

Seattle Department of Transportation

# ROADWAY STRUCTURES

## 2023 Annual Summary



*Magnolia Bridge*



**Seattle**  
Department of  
Transportation



## ASSET CONDITION

### Bridges

- Bridge inspection frequency: We ensure all bridges undergo inspections at least once every 24 months Federal Highway Administration's (FHWA) requirements. Depending on the bridge's condition and type, we may increase inspection frequency or employ specialized inspection techniques. This includes assessments for nonredundant steel tension members, underwater inspections (every 60 months), or focused inspections for atypical or non-standard bridge components.
- Rating bridge condition: Bridge conditions are rated following the FHWA National Bridge Inspection Standards (NBIS). This system evaluates bridges based on their current state relative to their original condition, focusing on critical components such as the deck, superstructure, and

substructure. In alignment with NBIS guidelines, SDOT assigns bridges a rating of good, fair, or poor, reflecting the condition of these essential elements, with the overall assessment based on the component with the lowest rating. This is not the only factor in developing our preservation strategy.

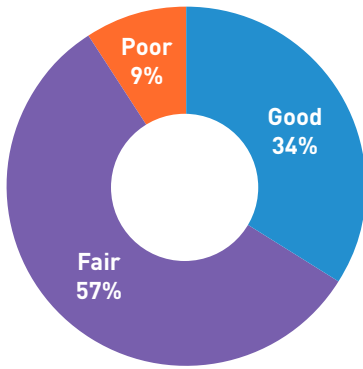
- Poor condition bridges: A bridge rated as being in poor condition can still be deemed safe for public use. Such ratings indicate the presence of structural or maintenance considerations. To continue meeting our top priority of safety, we can proactively undertake one of several steps: increasing the frequency of inspections, adjusting load capacity through restriping, posting weight limits, or executing temporary repairs as necessary to maintain public use and manage costs.

SDOT assesses the condition of 35 pedestrian and 86 vehicular bridges.

