

## **Policy Group Meeting**

Department of Community Services Transportation Division

April 26, 2018

## Agenda



- 1. Project Update
- 2. Project Milestones
- 3. Options Evaluation
- 4. Next Steps
- 5. Public Comment
- 6. Closing Remarks







## **Stakeholder Briefings**









Senior Agency Staff Group
April 4, 2017
July 14, 2017
January 18, 2018
April 11, 2018

# Stakeholder Representative Group April 17, 2017 July 27, 2017 January 30, 2018 April 16, 2018





## Public Outreach

## Red Cross / KGW Keeping You Safe

## "Prepare Out Loud"





DE BRIDGE









#### **Public Outreach**

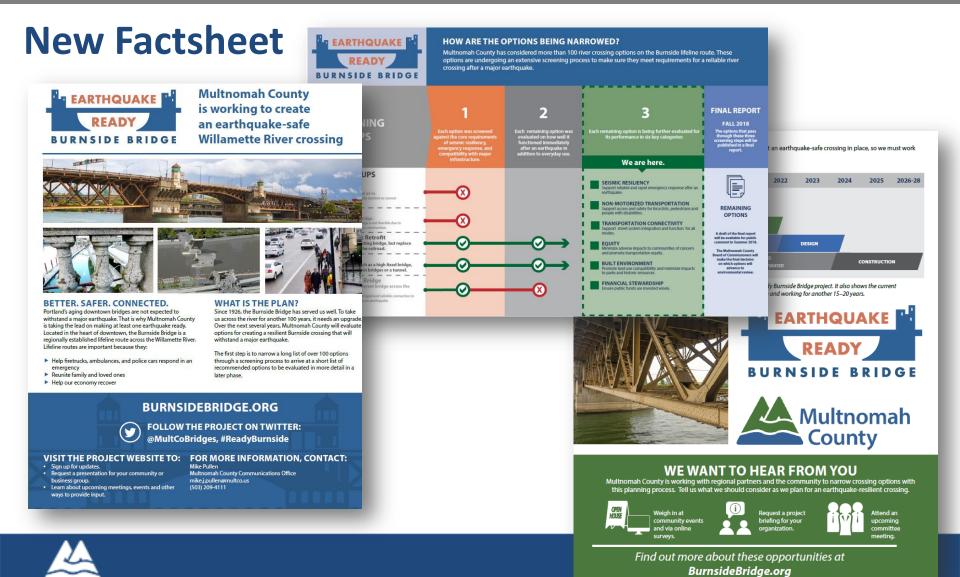
## Multnomah County Podcasts – Project Spotlight



