



Date of Meeting: November 3, 2020
Item No.: 5B

West Seattle High-Rise Bridge Safety Project Discussion

NWSA Managing Members Meeting
November 3, 2020

Agenda

- **Northwest Seaport Alliance/Port of Seattle Goals and Strategy**
- **Mitigation efforts**
 - Low Bridge Access
 - West Marginal Way
- **Seattle's 2020 Bridge Audit**
- **Seattle Department of Transportation's (SDOT) Cost-Benefit Analysis**
 - New Rapid Replacement Alternative
- **Northwest Seaport Alliance/Port of Seattle Priorities vs Top Alternatives**
- **Discussion, Questions and Next Steps**

Port of Seattle and NWSA Priority Goals

- 1. Low Bridge Freight Access**
- 2. Maritime Industry Access**
- 3. Strategic Economic Impact**
- 4. Local Operations Support**
- 5. Rapid Restoration**
- 6. Equitable Implementation**
- 7. Sustainable Solutions**
- 8. Broadly Supported Execution**

NWSA/POS Strategy



Overarching

- Highlight regional impacts
- Advocate for best NWSA/POS outcome
- Support all efforts to secure funds at the state and federal levels

Local

- Continued close stakeholder engagement
- Direct advocacy with the City



State and Federal

- Prioritize the issue with legislator outreach
- Continue to engage congressional delegation
- Engage and involve Eastern WA stakeholders
- Close coordination with the City

Spokane Street “Lower Bridge”



- Provides access into Terminal 5
- Access is currently heavily restricted
- Continues to receive significant attention
- Newly formed subcommittee to help guide policy development

Low Bridge Access Policy

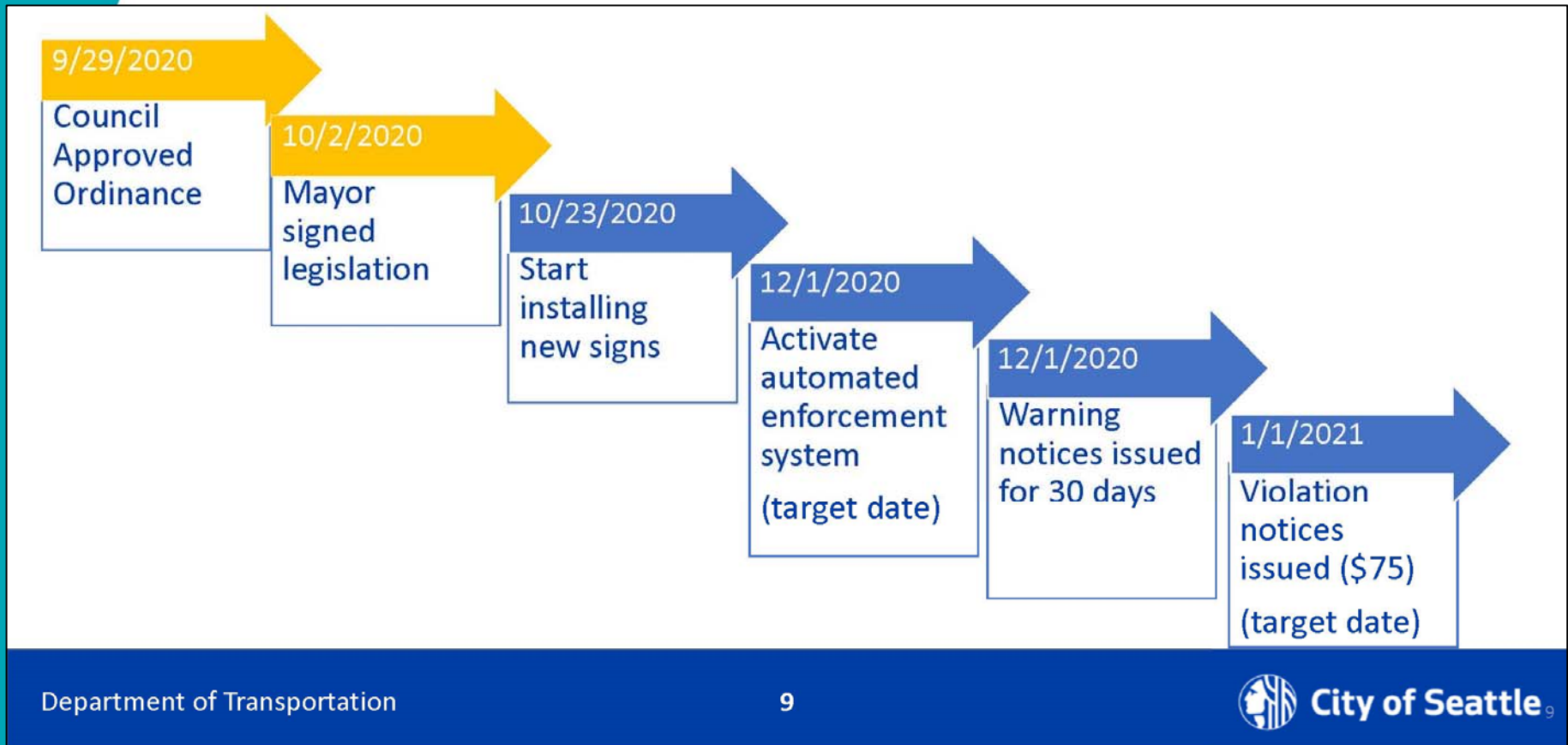
- Emergency vehicle response remains top priority; SPD continues to enforce placards at peak periods
- Allowed Users:
 - Everyone between 9 pm and 5 am
 - School buses
 - 75 Maritime/industrial users proximate to Harbor Island
 - 22 Employer shuttles
 - 10 Vanpools of essential workers
 - 108 ILWU
 - 13 West Seattle chamber/Junction BIA for small business access
- Automated enforcement still on track for beginning this Fall; Low Bridge Subcommittee created to inform policy



