

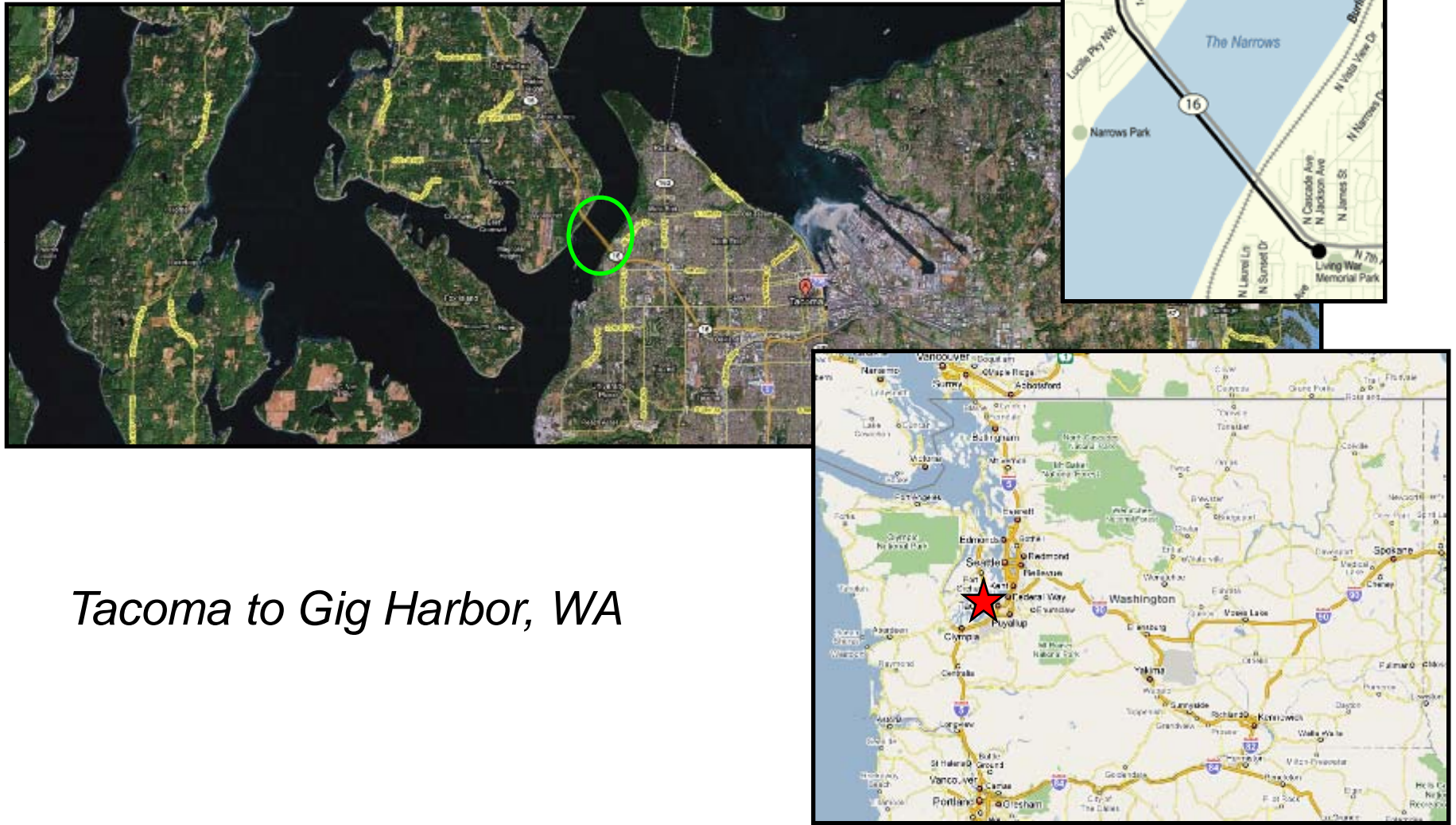
The Tacoma Narrows Bridge: Expansion Joint Noise

