

A photograph of a flooded landscape. In the background, a dense forest of bare trees covers a hill. In the middle ground, a large body of water (flooded field or pond) reflects the sky. On the left side of the water, a white barn with a red roof and a tall white silo are visible. The foreground shows a grassy area with some trees and a fence line. The overall scene is hazy and overcast.

Flood Reduction Facility / Airport Levee Raise - Review

October 3, 2019

Review and Refinement of the Project

- Ecology and USACE preparation of the EISs underway
- Agencies have formally requested clarification of several aspects of the projects
 - Purpose and Need
 - Design Configuration, Construction and Operation Procedures

Purpose and Need

Statement of Purpose and Need:

- Flood Retention Facility (FRE) detains flood water very occasionally (estimated once every 7 yrs)
- FRE effectively reduces flood stage throughout Chehalis Valley during major flood events
- FRE does not regulate or detain water during typical annual high flow events
- FRE reduces monetary and infrastructure damage and impacts for major flood events
- FRE does not expand floodplain limits DS

Design Configuration, Construction, and Operation Procedures

- 13 – 28% of major floods as measured at Grand Mound is contributed from the watershed upstream of the proposed facility site
- Narrow stream channel through bedrock constriction naturally controls riverine processes
- Favorable foundation construction conditions
- Minimal infrastructure impacts upstream of FRE site

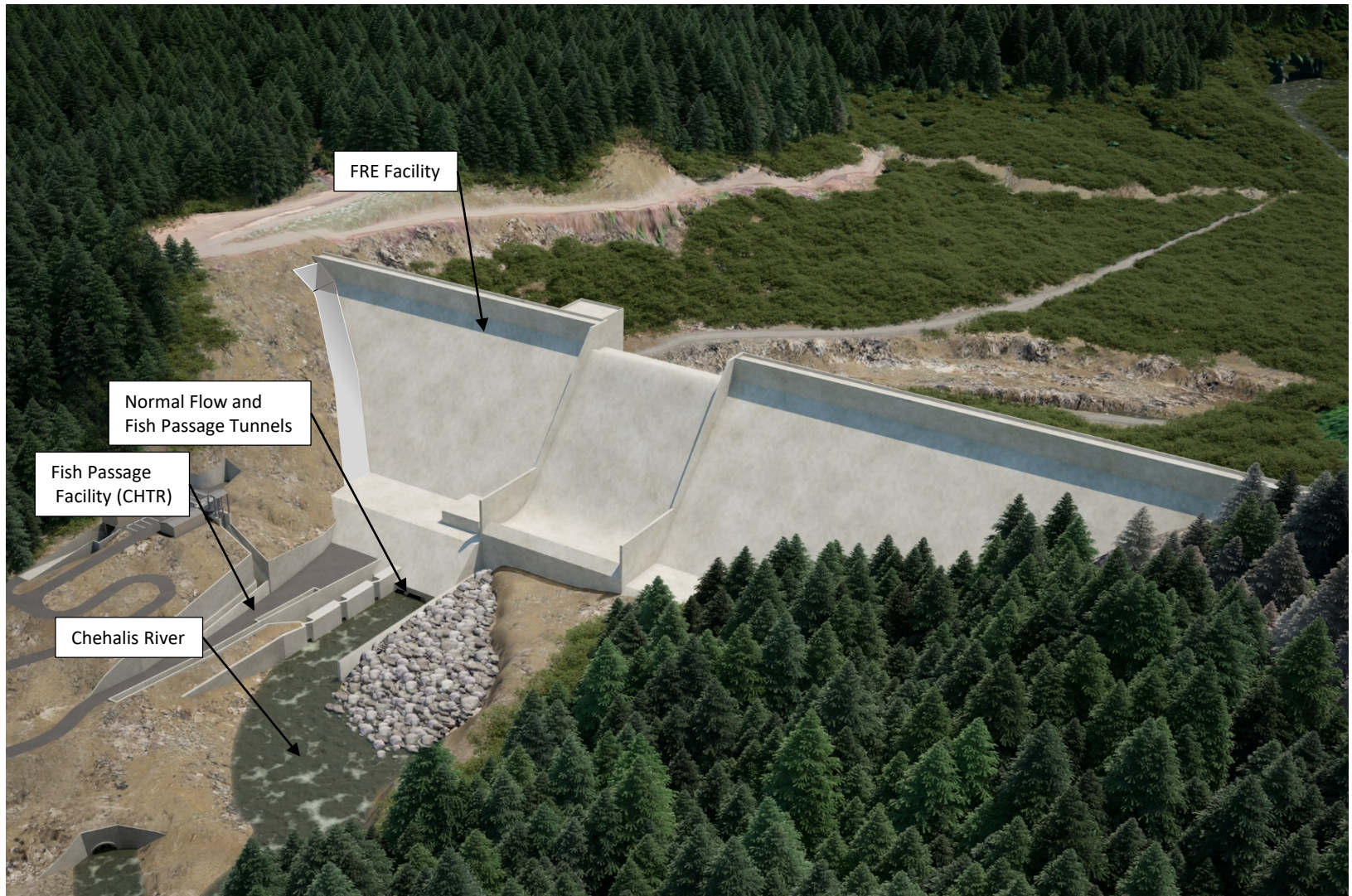
Source: Summarized in November 30, 2018 Letter from the Chehalis Basin Flood Control Zone District to the US Army Corp of Engineers.

