

Background

On Monday, April 11, the Washington State Department of Transportation (WSDOT) opened the new SR 520 floating bridge to westbound traffic connecting the Eastside and Seattle. Shortly after opening to traffic, WSDOT heard from the city of Medina and nearby project neighbors about a new noise being experienced near the new bridge. The new noise has been described as a “thump-thump” or a “zip” sound. In response, WSDOT began taking noise measurements in several locations on both the old and new bridges and in the surrounding neighborhood.

The eastbound lanes of the new floating bridge opened to traffic on Monday, April 25, allowing both directions to be operational on the new bridge and allowing the old bridge to be permanently closed to traffic. Now that all traffic is on the new bridge, WSDOT is taking additional noise measurements to better understand the issue.

During design and construction of the [SR 520 Floating Bridge and Landings Project](#), WSDOT addressed noise in three key ways:

- Using quieter concrete pavement;
- Encapsulating the expansion joints on the underside of the structure; and
- Building noise walls to the extent practical and feasible.

New SR 520 floating bridge expansion joints

Expansion joints are a critical part of a bridge’s infrastructure. The joints allow the bridge to move and flex with changing traffic, weather, and lake conditions.

The new SR 520 floating bridge has eight major expansion joints at each end of the bridge with several smaller strip seal joints every 360 feet on the floating section. Of the major expansion joints:

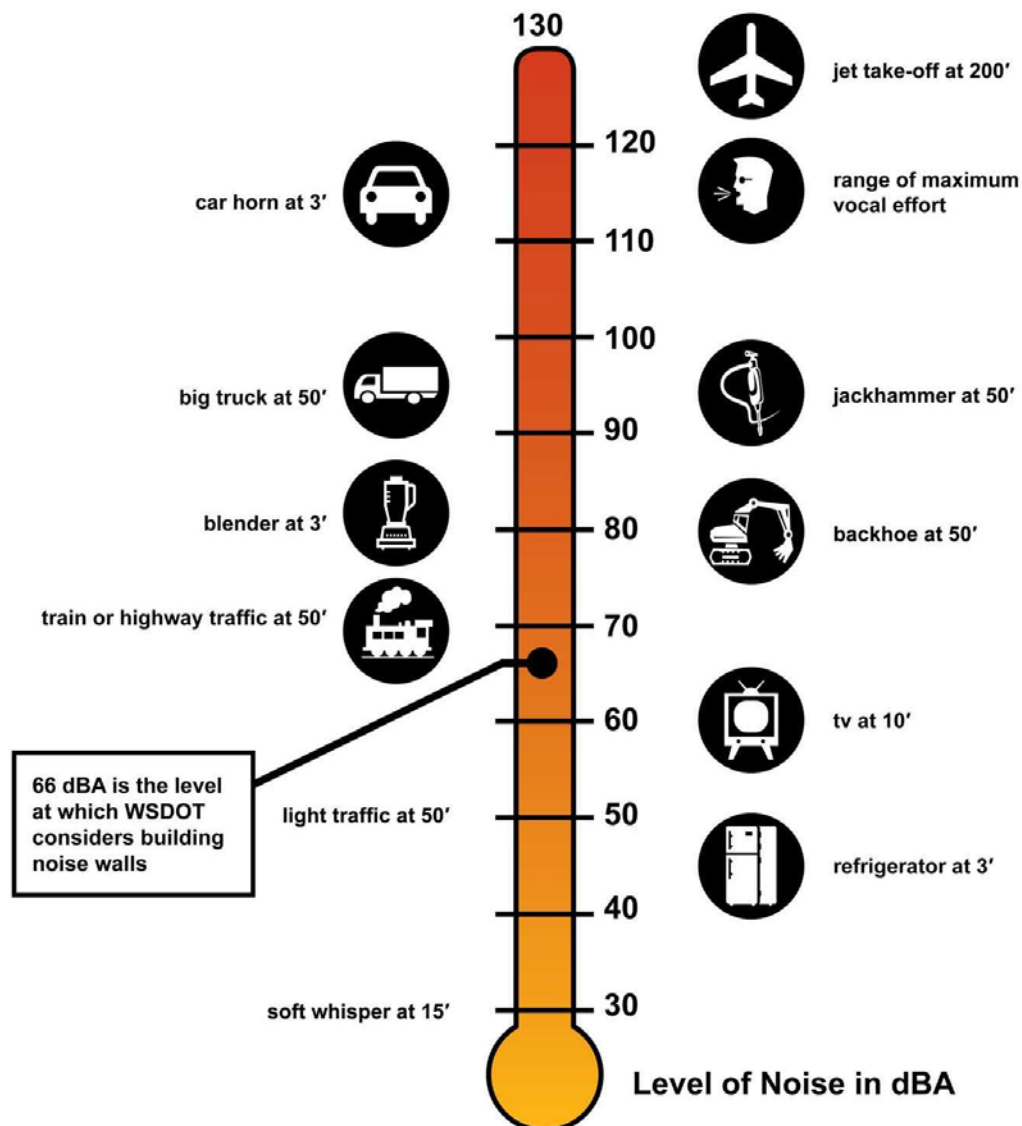
- There are four large expansion joints that connect the floating bridge to the transition span between the floating bridge and the land-based approach bridges. There are two on each end of the bridge with one westbound and another eastbound.
- The other four major expansion joints are smaller and connect the land-based approach bridges with the transition span. Like the large expansion joints, there are two on each end of the bridge with one westbound and another eastbound.

