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Responsive, High-Quality, Creative

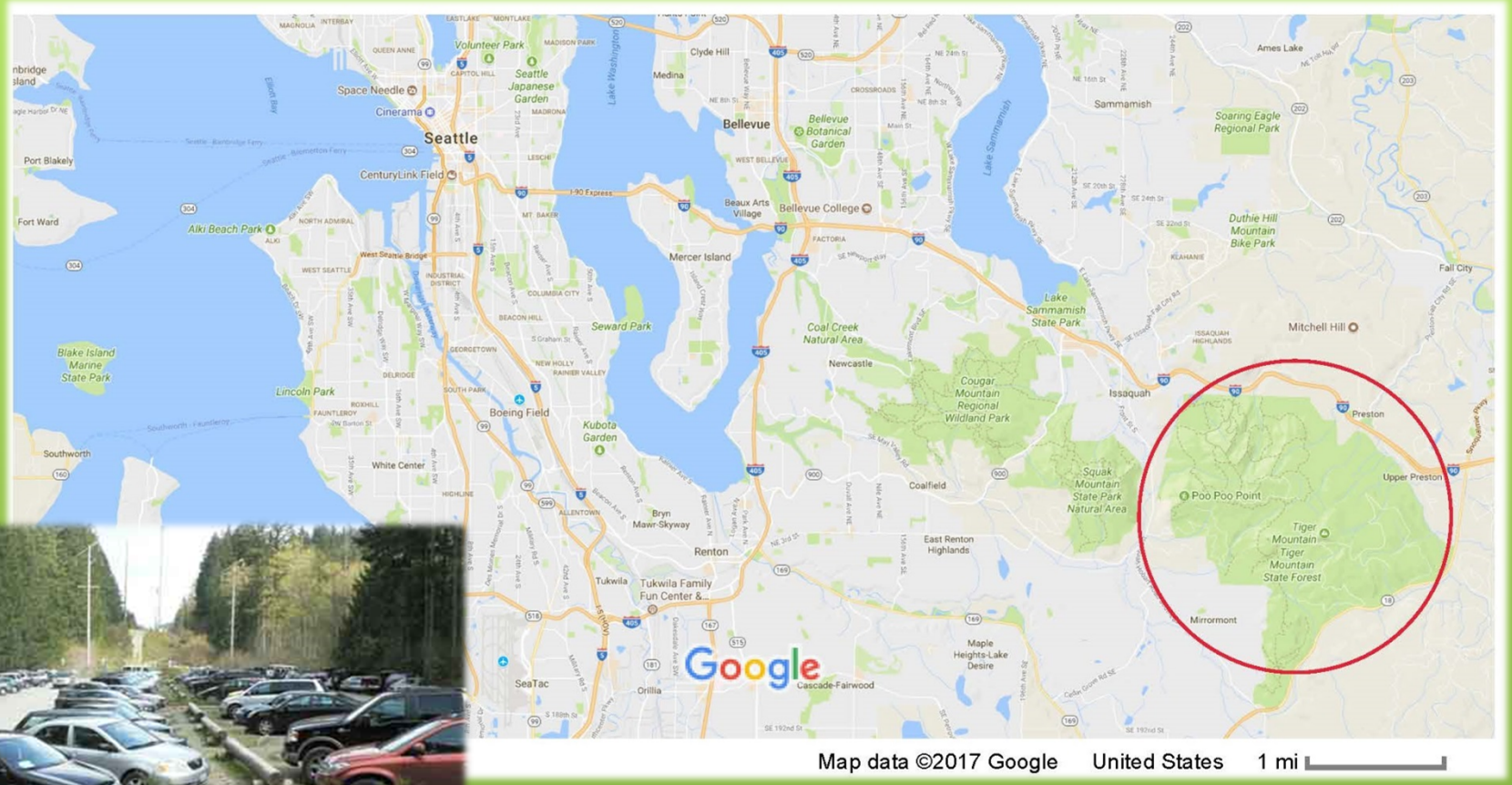
Murat's (Lower High Point) Bridge

Presenters:

Jim Patton
(State of Washington)

Jane Li
(RHC Engineering)

Tiger Mountain State Forest attracts thousands of hikers and mountain bikers on summer weekends.



The 'Issaquah Alps' is a major Front Country Destination.

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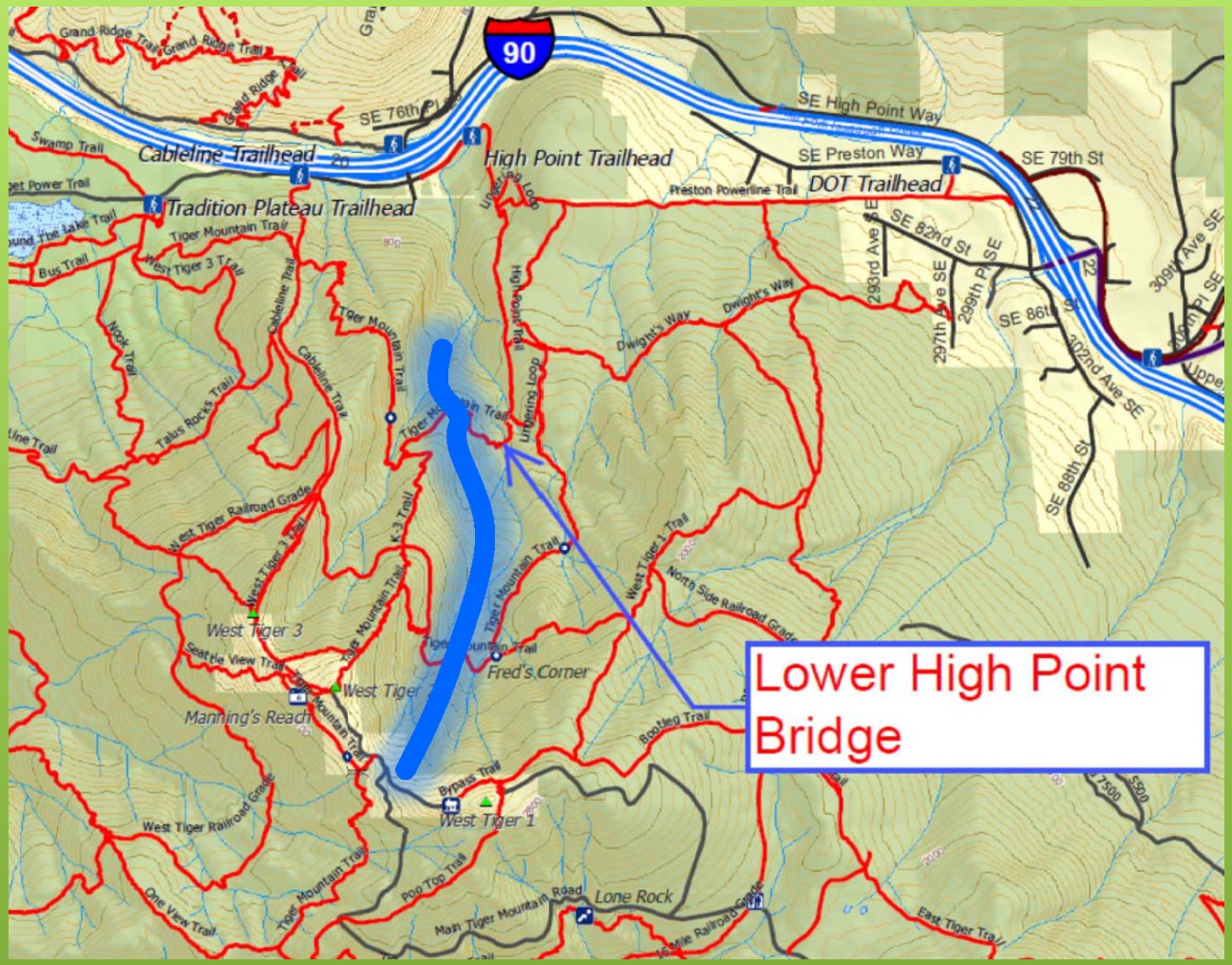
It had a popular looped trail system



