Attachment O

Cost Risk Assessment Cost Estimate Summaries

For information about this project in other languages or ADA accommodations (Americans with Disabilities Act), please call 503-988-5970 or email burnsidebridge@multco.us.

Para obtener información sobre este proyecto en español, ruso u otros idomas, llame al 503-988-5970 o envíe un correo electronico a burnsidebridge@multco.us.

Для получения информации об этом проекте на испанском, русском или других языках, свяжитесь с нами по телефону 503-988-5970 или по электронной почте: burnsidebridge@multco.us.

Multnomah County

2020 Cost Risk Assessment (CRA) Process

Earthquake Ready Burnside Bridge (EQRB)

Alt: Enhanced Seismic Retrofit Alternative (No Temp Bridge)

Workshop Date: February 26, 2020

CRA Cost Range

(opinion of probable cost range as of February 2020 Project analysis)

10% Chance cost will be less than: **$803M**

10% Chance cost will be more than: **$973M**

80% Chance cost will be in this range

Project Need - Multnomah County is delivering the EQRB Project to provide our community with a reliable Willamette River crossing on the Burnside regional lifeline route after a major earthquake.

Description – The Enhanced Seismic Retrofit Alternative would upgrade the existing bridge. While this alternative allows for the preservation of portions of the historic Burnside Bridge, it requires replacement of some elements, extensive retrofitting of others, and retains many columns in unstable soil near the river.

Key Assumptions and Findings

- Construction Manager / General Contractor (CM/GC) delivery method
- 3 to 4 years to construct
- Traffic to be detoured to adjacent bridges during construction
- Costs escalated to mid-point of construction
- This alternative would have consequential impacts to the historic elements of the existing bridge.
- This alternative possesses the greatest construction risks of all the alternatives.

CRA Schedule Range

(opinion of probable cost range as of February 2020 Project analysis)

Construction Start Date: **March 2024**
Construction Completion Date: **October 2028**

Major Project Risks

Key Project Cost Risks (impacting estimated expected value impacts)

Threats

- Fluctuating market conditions due to competitive labor market ($11M to $34M)
- Cost of change orders due to ground improvement ($9M to $31M)
- Cost of change orders due to CSO Force Main relocation ($5M to $26M)
- Cost of change orders due to obstructions during shaft construction ($5M to $15M)

Opportunities

- Design innovations from contractor input ($13M to $15M)
- Benefit of alternative ground improvement measures ($0M to $3M)
- Benefit from reduced foundation sizing due to refined seismic analysis ($2M to $4M)

Key Schedule Risks (Impacting Construction Completion Milestone):

Threats

- Delays associated with CSO Force Main relocation (2 to 9 months)
- Challenges with movable bridge Installation and Commissioning (2 to 4 months)
- Difficulties with in-river cofferdam construction (1 to 3 months)

Opportunities

- Construction acceleration from contractor input (1 to 3 months)
- Use of full depth precast deck panels to accelerate construction (0 to 1 month)

Level of Project Design Low | Medium | High

NEPA Phase

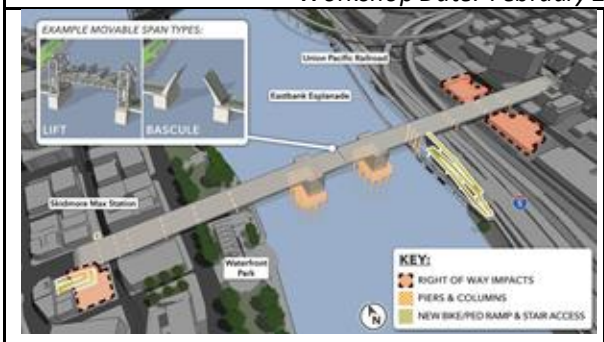
Multnomah County

2020 Cost Risk Assessment (CRA) Process

Earthquake Ready Burnside Bridge (EQRB)

Alt: Replacement Alternative with Short-span Approach (No Temp Bridge)

Workshop Date: February 26, 2020



CRA Cost Range

(opinion of probable cost range as of February 2020 Project analysis)

10% Chance cost will be less than: **$832M**

10% Chance cost will be more than: **$1.016B**

80% Chance cost will be in this range

CRA Schedule Range

(opinion of probable cost range as of February 2020 Project analysis)

Construction Start Date: **March 2024**
Construction Completion Date: **August 2029**

Project Need - Multnomah County is delivering the EQRB Project to provide our community with a reliable Willamette River crossing on the Burnside regional lifeline route after a major earthquake.