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TNB: Location



Tacoma to Gig Harbor, WA



1940: Original TNB – “Galloping Gertie”



2008: New TNB (Left) finished alongside existing structure (Right)



Traffic Noise Analysis

- Conventional traffic noise model using TNM v2.5
- Impacts modeled: WA = 66 dB(A)
- Barriers feasible, but not reasonable
 - Challenging topography



Expansion Joint: Arrives

- Modular expansion joints (2)
 - German design, US fabrication
 - 70' wide, 15' long
 - ≤ 56 inches of deck expansion/contraction



Joint en route from Minnesota



Expansion Joint: Installed



Joint installed - top



Joint installed - bottom



“The Zipper”

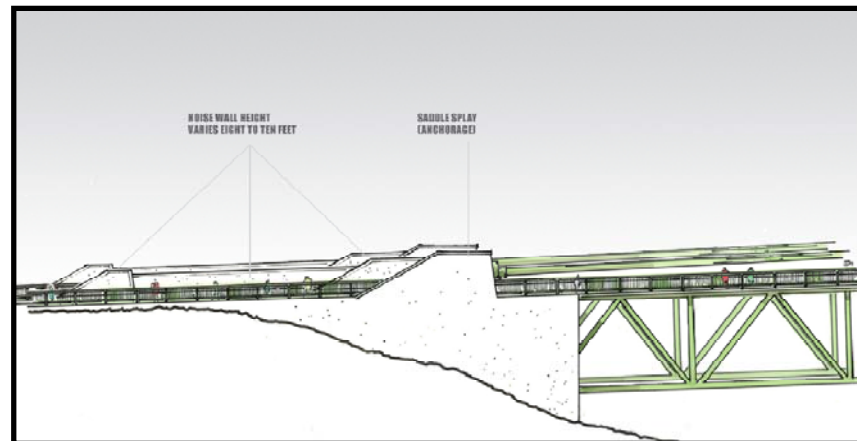


- Not conventional traffic noise - unexpected
 - “giant troll trying to escape from a box”
 - TNM 3.0?
- Complaints from people >1 mile away!
- Considered variety of responses
 - Joint coatings: Line-X/Rhino-Lining
 - Metal plate on top of joint
 - Flexible material fill



Final Design

- Target: low frequency joint noise
 - Reflected noise from cable housings, crash barriers
- Public/Private design collaboration
 - Deck restrictions
 - Aesthetic considerations



Mitigation sketch







C7588 New TNB Expansion Joint Noise Mitigation
Last SoundSorb Panels Placed NE Traffic Barrier
07/06/2009