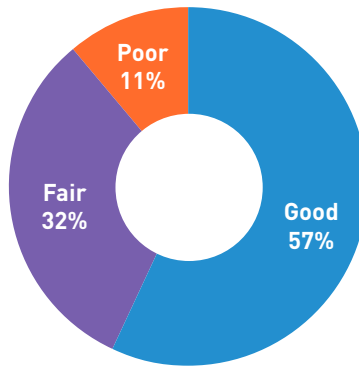


*University Bridge*

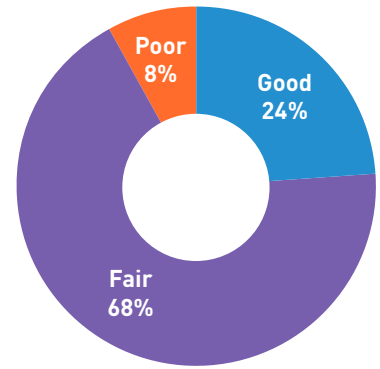
**Overall Bridge Condition**



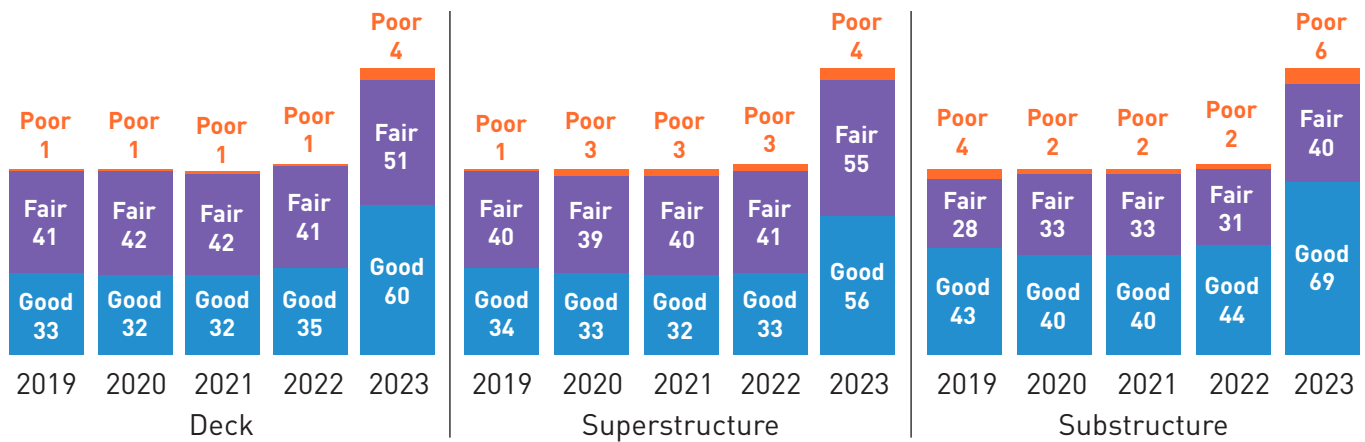
**Pedestrian Bridge Condition**



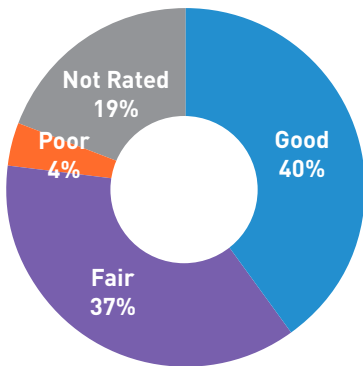
**Vehicular Bridge Condition**



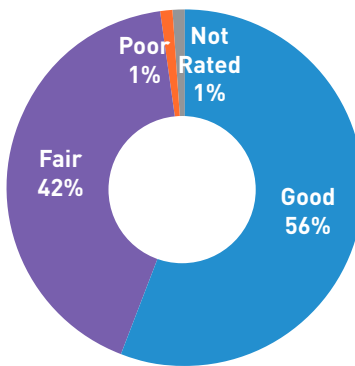
**Main Component Condition**



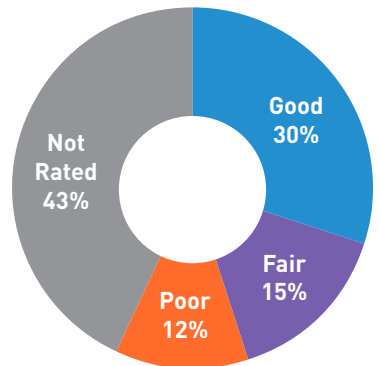
**Retaining Wall Condition**



**Stairway Condition**



**Areaway Condition**



\*Bridge inventory is larger than in previous years as bridge inspectors began reporting element data on Non-Reportable NBI bridges in 2023.

# STRUCTURAL OPERATIONS AND MAINTENANCE HIGHLIGHTS

## Levy to Move Seattle Highlights

The Levy to

# MOVE SEATTLE



### Bridge Maintenance

Completed 381 bridge minor repairs, including:

- Repairing a sidewalk on the Magnolia Bridge
- Spall (breakage) and exposed rebar repairs on the Ballard Bridge
- Spall repairs on Albrow Pl over Airport Way S
- Rail and spall repairs on the W Howe St Bridge
- Preventative Maintenance on the Queen Anne Bridge

### Stairway Rehabilitation

Rebuilt six stairways to current standards:

- Troll Knoll - Aurora Ave N between N 36th St and Aurora Ave N
- Princeton Ave NE
- S Morgan St
- California Dr SW
- W Lawton
- S Norfolk St

### Other Maintenance

- Spokane Swing Bridge Slew Cylinder removal, overhaul, and repair
- Planning Control Systems upgrades on Spokane St Swing, Ballard, Fremont, and University Bridges
- Quarterly preventative maintenance on Spokane St Swing, Ballard, Fremont, University and South Park Bridges
- Preventative maintenance on Royal Brougham Bridge, Klickitat Ave SW Bridge, Rainier & MLK Pedestrian Bridge, Thomas St Ped Bridge, Marion St Pedestrian Bridge, N 41st & Aurora Pedestrian Bridge, Rainier Bus Shelter, Westlake/Dexter Bus Shelter