that was bisected by flood in 2009.

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The public asked for a solution.

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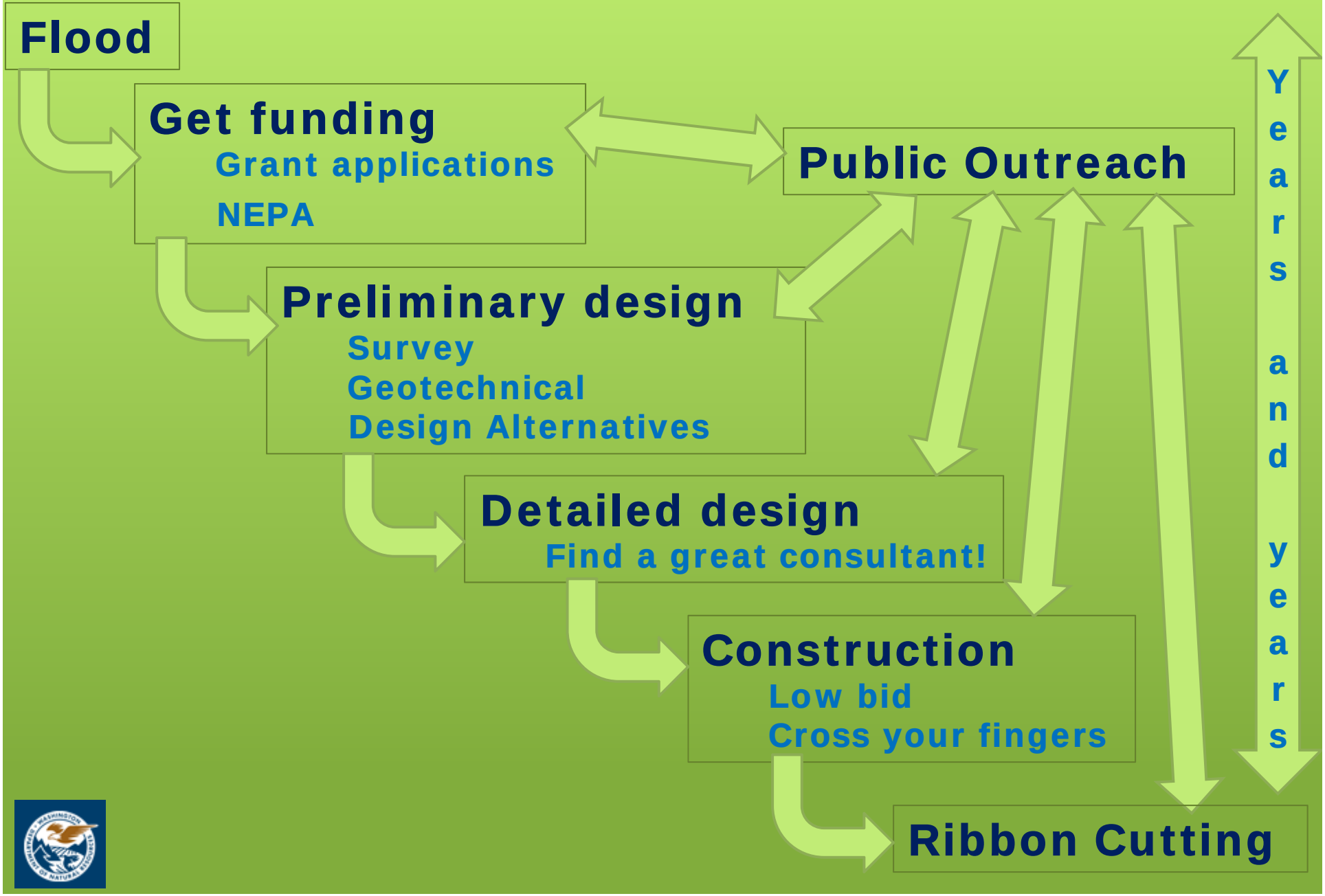
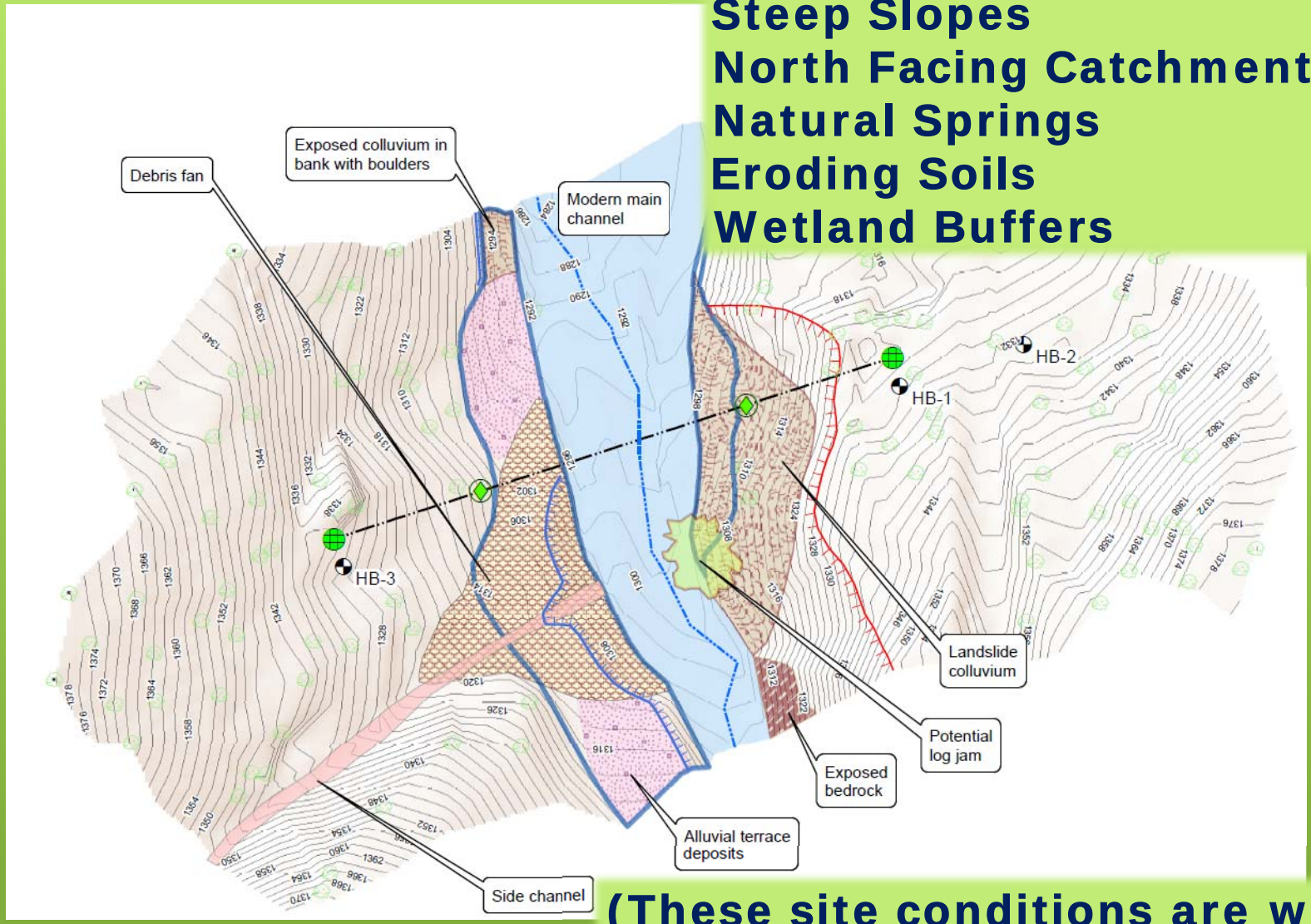
So DNR started working on it.