Low Bridge Subcommittee Members

| COMMUNITY TASK FORCE MEMBERS | |
|--|--|
| West Seattle business community | Dan Austin, WS Chamber; Lora Radford, WSJA |
| Maritime and industrial users proximate to Low Bridge | Bob Watters, SSA; Ken Bowden, Nucor |
| Labor | John Persak, ILWU |
| MEMBERS OUTSIDE THE COMMUNITY TASK FORCE | |
| Employer shuttles / private school buses | Andrew Darbyshire, TransWest |
| Medical centers / patients | Ross Baker, Virginia Mason |
| AGENCY STAFF | |
| Seattle Department of Transportation | Colin Drake |
| Port of Seattle/Northwest Seaport Alliance (Freight) | Lindsay Wolpa |
| King County Metro (Transit and Vanpools) | Steve Crosley |
| Office of Economic Development | Sarah Scherer |
| Other agencies as needed: Seattle Police Department, Seattle Fire Department, Seattle Public Utilities, Seattle City Light | |

Lower Bridge Automated Enforcement Timeline





West Marginal Way

West Marginal Way Potential Construction Schedule



2020 Seattle Bridge Audit

Seattle Department of Transportation: Strategic Approach to Vehicle Bridge Maintenance is Warranted

September 11, 2020

Sean DeBlieck, Deputy City Auditor

David G. Jones, City Auditor



Seattle Office of City Auditor



- **What inspired the audit:** “The unexpected closure of the West Seattle High Bridge in March of 2020 raises questions about the adequacy of the City’s oversight of its bridge portfolio.”
- **Why it was done:** “Seattle City Councilmember Alex Pedersen requested this audit to assess the physical condition of and maintenance investments in vehicle bridges in Seattle.”
- **Recommendation:** “...to address the issue of aging bridge infrastructure, SDOT should develop a strategic bridge preservation program to make the most efficient use of current resources and to develop more effective plans for future needs.”

