SR 520 Floating Bridge and Landings
Medina noise: Committee of the Whole meeting summary
Tuesday, November 1st, 2016
Medina City Hall

Attendees
WSDOT
- Dave Becher
- Larry Kyle
- Lawrence Spurgeon
- Stacey Howery
- Kathryn Murdock

City of Medina consultants
- Mike Groesch
- Kelly Evans
- Paul Berendt
- AJ Dotzauer

City of Medina
- Mayor Morcos
- Deputy Mayor Wen
- Councilmember Adkins
- Councilmember Boyd
- Councilmember Pryde
- Robert Grumbach
- Michael Sauerwein
- Ryan Osada
- Aimee Kellerman

Others
- Approx. seven members of the public

Materials
- Agenda
- Expansion joint folio
- Mageba PowerPoint proposal

Key topics discussed

Review of expansion joint measurements (Dave Becher)
- During the weekend closure of SR 520 from Oct. 7 to 10, work was taking place throughout the SR 520 corridor. During that time, WSDOT crews took measurements on the expansion joints located on both the east and west sides of the new SR 520 floating bridge.
  - Measurements took crews 12 hours on Saturday and 14 hours on Sunday. Crews took a number of different readings of the expansion joints itself including:
    - Measuring gaps between beams of the expansion joint.
    - Measuring the pavement slope as vehicles approach the joint and as they drive away from the joint to ensure the slope percentage stays relatively consistent.
  - Councilmember Atkins thanked WSDOT for collecting the data.
  - Becher noted that the drawings in expansion joint folio (see meeting materials) are exaggerated to better illustrate what we think the preliminary measurements are indicating about the alignment and configuration of the joint.
- The measurements from the weekend closure were provided to Mageba. On Friday, Oct. 28, WSDOT had a conference call to discuss the measurements.
  - At this time, Mageba has the data and information that they originally planned to come out and take themselves.
WSDOT originally thought the difference between the gaps in the beams was an issue but Mageba noted that over time the gaps will normalize and become more uniform.

Larry Kyle noted that there is a possibility that Mageba’s expert from Switzerland can look at the tilting of the joint when he is in the United States later this month looking at a bridge in Ohio. Mageba wanted to further review the gaps between the straight edge reference line and the beam.

**Question (Mayor Morcos):** Residents have noted that the eastbound direction is not as noisy as the westbound direction. Was that apparent in the measurements?

**Answer (WSDOT):** Based on the measurements, the gap distance is not clearly different between the two joints. We are asking Mageba to look into it based on residents’ observations.

**Question (Councilmember Atkins):** Did you measure both expansion joints?

**Answer (WSDOT):** Yes.

Becher reinforced that the differences that WSDOT found in the measurements, both in the tilting and the gaps between the beams, are very small. He noted that it does not mean that adjusting for these inconsistencies will not make a difference in the noise but they are small variations.

**Question (Public):** When will the Mageba representative be in the United States?

**Answer (WSDOT):** When we spoke with Mageba, they mentioned that the representative would likely be in the United States in the next two to three weeks. Mageba is still investigating whether they are able to fit in a trip to Seattle in their schedule.

### Replacing the joint (Dave Becher)

**At the last Committee of the Whole meeting, WSDOT discussed a number of options that may have some impact on the noise. One of those options was the replacement of the expansion joint with a new joint that includes sinus plates on top of the joint.**

- The sinus plate technology has been used extensively in Europe and in Canada, and will also be installed on the West Approach Bridge North (WABN).

- Expansion joints with sinus plates have never been used on a floating bridge which requires six degrees of freedom of movement. The sinus plates are fixed on top of the joint so they do not move as cars travel over them. Because the plates are fixed and fit closely together there is concern that, when the joints move within the six degrees of freedom required for the floating bridge joint, the plates may lock up and then break free, potentially flying into traffic.

- In order to install sinus plates on an expansion joint on the floating bridge, you would need to do two types of testing: geometric modeling and fatigue testing. At this time, this testing has not been done for the conditions on the SR 520 floating bridge.

**There was discussion at the last Committee of the Whole meeting about whether testing could be done in advance if funding became available. You could do testing in advance but in order to provide a fair, competitive playing field, contractually WSDOT cannot just have Mageba test the joints.**

- WSDOT would have to offer up the testing to the other manufacturers as well in order to avoid lawsuits.

- It is a competitive market in expansion joints and WSDOT would not want to give an advantage to one manufacturer over another.

