SR 520 Floating Bridge and Landings
Medina noise: Committee of the Whole meeting summary
Tuesday, August 23rd, 2016
Medina City Hall

Attendees
WSDOT
- Dave Becher
- Larry Kyle
- Lawrence Spurgeon
- Stacey Howery
- Emily Durante

Others
- Guido Schwager, Mageba (by phone)
- Rep. McBride legislative assistant
- Approx. 3 members of public

City of Medina
- Mayor Morcos
- Deputy Mayor Wen
- Councilmember Adkins
- Michael Sauerwein, City Manager
- Kathleen Haggard, City Attorney
- Aimee Kellerman, City Clerk

Materials
- Options table for replacement or retrofit

Key topics discussed
This meeting was primarily a question and answer session with a specialist from the expansion joint manufacturer, Mageba, Guido Schwager. Questions and responses are documented below:

- **Question:** Why do the SR 520 bridge expansion joints require additional testing to accommodate sinus plates?
  - **Response (Mageba):** Expansion joints typically have movement in one direction of travel but the floating bridge has to accommodate six-degrees of freedom and potentially an extreme vertical displacement if there is a 20-foot drop in water level due to a failure of the Hiram M. Chittenden Locks in Ballard. These accommodations create challenges with the sinus plate design and meeting WSDOT design requirements. Mageba has also not previously used a sinus plate joint in the United States or on a floating bridge.

- **Question:** Is the new expansion joint with sinus plates on the west side of the fixed structure?
  - **Response (Mageba):** Yes, it is on the West Approach Bridge North (WABN) project, being constructed by Flatiron. The joint being used on the WABN project are the first Mageba joints with sinus plates being installed on a bridge in the United States.

- **Question:** Is the 6-foot width of the expansion joint on the Floating Bridge project larger than a typical expansion joint?
  - **Response (Mageba):** These joints are much larger than those being installed on the WABN project. I will follow up with our Mageba team to inquire whether this size of joint
has been installed in Europe or Asia. (As previously noted, it definitely has a wider range of motion than most other typical joints.)

- **Question:** What kind of noise complaints has Mageba heard regarding the expansion joints?
  - **Response (Mageba):** Mageba has frequently heard complaints about the expansion joints and has spent a lot of time and effort researching these complex issues. The noise itself is mainly created by tires hitting the gaps in the top of joints but the noise also depends on the speed and type of vehicle. You can try to capture or break the noise with barriers or a noise absorbing mat but you cannot easily determine the dBA decrease associated with these efforts as the noise impacts are associated with multiple variables including location and vehicle type.

- **Question:** Have you ever faced a situation similar to the eastside of the Floating Bridge where noise is coming up with an “amphitheater” effect on residential homes?
  - **Response (Mageba):** I will follow up with our Mageba team to see if they have encountered this type of situation on other projects where homes are above the bridge.

- **Question:** What sort of modeling and testing is done? What are the types of facilities?
  - **Response (Mageba):** Mageba hires consultants to do noise data acquisition of neighborhoods and put together a performance document to determine what kind of improvements are possible, if any, to reduce noise levels. Often, the data from the instruments tell a different story than what residents are experiencing. The joints are not noisier than the federal allowable standards but that does not mean that they are not audible to residents living near the bridge.

- **Question:** Can Medina invite Mageba experts to visit the site to see if a sinus plate retrofit is possible or if other recommendations could reduce the noise impacts?
  - **Response (Mageba):** Yes, Mageba will be willing to send experts to the project site. A fix to the joint would not be easy, fast or cheap to complete. The experts would first have to investigate the joint, take measurements and try to determine what is generating the noise before any retrofits or repairs could be contemplated.

- **Question:** Is it possible the height of the joint is not flush with the pavement?
  - **Response (WSDOT):** WSDOT will be taking field measurements when the roadway is closed to determine whether the joint is flush with the pavement.

- **Question:** Is Mageba in agreement with the way WSDOT would measure the joint with a straight edge?
  - **Response (Mageba):** Yes, this is the first step that Mageba would check. The easiest way to get a two to four dBA reduction is to make sure the pavement and expansion joint are flush. Medina representatives noted that the westbound lanes are significantly louder than the eastbound lanes. They wanted to know if this could be attributed to eastbound traffic traveling uphill. This would have to be checked in the field to determine if they are actually louder and whether the eastbound and westbound joints were flush with the pavement.