Proposed Flood Retention Facility Site

Narrow, bedrock-
constricted site



Proposed Flood Retention Facility

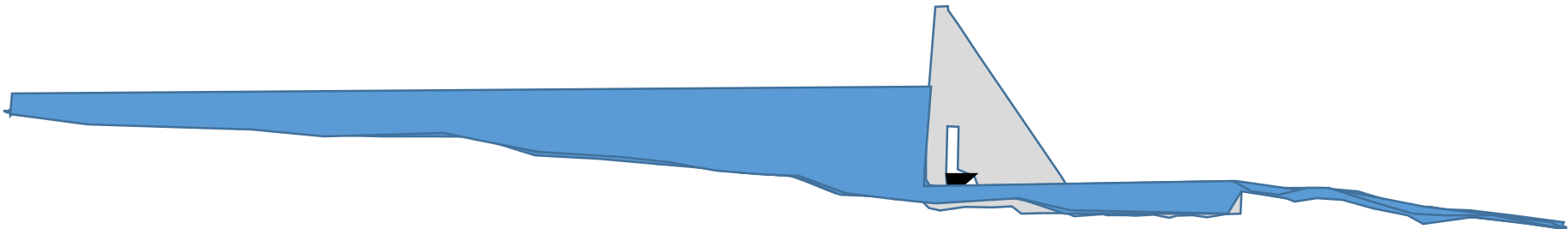


Goals of the Flood Retention Facility

- Temporary flood flow detention
- Riverine process throughput
- Maintain slope stability in the temporary inundation areas behind the dam reservoir
- Ramping rates commensurate with habitat needs
- Debris management in inundation area
- Minimize construction and operation impacts

