Capitola City Council

Agenda Report

Meeting: November 14, 2024

From: Public Works Department

Subject: Stockton Bridge Debris Mitigation Project Update

Recommended Action: Staff recommends that the City Council: 1) receive report; and 2) direct staff to utilize available funding to develop project plans/permits and solicit public feedback to rebuild Stockton Bridge to address flood risk and debris accumulation.

Background: The Stockton Avenue Bridge, constructed in 1934, is a beam bridge with three openings and two support piers. The bridge spans Soquel Creek and is the furthest downstream bridge on the Creek. Soquel Creek is prone to large woody debris, which historically causes flooding by blocking other bridges. Unlike the upstream bridges at Soquel Drive and Highway 1, the Stockton Avenue Bridge has smaller spans, increasing the risk of debris accumulation and flooding.

Due to its vulnerability, the Stockton Avenue Bridge is identified as a critical at-risk facility in the City's 2013 Local Hazard Mitigation Plan (LHMP). In 2016, a due diligence memorandum was completed to assess the potential impact of debris flow on the bridge during a catastrophic flooding event. The memorandum recommended the installation of debris fins to guide debris through the larger center span of the bridge.

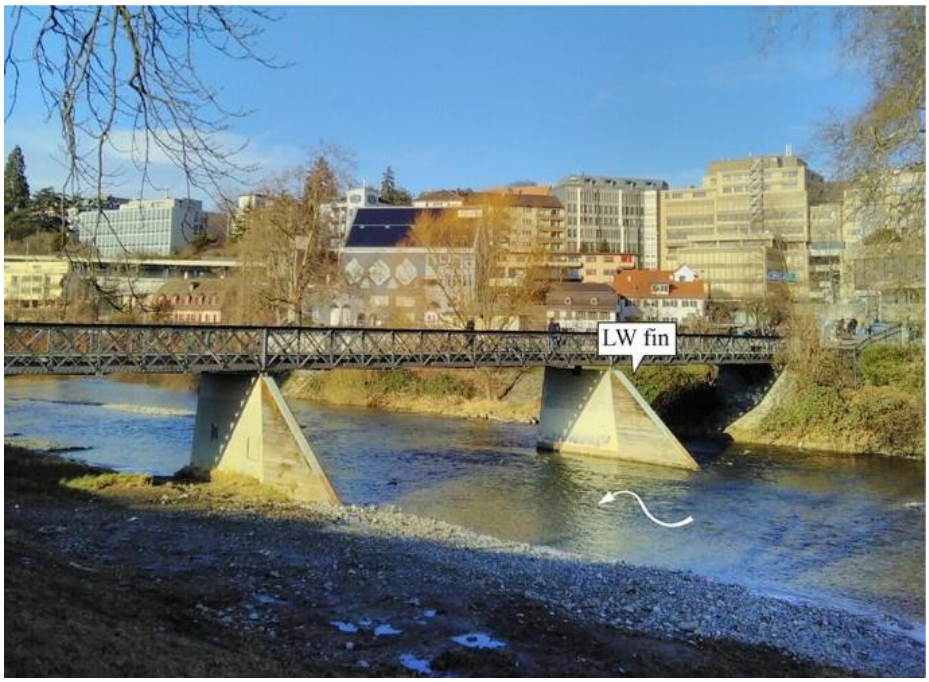
The development of a debris mitigation project for the Stockton Avenue Bridge involves conducting a feasibility study and detailed site study, including a hydraulic model, evaluation of alternative debris control measures, consideration of permits, infrastructure requirements, and cost analysis. The adopted FY 2022-23 budget allocated $350,000 for the initial phase of the "Stockton Bridge Reinforcement Project." With support from State Senator John Laird, State Assembly Bill 102 was passed this summer, which allocated an additional $500,000 for this project.

On January 25, 2024, the City Council authorized a Professional Services Agreement with CSW/Stuber-Stroeh Engineering Group, Inc. in an amount not to exceed $125,343 to conduct a comprehensive feasibility study to explore potential solutions to address debris accumulation while preserving the structural integrity, aesthetic value, and recreational use of the bridge. This study was aimed at identifying viable options to mitigate flood risks associated with large wood debris (LWD) while considering the broader environmental, economic, and community impacts.