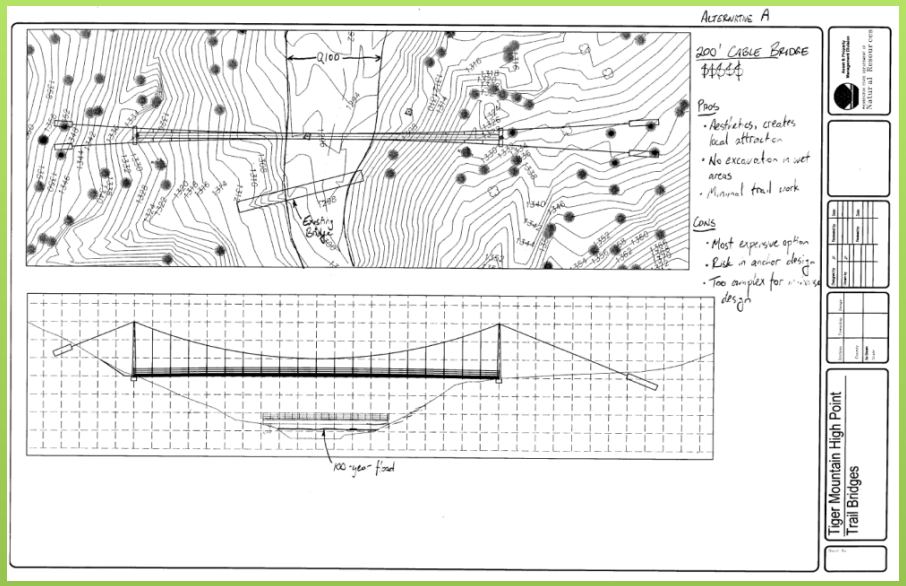
Site conditions were difficult.

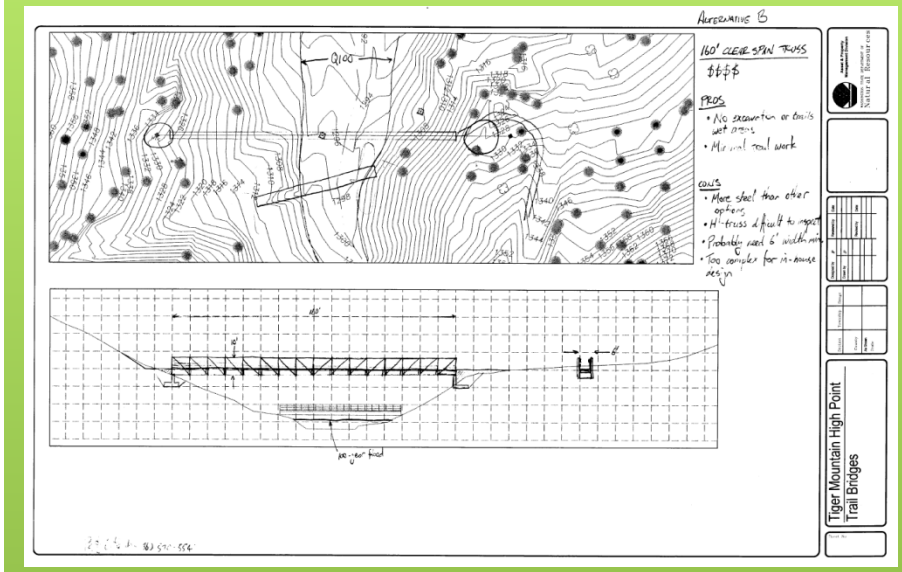
Steep Slopes
North Facing Catchment
Natural Springs
Eroding Soils
Wetland Buffers