December 2017



#### **Public Outreach**

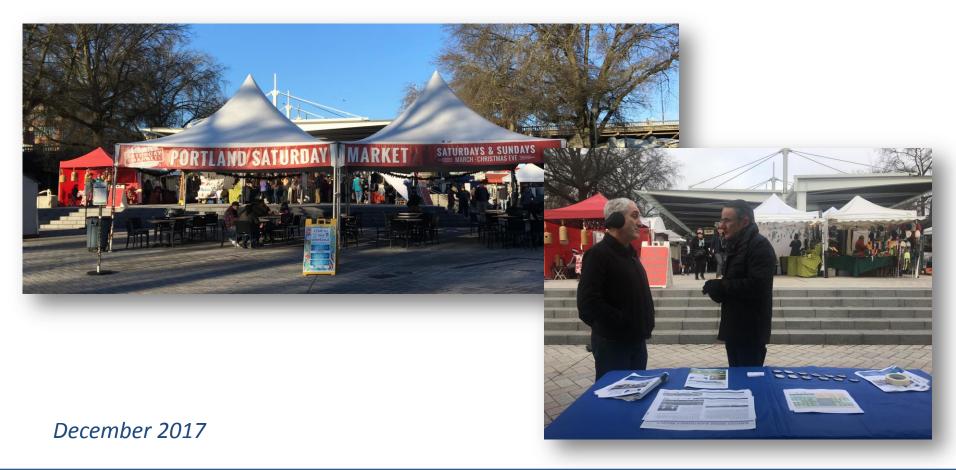






#### **Public Outreach**

## **Portland Saturday Market**

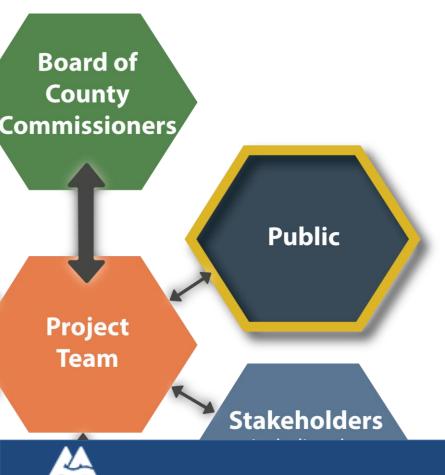


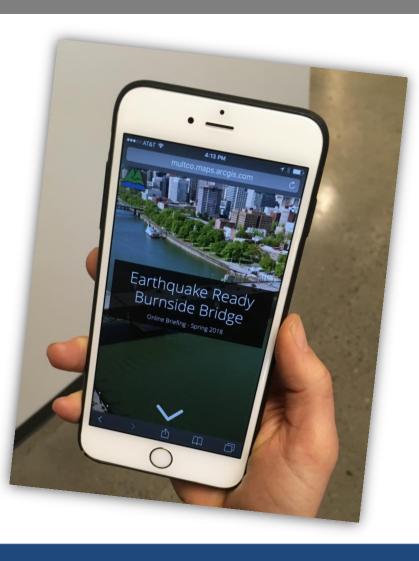




## **Public Outreach**

## **Online Briefing**

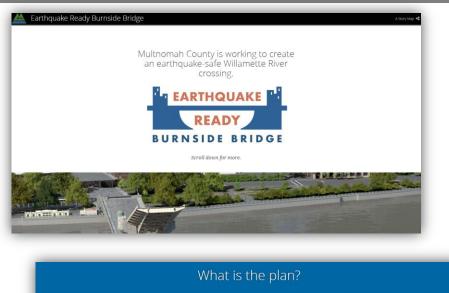








## **Public Outreach – Online Briefing**







We want to hear from you.







#### Online Briefing – What we are hearing...

solutionknow transportation qe devicted B (: time SC rder Tra nuge ferry DI MUST e easi work 5 pier ic connections opportun





#### Online Briefing – What we are hearing...

What you would like us to consider as we evaluate options further...

*"Efficiency. Which plan can best be completed in the shortest amount of time."*  *"I would like to see world class pedestrian and cycle connections continue to remain one of the pillars of this project."* 

"Make sure that we have a bridge that can withstand a major earthquake and allow emergency responses to go between downtown and the east side."





#### Online Briefing – What we are hearing...

Is there anything else we should know...

*"Good choices so far. Move forward quickly."* 

"Re-doing the bridge will impact an area that serves a large portion of the houseless population in Portland. That impact must be mitigated through careful advance planning and appropriate funding levels."

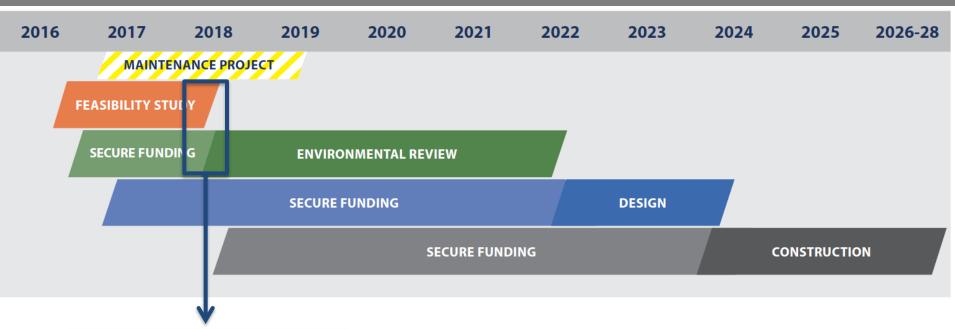
"Build it once, build it right. If we have the technology to construct a seismically stable bridge, build/reconstruct one that will last a century. If that technology is still 30 years out, build/reconstruct a bridge that will last a halfcentury with plans to fix it better later."