07/20/2009 13:35

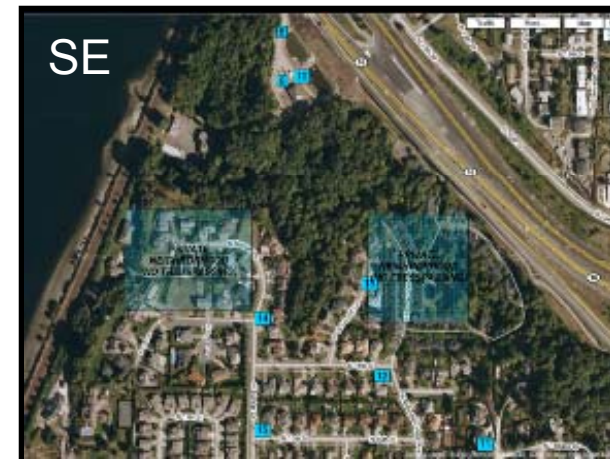


Evaluation

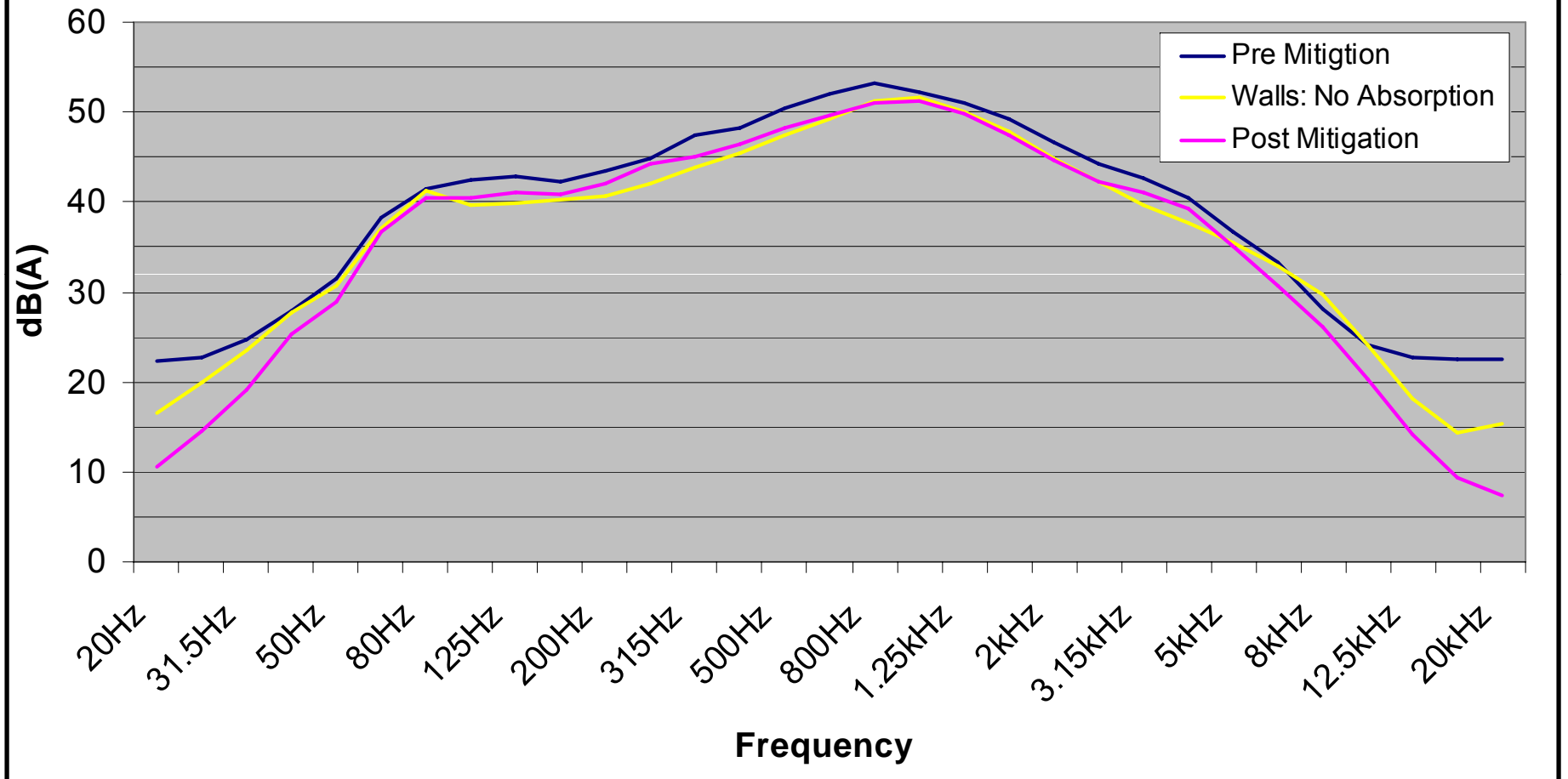
- New experience – framed as research pilot project
- Complications:
 - Airport, local roadway traffic, boat noise, rumble strips
 - Neighborhood noises: lawn mowers, construction, etc.
 - Meter damage?
- 1/3 octave band measures at 26 locations in neighborhoods on all four corners of bridge
- Pre-Mitigation, Walls: pre-absorptive, Post-Mitigation
 - Receivers within 1000'