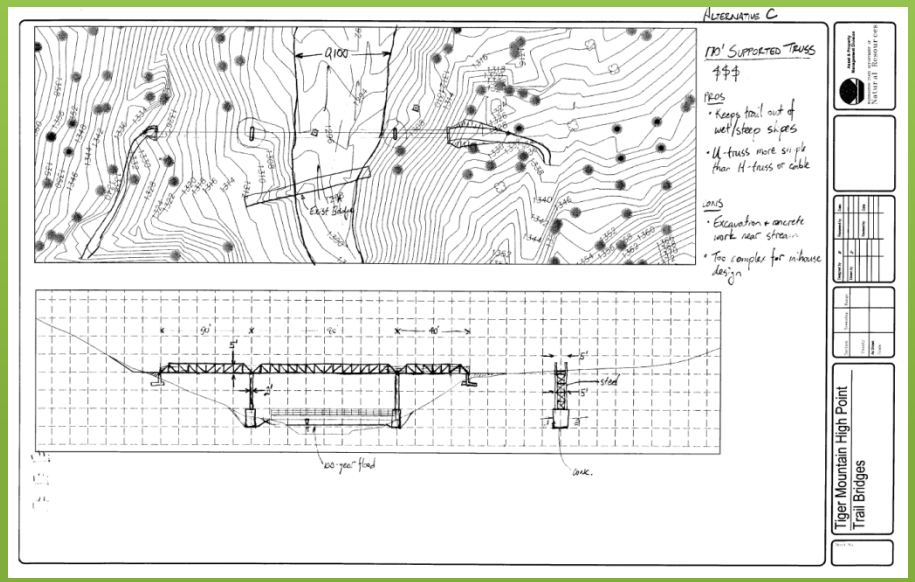


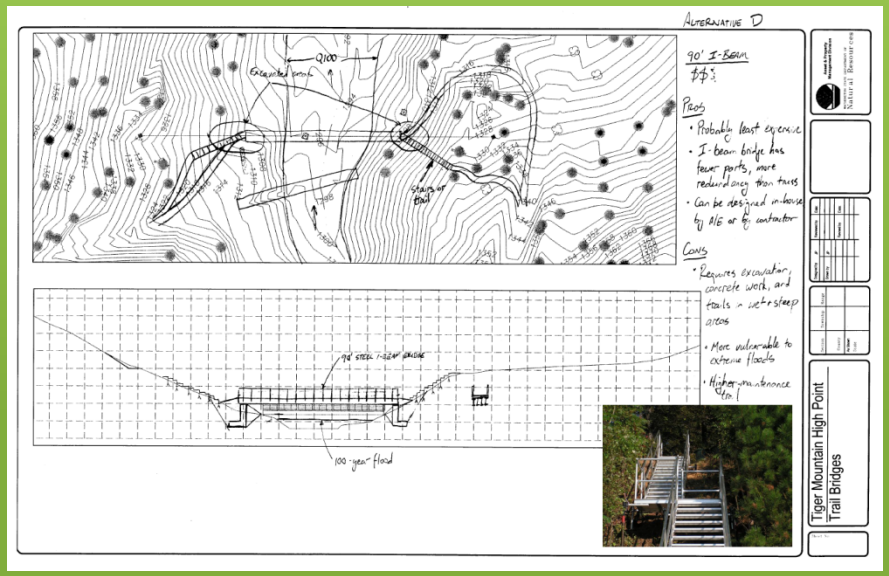
(These site conditions are why the bridge went out in the first place.)

Preliminary design alternatives:

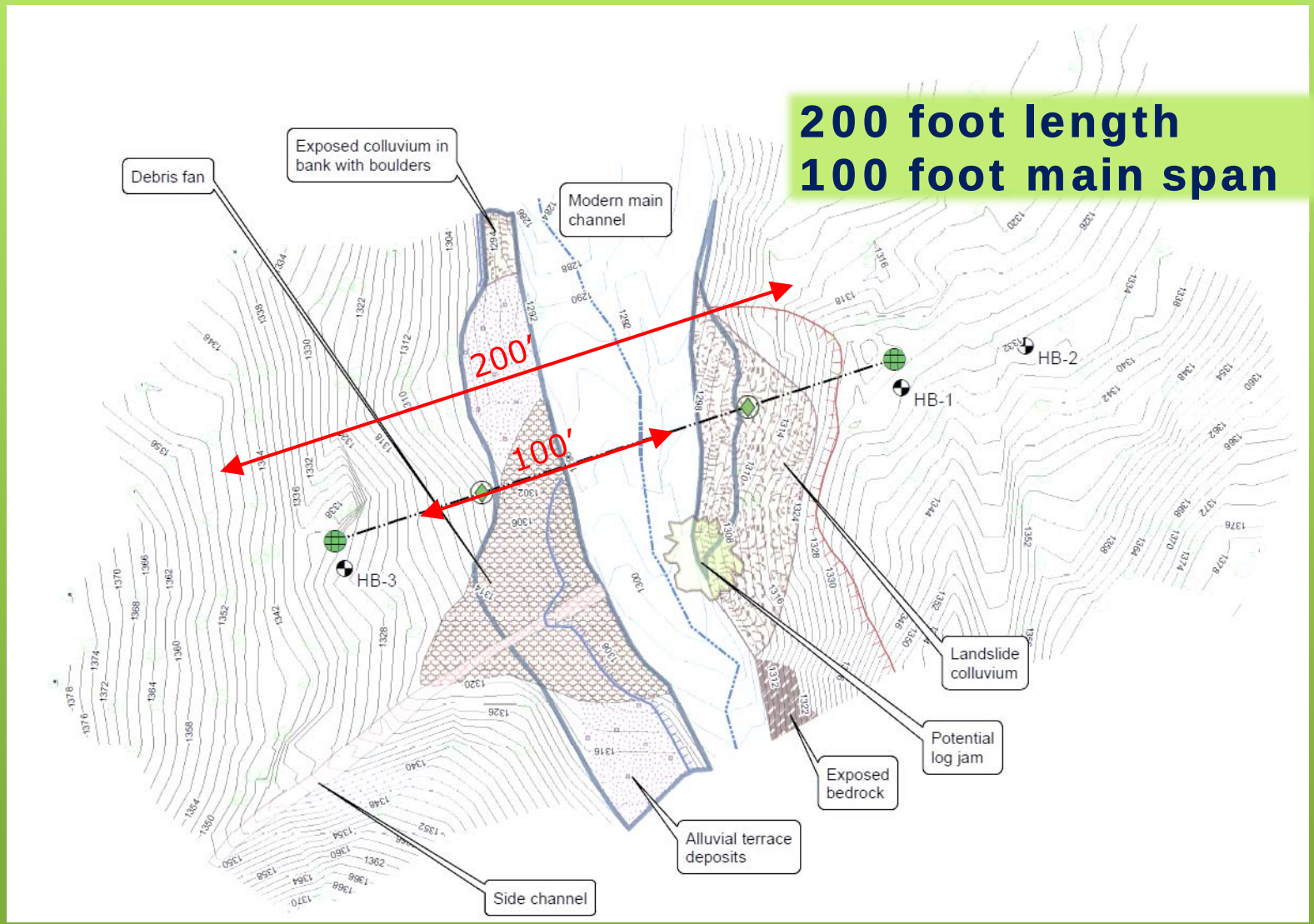








Site conditions set the length and span of the replacement bridge.



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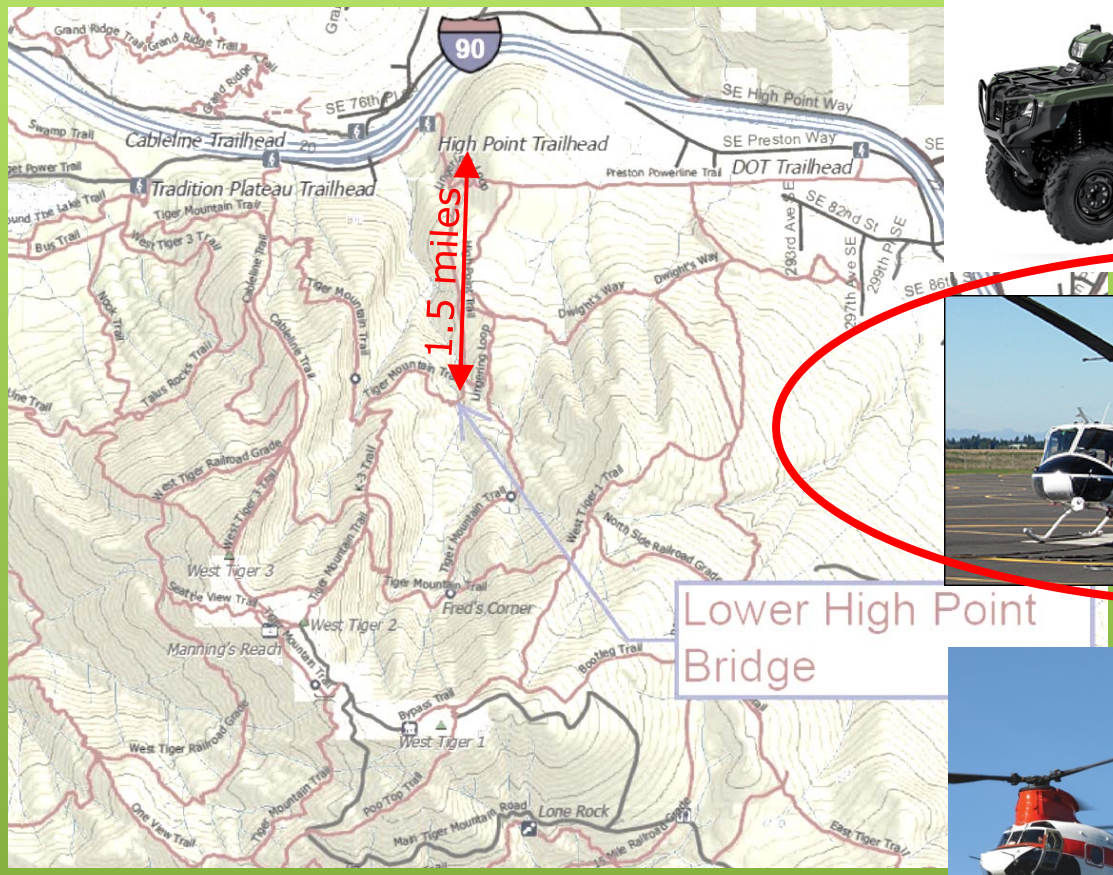
The remote location guided design.