### BRIDGE INSPECTIONS

Completed 100% of NBIS bridges

Routine: 62	Underwater: 2
Fracture Critical: 5	Condition: 41
Special: 3	Short Span: 3
Safety/Other: 46	

### COMPLETED WORK ORDERS

Bridges: 560	Retaining Walls: 12
Stairways: 64	Areaways: 3

### BRIDGE OPENINGS

Variance from 2022 identified at right

Ballard: 3,208	↓ 53
Fremont: 4,502	↑ 63
University: 2,652	↑ 6
Spokane: 1,627	↓ 102
South Park: 497	↓ 275

### EMERGENCY RESPONSE

Crashes: 1
Operational: 29
Other Maintenance: 7

### OTHER ROADWAY STRUCTURE INSPECTIONS

Stairway: 170
Retaining Walls: 44
Areaways: 109
Plan Review: 241
Service Requests: 126



Fremont Troll

## GLOSSARY

### Bridge Inspection Types

- **Routine:** Regularly scheduled inspections consisting of documenting observations, measurements, or both, used to determine the physical and functional condition of the bridge at a point in time.
- **Non-redundant Steel Tension Member (NSTM) (previously Fracture Critical):** Inspection to assess the structural condition of each NSTM member, whose failure could result in the partial or total collapse of the bridge.
- **Private/Other:** Inspection of privately-owned structures that spans across the public right-of-way.
- **Condition:** Inspection to assess the condition of pedestrian structures or other bridge structures that may not meet National Bridge Inspection Standards guidelines for a “routine” inspection.
- **Short Span:** Inspection used for vehicular bridges that are 20 feet or less.
- **Special:** Inspection to assess the condition of special features on a bridge, such as the electrical and mechanical elements of a moveable bridge.
- **Underwater:** In-water inspections to examine the underwater elements of the bridge to determine their structural condition and adequacy.

### Bridge Load Rating

Determines a bridge’s capacity to carry specific types of vehicle loads. This information is used to manage and enforce vehicle loads on bridges. This is important for safety and preservation.

Activities include:

- Analyze the vehicle load capacity of bridges
- Field verification tests
- Monitor bridges with low ratings
- Post or restrict the weight and or type of vehicle for bridges or structures with reduced load ratings.

### Component level assessment

Detailed assessment of the condition state of the individual bridge components, which includes and is not limited to the deck, the substructure, and the superstructure.

### Other Inspections

Inspections to assess the condition of other roadway structures that are not identified as a bridge, such as areaways, retaining walls, and stairways.

### Superstructure

Typically refers to the bridge elements above the bearings and piers. Key components include:

- **Deck:** This is the surface that people drive, ride, or walk on.
- **Girders:** These horizontal structures provide support to the deck, spanning the length of the bridge.
- **Trusses:** These are triangular units that support the deck, particularly on long bridges.
- **Bearings:** The interface between the superstructure and substructure; bearings support the superstructure’s weight.
- **Parapets:** Railing or barrier that is located along the outside edge of a bridge.
- **Expansion Joints:** These elements provide continuity between the bridge and the roadway and allows the bridge to expand and contract due to variations in temperature.

### Substructure

Typically refers to all the other elements of the bridge that supports the superstructure. Key elements include:

- **Column:** Vertical component that supports the superstructure.
- **Bent or Pier:** Commonly used to refer to a column or a line of columns situated perpendicular to the path of travel.
- **Foundation:** Element that is located below ground and supports the bent or pier.
- **Abutment:** Refers to a bent or pier, denotes the support elements that support the beginning and the end of the bridge.

## Roadway Structures Mission

Make the most of Seattle's transportation investment, preserve infrastructure, manage capital improvements and maintain and operate bridges, retaining walls, stairways and areaways to provide a safe and reliable transportation system.

