

After many years of planning, design, and construction, the lands and waters of the Steigerwald National Wildlife Refuge were reconnected to the Columbia River for the first time in 60 years. To make this happen the team overcame significant agency challenges.

Steigerwald Floodplain Reconnection

Two reasons the project may not have happened

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Challenge 1

The Project removed a USACE levee protecting a five-mile-long segment of Washington SR-14. WSDOT initially expressed support for the project following the feasibility study; however, they rescinded support after reviewing the 30% design plans with concerns of new risks to SR-14.

Challenge 2

US Army Corps of Engineers required assurance that Columbia River and Gibbons Creek flood risk reduction would remain for at least 50 years.



Loss of Critical Stakeholder Support

Following the delivery of the 30% design plans (Feb. 2016), WSDOT formally withdrew their support for the project, detailing concerns the project would not provide the same level of flood protection to SR14 as the existing levee system.



Regaining Support

The revised 30% design (July 2016) not only addressed WSDOT's direct concerns of flood and erosion risk with the proposed road raise and vegetated berm, but also showed the benefit of increased conveyance and sediment transport in the re-designed Gibbons Creek channel. Together these factors re-affirmed the support of WSDOT.

Meeting USACE Requirements:

- One-dimensional sediment transport modeling (HEC-RAS) quasi-unsteady state mode
- Dynamic bed change only; no overbank transport
- Synthesized hydrographs representing 50-year record
- 9 bed sediment sample locations for model input data
- Calibration to 16-year sediment maintenance (dredging) records

