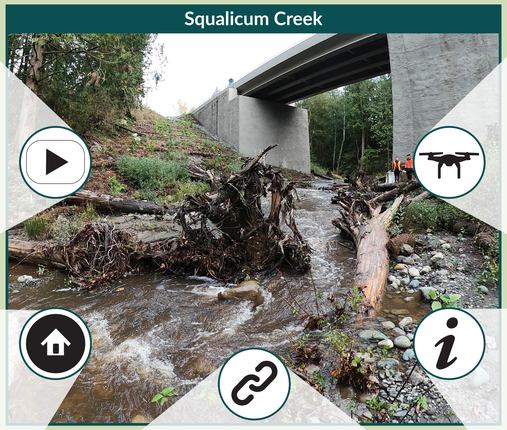
WSDOT is using 360 cameras and virtual tour software to create virtual site tours (VST) that blend various forms of media and data. A VST acts as a hub that functions as a living document and is updated continuously, through all project phases. VSTs improve cross-discipline and interagency communication for projects ranging from small culvert replacements to large engineered log jam installations.



Timelapse video



Home map

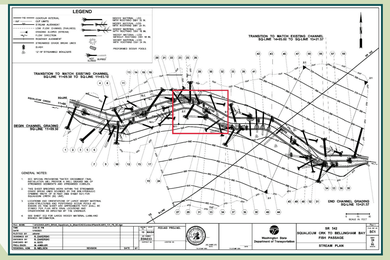




LiDAR/photogrammetry scans



Drone imagery



Plan sheets

TECHNOLOGY & PROCESS

Equipment

- 360 camera with tripod
- Virtual tour software (online platform)
- iPhone and Polycam or equivalent app (optional)

Data collection and processing

- Determine scope of VST based on intent, audience, and project stage
- Identify ideal site and weather conditions for collection (consider vegetation, flow, tidal influence, etc.)
- Collect 360 photos and LiDAR/photogrammetry scans
- Process photos and assemble virtual tour
- Add supplementary materials, e.g., LiDAR/photogrammetry, drone footage, timelapse, and standard site data—such as pebble counts, BFW measurements, and longitudinal profile.

IMPLEMENTATION AND DELIVERABLES

VSTs are tailored to project specific needs. A low-risk, low-complexity project can be conveyed by minimal 360 photo collection within the immediate project vicinity. A VST for a high-risk, high-complexity site is more expansive, consisting of extensive 360 photo collection paired with supplementary materials.

SR 119 MP 7.80 Unnamed Tributary to Lake Cushman

This VST captures existing conditions in the design phase of a project with unique geomorphic, geologic, and hydrological constraints. The VST highlights complexities such as a 10.5-foot arrested headcut, geologic contacts and a potential fault line, units, upstream wetland complexes with beaver activity, and downstream water surface fluctuations caused by dam operations Additionally, this site is remote and difficult to traverse. The VST is used to "return to site" during discussion among designers and comanagers.

SR 542 MP 3.45 Squalicum Creek

This VST documents the post-construction site conditions of the SR 542 Squalicum Creek crossing through 360 imagery and supplementary materials, including drone imagery, timelapse data, design documentation, and LiDAR scans. This VST showcases the current state of LWM design and aids WSDOT in site monitoring efforts, ultimately informing future design.

Use the QR code to access examples of WSDOT VSTs.

Design phase example: SR 119 MP 7.80 Unnamed Tributary to Lake Cushman

Post-construction phase example: SR 542 MP 3.45 Squalicum Creek

DISCUSSION

Successes

- VSTs reduce the number of site visits, lowering cost, time, carbon emissions, and foot traffic in sensitive habitat.
- Necessary equipment is relatively affordable, and process/workflow is intuitive.
- Robust site monitoring technique.
- Deliverables are easily distributed and navigated.
- VSTs increase accessibility for sites that are remote and/or physically challenging to traverse.

Limitations

- VSTs do not replace the need for in-person site visits. In-person site visits are critical to inform design.
- 360 photo quality limits the level of detail and information shared in VSTs (e.g. decreased photo resolution when using online tour platforms or in low-light situations).

CONCLUSION

VSTs are an effective communication tool that assist in coordination efforts among designers and with comanagers. Overall, this practice has been met with early success and our team is building an advanced workflow to share with others. These products and efforts will adapt as we test the applicability and value of different technologies to improve upon VSTs.

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