

Bridge Seismic Program

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Levy Oversight Committee

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Outline

- Key Takeaways
- Levy to Move Seattle: Bridge-Specific Programs
- Program Overview
- Program History
- Meeting Bridge Seismic Reinforcement Commitments
- Progress To-Date
- Looking Ahead
- Questions

Key Takeaways

- Meeting commitments to voters across bridge programs, including the seismic reinforcement program
- What are seismic reinforcements
- Adjustment to the Bridge Seismic program workplan to meet commitments
- Current bridge seismic projects and project schedules



N 102nd Pedestrian Bridge



W. Howe St Bridge

Levy to Move Seattle: Bridge-Specific Programs

Program	Status
Bridge Repair Backlog <i>Eliminate the backlog of needed bridge spot repairs</i>	✓ On track <i>(presenting in spring/early summer)</i>
Bridge Seismic Improvements <i>Seismically reinforce 16 vulnerable bridges</i>	✓ On track <i>(presenting today)</i>
Bridge Replacement, Fairview <i>Replace Seattle's last timber vehicle bridge (on Fairview Avenue)</i>	✓ Completed in 2021
Bridge Replacement, Planning & Design <i>Plan and design high priority bridge replacements to begin construction after 2024. \$10M may be used for implementing near-term pedestrian and bicycle safety projects on bridges being studied for replacement</i>	✓ On track <i>(presented last month)</i>
Northgate Bridge <i>Provide additional City funding for a pedestrian and bicycle bridge over I-5 connecting to light rail in Northgate</i>	✓ Completed in 2021
Lander St Bridge <i>Provide local money to design and build the Lander Street Overpass</i>	✓ Completed in 2020



Overview

- Strengthens existing bridges, to make them less vulnerable to a seismic event
- Typical seismic reinforcements:
 - Strengthening the bridge's cap beams, columns, footings, and abutments
 - Installing ground anchors to reduce "rocking" and uplift
 - Add restrainers to minimize span from unseating
- Opportunities:
 - Repairing cracks and damaged concrete
 - Replacing the bridge expansion joints
 - Potential to address vertical load deficiencies



Underside of the Cowen Park Bridge showing installation of the carbon fiber wrapping on the arch support struts

Program Overview

Levy to Move Seattle commitment (2015 Ordinance):

Seismically reinforce 16 vulnerable bridges.

Funding (2016-2024):

- \$1M Local
- \$67M Levy
- \$13M Leverage

Delridge Way SW Pedestrian Bridge



History

2015 Levy communications
materials & 2018
Workplan identified 16 bridges

Planned projects (2019-2024)

This list is currently in alignment with SDOT's highest maintenance priorities and available funding. This list may be revised annually and will be updated in SDOT's annual workplans.

Year	Project Name	Annual Target
2019	W Howe St Bridge	1
2020	8th Ave NW/NW 133rd St Bridge	5
	N 41st St Ped Bridge	
	Cowen Park Bridge	
	Delridge Way Ped Bridge	
	SW Andover Ped Bridge	
2021	4th Ave S Main to Airport Way Bridge	3
	15th Ave NW/Leary Way Bridge	
2022	Ballard Bridge	2
	Fremont Bridge	
2023	1st Ave S Viaduct/Argo Bridge	4
	4th Ave S Viaduct/Argo Bridge	
	Admiral Way N Bridge	
	Admiral Way S Bridge	
2024	15th Ave NE/NE 105th St Bridge	2
	McGraw St Bridge	
Total		16



History: 2020 Memo

- Upon completion of all 16 Concept Design Reports: estimated costs for full scope of work exceeded program budget
- Five bridges deferred from current workplan:
 - 1st Ave S Viaduct/Argo Bridge
 - 4th Ave S Bridge (Main St to Seattle Blvd)
 - 4th Ave S Viaduct/Argo Bridge
 - Ballard Bridge (Bascule span)
 - Fremont Bridge (Bascule span)

Memo

Date: 11/16/2020

To: Move Seattle Levy Oversight Committee

From: Matt Donahue, Interim Director Roadway Structures, Program Owner

Subject: Levy program 12, Bridge Seismic Concept Design Report results

Purpose: As Concept Design Reports have advanced for the Bridge Seismic Program, the estimated costs to complete the full scope of the 16 bridges in the Bridge Seismic Program exceed the programmed budget. The purpose of this document is to provide a recommendation to the Levy Oversight Committee (LOC) regarding how to meet the intent of the program as outlined by the Levy given the increase in costs from the previous conceptual cost estimates.