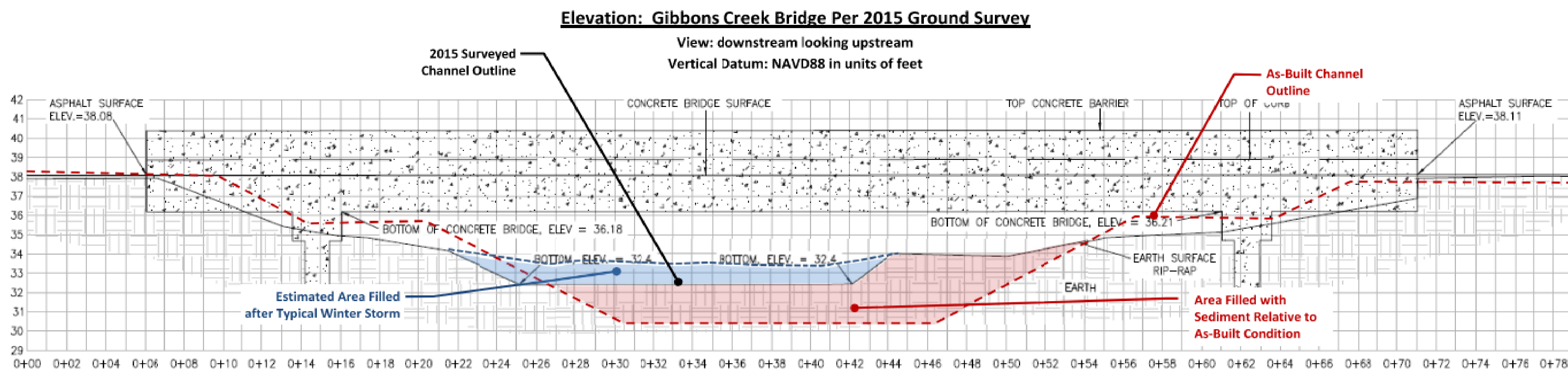
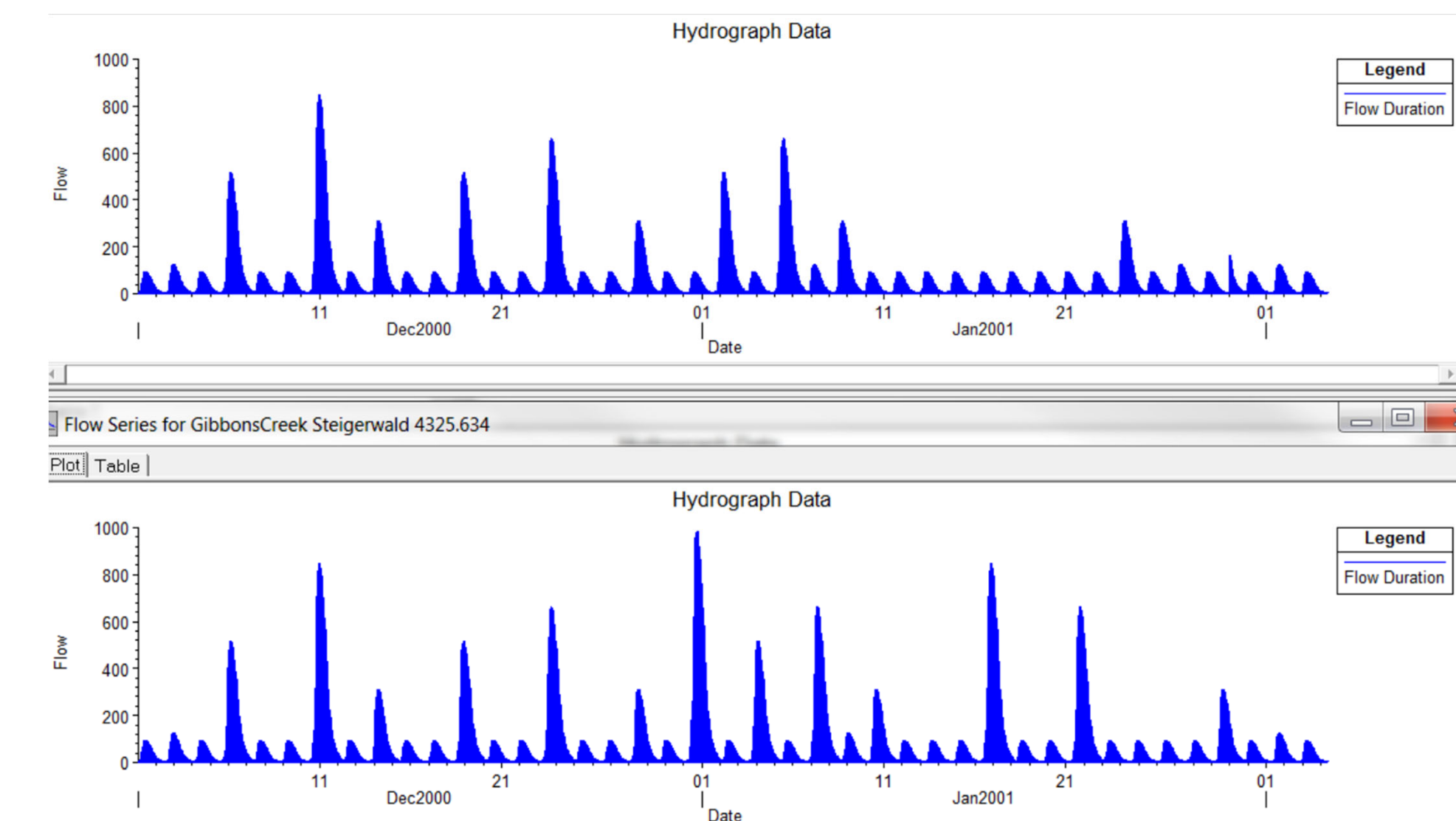