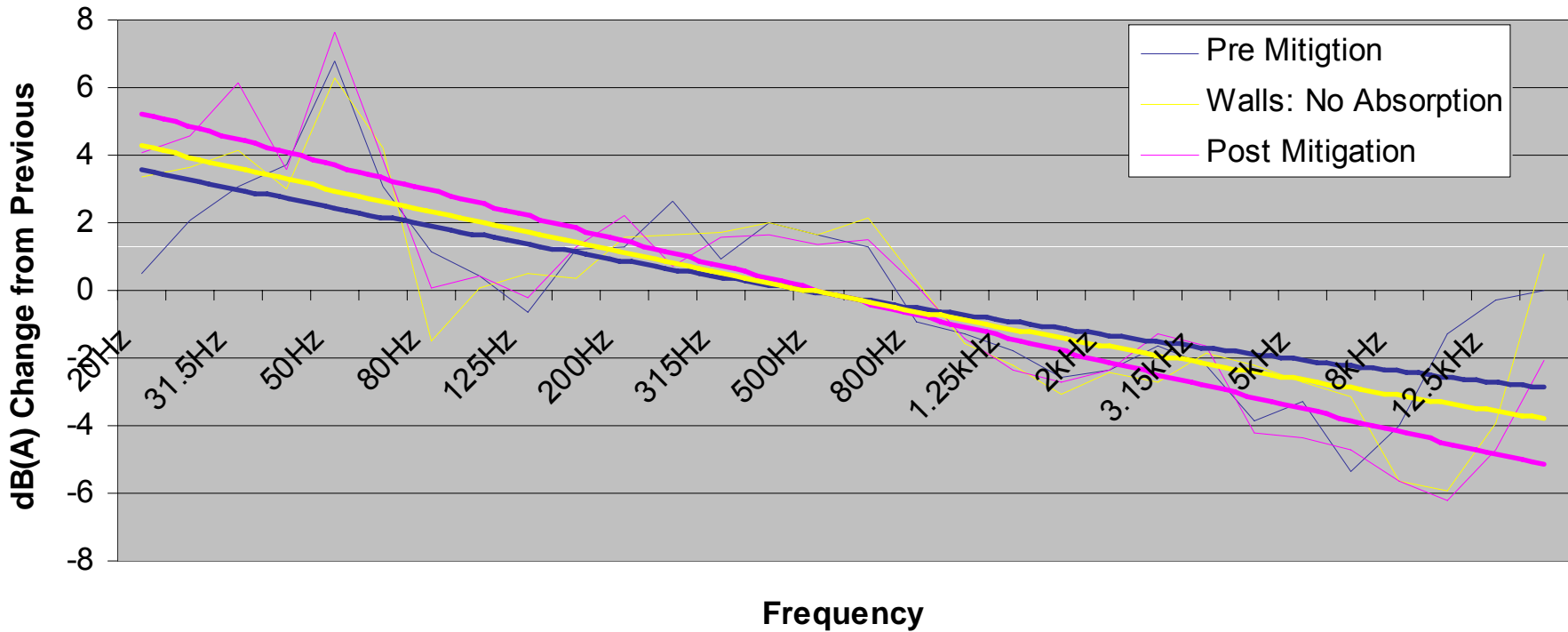
Evaluation: Measure Locations



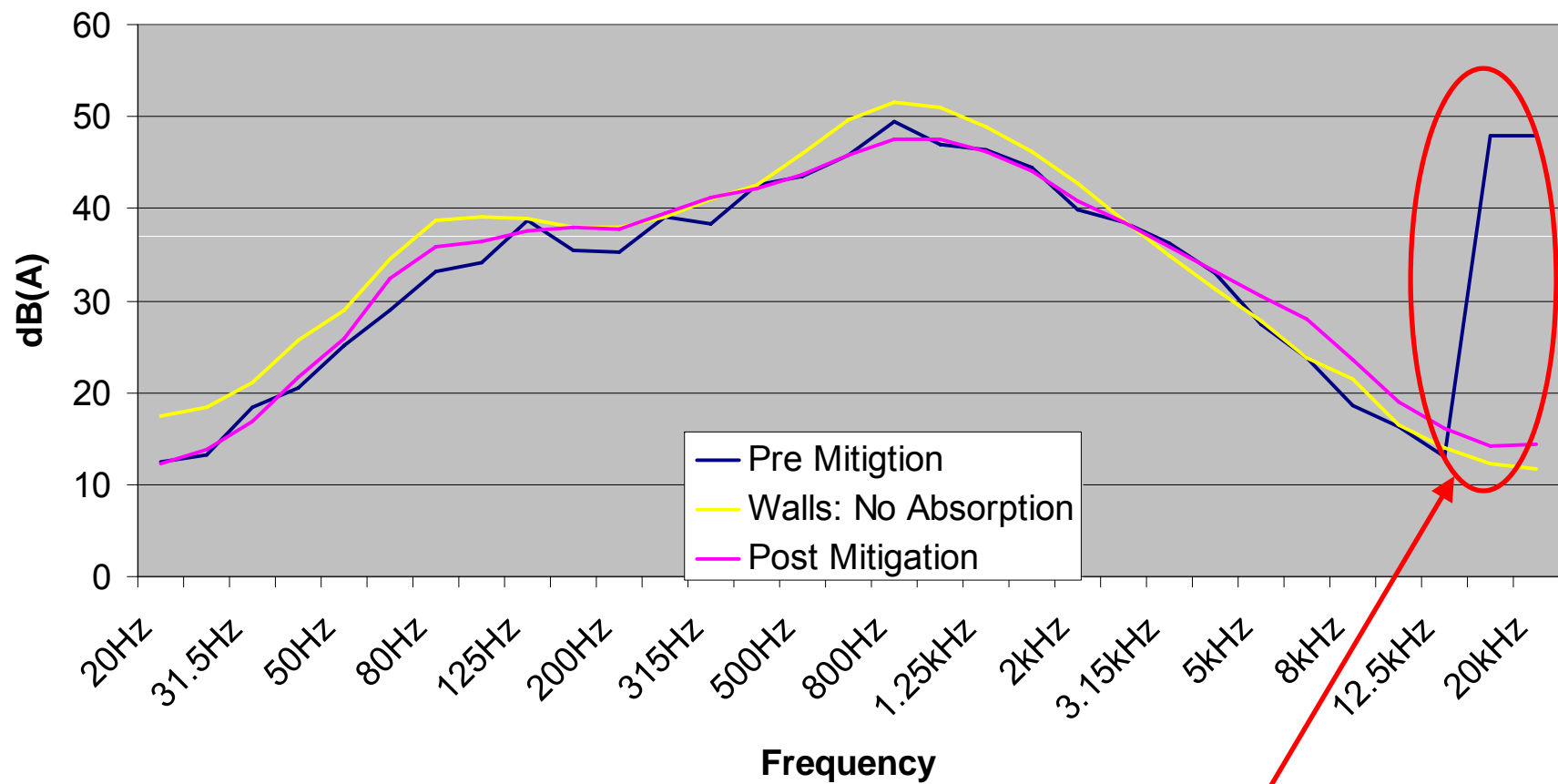
Frequency Distribution: TNB, Avg. Frequency for All Sites in Tacoma NE



Slope Comparison: TNB Tacoma NE Neighborhood Avg by Freq.



Frequency Distribution: Tacoma Narrows Bridge, Avg for All Sites in Gig Harbor NW



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Questions?



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WSDOT Air Quality, Noise, Energy website:
<http://www.wsdot.wa.gov/Environment/Air/Noise.htm>