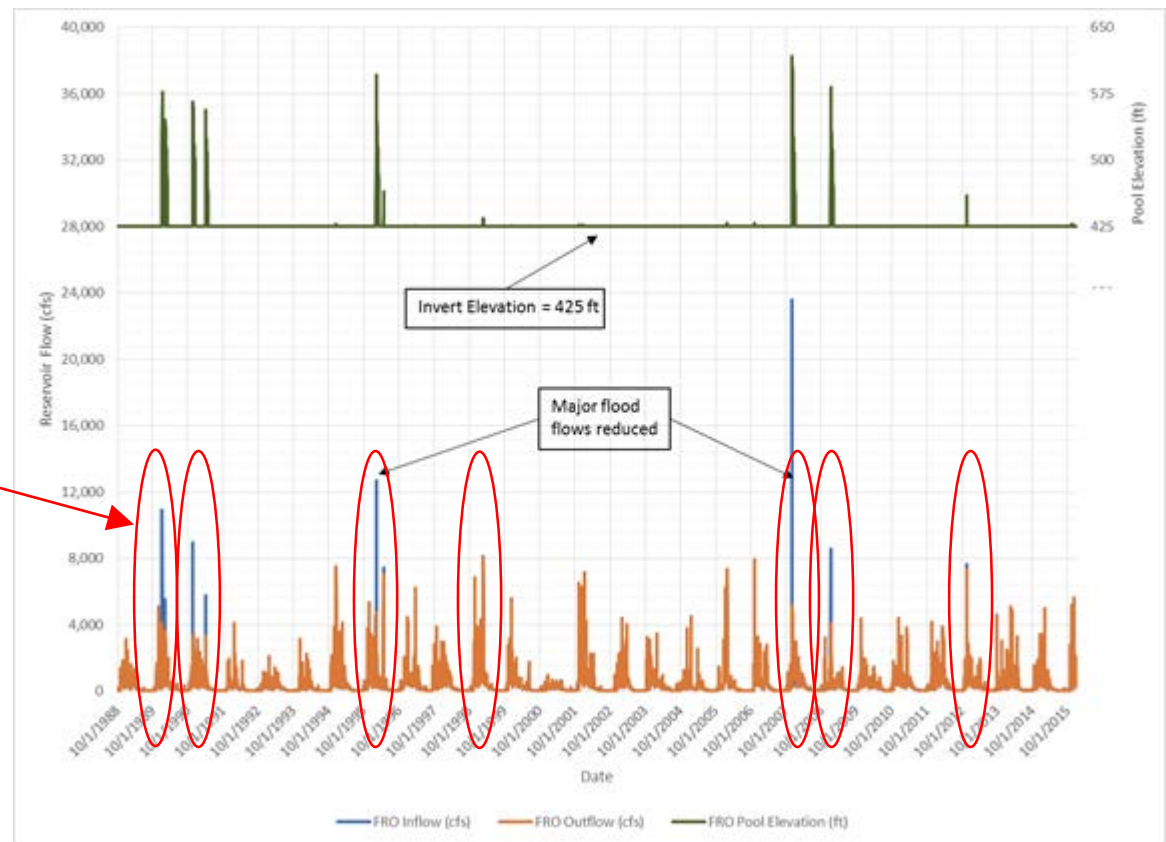
Proposed Facility Operating Rules

- Available flood storage capacity = 65,000 acre-feet
- All passages open except during infrequent large floods (approx. every 7 years)
- Regulation only begins if 'major' flood predicted