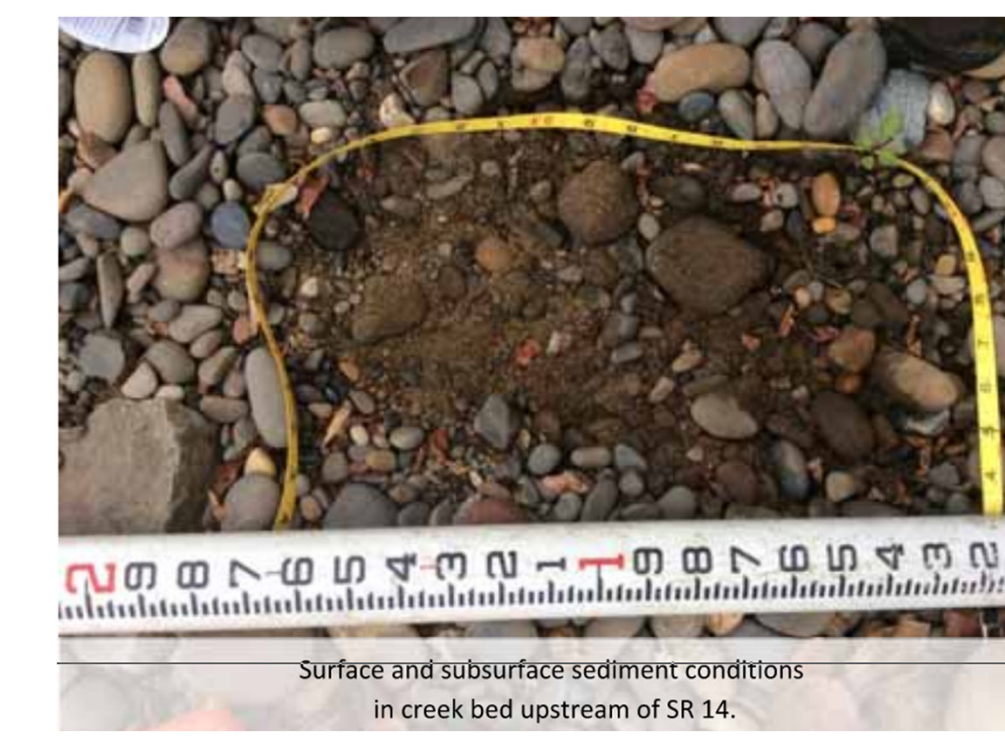