Action needed: Concurrence to implement the recommendation noted in this memo

Background: Each project in the Bridge Seismic Program starts with a Concept Design Report (CDR). The goal of the CDR is to analyze the structure to determine its seismic deficiencies as is; to make recommendations to SDOT for retrofit strategies to achieve the desired structural performance under seismic loading; and to analyze the structure with the retrofits adopted by SDOT to ensure that those retrofits will provide the desired level of service (e.g. bridge operational after a 100-year level event, bridge will not collapse after a 1000-year level event). The CDR also provides an engineering cost estimate for design and construction of the adopted retrofit strategies. The following table summarizes the programmed funding level and cost estimate for design and construction for each project, including cost to develop the CDR:

Table 1: All programmed bridges, cost estimate vs. original programmed budget

No.	Bridge	Programmed Amount (2016 + Contingency) ¹	Updated Cost Estimate for Design & Construction, Including CDR development (2020) ²
1	SW Andover Pedestrian Bridge ⁴	\$1,023,626	\$2,776,201
2	Ballard Bridge (Bascule)	\$7,140,065	\$32,449,070
3	Fremont Bridge (Bascule)	\$7,116,560	\$29,110,232
4	Admiral Way North Bridge ³	\$7,401,221	\$15,465,788
5	Admiral Way South Bridge ³	\$3,700,606	
6	Delridge Pedestrian Bridge	\$1,500,000	\$3,338,544
7	15th Ave NW/Leary Way Bridge	\$1,153,000	\$4,637,350
8	15th Ave NE over 105th Ave NE	\$3,421,423	\$5,990,000
9	McGraw St Bridge	\$6,320,460	\$8,248,594

Meeting Bridge Seismic Commitments

Identifying additional funding to increase progress towards 2015 Levy Ordinance commitments.

- Local Programs Grants
- PSRC TAP Grant

We have added five bridges back to the workplan to meet the original goal of 16 bridges.

- 45th Ave NE Pedestrian Bridge
- 13th Ave NW/Holman Rd NW Pedestrian Bridge
- Rainier and MLK Jr Way Pedestrian Bridge
- N 102nd and Aurora Pedestrian bridge
- Lower Spokane St Swing Bridge Silt Removal



13th Ave NW/Holman Rd NW pedestrian bridge

West Seattle Bridge Rehabilitation



West Seattle Bridge Pier 18 (on left) - complete!

- Significant bridge repair effort occurring concurrently with bridge program Levy deliverables
- Not Levy-funded, yet was a significant investment in the structure's seismic resiliency
- Strengthening improved structure seismic performance; Pier 18 bearing modifications restored thermal movement

Progress To-Date



8th Ave NW/NW 133rd St Bridge – complete!



SW Andover St Ped Bridge – complete!

BRIDGE SEISMIC PROJECTS

COMPLETED

SW Andover Ped Bridge (2022)

8th Ave NW/NW 133rd St Bridge (2022)

Cowen Park Bridge (2020)

W Howe St Bridge (2020)

Begin construction in 2023

McGraw St Bridge

15th Ave NW/Leary Way Bridge

Admiral Way N Bridge

Admiral Way S Bridge

15th Ave NE/NE 105th St Bridge

Begin construction in 2024

13th Ave NW/Holman Rd NW pedestrian bridge

45th Ave NE pedestrian bridge

N 102nd and Aurora pedestrian bridge

Rainier and MLK Jr Way pedestrian bridge

N 41st St Ped Bridge

Delridge Way Ped Bridge

Lower Spokane St Swing Bridge Silt Removal

Deep Dive: SW Andover St Bridge Retrofit



SW Andover St Ped Bridge

- Completed retrofit prior to reopening of West Seattle High Bridge
- Work included:
 - Linked drop-in spans with approach spans
 - Prevent rocking of the east abutment with soil anchors
 - Repair spalls and minor defects