From City's Bridge Audit *(presented September 2020)*

SDOT Estimates More Funding is Needed

- To maintain bridges in a state of good repair, SDOT estimates they should spend 1 to 3 percent of total replacement cost
- In 2018, the replacement value for all SDOT bridges over 60 years old was estimated to be \$3.4 billion
- At 1 percent, that's a minimum of \$34 million per year
- Average annual spending on bridge maintenance for the last 14 years was \$6.6 million



Cost-Benefit Analysis (CBA)

SEATTLE DEPARTMENT OF TRANSPORTATION

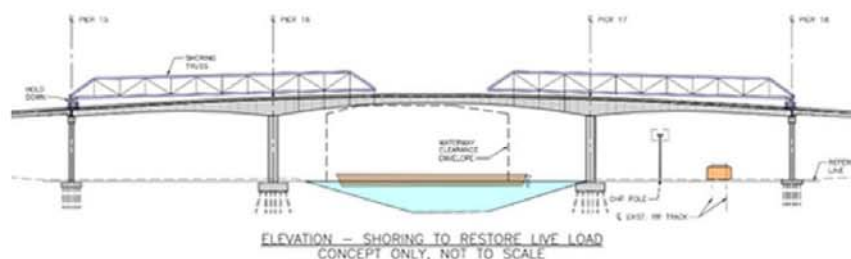
WEST SEATTLE HIGH-RISE BRIDGE
SAFETY PROJECT
COST-BENEFIT ANALYSIS REPORT



wsp

- On October 20, SDOT released the CBA performed by their consultant, WSP.
- The report “is intended to support the City as it makes the decision related to rehabilitation and/or replacement.”
- The CBA “examines three different schemes (shoring, rehabilitation, and replacement), comprising six different alternatives based on preliminary engineering work and the continued monitoring of the bridge.
- WSP eliminated Alternative 3 (partial superstructure replacement) as they “determined that it would be prohibitively difficult to make continuous connections between the concrete and steel.

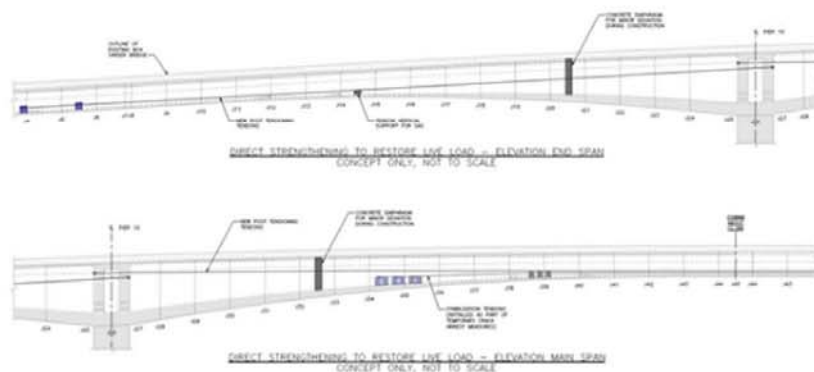
Alternative 1: Shoring



| Activity | Duration | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 | 2032 | 2033 | 2034-2082 | 2083 | 2084-2108 |
|--------------------------|------------|------|------|------|------|------|------|------|------|------|------|------|------|------|-----------|------|-----------|
| Design Shoring | 0.5 Years | | | | | | | | | | | | | | | | |
| Construct Shoring | 3.25 Years | | | | | | | | | | | | | | | | |
| Traffic on Shored Bridge | 5 Years | | | | | | | | | | | | | | | | |
| Construct New Bridge | 3.67 Years | | | | | | | | | | | | | | | | |
| New Bridge Service Life | 75 Years | | | | | | | | | | | | | | | | |
| Direct Strengthening | 1 Year | | | | | | | | | | | | | | | | |