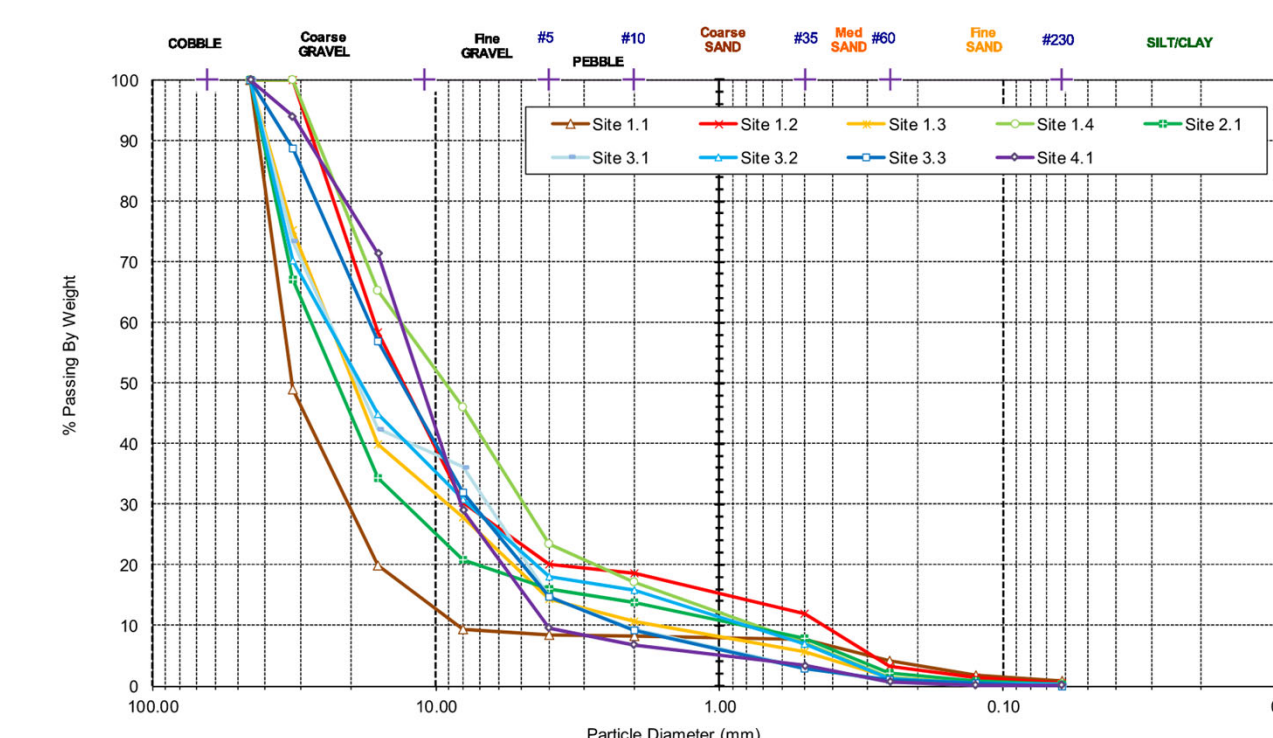
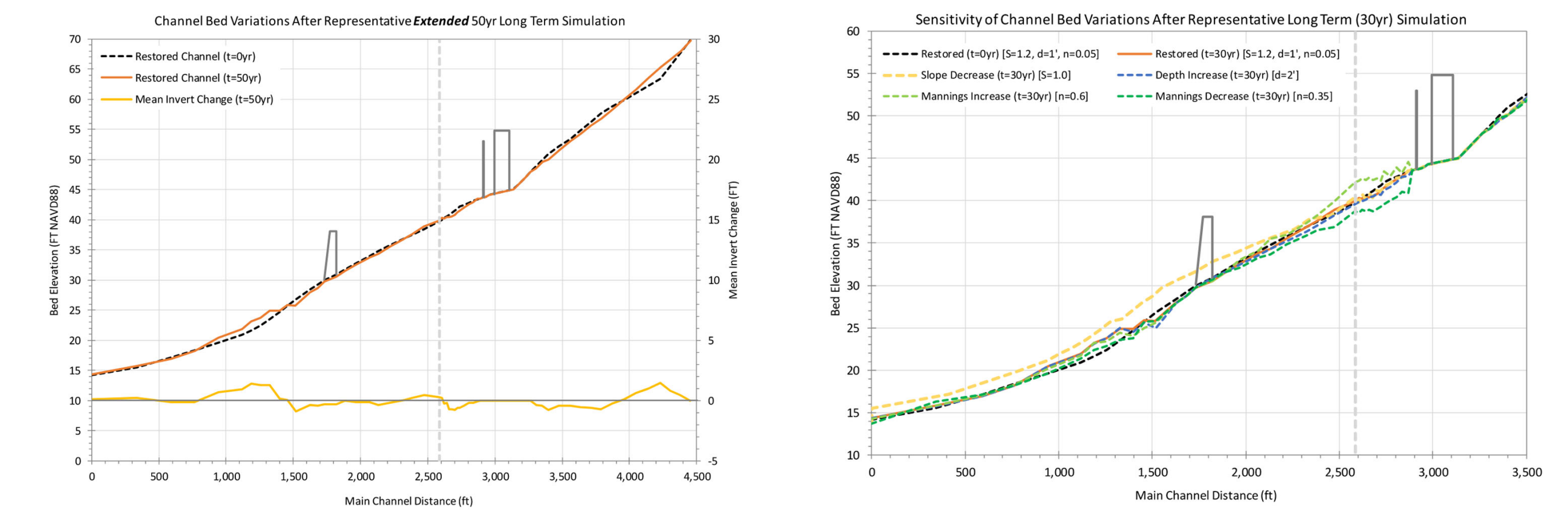


