Interstate BRIDGE Replacement Program

IBR Program Climate Framework

May 2024

IBR Program Climate Framework

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FIGURE

1. INTRODUCTION

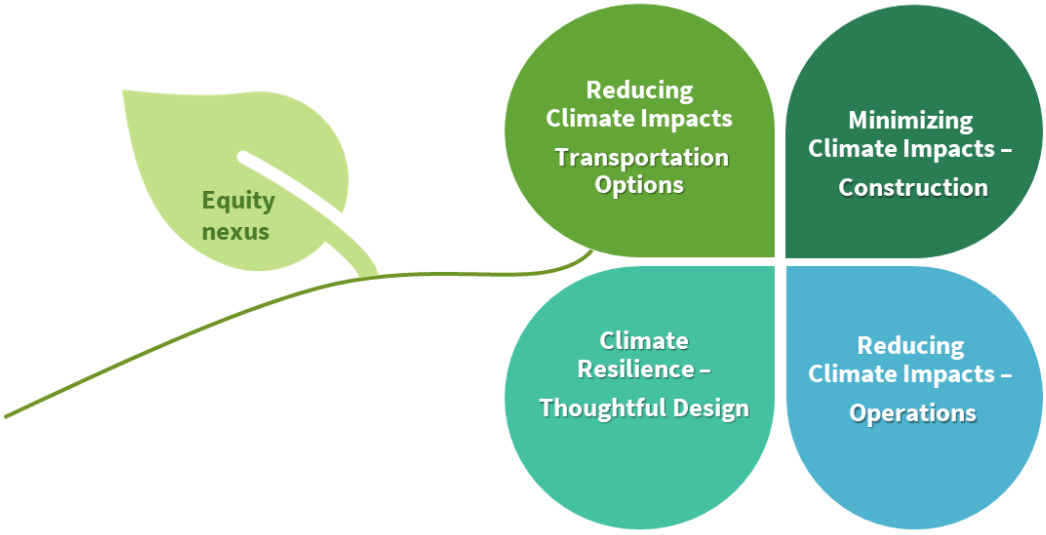
This document outlines the IBR Program Climate Framework and working concepts for implementation. The IBR Climate Framework has two main objectives: reduce climate impacts and improve climate adaptation and resilience. The framework will be applied to all Program phases including design, construction, and long-term operation and maintenance. The goal of this work is to account for environmental impacts throughout the life cycle of the bridge and associated facilities. In collaboration with local agency partners, the public, and the Program's community and equity advisory groups, the IBR Program developed the following desired outcomes associated with climate change and resiliency. Desired outcomes are observable and measurable accomplishments that the IBR Program aspires to achieve at a program level. The following desired outcomes align with the Program's Purpose and Need statement, as well as with the community priorities and values adopted by the Community Advisory Group and the equity objectives adopted by the Equity Advisory Group.[1]

- Reduce greenhouse gas emissions in support of state climate goals.
- Minimize operational and embodied carbon during construction.
- Design all structures to be resilient to and operable following anticipated climate disruptions (e.g., heat events, flooding, sea level rise).
- Limit other Program-related environmental impacts that exacerbate effects of climate change (e.g., heat island, runoff).

These desired outcomes are translated into the climate framework. Figure 1 illustrates the operational goals that will be developed and demonstrated during each stage of the IBR Program. The equity nexus indicates the connection between climate resilience and equity objectives of the IBR Program.[2] Because traditionally marginalized and underserved communities can be more vulnerable to the effects of climate change, treatments to mitigate the impact of climate change will be considered with sensitivity to those communities.

[1] For more information on the advisory groups associated with the IBR Program, see https://www.interstatebridge.org/advisory-groups.
[2] For more information on the equity objectives of the IBR Program see https://www.interstatebridge.org/equity.

Figure 1. IBR Climate Framework



Implementing the Climate Framework will require collaboration and diligence from the Program team, partners, and other interested parties. Using the Climate Framework and tangible measures, the IBR Program will develop a plan to monitor construction emissions and future operations of the highway, transit, and active transportation facilities. The specifics of targets and data to monitor will be developed in collaboration with local agency partners.

The next four sections of the document describe how the framework elements are aligned with Program development and future operations.

2. IMPROVE CLIMATE RESILIENCE THROUGH THOUGHTFUL DESIGN CHOICES

This Program has an opportunity to create a transportation system that will support our region's resilience in a future with more extreme weather events. Climate modeling predicts the type and frequency of extreme events, and the IBR Climate Framework directs Program staff to design for performance in a range of environmental conditions. Actions the Program will take include the following:

- Manage stormwater within the project area to account for **increased storm intensities** and prevent flooding.
- Design bridge footings and boat and barge clearances to anticipate **increased river elevations** due to changes in precipitation and river flow patterns.
- Design bridge footings to anticipate **lower low-water levels in summer months**.

