

To: Toll Bridge Oversight Committee (TBPOC)
From: Toll Bridge Seismic Safety Peer Review Panel (SSPRP)

August 8, 2013

Ref: Seismic Safety and Opening of the New San Francisco Oakland Bay Bridge

Dear TBPOC:

We are writing to you to restate our opinion that the opening of the New San Francisco Oakland Bay Bridge East Bay Spans should not be delayed once seismic safety has been achieved. This has been and is the opinion of the Caltrans SAB and the Toll Bridge SSPRP from the very beginning. We have already experienced significant delays for this important seismic safety project due to political posturing and inquiries, prompted by technical misinformation. To date we are fortunate that we did not have a repetition of a Loma Prieta type event or an even bigger earthquake in the Bay Area, an event that is almost certain to occur, we just don't know when.

The existing East Bay Spans of the Bay Bridge, while upgraded and retrofitted following Loma Prieta, still do not provide the desired and even mandated level of life safety for even ordinary bridges (exactly the reason why we are building the new bridge) and should be decommissioned ASAP, namely as soon as traffic can be moved to the new bridge safely, both in terms of traffic operations and earthquakes. The new bridge, even with two of the shear keys on bent E-2 not yet functioning, has already achieved a level of seismic safety that exceeds that of the old bridge by at least a factor of two. Actually, based on all analyses provided to date, the new bridge (with shims installed as discussed below) has met the design intent - namely to withstand the 1,500 year event with minimal damage that will allow traffic operations after inspection and minor repairs as desired for a life line bridge.

In most other bridges the seismic loads are carried by the bearings and the shear keys are the secondary system that will catch the bridge once the bearings have failed. The New Bay Bridge is different. For the New Bay Bridge the shear key system on E-2 was conceived and designed to carry the entire lateral load. To achieve this, the rocker bearings have a gap on both sides so that the transverse loads are not transmitted through the bearings. This gap also allows for improved rotation, easier inspection, and reduced maintenance of the bearings over the 150 year design life of the bridge.

Currently, shear keys S1 and S2 are not complete and cannot carry lateral loads. However, in case of an earthquake the lateral load can be carried by the center shear keys S3 and S4 on the cross beam of bent E-2 and the four bearings as long as the gaps in the bearings are closed and the bearings act jointly with shear keys S3 and S4. This short-term interim solution has been rationally evaluated by the designers and Caltrans, including FEM analysis of the bearing upper and lower housings for seismic loads as well as the bearing hold down assemblies (see Seismic Evaluation of SAS at E-2 Pier prior to completion of shear Keys S1 & S2, July 15, 2013).

The closing of the gaps is accomplished through the installation of shims which are Teflon coated machined steel plates that still allow bearing rotation but no significant lateral

movement in the bearings. The only drawback is that inspection and maintenance of the bearings is somewhat more difficult during the short time the shims are in place. This drawback is more than offset by the protection that will be provided to the bearings by the shims should a major earthquake occur before shear keys S1 and S2 are retrofitted. We understand that the shims are manufactured, were delivered to the site, and can be installed in one week.

With the design level of seismic safety achieved with shims in place, there is no reason or justification to delay the opening of the new bridge. This way we can provide seismic safety for the general public at the earliest possible time. As long as we are ready with all other traffic and seismic related safety and functionality issues, there is no need to wait until December (or whenever the outer shear keys S1 and S2 on E-2 are completed) to open the bridge. The New San Francisco Oakland Bay Bridge East Bay Spans should be opened for traffic on Labor Day, as originally planned.

In the opinion of the SSPRP, the State is taking on a higher risk in delaying the opening of New Bridge than in opening the New Bridge at the earliest possible date while continuing with the retrofit of shear keys S1 and S2.

For the SSPRP
Sincerely Yours

A handwritten signature in blue ink, appearing to read "Frieder Seible". The signature is written in a cursive style with a large initial "F".

Frieder Seible, chair, SSPRP