Discussion: The Stockton Bridge Debris Mitigation Study involved comprehensive modeling and field assessments of Soquel Creek’s hydraulic behavior, bridge dynamics, and debris flow patterns during flood events. Several key factors were evaluated to ensure that each alternative could effectively reduce flood risk without negatively impacting the creek’s ecosystem or the community’s use of the area.

The following summarizes the findings of each alternative:

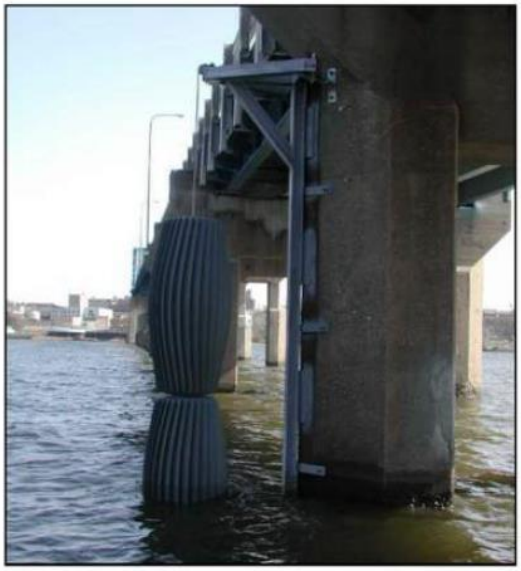
1. **Debris Diversion Fins** – Vertical or angled fins would be installed in the creek upstream of the bridge to deflect LWD. While these are geotechnically, biologically, and structurally feasible, hydraulic analysis showed that they would raise water levels upstream, increasing flood risk. Moreover, debris diversion fins had the most significant negative impact on aesthetics and recreational use, as they would be highly visible and disrupt the natural creek environment.



2. **Debris Diversion Cage** – A cage structure would be installed upstream of the bridge, trapping larger debris before it reaches the piers. Hydraulically, this option performs well, but has a tendency to trap smaller debris, which can accumulate and create blockages. Debris diversion cages are also visually intrusive and have a moderate impact on recreational users of Soquel Creek, including kayakers and fishermen.

3. **Debris Diversion Piers** – This option involves installing a series of piers upstream of the bridge designed to catch debris without significantly obstructing water flow. The piers were found to be geotechnically, biologically, and structurally feasible, and perform better than fins and cages in maintaining water flow. However, smaller debris accumulation still poses a concern. Despite this, diversion piers have the least impact on aesthetics and recreation compared to the other debris mitigation alternatives.

4. **Debris Sweeper** – A mechanical arm would sweep debris from the bridge piers during high-flow events. This is the least costly alternative but has a high likelihood of failure due to potential damage by LWD. Moreover, the effectiveness of this alternative is limited, making it a temporary and unreliable solution.



5. **Bridge Replacement** – Replacing the Stockton Bridge with a modern structure featuring a wider span and fewer obstructions is the most effective long-term solution for reducing flood risk. By increasing the hydraulic capacity and matching the clear span of upstream bridges, the replacement bridge would allow for better debris passage and significantly lower the flood risk. Although the most expensive option, bridge replacement provides a permanent solution with minimal impact on the creek's appearance and recreational activities.

Hydraulic Considerations:

Each debris diversion countermeasure was carefully evaluated for its hydraulic impact. The hydraulic modeling demonstrated that debris diversion fins, while structurally sound, significantly raised upstream water surface elevations, thereby reducing the creek's ability to pass floodwaters. The diversion cage performed similarly, with smaller debris accumulating at the structure and posing a risk of blockage over time.

The debris diversion piers were determined to have the best balance between structural feasibility and maintaining hydraulic performance. Although some small debris may collect at the piers, they allow for better flow compared to the other alternatives. However, the piers still present limitations in fully addressing flood risk.

Bridge replacement emerged as the most hydraulically effective solution. By increasing the span and reducing obstructions, the replacement bridge would eliminate many flow constraints that currently lead to debris accumulation and flood risks. This alternative was the only option that fully addressed the long-term flood mitigation needs of Soquel Creek.