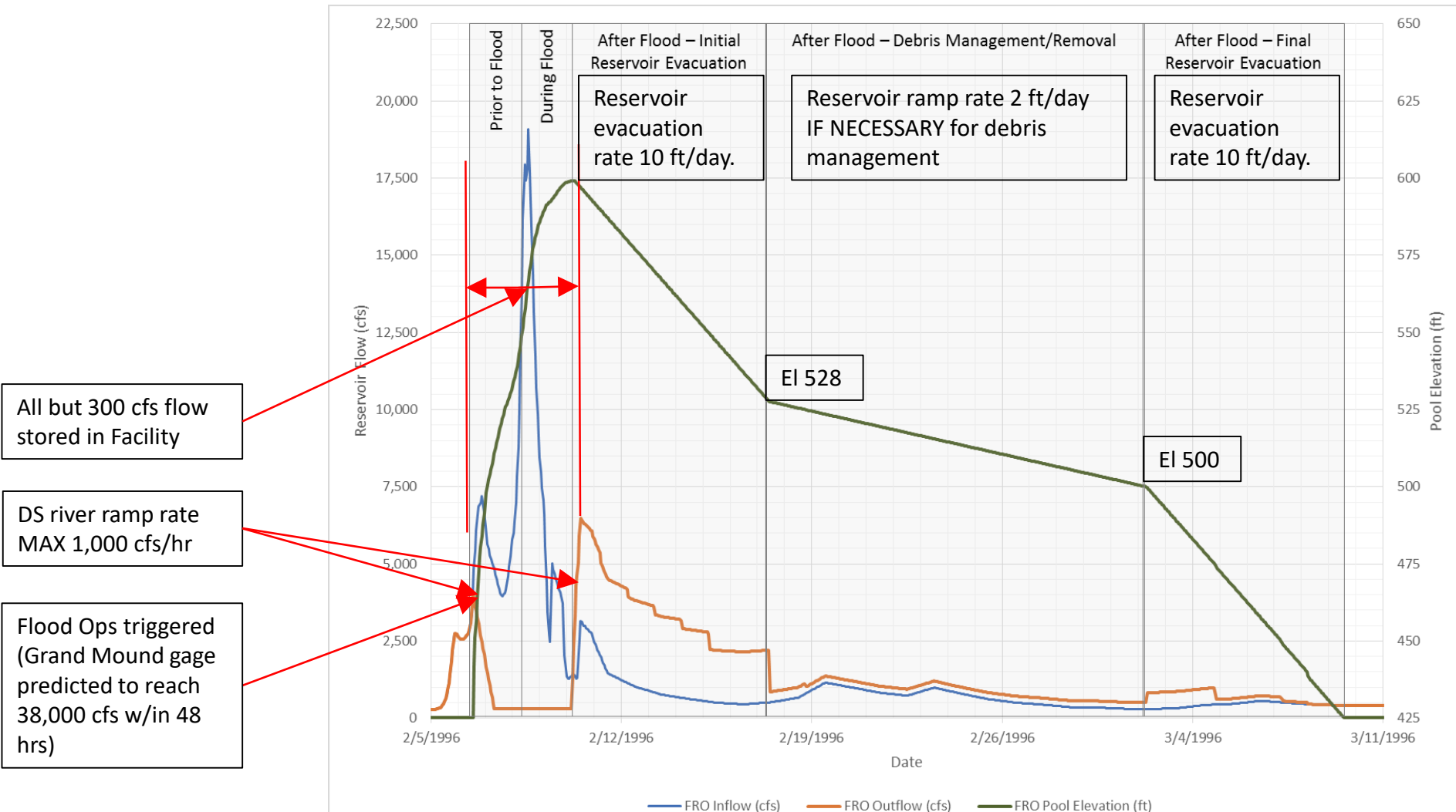
How Often Does a Major Flood Occur ?

FRO would likely have operated during these events over past 30+ years



Source: Chehalis Basin Strategy – Operations Plan for Flood Retention Facilities. Anchor QEA, June 2017

Flood Operations – Major Flood Event



Source: Chehalis Basin Strategy – Operations Plan for Flood Retention Facilities. Anchor QEA, June 2017