- **Estimated Total Ownership:** \$1558.9M
- **Estimated Upfront Construction Costs:** \$103.5M
- **How long could it take?** Could return partial traffic by late 2024
- **How long could it last?** 5 years
- **Biggest Risks/Drawbacks:**
 - Complex, costly, short lifespan and long construction duration
 - Does not restore full capacity
 - Still requires replacement = closing the bridge again

Alternative 2: Repair

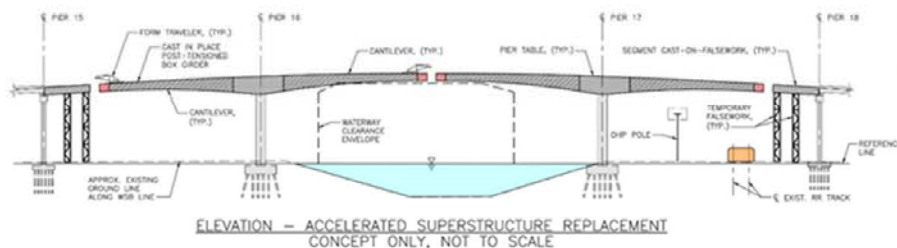


Alternative 2 : Repair 15-Year Lifecycle

| Activity | Duration | 2021 | 2022 | 2023-2031 | 2032 | 2035 | 2036 | 2037-2038 | 2038-2113+ |
|---------------------------------|----------|------|------|-----------|------|------|------|-----------|------------|
| Design Rehabilitation | 0.5 yrs | | | | | | | | |
| Construct Rehabilitation | 1.08 yrs | | | | | | | | |
| Traffic on Rehabilitated Bridge | 15 yrs | | | | | | | | |
| Construct New Bridge | 3.67 yrs | | | | | | | | |
| New Bridge Service Life | 75+ yrs | | | | | | | | |

- Estimated Total Ownership: \$916.0M
- Estimated Upfront Construction Costs: \$47M
- How long could it take? Could return traffic in 2022
- How long could it last? 15+ years (see risk below)
- Biggest Risks/Drawbacks:
 - Not confident in duration of repairs
 - Difficult to secure needed annual maintenance funding
 - Seismic performance lower than replacement alternatives
 - Still requires replacement = closing the bridge again
 - Greater uncertainty and more complexity in future (T5, LINK, traffic demand, increased density)
 - Securing funding to replace a functioning (repaired) bridge later perhaps harder than funding a closed bridge now

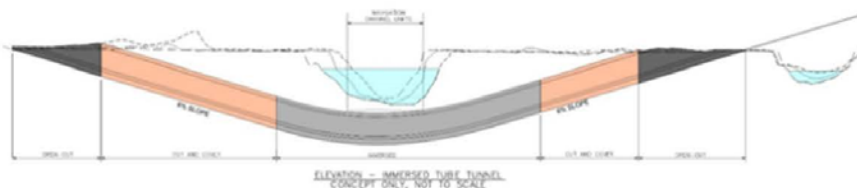
Alternative 4: Superstructure Replacement



| Activity | Duration | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027-2075 | 2076 | 2077-2101 |
|--------------------------------------|------------|------|------|------|------|------|------|-----------|------|-----------|
| Design Superstructure Replacement | 1.5 Years | | | | | | | | | |
| Construct Superstructure Replacement | 3.83 Years | | | | | | | | | |
| New Bridge Service Life | 75 Years | | | | | | | | | |
| Direct Strengthening | 1 Year | | | | | | | | | |

- Estimated Total Ownership: \$1005.7M
- Estimated Upfront Construction Costs: \$383.1M
- How long could it take? Could return traffic in 2026
- How long could it last? 75 years
- Biggest Risks/Drawbacks:
 - Mobility impacts from longer closure
 - Securing funding; larger up-front capital cost
 - Permitting and regulatory issues could impact schedule

Alternative 6: Immersed Tube Tunnel (Off Alignment)



| Activity | Duration | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030+ |
|------------------------------|-----------|------|------|------|------|------|------|------|------|------|-------|
| Design and ROW/Easements | 3.5 Years | | | | | | | | | | |
| Construct Tunnel and Tie-Ins | 5.5 Years | | | | | | | | | | |
| New Tunnel Service Life | 75+ Years | | | | | | | | | | |