Cost Analysis:

- **Debris Diversion Fins, Cages, and Piers ($1.6M- $2.4M)** have relatively similar costs, with all options requiring substantial construction, ongoing maintenance, and potential upgrades as conditions change over time.
- **Debris Sweepers ($1.4M)** present the lowest upfront cost but come with a high risk of failure and frequent repair needs due to LWD impact, making it an impractical long-term solution.
- **Bridge Replacement ($17M-$20M)**, while the most expensive alternative, would require minimal ongoing maintenance once constructed and offers the greatest long-term benefits in terms of flood risk reduction.

Environmental, Aesthetic, and Recreational Impacts:

Environmental assessments were conducted to ensure that each alternative would minimize disruption to the natural ecosystem of Soquel Creek. The debris diversion fins and cages have the most significant environmental and visual impact, altering the natural landscape and affecting wildlife habitats. Additionally, these options would interfere with the recreational use of Soquel Creek, such as kayaking and fishing.

Debris piers, while somewhat visible, have less impact on the creek’s appearance and recreational use. However, the full bridge replacement option not only improves flood risk but also results in the least disruption to the visual and recreational experience of the creek, as it would preserve and enhance the open water flow and natural aesthetics.

Recommendation

Table 1 provides a comparison of the debris mitigation options, evaluating each alternative based on hydraulic feasibility, cost, environmental and recreational impact, and effectiveness in reducing flood risk.

Table 1. Mitigation Alternatives

Option	Hydraulic Feasibility	Cost	Environmental Impact	Recreational Impact	Flood Risk Reduction
Debris Diversion Fins	Reduces hydraulic capacity, raises water level	Moderate	Significant visual impact	High disruption	Least effective
Debris Diversion Cage	Feasible but risks blockage	Moderate	Moderate visual and ecological impact	Moderate disruption	Moderately effective
Debris Diversion Piers	Feasible with minimal blockage	Moderate	Minimal visual impact	Minimal disruption	Moderately effective
Debris Sweeper	Low hydraulic effectiveness, high failure rate	Low	Minimal impact	Minimal disruption, low reliability	Least effective, unreliable
Bridge Replacement	Most effective, improves flood capacity	High	Minimal impact, preserves aesthetics	Minimal disruption	Most effective

Of the presented mitigation options, bridge replacement is identified as the most effective long-term solution to mitigate flood risk along Soquel Creek. While the initial cost is high, this alternative will provide the greatest hydraulic performance, reduce flood risk permanently, and have the least environmental and aesthetic impact.

If bridge replacement is deemed financially or logistically unfeasible at this time, debris diversion piers may be considered as a secondary alternative. This option provides a reasonable level of flood risk mitigation while balancing cost and maintaining the aesthetic and recreational value of the area.

If directed, staff will proceed with the following actions:

1. Utilize available funding to initiate planning and design for the replacement of the Stockton Bridge, including cost estimation, environmental review, and structural analysis. Staff will also begin coordinating outreach efforts to ensure that stakeholder groups, residents, and other members of the community have multiple opportunities to provide input on the future plans for the bridge.
2. Using those plans pursue state and federal grant opportunities to fund bridge replacement or debris mitigation alternatives.
3. Maintain interim monitoring of debris accumulation while a permanent solution is developed.

Fiscal Impact: On August 24, 2023, the City Council accepted $500,000 in grant funds from the California Department of Water Resources (CDWR) for the Stockton Bridge Debris Mitigation Project. The adopted FY 2022-23 budget allocated $350,000 for the initial phase of the "Stockton Bridge Reinforcement Project," bringing total project funding to $850,000.

The fiscal impact of bridge replacement will be substantial, but funding opportunities exist through state and federal grants, including FEMA and infrastructure-related programs. Utilizing existing project funding to further develop bridge plans will make potential future applications for grant funding more competitive. Regardless, staff will continue to explore available funding sources and will provide further updates as the project moves forward.

California Environmental Quality Act (CEQA): This action does not constitute a “project” pursuant to Section 15378 of the California Environmental Quality Act.

Attachments:

1. Stockton Bridge debris accumulation report

Report Prepared By: Jessica Kahn, Public Works Director

Reviewed By: Julia Gautho, City Clerk

Approved By: Jamie Goldstein, City Manager