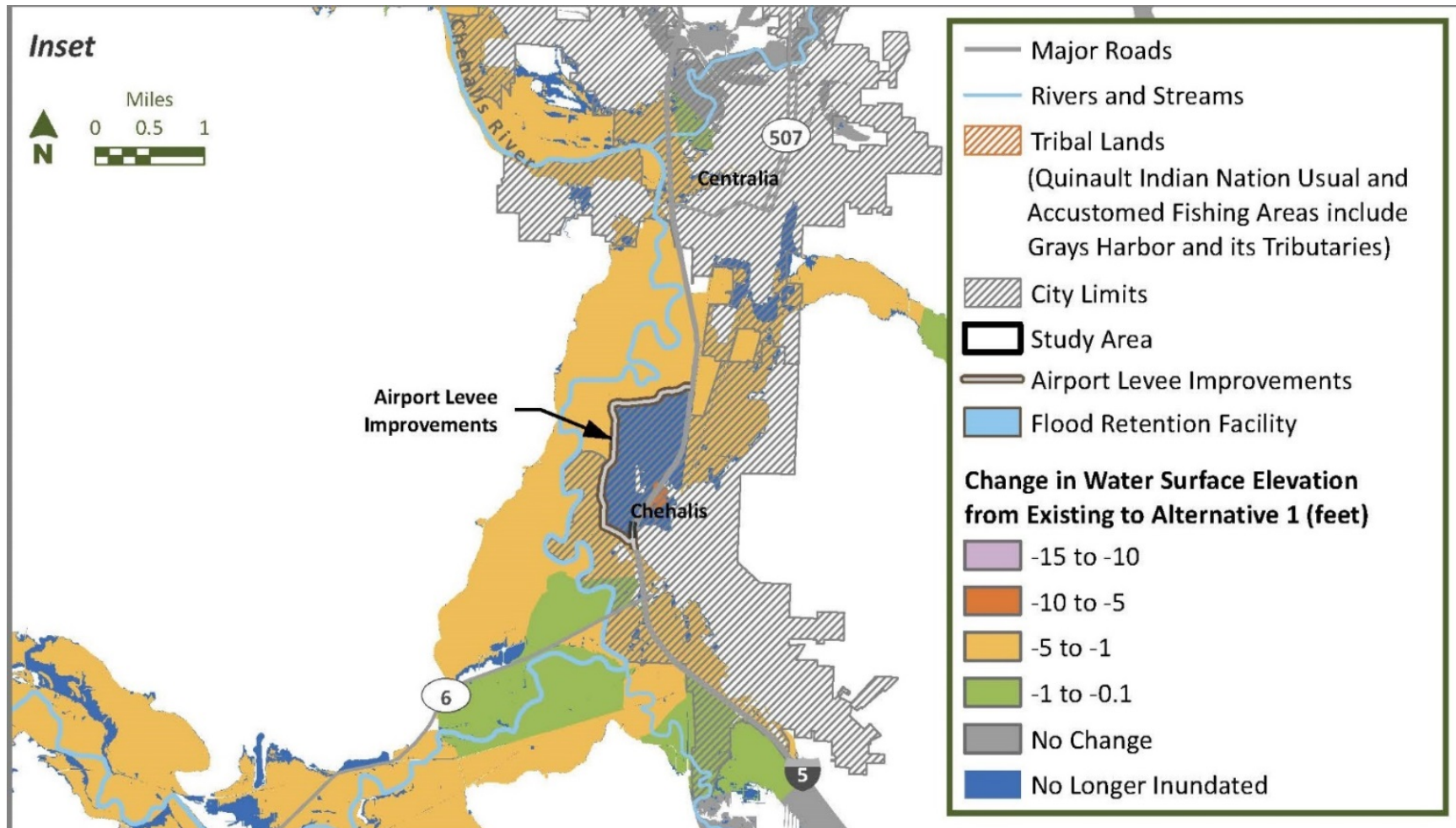
How Much are Peak Flows Reduced During Major Floods ?

Grand Mound gage peak flows reduction

FLOOD	PEAK FLOW WITHOUT FLOOD RETENTION (CFS)	PEAK FLOW WITH FLOOD RETENTION (CFS)	DIFFERENCE IN PEAK FLOW (%)
100-year	70,600	58,400	-17.3%
10-year	43,800	37,500	-14.4%
1996	72,100	61,200	-8.5%
2007	71,100	52,100	-26.7%
2009	57,300	48,600	-15.2%

Source: Chehalis Basin Strategy Flood Retention Facility EIS documents

How Much would 100-year Flood Elevations be Reduced ?