Figure 1. Diagram of as-constructed (1971) Gibbons Creek channel at the SR-14 bridge compared the channel cross-section surveyed in 2015 showing the severely reduced capacity requiring regular dredging to maintain.

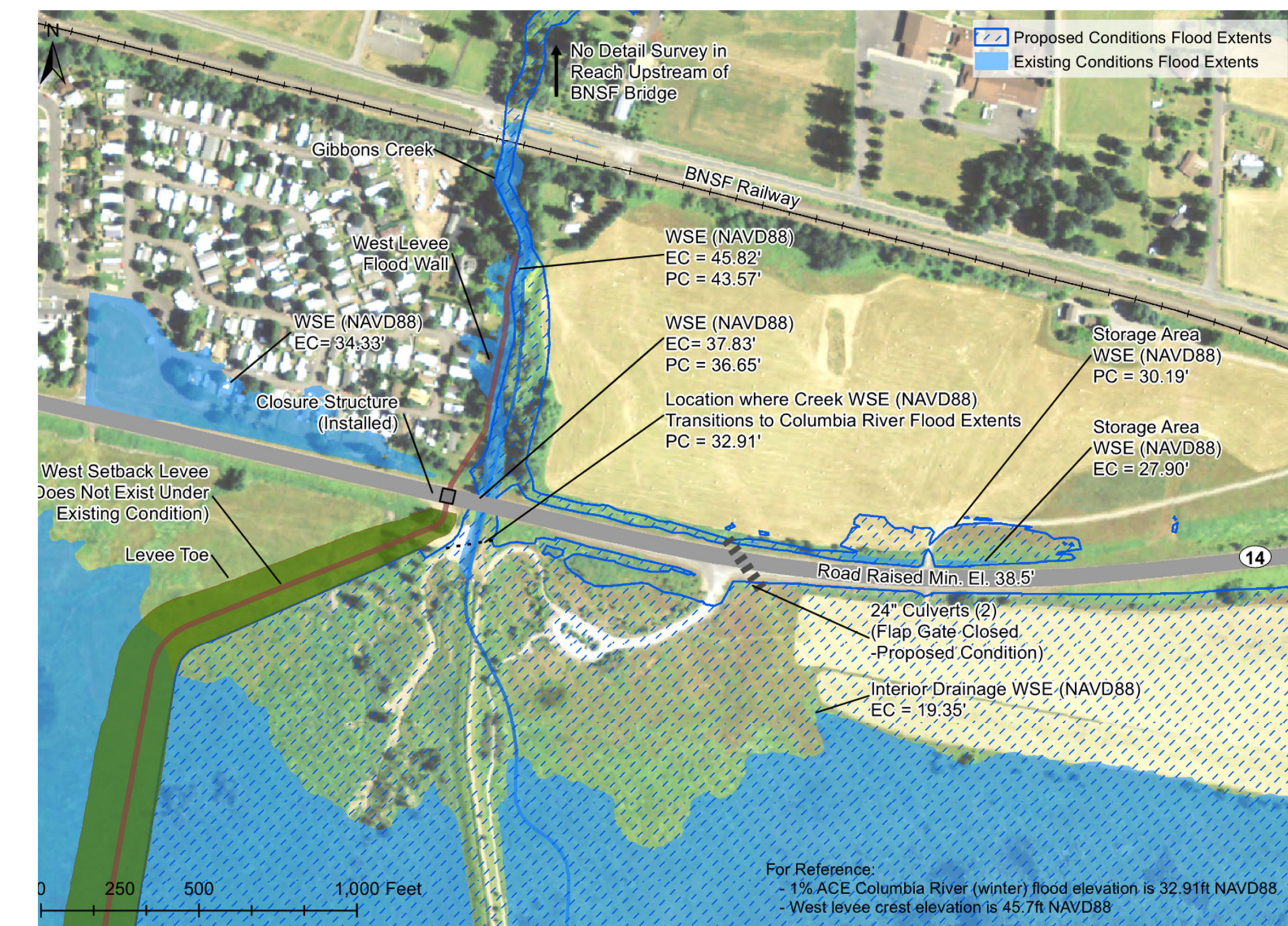
Demonstration of:

- Successful 30- and 50-year simulations
- Slight to moderate underprediction of observed bedload transport (from dredging records)
- No appreciable aggradation (or erosion) over the long term
- Future flood risk reduction (flood water levels) did not change even under sensitivity scenarios



Implications:

- Passed Independent Expert Peer Review (IEPR), USACE technical team review, and Safety Assurance Review (SAR)
- Section 408 approval granted!
- Minor, episodic bed elevation changes in the creek after two years of observation



WSDOT Concerns:

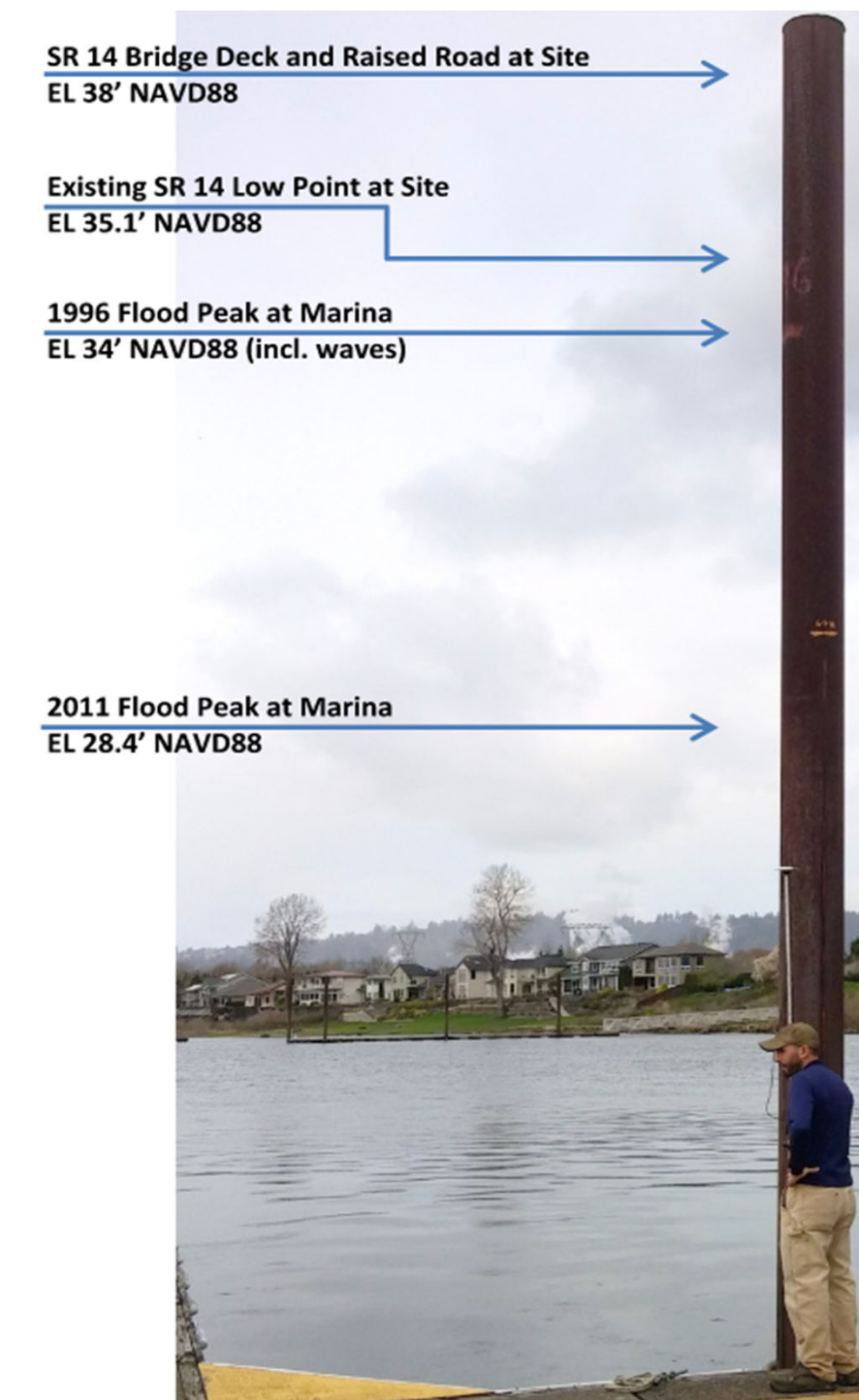
- Removal of the levee would result in **overtopping** of SR14 during a 1% ACE flood event.
- Exposure of the SR14 road embankment to flood events would create a risk of **wind-wave erosion** to the highway embankment.

Analyses:

- Analysis of **historic flood stage data** and Columbia River flood profiles.
- **Wind-wave modeling** and erosion risk assessment.
- 1D HEC-RAS mobile bed **sediment transport modeling**.

Solutions:

- **Raise the low-point of the SR14 roadway** above the 0.02% (500-yr) ACE Flood elevation.
- Construct a **vegetated wave runoff berm** to protect the highway embankment.
- Improve **Gibbons Creek conveyance** to reduce right-of-way (ROW) risk and maintenance.



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