- Select material for and design road surfaces to account for **increased temperature extremes.**
- Use native and other resilient species to ensure **plant survival and resiliency.**
- Incorporate **renewable energy–harnessing technology** such as solar panels or wind turbines that can help to support the local electricity grid and offset emissions directly from bridge operations.
- Design pedestrian and active transportation environments that **anticipate extreme weather and take advantage of opportunities to mitigate or manage exposure;** for example, provide shade and use reflective or light-colored materials.

The Program is also thinking broadly about what might happen globally as extreme weather and sea level rise displaces communities close to the coast and equator. Impacts to seasonal jobs may result as harvest seasons shift and wildfires or flooding ruin soils. As climate becomes more unpredictable, the following may result and impact the Pacific Northwest:

- Climate refugees may lead to an influx of residents.
- Changing work patterns may lead people to shift to earlier, later, or cooler hours or even to telecommute.
- Shift of seasonal work and transport of seasonal products, agriculture especially.

Creating a resilient bridge to withstand the unpredictability of the next 100 years is critical to ensuring that the Oregon Department of Transportation and the Washington State Department of Transportation can continue to manage travel demands as they change with future population growth and extreme weather.

3. REDUCE CLIMATE IMPACTS VIA TRANSPORTATION OPTIONS

One of the best ways to eliminate emissions from transportation in the long term is to shift demand away from single-occupancy vehicles to other modes such as transit, carpooling, and bicycle and pedestrian trips. Not only would this move more people in fewer vehicles, but it also would reduce congestion and improve travel times and reliability. The Program will take the following actions to shift travel demand to low emission modes:

- Increase access and connections to high-capacity transit.
- Increase and improve accessibility for people who walk, bike, and roll.
- Design infrastructure to better accommodate high-efficiency vehicles by creating charging opportunities.
- Design infrastructure that supports communities with high access to multimodal opportunities and transit (e.g., complete communities).
- Implement pricing strategies such as tolls.

The Program will take the following actions to improve transportation efficiency:

- Reduce congestion through mode shift and changes to time-of-day travel.
- Design to reduce stop-and-go traffic patterns.
- Target moderate speeds for lower emissions.
- Incorporate transportation system management such as intelligent transportation systems.

4. MINIMIZE CLIMATE IMPACTS FROM CONSTRUCTION

Construction methods can be harmful to the surrounding environment by emitting greenhouse gases and generating construction noise and material waste. The Program will investigate and engage in the best and most climate friendly construction materials, equipment, and practices in an attempt to reduce embedded carbon in materials, reduce the use of carbon-intensive fuels, maximize recycling, and reduce and mitigate greenhouse gas emissions. Lifecycle emissions will be considered when making recommendations and choices.

The following are potential concepts to reduce climate impacts from construction:

- Optimize project elements to use the minimum amount of construction material to achieve their function.
- Design for prefabrication and/or modular components to reduce waste (e.g., use columns of the same size to allow reuse of concrete forms).
- Use warm-mix asphalt in lieu of hot-mix asphalt to reduce energy consumption and associated greenhouse gas emissions.
- Research clean production methods for cement and concrete, and if found viable, incorporate into material specifications.
- Maximize the use of recycled material to reduce virgin material production and use. This would include recycling existing concrete and asphalt pavements to be used as aggregate base, subbase, backfill materials, etc.
- Minimize lengthy supply chains for materials by using local sources where possible while still maintaining acceptable quality levels for materials.
- Use battery-powered equipment as feasible, and where not, use equipment that exceeds Tier 4 emission regulations established by the U.S. Environmental Protection Agency.
- Establish a demolition and recycling plan to maximize the recycling or reuse of old bridge and roadway components.

5. REDUCE CLIMATE IMPACTS FROM OPERATIONS AND MAINTENANCE

Operation and maintenance of the infrastructure built for the IBR Program would result in long-term environmental impacts. Impacts mitigated from operations and maintenance do not include the impacts from roadway users, but rather how the bridge, highway, transit and associated facilities are run and maintained. Within this element of the framework, the Program is focused on areas under direct control of the Oregon and Washington departments of transportation and TriMet and C-TRAN as opposed to the vehicle impacts from bridge users.

Vehicles (e.g., light-rail vehicles and maintenance vehicles), road surfaces (both on structures and on the ground), lighting, and the structures themselves will all need regular maintenance and repair and, at some point, replacement. A configuration with a bridge lift would add to operation and maintenance and energy needs. The infrastructure design choices made for the Program will determine the maintenance and operation requirements. The following factors may be considered in mitigating impacts from operations:

- Electrify the maintenance fleet.
- Establish replacement equipment and material standards.
- Use green energy for administrative services to oversee and operate the tolling system.