  There could also be other reasons for this perceived noise difference, including speed, acceleration and weather. The joints expand in hot weather and contract in cold weather, the sound may increase during the winter when the joints have wider gaps. It would take at least 12 months to retrofit the joint to allow time for testing, manufacturing, design, and installation. If you were required to perform fatigue testing of the sinus plates, an additional 12 to 18 months of testing would be required because the joints on the floating bridge require six-degrees of freedom. The testing would mimic the bridge movement to determine if the sinus plates would shear off due to the stresses associated with the bridge movement.
• Question: Can joint replacement occur in stages to prevent closures?
  o Response (WSDOT): No, a full directional roadway closure is necessary to install the joints. It would likely take four to five full days of work, at a minimum, for installation and would require additional time to remove existing joints. The overall closure of the roadway would likely be two to three weeks. Retrofitting of the existing joints could take months, depending on whether full, directional roadway closures or lane closures were used. Even the retrofit option would require some full closures of SR 520.

• Question: Is a retrofit or replacement more reliable?
  o Response (Mageba): Both options need to be held to the same standard. Manufacturing something means you are in control of the conditions so there is a higher quality assurance. The same warranty that the current joints have would apply to the new joint. With a retrofit, you have to drill thousands of holes for the sinus plates in the field. It is much more difficult to ensure the level of quality for the joint. In addition, the contractor would have to raise the pavement close to an inch to account for the added sinus plates so it would require a much longer closure.

• Question: What is Mageba’s timeframe for sending out an expert?
  o Response (Mageba): I will follow-up with our technical experts in Europe and coordinate with WSDOT.

(WSDOT) It is important to note that any expansion joint retrofit or replacement project would be performed under a separate contract. WSDOT would not modify the current Floating Bridge contact to perform this work due to the potential costs associated with modifying the contact.

• Question: Will WSDOT synchronize the bridge closure with a visit from Mageba experts?
  o Response (WSDOT): WSDOT plans to conduct measurements during the next bridge closure before Mageba arrives to provide any preliminary information to the Mageba experts to help facilitate their investigations. If further closures are required to support the Mageba experts, WSDOT will try to coordinate these with future bridge closures.

• Question: What is the timeline for testing of a sinus plate expansion joint?
  o Response (Mageba): If fatigue testing was required, it would likely take 12 to 18 months to complete.

• Question: Could Medina acquire funding to accelerate the 12 to 18 months of testing so that it could occur now instead of waiting until later?
  o Response (WSDOT): WSDOT does not have current funding or authorization from the Legislature to pursue this testing.

• Question: Are there contingency or maintenance funds available from the current contract which could be used for the expansion joint retrofit or replacement?
  o Response (WSDOT): The existing contingency funding is allocated to on-going Program work which has been authorized by the Legislature. Contingency funds are not approved for this purpose.

• Question: Is there a WSDOT Projects noise mitigation “list” for available funding that the city of Medina can be added to?
  o Response (WSDOT): WSDOT does keep a list of areas where existing roadway facilities impact noise levels in neighborhoods. This program came out of 1970s legislation for projects that had been constructed prior to FHWA noise requirements. It would be possible to be added to the list, however, there is a requirement that the area in question exceeds the federal noise abatement criteria, and the measurements from SR 520 do not exceed that criteria.

• Question: Is there movement at the federal level to address “spike” noise levels (Lmax vs. Leq)?
Response (WSDOT): Not currently. However, there is continued development in noise abatement criteria and there is always federal interest in adapting the policies. WSDOT will follow up with FHWA to see if there are any plans to address “spike” levels.

- **Update (May 2017):** WSDOT has followed up with FHWA and there are not currently any plans to address “spike” levels.

- **Question:** Is joint replacement more likely to provide the best quality?
  
  - **Response (Mageba):** If we want to ensure that the expansion joint will last 75 years, replacement would be necessary. To retrofit, and not replace, the existing joint, there would be thousands of holes which would need to be drilled in the field. If a mistake was made in the field the joint could be damaged and impact its service life.

**Next steps**

- COW members noted that they found the meeting useful and requested another meeting in one month, or when additional information on potential options is available.