ATV
$100/day
200 lbs

Bell UH-1
$8,000/day
3,400 lbs

Chinook
$30,000/day
26,000 lbs

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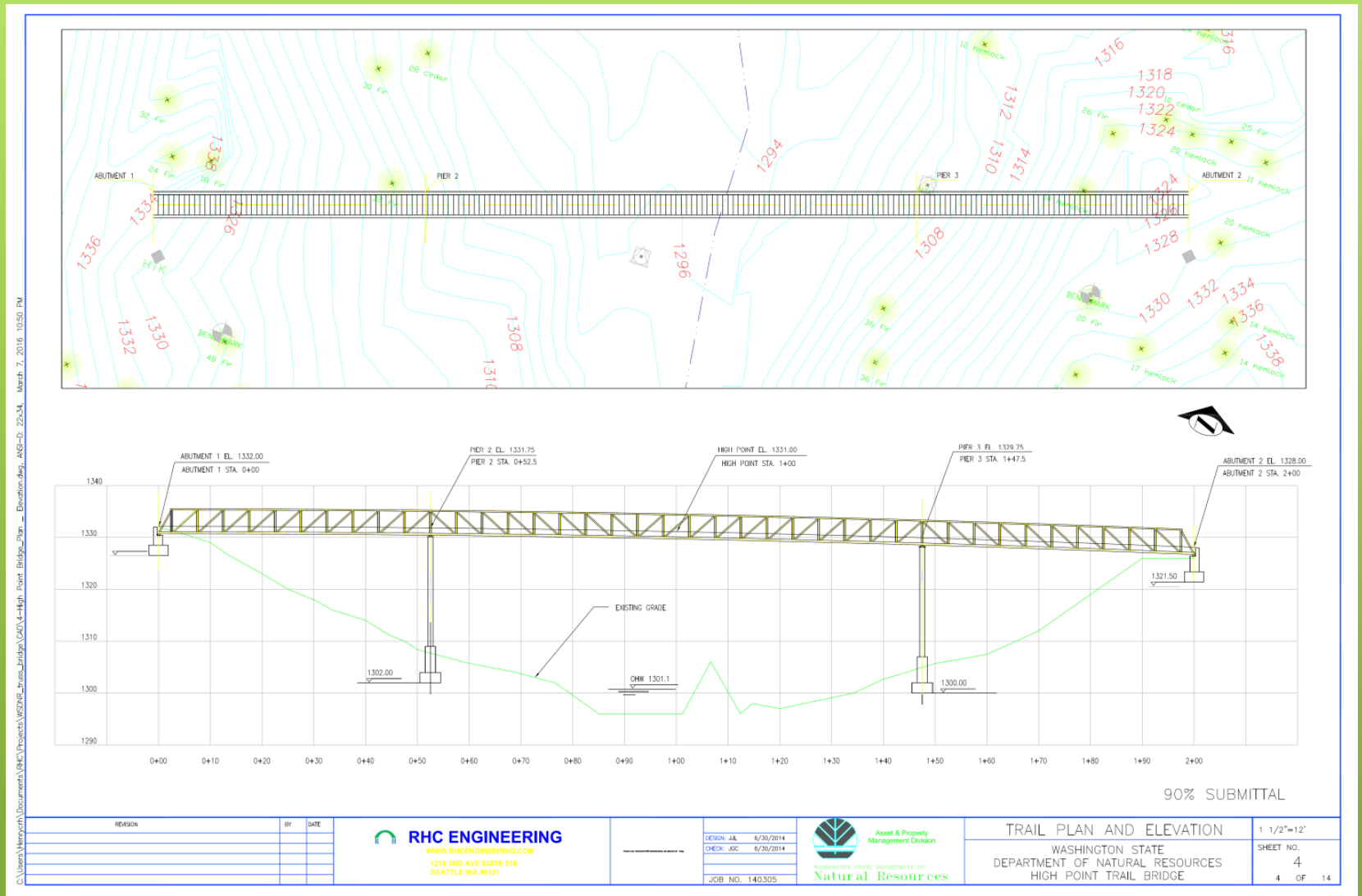
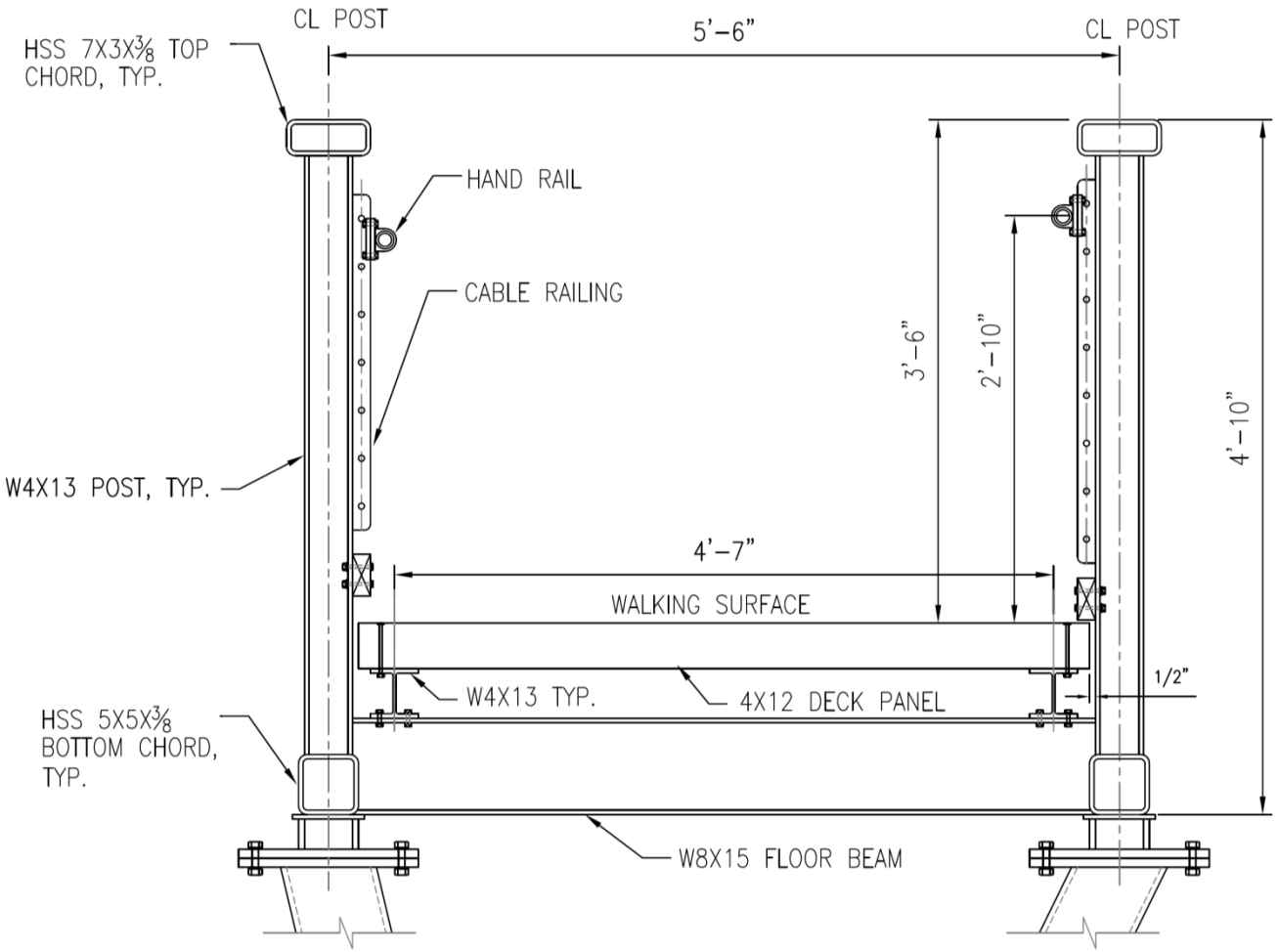
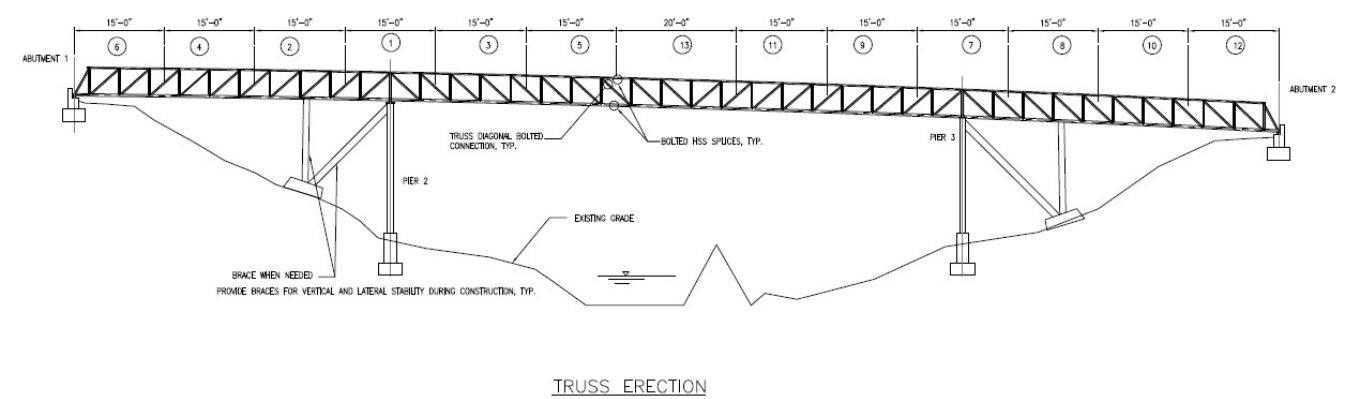
Bridge is 30 ft. above the creek with foundations outside of bank erosion zones