Please see the attached map to see where the major expansion joints are on the east end of the new floating bridge.

Noise: How do we hear it? How do we measure it?

- [Sound is measured](#) in units called decibels (dBA).
- An average person's ear can perceive a 3 dBA or greater change in noise levels.
- A 10 dBA reduction sounds half as loud to the human ear; a 10 dBA increase sounds twice as loud.

The noise thermometer pictured below represents relative sound levels of common activities.



We measure the intensity of sound in decibels, which indicate a sound's relative loudness, and Hertz, which is the tone or pitch of sound that people hear.

Decibels (dBA) from roadway noise are measured in A-weighting, which allows our noise meters to imitate the same frequencies that can be heard by the human ear. The [decibel scale](#) (pdf 334 kb) ranges from 0 decibels, the threshold of human hearing, to 140 decibels, where serious hearing damage can occur. The average human ear can only distinguish between two sound levels that are at least 3 dBA different in loudness.

Traffic noise typically ranges between 55 and 80 dBA along a highway right of way line. According to the Federal Highway Administration, roadway noise impacts start at the 67 dBA level, as measured at the noise sensitive receivers. This is when people standing a few feet apart have trouble hearing each other in normal communication. It should be noted that everyone has a different reaction and tolerance to various noise levels.

Most people only discern a difference in noise level when there is a three or more decibel change. This is equivalent to doubling traffic volumes, such as an increase of 1,000 to 2,000 vehicles on the road.

Hertz (Hz) is the measurement we use when studying the tone or pitch of sound that people hear. The higher a noise's Hz level, the higher it sounds. People generally hear the range between 20 and 10,000 Hz. Around the 1,000 Hz frequency are sounds that many people cannot ignore: crying babies, rushing streams and traffic noise.



WSDOT noise expert takes measurements at Evergreen Point Road Lid in Medina

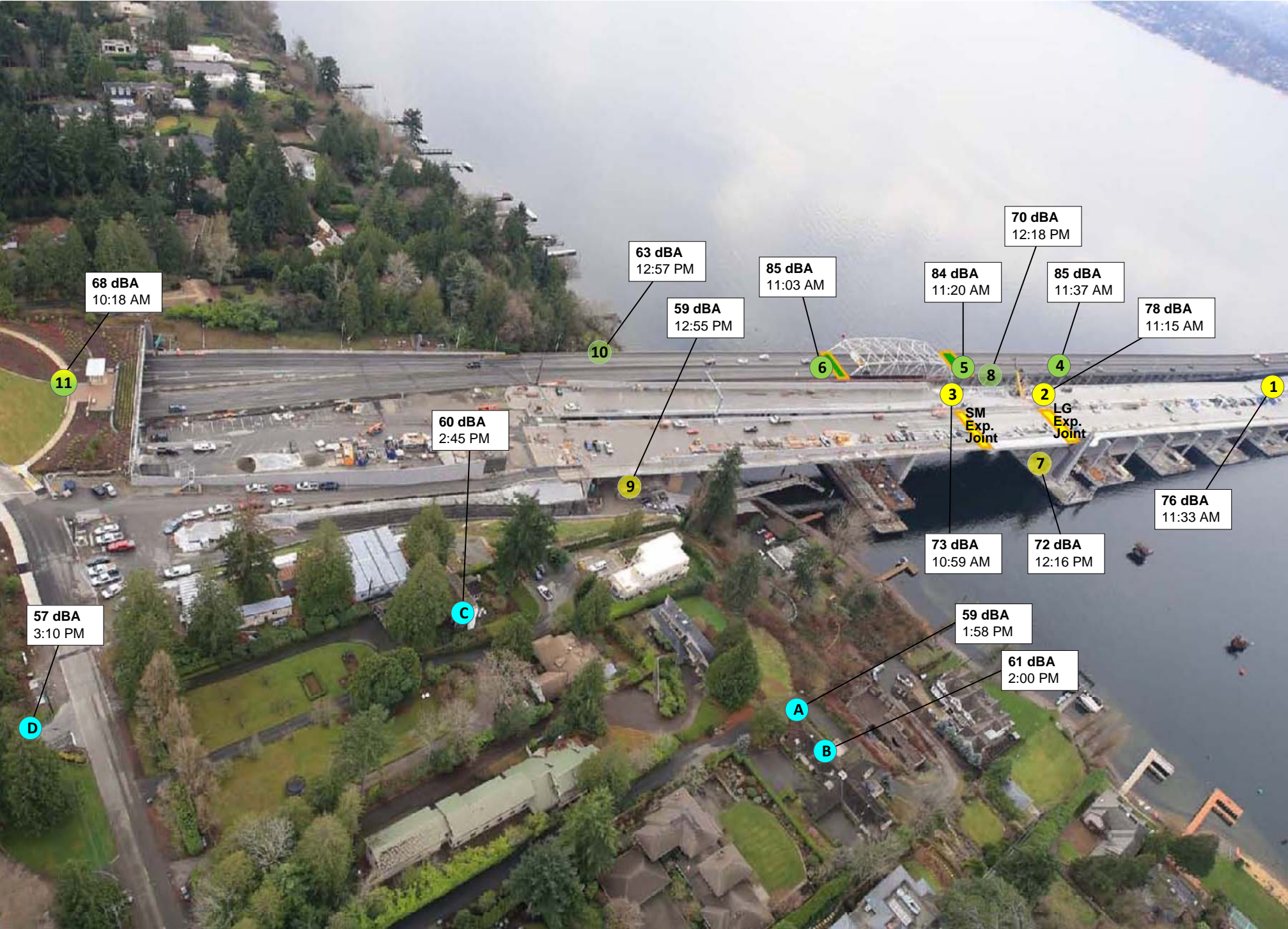
Traffic noise is typically measured in **Leq**, which is the time-weighted average generally taken over a period of 15 minutes. For example, 55 dBA Leq means that 55 dBA was the average level of noise measured at the recording location for at least 15 minutes.