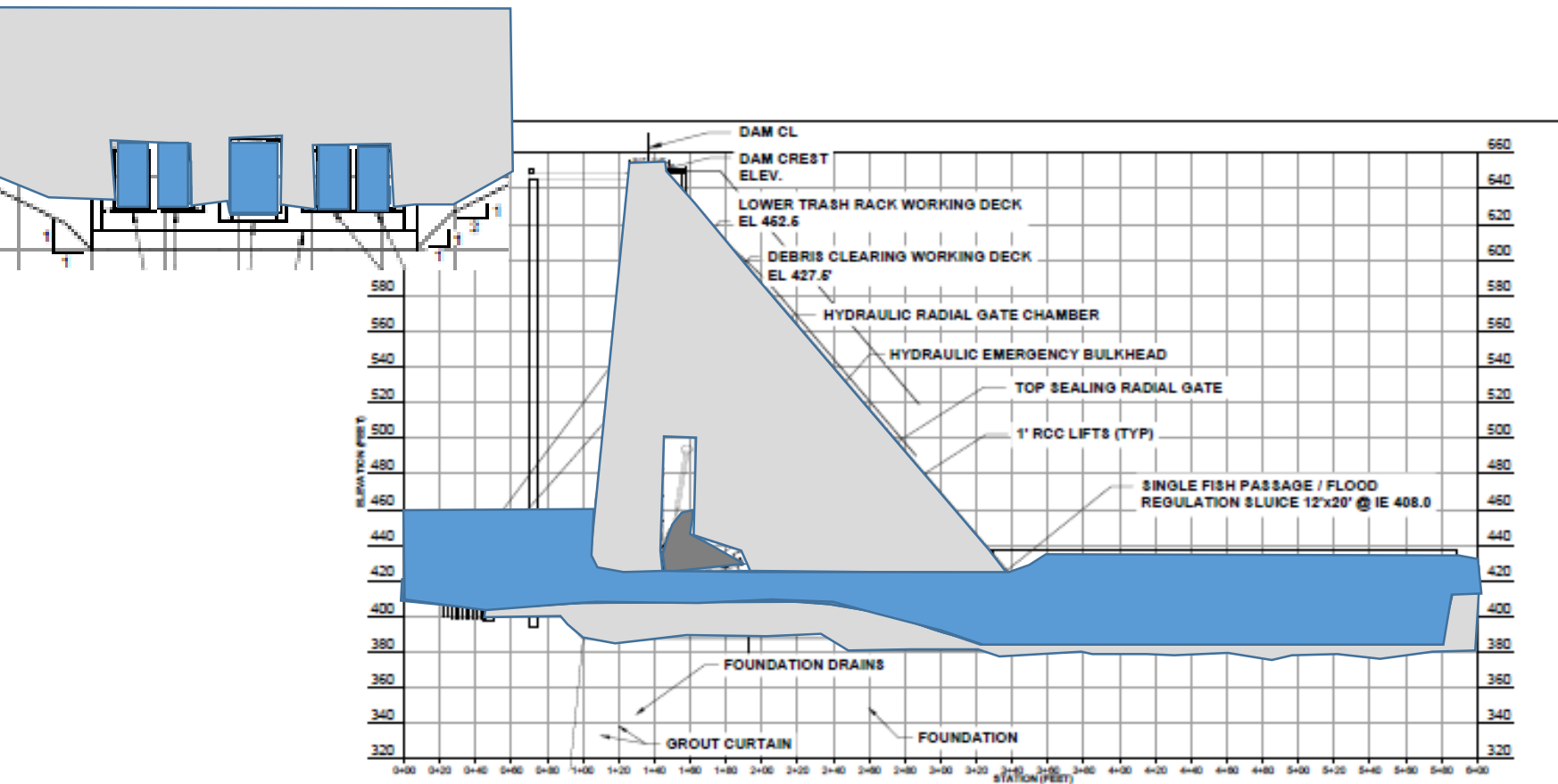


Source:

Fish Passage

- 5 large flow passages open to maintain river flows
- Upstream and downstream passage unimpeded
- River flow velocity and depth through large passages are similar to existing river channel over range of typical flows

Fish Passage (cont.)

