MENU OF STRATEGIES: ROADWAY ADAPTATION

A. Design and Engineering

	STRATEGY	SCALE	EXAMPLES
☐	**A1. Retrofit vulnerable sites to withstand extreme weather events**	Site	• Culvert upgrades (e.g. improved hydraulic capacity/geomorphic compatibility) • Enhanced drainage design • Stream bank armoring • Riprap to prevent bridge scour • Rockfall barriers • Elevation of roadways or bridges • Improved stormwater detention
☐	**A2. Model asset lifespan to account for climate hazards**	Corridor / Systems	• Performance parameters for asset upgrades • Anticipating climate and land use changes
☐	**A3. Update roadway design standards to reflect latest climate data**	Systems	• Developing climate-resilient design guidelines/"climate-ready" standards • Applying updated precipitation models and asset risk assessments based on latest climate data • Updating design calculations and design requirements, including requirements for subdivisions (e.g. hydraulic capacity, flood frequency, stormwater management)

B. Nature-Based Solutions

	STRATEGY	SCALE	EXAMPLES
☐	**B1. Preserve wetlands and floodplains to improve stormwater retention**	Site / Corridor	• Right-of-way acquisitions for flood storage • Wetlands management strategy • Open space development requirements • Development setbacks from wetlands and natural resources
☐	**B2. Improve river and stream environments**	Site / Corridor	• Vegetated erosion control methods for riverbank protection and armoring • Re-naturalized streambeds • Infrastructure setbacks from river channels
☐	**B3. Enhance stormwater management via green infrastructure/ low impact development**	Site / Corridor	• Bioretention ponds • Constructed wetlands • Vegetative swales • Infiltration trenches • Rain gardens • Permeable pavement • Stormwater planters and tree box filters • Street trees
☐	**B4. Update vegetation control practices**	Site / Corridor	• Management of invasive species • Planting flood-tolerant species

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C. Operations and Maintenance

	STRATEGY	SCALE	EXAMPLES
☐	**C1. Optimize monitoring, maintenance, and replacement of bridges, culverts, and stormwater drainage systems**	Corridor/ Systems	• Minimizing repair backlogs • Documenting maintenance crew processes and best practices • Reassessing road repair schedules • Budgeting for priority infrastructure upgrades
☐	**C2. Update seasonal maintenance programs in response to climate change**	Corridor/ Systems	• Developing more "climate-ready" standards for operations and maintenance • Monitoring of bridges, culverts, and stormwater drainage systems (including any beaver activity) • Removal of debris and sediment • De-icing of roadways while reducing salt usage to protect water quality (e.g. Green SnowPro Certification)
☐	**C3. Establish flexible, responsive maintenance capabilities**	Systems	• Interagency coordination and resource sharing • Volunteer programs to assist in monitoring and removing debris • Standby contracts and staffing for extreme event response • Enhanced emergency communications systems • Stockpiling materials and equipment for extreme weather events

D. Outreach and Collaboration

	STRATEGY	SCALE	EXAMPLES
☐	**D1. Support staff training and knowledge sharing**	Systems	• Toolbox of climate resources • Staff training opportunities • Collaborative climate planning activities • Grants, funding, and technical assistance
☐	**D2. Increase public awareness of climate-related risks to infrastructure**	Systems	• Information dissemination (e.g. newsletters, user-friendly web resources) • Workshops with community stakeholders and affected property owners (e.g. downstream effects of clear cutting) • Volunteer programs (e.g. maintaining driveway culverts, capturing stormwater on-site) • Safety signage/safety devices at vulnerable crossings (e.g. flood height indicators)
☐	**D3. Strengthen multi-sector partnerships and collaboration**	Systems	• Enhanced communications/knowledge sharing (e.g. adaptation, conservation, water quality) • Adaptation workgroups; annual workshops; tailored working sessions • Coordination with State agencies • Cost-sharing (e.g. joint development and maintenance of infrastructure) • Policy alignment

MENU OF STRATEGIES: ROADWAY ADAPTATION

E. Data, Planning, and Policy

	STRATEGY	SCALE	EXAMPLES
☐	**E1. Regularly inventory vulnerable assets using up-to-date climate data**	Systems	• Documenting asset updates; monitoring changes to vulnerability status • Database maintenance • Updating mapping resources
☐	**E2. Develop climate priorities and incorporate into plans and policies**	Systems	• Long-Range Transportation Plans • Hazard Mitigation Plans • Capital Improvement Plans • Land development studies; land use plans • Zoning and site / subdivision regulations • Emergency response plans
☐	**E3. Integrate climate data to guide ongoing decision-making**	Systems	• Updated performance measures • Updated procurement criteria, RFPs • Budgeting considerations and cost-tracking (e.g. work order codes to address climate adaptation and climate-related emergency response) • Increasing transportation system redundancies