Noise measurement map

On page four you will find a draft SR 520 preliminary noise measurements map, including on bridge and residential measurements.

Next Steps

- WSDOT is taking additional noise measurements now that all traffic is on the new floating bridge.
- WSDOT will share this information and additional updates on the [project Web page](#) and via email.
- WSDOT will attend the June 13 Medina City Council meeting.
- WSDOT's contractor, Kiewit/General/Manson, a Joint Venture (KGM) has begun decommissioning activities to remove the old SR 520 floating bridge from Lake Washington. This work will be completed by the end of 2016.
- Later this year KGM will build the planned noise wall and screening wall south of the new floating bridge near the shoreline in Medina.



Sound Level Measurements from the New and Old Bridges (taken 4-19-16)

	General Location	Location Description
1	Pavement West of Expansion Joints	In EB lanes of new bridge, standing approx. 1,200 feet west of the expansion joints.
2	Large Expansion Joint	In EB lanes of new bridge, standing immediately adjacent to the large expansion joint.
3	Small Expansion Joint	In EB lanes of new bridge, standing immediately adjacent to the small expansion joint.
4	Pavement West of Expansion Joints	In the WB lanes of the old bridge, standing approx. 200 feet west of the expansion joints.
5	Large Expansion Joint	In the WB lanes of the old bridge, standing immediately adjacent to the large expansion joint.
6	Small Expansion Joint	In the WB lanes of the old bridge, standing immediately adjacent to the small expansion joint.
7	Under Large Expansion Joint	On the pontoon below the WB lanes approximately 70 feet directly under the large expansion joint
8	Under Large Expansion Joint	On the pontoon below the EB lanes approximately 70 feet below the expansion joint.
9	East Shoreline Under Bridge – North Side	North side of the new bridge on the road leading to the SR 520 maintenance building
10	East Shoreline Under Bridge - South Side	South side of the old bridge on the road leading to the SR 520 maintenance building.
11	West end Evergreen Point Lid	Standing in the public viewing area on the west side of the Evergreen Point Road lid.



- KEY
- Measurement taken on new bridge
 - Measurement taken on old bridge
 - Measurement taken on new lid
 - Measurement taken at residence

NOTE

All sound level measurements are in **Leq**. The **Leq** or equivalent sound level is the time weighted average sound level over the 15-minute measurement period.

These measurements were taken during an interim condition, when traffic was travelling eastbound on the old bridge and westbound on the new bridge. Additional noise measurements are being taken now that all traffic is on the new bridge.

Sound Level Measurements Collected at Nearby Residences (taken 4-20-16)

	Residential Address
A	3223 Evergreen Point Road, Medina (outside house)
B	3223 Evergreen Point Road, Medina (on 2nd floor balcony)
C	3205 Evergreen Point Road, Medina
D	3204 76th Ave. NE, Medina
E	8901 NE 34th St., Yarrow Point