**Question (Mayor Morcos):** Would you ask manufacturers to pay for their own testing?

**Answer (WSDOT):** I am not sure. Since this is a unique situation with a floating bridge, I am not sure that a manufacturer would voluntarily have the testing done and pay for it themselves.

**Question (Mayor Morcos):** Couldn’t Mageba retrofit their joints with a sinus plate while another manufacturer would have to completely replace the joint?
Answer (WSDOT): That would probably be true but as we discussed at the last Committee of the Whole, retrofitting would be very difficult. I am not sure WSDOT would be comfortable retrofitting the joint because of risks. Also, retrofitting may not be cheaper than replacing the joint because you would have to cut beams out of the joint, weld it back into place and drill many holes into the joint in the field.

Question (Mayor Morcos): At the last meeting, it was an option to retrofit or replace the joint. Is retrofitting not an option anymore?

Answer (WSDOT): At this point, no option has been fully eliminated. It becomes a question of, if funding becomes available, what is the most cost-effective option.

Question (Councilmember Atkins): We also discussed that retrofitting would not be Mageba’s first choice because of the difficulty of retrofitting the expansion joint on the bridge.

Answer (WSDOT): Correct, it would not be our preference.

Question (Councilmember Atkins): If we conducted the geometry and fatigue study, would the next party that we would need to convince be the WSDOT Bridge office?

Answer (WSDOT): Yes, you would show them the data

Question (Public): You keep saying “If funding becomes available.” Is there no money available?

Answer (WSDOT): There is not money to do these repairs. The Legislature would have to authorize WSDOT to spend the money.

Question (Public): My parents lived near the bridge on Evergreen Point Road for 53 years. My father recently passed away and we are trying to sell his home which has been impossible. It has been on the market for a couple months and we have had no offers for a $3 million dollar home. If this is going to take years, I need to know.

Answer (WSDOT): If funding became available, we estimate that it would take approximately 3 to 4 years.

Question (Mayor Morcos): Don’t you need two sources of funding, both for the design and installation?

Answer (WSDOT): Correct.

Mageba proposal

WSDOT reviewed the Mageba proposal PowerPoint

Dave Becher noted the brief summary on page 3.

- In 2012, Mageba was awarded the supply of the modular joints
- In April 2016, WSDOT began receiving noise complaints from nearby neighbors.
- WSDOT contacted Mageba to look at the noise measurements to provide possible suggestions.

Larry Kyle noted that Mageba’s suggestions begin on page 11.

- Mageba suggests a quicker solution to potentially reduce noise coming from the joints. These solutions have been discussed in general terms at previous meetings.
- Their two suggestions included in this draft proposal were: Robo®Foam and Robo®mute.

Question (Mayor Morcos): Are any of these solutions used on the bridge currently?

Answer (WSDOT): No.

Question (Robert Grumbach): Have any of these been used on the bridge in British Columbia?

Answer (WSDOT): Something similar to the Robo®Foam solution is being used on the Golden Ears Bridge in British Columbia. It was a low-cost, mitigating effect from the noise that was disruptive to neighbors. They stuffed shredded rubber into a geotech fabric “sock”, placed the “sock” in the gaps between the beams and then a neoprene-like material was attached to each beam securing the “sock” in place. This solution made a
noticeable difference to the ear. It has been used on this bridge for about two to three years. However, the material they used is not durable and requires maintenance every few months. The material would break and fly up and become a hazard outside the bridge area.

- Larry Kyle presented the first option proposed by Mageba, the Robo®Foam which would replace the seals between the beams with a "U"-shaped seal (instead of the current "V"-shaped seal). The solid Robo®Foam would then be glued into the gap. We anticipate that this may be a bit more durable than the solution that was used in Canada because the Robo®Foam is a solid strip of material between the beams rather than different, separate materials. This material is licensed all over the world and has been used on a bridge in Japan. They said it was successful and did not have to be maintained as frequently. We asked Mageba to talk to their Japanese counterpart and provide more information.

- Question (Mike Groesch): Are the beams shaped properly to accept this?
  - Answer (WSDOT): Yes

- Question (Mike Groesch): Do you have maintenance costs and installation costs for the Robo®foam?
  - Answer (WSDOT): Not yet.
  - Comment (Public): This may be a good temporary fix
  - Answer (WSDOT): It is something that could be installed more quickly but anytime it has to be fixed, WSDOT would need to close the highway to fix it.
  - Comment (Public): Can it be done overnight or would it need to be a weekend closure?
  - Answer (WSDOT): It can likely be done during a weekend closure but it depends on how much maintenance is required.

