SR 520 Floating Bridge and Landings
Medina noise: tech team meeting #2
Thursday, July 28, 2016, 9:00-11:00 a.m.
Medina City Hall

Attendees

WSDOT
• Dave Becher
• Larry Kyle
• Lawrence Spurgeon
• Stacey Howery
• Emily Durante

City of Medina
• Michael Sauerwein
• Robert Grumbach
• Ioana Park

Materials

• Agenda
• Potential schedule for replacement/retrofit
• Package from TransLink/Golden Ears Bridge (Canada)

Key topics discussed

Review of potential joint modification schedule
- Due to timing considerations, retrofitting or replacing the expansion joints would not be done as a change order to the existing contract with KGM. A new contract would need to be established and would bid through the typical, competitive process.
- Options (see table):
  o Retrofit: modify existing joints to add sinus plates (see attached table for details).
    ▪ Additional testing will probably be needed to evaluate the performance of the plates with the unique, three-dimensional movement of the floating bridge. Authorization and budget allocation from the legislature would likely be needed in order to proceed with testing, which could add 1-2 years to the timeline.
    ▪ Testing would move the joint through various configurations to make sure the sinus plates do not bind or restrict the movement of the bridge and to ensure that the plates are not damaged and remain durable through all bridge movements.
    ▪ Testing could take 6 - 12 months, and installation could potentially go over two seasons because some work is weather sensitive.
    ▪ Additional permits would be needed to complete the work, including a new noise variance and a shoreline permit.
    ▪ A retrofit of the existing joint is a complicated operation as parts of the existing expansion joint would need to be removed and replaced (requiring field welding). This is a difficult operation and could greatly shorten the life of the retrofitted joint.
    ▪ Concern that a joint that has been retrofit would not meet durability standards (shorter service life) and would require increased maintenance.
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Final: 8/8/2016
**Replacement**: removing the existing joint completely and installing a new one (see attached table for details).

- Same estimated timeline as retrofit option; new joint would take roughly six months to fabricate.
- Additional permits would be needed to complete the work, including a new noise variance and a shoreline permit.
- Replacement has a longer lifespan than a retrofit, but is more expensive up front. (Retrofit may be more expensive in the long term, due to shorter expected joint life and higher maintenance costs.)
- Existing joint is close to the hinge; retrofit activities would need to be done very carefully as damage to that joint could jeopardize the function of the transition span.
- If the current joint fails, there are two warranties. If this new joint failed, the risk would be on WSDOT. (Retrofitting the joint would likely void the warranties.)

Examples of other bridges with similar joint technology

- **I-90 bridge**
  - WSDOT has received similar noise complaints from Mount Baker and Mercer Island.
  - The original bridge expansion joints should have lasted 50-75 years, but a problem with the original joint (either design or fabrication) along with overloading of the joints once the bridge was open to traffic resulted in premature failure of the joints. They were constantly undergoing maintenance to keep them in service until they were replaced in 2009.
  - The joint redesign took two years to complete with the traffic control planning taking a year to work through due to the high impacts to the roadway operations.
  - The replacement cost $8 million for design and construction, but construction prices can be extremely variable based on the economy. In 2009, WSDOT was receiving very favorable bid prices.
  - If not handled properly, a retrofit of the 520 bridge could experience similar maintenance problems due to the need to field weld components to strengthen the expansion joint to add the sinus plates.

- **Golden Ears Bridge in Canada**
  - When Golden Ears opened in 2004 (with a similar joint to SR 520) the bridge owner, TransLink, received similar complaints about joint noise.
  - Although it’s a cable-stay bridge, TransLink considered similar mitigation options:
    - Retrofitting the joint, installing a “hump” seal, alternative materials for filling the joint cavity, a rubber gasket “V” seal that sits between beams of the joint.
  - They found that the main cause of noise is the pumping of air into the joint cavity by tires, so they tested materials that absorbed noises at those frequencies. They came up with a geotechnical fiber “sock”, filled with pulverized rubber and added a 2-inch rubber cap which glued in place between the joint beams.
    - They found that up to a 10 dBA reduction during dry conditions, and much lower reductions in wet conditions (approximately 3 dBA).
  - This mitigation option relied on the air gap inside the fiber, between the bits of rubber, to absorb the sound. When that space is filled with water, there is less room to help absorb the sound waves.
• For the Golden Ears Bridge, this seems to reduce the sound band that is most “bothersome.”

- Maintenance:
  • From 2013 - 2015, TransLink crews were performing maintenance every few months on the bridge joints. Based on maintenance records, the material appears to fail and needs to be replaced about every two years, but the failure appears to occur section by section.
  • When the failures occur, the pieces of rubber are released into the environment and could enter the drainage system and travel into the lake. This will likely be a cause for concern from state/federal agencies.
  • Sinus plates were not a practical option for the Golden Ears Bridge situation. As this bridge was constructed under an “operate and maintain” contract, the contractor, not TransLink is responsible for performing the maintenance work.
  • Acoustically, the geotechnical fiber appears to be a practical solution; however, this material requires constant maintenance (see attached maintenance log) which over a 75 year lifespan for the expansion joint becomes very costly.

- Port Mann Bridge in Canada
  - At the time the Port Mann Bridge was in design TransLink was researching mitigation options for the Golden Ears Bridge. As a result. Even though the original joint design did not include sinus plates, TransLink was able to specify sinus plates before fabrication of the Port Mann joint began.
  - The Port Mann bridge has sinus plates on one end (near a residential neighborhood) and does not have sinus plates on the other end, which is in a more industrial neighborhood.

Next Committee of the Whole meeting
- WSDOT agreed to provide meeting minutes from both the Tech Team and COW meetings due to requirements and restrictions on City of Medina note distribution.
- The City is planning a Town Hall meeting on 8/10 at 5:00 p.m. to outline how the City is addressing the joint noise issue.
- Mageba participation
  o A representative from Mageba has shown willingness to participate in a conference call. Mageba availability will determine when the next COW meeting takes place.
  o COW and other participants are requested to send questions to be shared with Mageba prior to the next COW meeting.
  o Important to note that Mageba only fabricates the joint; the contractor is responsible for installation and timeline.

- Next COW meeting
  o Proposed to be the week of 8/23 or 8/29.
  o Plan to go through materials from the 7/28 Tech Team meeting and have a Q&A with Mageba.

Next Technical Team meeting
- After next COW meeting, TBD in September.