Description - The Replacement Alternative with Short-span Approach would replace the existing Burnside Bridge with a new movable bridge at about the same surface height and location as the current bridge. It would have fewer columns than the current bridge, but more than the Replacement Long Span alternative.

Key Assumptions and Findings

- Construction Manager / General Contractor (CM/GC) delivery method
- 4 to 5 years to construct
- Traffic to be detoured to adjacent bridges during construction
- Costs escalated to mid-point of construction
- This alternative is more expensive, has greater natural resource impacts, and presents more seismic risk than the Replacement Long Span because it requires more columns in unstable soil near the river.

Major Project Risks

Key Project Cost Risks (impacting estimated expected value impacts)

Threats

- Fluctuating market conditions due to competitive labor market ($13M to $39M)
- Cost of change orders due to ground improvement ($9M to $31M)
- Cost of change orders due to unforeseen circumstances ($5M to $23M)
- Cost of change orders due to obstructions during shaft construction ($5M to $10M)

Opportunities

- Design innovations from contractor input ($13M to $15M)
- Benefit of alternative ground improvement measures ($0M to $3M)
- Benefit from reduced foundation sizing due to refined seismic analysis ($2M to $4M)

Key Schedule Risks (Impacting Construction Completion Milestone):

Threats

- Challenges with movable bridge Installation and Commissioning (2 to 4 months)
- Delays associated with Local Agency permitting and Land Use approvals (1 to 4 months)
- Difficulties with in-river cofferdam construction (1 to 3 months)

Opportunities

- Construction acceleration from contractor input (1 to 3 months)
- Use of full depth precast deck panels to accelerate construction (0 to 2 months)

Level of Project Design — Low | Medium | High

NEPA Phase

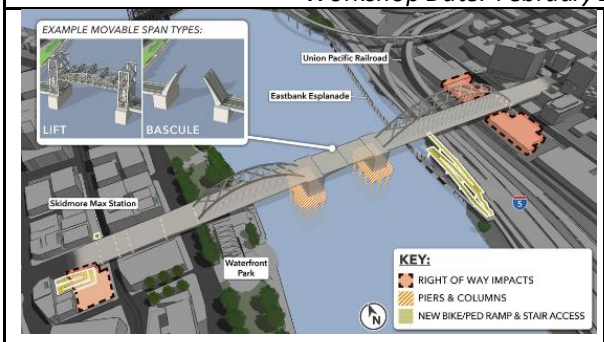
Multnomah County

2020 Cost Risk Assessment (CRA) Process

Earthquake Ready Burnside Bridge (EQRB)

Alt: Replacement Alternative with Long-span Approach (No Temp Bridge)

Workshop Date: February 26, 2020



CRA Cost Range

(opinion of probable cost range as of February 2020 Project analysis)

10% Chance cost will be less than: **$800M**

10% Chance cost will be more than: **$965M**

80% Chance cost will be in this range

Project Need - Multnomah County is delivering the EQRB Project to provide our community with a reliable Willamette River crossing on the Burnside regional lifeline route after a major earthquake.

Description – The Replacement Alternative with Long-span Approach would replace the existing Burnside Bridge with a new movable bridge in the same location and length as the existing bridge with support structure above the roadway surface resulting in fewer columns below. This means there are longer spans between columns.

Key Assumptions and Findings

- Construction Manager / General Contractor (CM/GC) delivery method
- 4 to 5 years to construct
- Traffic to be detoured to adjacent bridges during construction
- Costs escalated to mid-point of construction
- This alternative was recommended because it is the most seismically resilient, has the lowest cost, and has the fewest natural resources impacts of any of the replacement alternatives.