- Estimated Total Ownership: \$2,823.6M
- Estimated Upfront Construction Costs: \$1,992.1M
- How long will it take? Could return full traffic by 2030
- How long could it last? 75 years
- Biggest Risks/Drawbacks:
 - Environmental: Hazardous materials from dredging the bottom of the Duwamish Waterway
 - Mobility impacts from a long construction duration
 - Securing funding
 - Impacts to Harbor Island
 - Unique asset for SDOT to maintain

Rapid Replacement Alternative

(Alternative 4 variation)



- Reuse of existing piers and foundations
- Construction strategy integrated into design
- Arch fabrication concurrent with back span construction
- Outreach to Northwest fabricators/contractors
- Past success with Lake Champlain Bridge in both Cost / Schedule
- Expedited process and efficiency of construction very likely to yield lower construction costs

| Activity | Duration | 2021 | 2022 | 2023-2071 | 2072 | 2073-2101 |
|--|------------|------|------|-----------|------|-----------|
| Design Rapid Span Replacement | 0.75 Years | | | | | |
| Demolition | 0.85 Years | | | | | |
| Fabricate and Install Rapid Span Replacement | 2 Years | | | | | |
| New Bridge Service Life | 75 Years | | | | | |
| Direct Strengthening | 1 Year | | | | | |

Rapid Replacement Simulation Video

<https://www.youtube.com/watch?v=C8k5l1bDOSg&feature=youtu.be>

Annual O&M Costs

| Alternative | Average Annual | Total O&M Costs (2021-2100) |
|---------------|----------------|-----------------------------|
| Alternative 1 | \$409 K | \$32.3 M (3.1%) |
| Alternative 2 | \$513 K | \$40.5 M (4.4%) |
| Alternative 4 | \$280 K | \$22.1 M (2.2%) |
| Alternative 5 | \$375 K | \$29.6 M (1.9%) |
| Alternative 6 | \$1,397 K | \$110.3 M (3.9%) |

NOTE:
(x.x%) = total O, M, & I costs as a percentage of total LCCA costs.

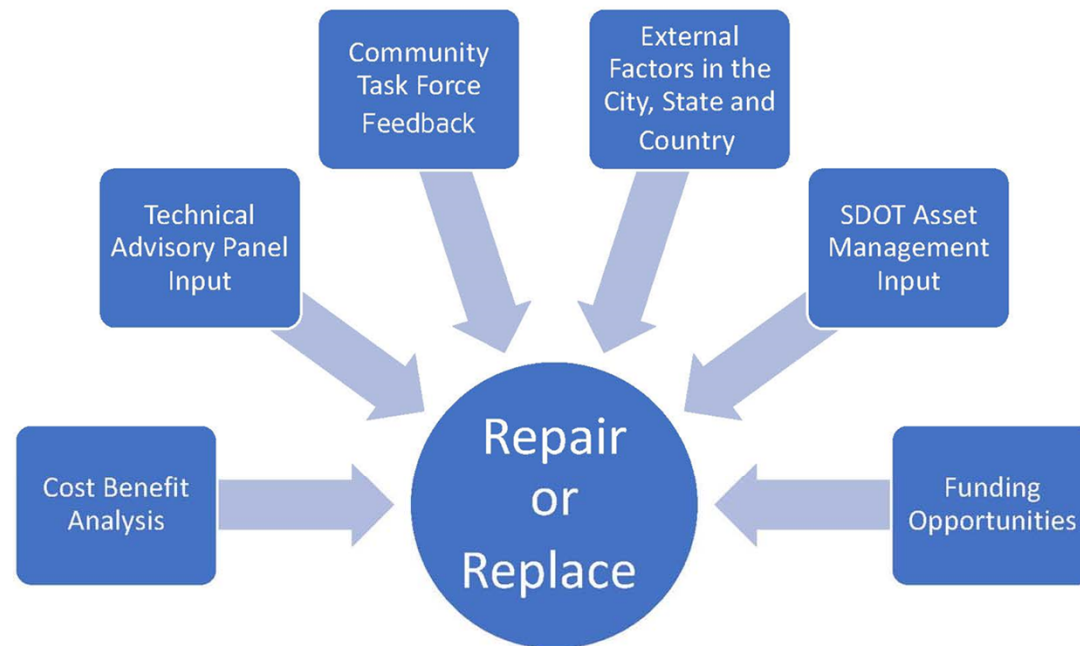
- Examples of operations and maintenance costs include:
 - Annual and Specialized Inspections
 - Intelligent Transportation Systems
 - Structural Health Monitoring
 - Painting/UV Protection
 - Ventilation & Fire Protection Systems
- Annual operations and maintenance costs vary between the options
- Securing adequate operations and maintenance resources for Seattle bridges is an on-going challenge and would have to be resolved for the repair pathway