Deep Dive: Plan for McGraw St Bridge

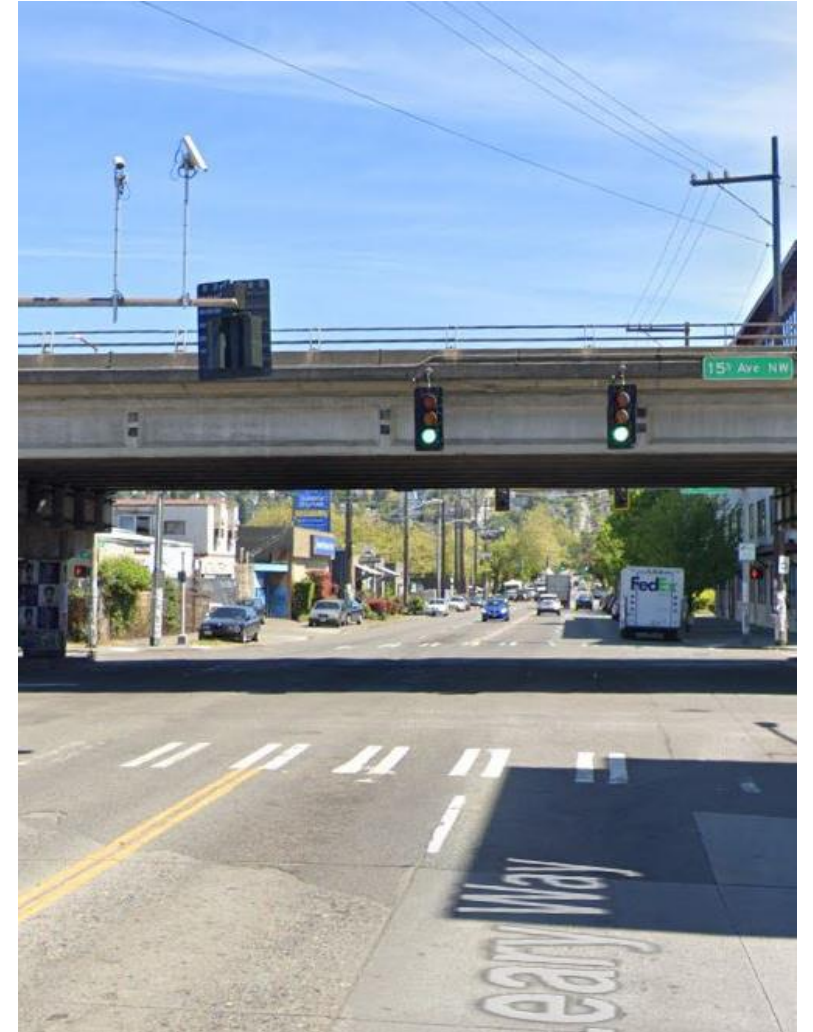
- Construction begins this summer
- Work will include:
 - Installing carbon fiber wrapping to strengthen the bridge's crossbeams, columns, and arches
 - Strengthening the existing arch with a concrete infill wall
 - Installing concrete blocks and support shells for the bridge's columns and crossbeams
 - Repairing cracks and damaged concrete
 - Replacing the expansion joints at both ends of the bridge



McGraw St Bridge

Deep Dive: Plan for Leary Way Bridge

- Combine with the levy-funded 15th Ave NW AAC project to minimize construction conflicts
- Construction begins this year; sequencing of seismic work to be developed with contractor
- Work will include:
 - Strengthen bridge structural elements: cap beams, columns, footings, and abutments
 - Install ground anchors
 - Repair cracks and damaged concrete
 - Replace the bridge expansion joints



15th Ave NW / Leary Way Bridge

Looking Ahead

- ✓ Focus on meeting commitments by end of 2024
- ✓ Life Cycle Cost Analysis to inform future work planning

Questions?



Contact Information



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From the entire SDOT Team:
Thank you!