- Comment (Public): Each time these options have been brought up in the past, the issue has been the environmental concerns of the debris falling into Lake Washington. Does this new option change the design and make it any more viable?
  - Answer (WSDOT): That is a concern with the “Golden Ears Bridge” option. We don’t know enough about the Robo®Foam to know if that is an issue but we are asking for more info from Mageba.

- Question (Robert Grumbach): Does the debris on the Golden Ears Bridge typically go up onto the bridge?
  - Answer (WSDOT): Yes.
  - Question (Robert Grumbach): Would this impact traffic?
  - Answer (WSDOT): We are not sure if it is just small pieces of fabric or if there are large pieces that break off. We have looked at the Golden Ears Bridge maintenance logs and they say that they have to replace seven feet of material at a time.
  - Comment (Councilmember Atkins): It does seem like having one bulky piece of material with the Robo®Foam option would cause less of an issue of material flying up onto the bridge or into the water.
  - Answer (WSDOT): Anecdotally from Mageba, they said that the Robo®Foam option has been less maintenance on the bridge in Japan.

- Question (Robert Grumbach): How does traffic compare on that bridge versus our bridge?
  - Answer (WSDOT): The traffic on the Golden Ears bridge is highway traffic, likely similar to traffic on SR 520. The bridge in Japan seems to be on a much smaller, possibly rural road, but we have asked Mageba to provide this information. The “Golden Ears Bridge” option is lasting approximately two years in Vancouver, B.C. and the Robo®Foam option may last twice as long. Neither option can last 75 years, the full life span of the bridge.

- Comment (Public): Does the Robo®Foam option have similar noise abatement criteria to the option used in Vancouver, B.C.?
Answer (WSDOT): The option in Vancouver has an approximately eight to ten decibel reduction in a certain frequency band. If we are able to achieve this same type of reduction in the correct frequency band with the Robo®Foam, it may make a difference.

Question (Robert Grumbach): It doesn’t necessarily reduce the sound across the board, just in a certain frequency band?

Answer (WSDOT): Correct, but Mageba has worked hard to tune it to the correct frequency of the joint.

Question (Robert Grumbach): Could Mageba make adjustments based on frequencies after it was installed?

Answer (WSDOT): Yes.

Question (Mike Groesch): If Mageba has installed this in Japan, it would seem that the information should be readily available and that the Robo®Foam option should be commercially available. How long will it take to install?

Answer (WSDOT): This product may not be commercially available. It is not a product that they initially developed themselves. These products were developed as responses to noise issues between bridge owners and local Mageba representatives as options to try to mitigate the noise. It is not a product that the corporate home office has a lot of data on.

Question (Deputy Mayor Wen): Is the material glued to the expansion joint?

Answer (WSDOT): The material has a rubber adhesion and the neoprene between the beams is glued in.

Question (Deputy Mayor Wen): When there is a breakdown, is it a breakdown of the material or a breakdown in the interface?

Answer (WSDOT): We are not sure. We know from the Golden Ears Bridge that the glue failed.

Question (Deputy Mayor Wen): Do you think the Robo®Foam is a better option?

Answer (WSDOT): We think that this will be a better option but we are waiting on more data on the installation in Japan.

Question (Mayor Morcos): Since the expansion joints expand and contract, does the Robo®Foam also expand and contract?

Answer (WSDOT): I would assume that Mageba would compress the Foam so that as the beams move, the Foam can move with the beams and not hinder the range of motion.

Question (Robert Grumbach): Would the process of the materials being more compact to being more stretched out effect the noise reduction?

Answer (WSDOT): It might.

Question (Robert Grumbach): Would this only absorb noise going downward or would it absorb noise going upward as well?

Answer (WSDOT): Mageba indicated that it may absorb noise going upward as well.

Comment (Public): Did Mageba think that the current encapsulation was acting as an echo chamber?
Answer (WSDOT): We believe that the encapsulation is working effectively. There were some gaps in between girders that allowed the noise to escape underneath but these gaps have been filled in.

Question (Robert Grumbach): Is the Robo®Mute mat a simple and relatively inexpensive solution that you can try?

Answer (WSDOT): We are not sure how expensive it is but it can be installed from under the bridge. However, you may not be able to have a continuous mat under the expansion joint because of the utilities near the expansion joint.

Question (Mayor Morcos): Do you have an estimate of how many decibels will be reduced with this option?

Answer (WSDOT): We do not have one. Mageba’s suggestion is to create a pilot project to test these options to determine if they reduce the noise.