Bridge is narrow to just meet the needs and reduce lift weight



A segmental, continuous span truss provided strength and low pick weight.



TRUSS ERECTION

13 truss sections
Field-bolted splices
Maximum 3,400 lbs per lift

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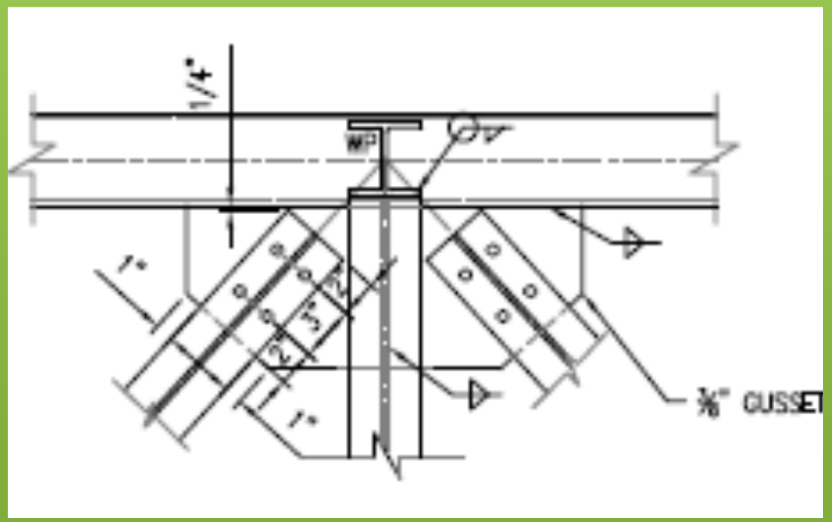
Connection Design Refinement