Estimated Total Ownership Costs

| Alternative | Estimated Total Ownership Costs (Life Cycle Costs) |
|--|--|
| Alternative 1 (Shoring) | \$1,558.9M |
| Alternative 2 (Repair) | \$916.0M |
| Alternative 4 (Superstructure Replacement) | \$1,005.7M |
| Alt 5 (Full Replacement) | \$1,542.7M |
| Alt 6 (Immersed Tube Tunnel) | \$2,821.0M |

Over the total life of the West Seattle High-Rise Bridge, the estimated total ownership costs of Alternative 2 and Alternative 4 are similar.

Decision Considerations



Mayor's Goals for the West Seattle Bridge Project

- Protect lives and preserve public safety
- Deliver the safest, fastest solution that provides the greatest certainty and benefit to all communities in and around West Seattle and the city, region, and state
- Identify the pathway with the highest level of certainty
- Minimize the impact of the closure on communities, particularly Black, Indigenous and People of Color communities
- Provide stability and confidence for significant economic investments being made by the Port of Seattle and Northwest Seaport Alliance, Sound Transit and others
- Secure needed funding from Federal and State partners

NWSA and Port of Seattle Priorities and Interests

- Low bridge access
- Maritime industry access
- Estimated timeline
- Estimated re-opening
- Previous capacity?
- Include ST3?
- Funding



| NWSA/POS Priorities & Interests | Alternative 2 | Alternative 4 | Rapid Replacement Alternative |
|---|---|--|---|
| Low bridge access <i>(all depend on SDOT policies)</i> | Ideal for short-term, questions about durability of rehabilitated bridge | Depends on demolition/ construction method | Depends on demolition/ construction method |
| Maritime industry access | Ideal for short-term, questions about durability of rehabilitated bridge (replace after 15-40 years) | May require mitigation of increased traffic congestion through project completion Likely most significant construction work zone considerations | Potential concerns about waterway navigation during demolition/construction |
| Estimated timeline <i>(in-water work, tribal fishing access and USCG permitting key considerations)</i> | <u>Design</u> : 6 months <u>Permitting</u> : ?? <u>Construction</u> : >1 year | <u>Design</u> : 18 months <u>Permitting</u> : ?? <u>Construction</u> : <4 years | <u>Design</u> : 9 months <u>Permitting</u> : ?? <u>Construction</u> : < 3 years |
| Estimated re-opening | 2022 *** <u>WSP</u> : 3.67 year closure 2062 for replacement *** <u>SDOT</u> : 3.67 year closure 2035 for replacement | 2026 | 2023 |
| Previous capacity? | yes | yes | yes |
| Include ST3? <i>(CBA assumes light rail built completed by 2032)</i> | No | Possible, but would likely extend current closure beyond six estimate year | Feasibility unclear |
| Funding | WSP : "It is our understanding that federal funds could be used in rehabilitation or replacement of the bridge" | | |



Discussion, Questions
and Next Steps