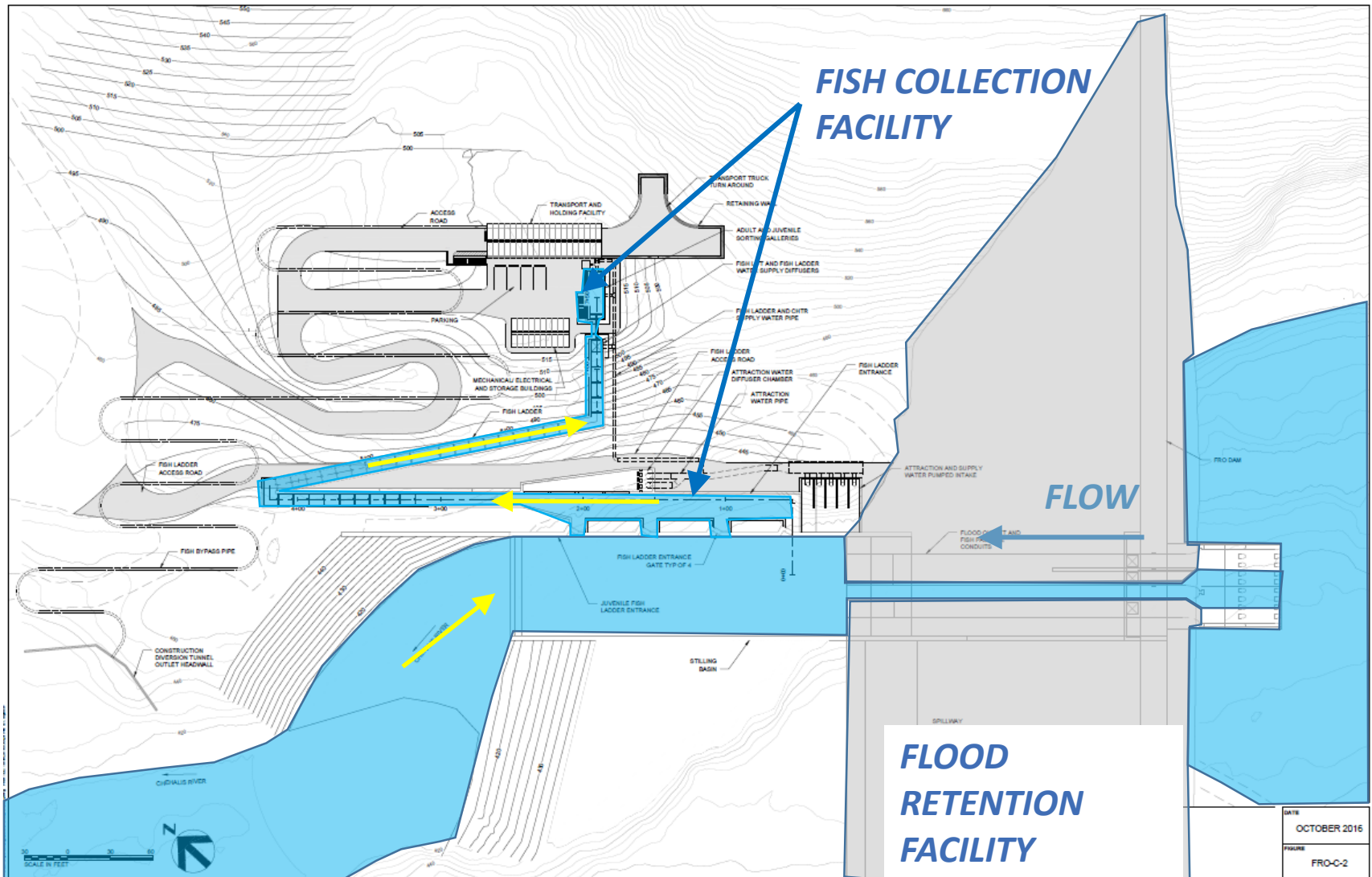


Fish Passage – During Floods

What happens during floods when regulation is required?

- Brief interruption during flood regulation events (every 7 years, on average)
- Gates begin to close and regulate flow to limit outflow (minimum outflow ≥ 300 cfs, and only through large center sluice)
- Downstream migration available through single gate opening
- In natural river systems, high storm flows typically discourage upstream migration
- Regulation of flows in the Chehalis River may actually enhance upstream migration opportunities by limiting DS flow
- Fish collection facility operates through regulated event to permit continued fish migration

Fish Passage – During Floods (cont.)