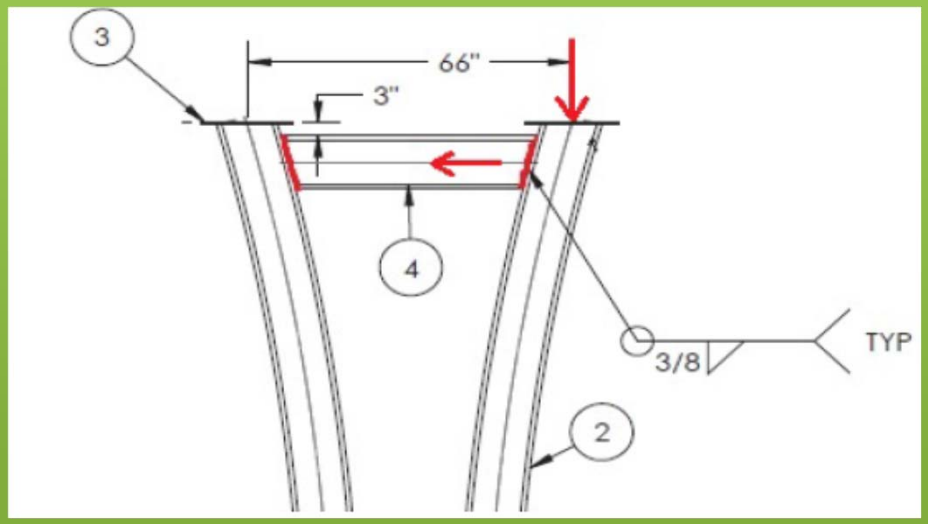
Gusset Plates

FHWA Guideline and WSDOT Triage Evaluation

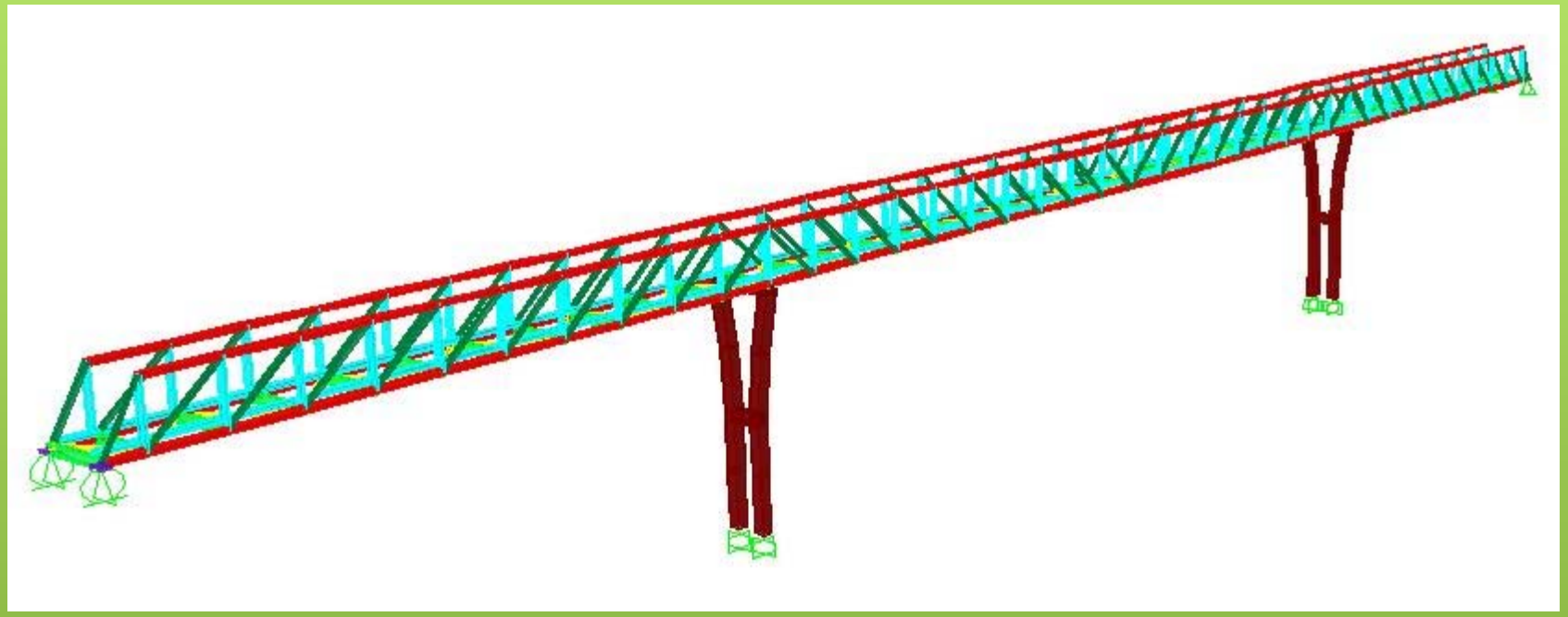
Steel Tube Connections

CDET Design Guide for Circular and Rectangular Hollow Section Welded Joints





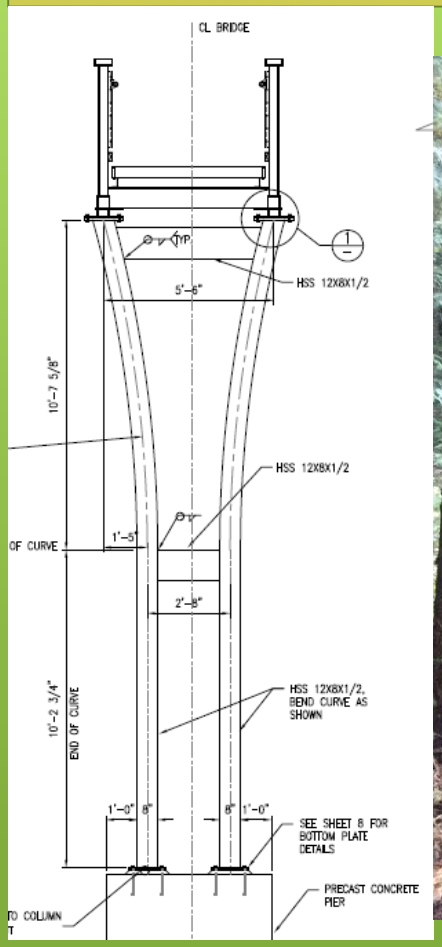
Seismic and wind design required 3D finite element analysis



- AASHTO GUIDE SPECIFICATIONS FOR LRFD SEISMIC BRIDGE DESIGN
- AASHTO STANDARD SPECIFICATIONS FOR STRUCTURAL SUPPORTS FOR HIGHWAY SIGNS, LUMINARIES, AND TRAFFIC SIGNALS FOR WIND DESIGN

Small, shallow, cast-in-place foundations minimized material delivery and earthwork.

Pier column stiffness was optimized for lateral loads.



Bearing plate bolt yielding protects superstructure even with the loss of one pier.

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Steel and formwork in place.

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Concrete poured by helicopter.

Concrete poured by helicopter.

NGJR2316.MOV

Concrete poured by helicopter.

- 200 foot long line.
- Two buckets, approx. ½ CY each.
- One pour every 5 minutes.

VNIP4127.MOV

Skyline anchored to trees.

Cable tension approximately 10X payload.

Truss was carried on skyline.

Remote control, 12V battery operated travelers.

Steel working platform carried on skyline.

Truss was assembled from one end toward the other


HIGH POINT TRAIL
TIGER MOUNTAIN TRAIL
TRADITION PLATEAU 2.6M
WEST TIGER #2 VIEWPOINT 2.0M
ISSAQUAH-HOBART ROAD 13.4M

Deck attachment allows flexibility in timber size and spacing.

Project Team:

Funding:
- FEMA
- NOVA Grant
- Private Contributions

Owner: WSDNR
- Project engineer: Jim Patton
- Region Manager: Sam Jarrett
- (and many others)

NEPA:
AECOM

Design Engineer: RHC
- Jane Li

Geotechnical:
Shannon & Wilson

Contractor: D&H Enterprises
- Darrel Gaydeski

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Thank you!

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