Appendix B:

Flood Resiliency Mitigation Measures for Bridges, Culverts, and Slope Stabilization

Bridges are essential for accessing property but can be vulnerable to flooding, erosion, and storm damage. Implementing mitigation measures can enhance their resilience and reduce repair costs. While the 500-year flood (or 0.02% annual exceedance probability) is a recommended design standard, feasibility may be limited due to environmental constraints. Each property presents its own set of unique circumstances and must be evaluated on a case-by-case basis.

Potential Mitigation Measures for Bridges

1. **Improve Scour Protection**
    - **Benefit**: Maintains the stability of bridge foundations during high-flow events. : Reduces the risk of scouring and structural failure during floods.
    - **Mitigation Measures**: Install Riprap, construct bridge wingwalls, construct spur dikes, realign piers and abutments, increase footing depth, install flow deflectors.
2. **Strengthen Bridge Components**
    - **Benefit**: Enhances the bridge's ability to endure extreme weather conditions and withstand debris impacts.
    - **Mitigation Measure**: Install debris deflectors, install semicircular or triangular end-noses, install batters, replace timber pile bent pier structure with solid concrete column pier, replace steel truss bridges with open deck bridges, construct debris catchments, and install debris sweepers.
3. **Design for Debris Passage**
    - **Benefit**: Ensures that bridge openings are wide enough to allow debris to pass without causing blockages and prevents the accumulation of debris that can lead to bridge failure.

- **Mitigation Measure**: Replace multi-spans with a single-span bridge, elevate the bridge deck, increase the bridge length, build a relief opening, use a low-flow crossing.

4. **Regular Maintenance and Inspections**
    - **Purpose**: Conduct routine checks to identify and address potential vulnerabilities. This action is critical after storms and flooding events.
    - **Benefit**: Early detection of issues can prevent costly repairs and ensure safety.

Additional Resources

For detailed information and additional mitigation measures to improve flood resiliency, please refer to:

FEMA's Hurricane and Flood Mitigation Handbook.
https://www.fema.gov/sites/default/files/documents/fema_rsl_p-2181-hurricane-and-flood-mitigation-handbook-for-public-facilites_05282025.pdf

American Society of Civil Engineers ASCE 24-24.
https://www.asce.org/codes-standards/publications-and-projects/publications/asce-24-24-flood-resistant-design-and-construction/