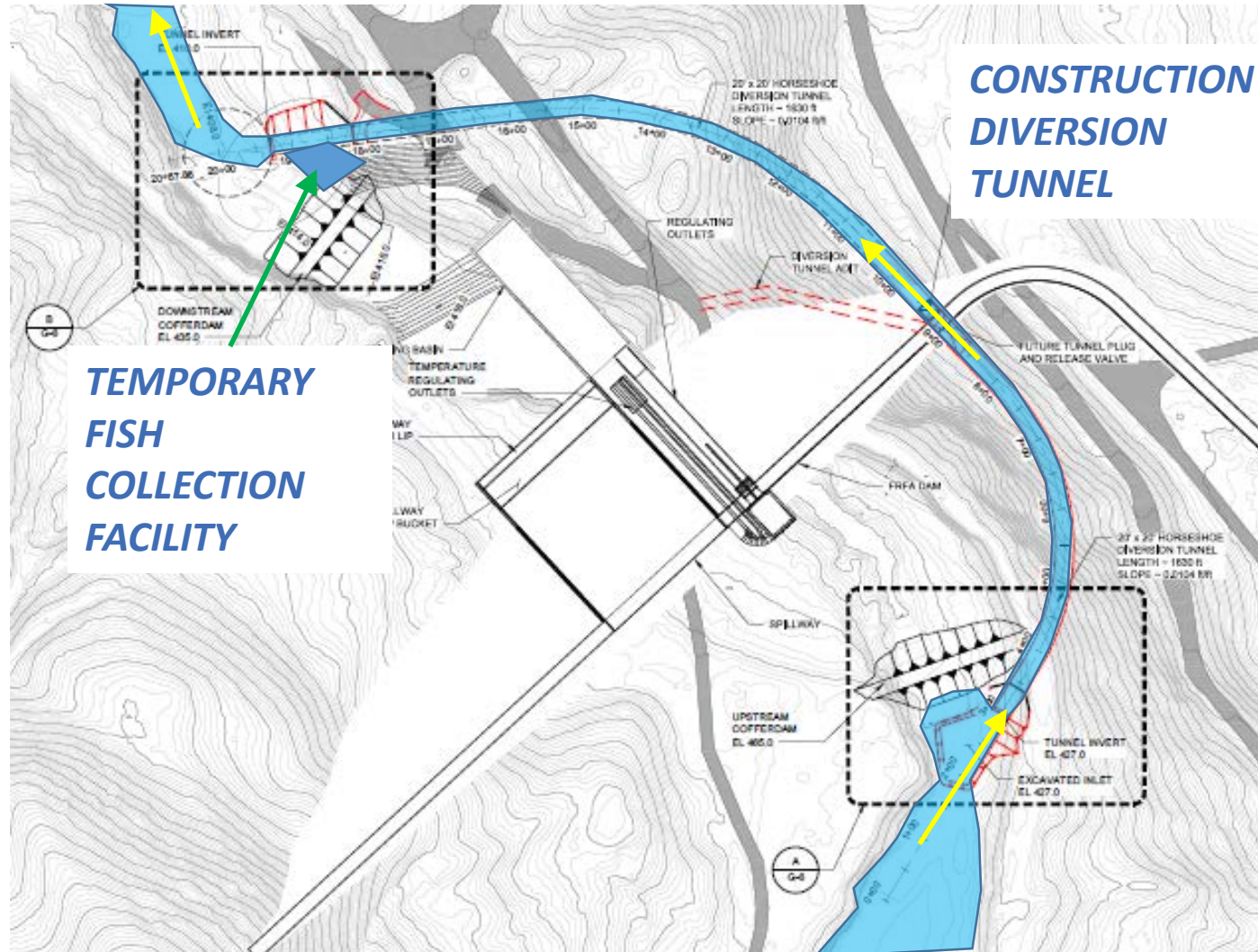


Source: Chehalis Basin Strategy Combined Dam and Fish Passage Supplemental Design Report FRX Dam Alternative, June 2017

Fish Passage – Construction Phase

- 20 ft diameter horseshoe tunnel 1800 ft long
- Cofferdams US and DS to direct flows through tunnel
- Fish migrating downstream pass through the tunnel
- Fish migrating upstream pass through the tunnel or temporary trap and haul facility for transport upstream to release locations
- Adaptive fish passage management during construction (trap and haul, collect and hold, free passage, etc.)

Fish Passage – Construction (cont.)



Construction In-Water Work Windows for Fish Protection

- 3 Work Windows – during summer low flow condition
- Window 1 - Initial construction of coffer dams/bypass tunnel and temporary trap and haul fish passage
- Window 2 – Completion of coffer dams for diversion
- Window 3 – Removal of diversion coffer dams and decommissioning of tunnel

Proposed Construction Schedule

- More detailed schedule incorporating major phasing developed and submitted to the Dept. of Ecology and the USACE to support EIS impact assessment
- Schedule shows overall construction period of approximately 5 years
- Actual schedule will depend on seasonal timing of the Notice to Proceed which occurs after permitting is completed