CRA Schedule Range

(opinion of probable cost range as of February 2020 Project analysis)

Construction Start Date: **March 2024**
Construction Completion Date: **August 2029**

Major Project Risks

Key Project Cost Risks (impacting estimated expected value impacts)

Threats

- Fluctuating market conditions due to competitive labor market ($13M to $39M)
- Cost of change orders due to unforeseen circumstances ($5M to $23M)
- Cost of change orders due to obstructions during shaft construction ($5M to $10M)

Opportunities

- Design innovations from contractor input ($13M to $25M)
- Benefit of alternative ground improvement measures ($0M to $2M)
- Benefit from reduced foundation sizing due to refined seismic analysis ($2M to $4M)

Key Schedule Risks (Impacting Construction Completion Milestone):

Threats

- Challenges with movable bridge Installation and Commissioning (2 to 4 months)
- Delays associated with Local Agency permitting and Land Use approvals (1 to 4 months)
- Difficulties with in-river cofferdam construction (1 to 3 months)

Opportunities

- Construction acceleration from contractor input (1 to 3 months)
- Use of full depth precast deck panels to accelerate construction (0 to 2 months)

Level of Project Design — Low | Medium | High

NEPA Phase

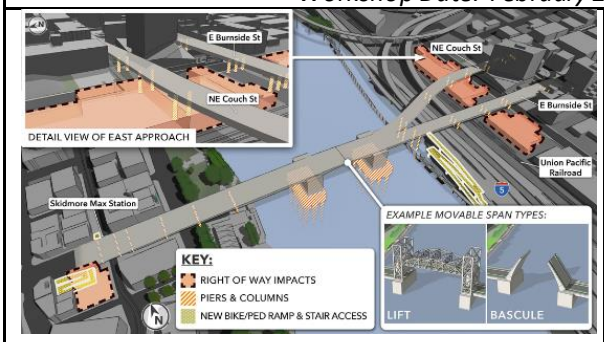
Multnomah County

2020 Cost Risk Assessment (CRA) Process

Earthquake Ready Burnside Bridge (EQRB)

Alt: Replacement Alternative with Couch Extension (No Temp Bridge)

Workshop Date: February 26, 2020



CRA Cost Range

(opinion of probable cost range as of February 2020 Project analysis)

10% Chance cost will be less than: **$899M**

10% Chance cost will be more than: **$1.095B**

80% Chance cost will be in this range

CRA Schedule Range

(opinion of probable cost range as of February 2020 Project analysis)

Construction Start Date: **March 2024**
Construction Completion Date: **August 2029**

Project Need - Multnomah County is delivering the EQRB Project to provide our community with a reliable Willamette River crossing on the Burnside regional lifeline route after a major earthquake.

Description - The Replacement Alternative with Couch Extension would replace the existing Burnside Bridge with a new movable bridge and a split east approach. In addition to its Burnside Street leg, it also includes an extension to Couch Street over NE 3rd and NE 2nd Avenues. It is at about the same surface height as the current bridge.

Key Assumptions and Findings

- Construction Manager / General Contractor (CM/GC) delivery method
- 4 to 5 years to construct
- Traffic to be detoured to adjacent bridges during construction
- Costs escalated to mid-point of construction
- This alternative provides the greatest benefit to freight and transit due to its smoothing the existing Couch St "S" curve alignment on the east bridgehead.
- This alternative requires many more columns in unstable soil near the river, increasing seismic risks and making it the most expensive alternative studied.

Major Project Risks

Key Project Cost Risks (impacting estimated expected value impacts)

Threats

- Fluctuating market conditions due to competitive labor market ($13M to $40M)
- Cost of change orders due to ground improvement ($9M to $31M)
- Cost of change orders due to unforeseen circumstances ($5M to $23M)
- Cost of change orders due to obstructions during shaft construction ($5M to $15M)

Opportunities

- Design innovations from contractor input ($13M to $25M)
- Benefit of alternative ground improvement measures ($0M to $2M)
- Benefit from reduced foundation sizing due to refined seismic analysis ($2M to $4M)

Key Schedule Risks (Impacting Construction Completion Milestone):

Threats

- Challenges with movable bridge Installation and Commissioning (2 to 4 months)
- Delays associated with Local Agency permitting and Land Use approvals (1 to 4 months)
- Difficulties with in-river cofferdam construction (1 to 3 months)

Opportunities

- Construction acceleration from contractor input (1 to 3 months)
- Use of full depth precast deck panels to accelerate construction (0 to 2 months)

Level of Project Design — Low | Medium | High

NEPA Phase

Multnomah County