- Question (Mayor Morcos): Could you use both the Robo®Foam and Robo®mute be tested/installed at the same time?
  
  Answer (WSDOT): Yes it is possible.

- Larry Kyle explained Mageba’s proposed pilot project which would involve installing and testing the options sequentially:
  
  - Step 1: Robo®Mute alone
  - Step 2: Robo®Foam alone
  - Step 3: Robo®Foam and Robo®Mute together

- Question (Mike Groesch): How would you evaluate the pilot project?
  
  Answer (WSDOT): We just received this information on Friday, Oct. 28, so we have not had the chance to review it yet.

- Question (Mayor Morcos): When you talk about a single joint, you are talking about the joint on the eastside, correct?
  
  Answer (WSDOT): If we wanted to pursue the least expensive option, we would install it on the westbound joint in the westbound lanes because we would not have to close the bridge. To have the biggest impact, it would make sense to install it on the westbound lanes on the eastside joint.

- Question (Councilmember Atkins): Wouldn’t we want to install it on the floating bridge because it is the area causing the most concern?
  
  Answer (WSDOT): Yes, it would be the logical thing to do. The suggestion to install on the joint on the west end of the bridge is also a joint of the floating bridge. The joint is not currently being driven on, but will be in use when the new west approach bridge is opened to traffic next year (2017).

- Question (Mayor Morcos): Could you close one lane at a time to install?
  
  Answer (WSDOT): No, for safety of the work crews we would need to at least have directional closures during installation.

- Comment (Mayor Morcos): Robo®Mute alone doesn’t seem to be as effective.
  
  Answer (WSDOT): Yes, from the data we have, the Robo®Foam seems to reduce the joint noise more effectively than the Robo®Mute alone. We expect that any kind of sound absorbing material, similar to the Robo®Mute, would get approximately three decibels of noise reduction. Three decibels is when it begins to be noticeable to the human ear.

- Comment (Paul Berendt): Combo of the two options should provide the greatest reduction.
  
  Answer (WSDOT): It will not be a linear reduction. You may get a few more decibels of reduction by adding a second option.

- Question (Deputy Mayor Wen): If we wanted to install any of the options tomorrow, how long would they take to install?
  
  Answer (WSDOT): We are not sure how readily available this material is. We would need one or more weekend closures of SR 520 and good weather. Mageba would likely need to manufacture the material which would take several months.
• **Comment (Robert Grumbach):** Is funding still an issue?
  - **Answer (WSDOT):** Yes, we would require additional funding from the legislature to implement a pilot project.

• **Comment (Public):** If you provide this new solution to Mageba, is there a way for them to license it to defray the cost?
  - **Answer (WSDOT):** Robo®Mute and Robo®Foam are their trademark systems already.

• **Comment (Public):** If the material is available to fix the bridge in Canada every few months, why is it not available for our bridge?
  - **Answer (WSDOT):** The Canadian bridge uses a different material than the Japanese bridge. They were each looking for a different solution and came up with something slightly different. The material from Canada is likely readily available but if we use that material, we need to recognize that their experience has been that the material does not last very long.

• **Question (Mayor Morcos):** Can we expect to have a report from you at the next meeting on the Japanese proposal?
  - **Answer (WSDOT):** Yes and hopefully Mageba will have also looked at the expansion joints.
  - **Comment (Public):** Let’s not have that meeting until you are ready instead of giving you a deadline you cannot meet.

• **Question (Robert Grumbach):** Do you have an idea about the timeline of when you will get this information?
  - **Answer (WSDOT):** We anticipate early December.

• **Question (Councilmember Atkins):** In past Committee of the Whole meetings, we discussed reduction of speed limits on the bridge. Is that feasible?
  - **Answer (WSDOT):** That issue would have to go to our state traffic engineer.
  - **Comment (Councilmember Atkins):** We had talked about doing it at least at nighttime when the noise impacts residents most.
  - **Answer (WSDOT):** The issue is that the bridge is designed for 60 miles per hour so enforcement would be a problem.

• **Question (Mayor Marcos):** Are you planning on doing anything about expansion joints not being flush?
  - **Answer (WSDOT):** When Mageba comes out, they will look at all items with their experts and determine if anything needs to be done.

**Next steps: Temporary tolling treadles**

- Dave Becher gave an update on the next steps for the tolling treadles installed at the temporary location between 84th Ave Northeast and Evergreen Point Road:
  - The temporary tolling treadles will be removed in spring 2017, during a full closure of SR 520. During the closure, all temporary tolling equipment will be removed.