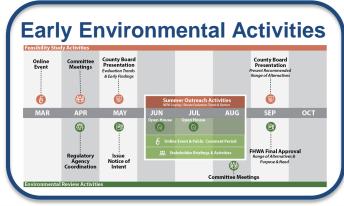


# **2. Project Milestones**



#### Timeline



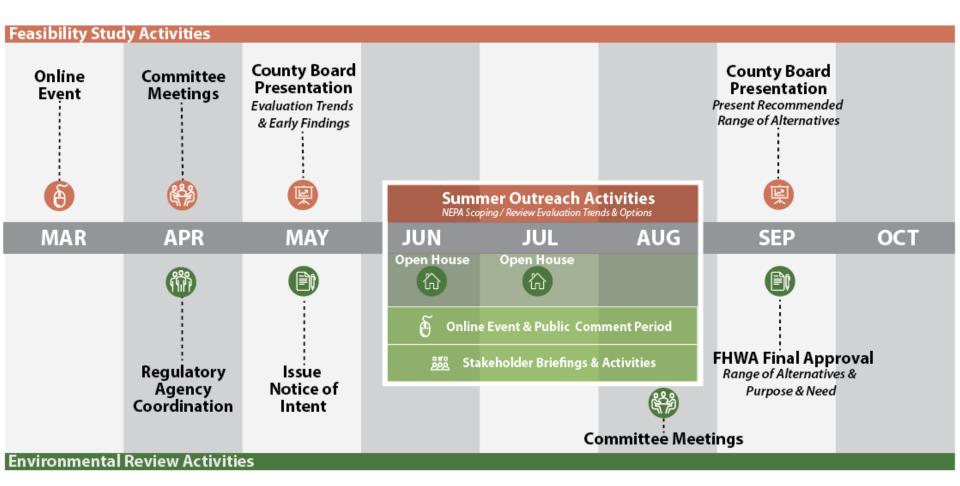




## **2. Project Milestones**



#### **Early Environmental Review Activities**





## **2. Project Milestones**

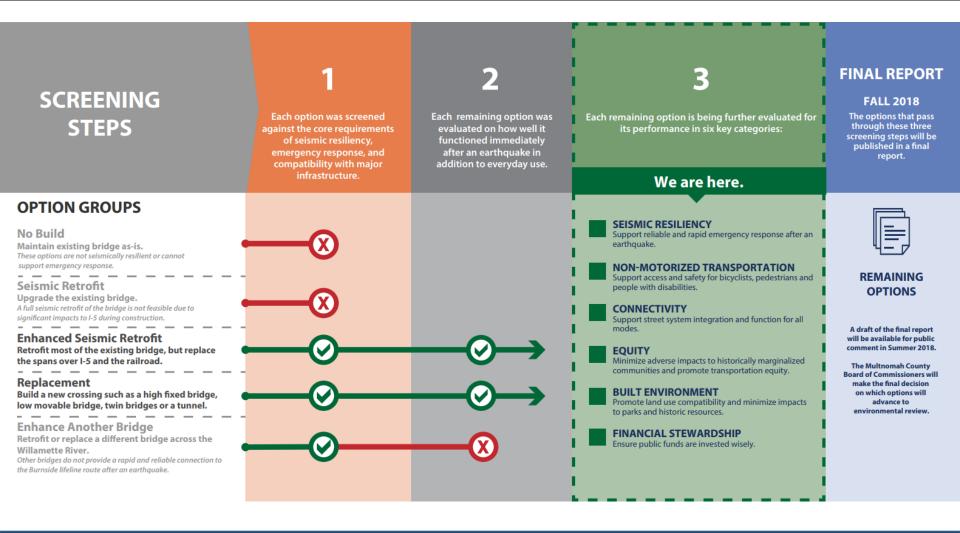


#### National Environmental Policy Act (NEPA) Process





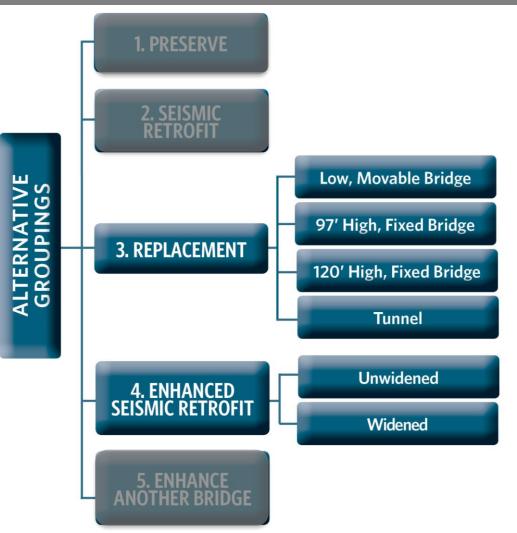








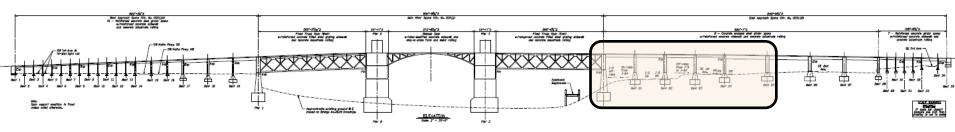
#### **Remaining Alternatives**







#### **Enhanced Seismic Retrofit Options**





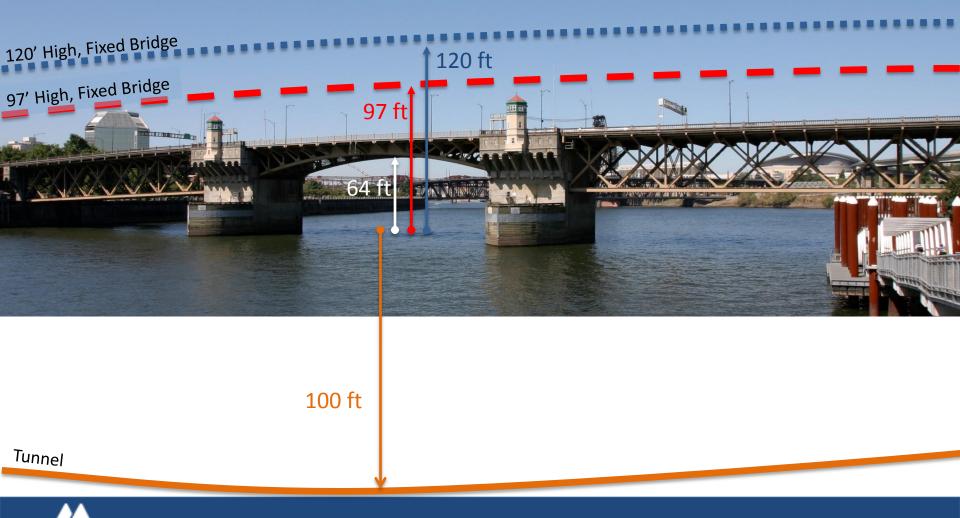


#### Photos of sections of bridge next to I-5



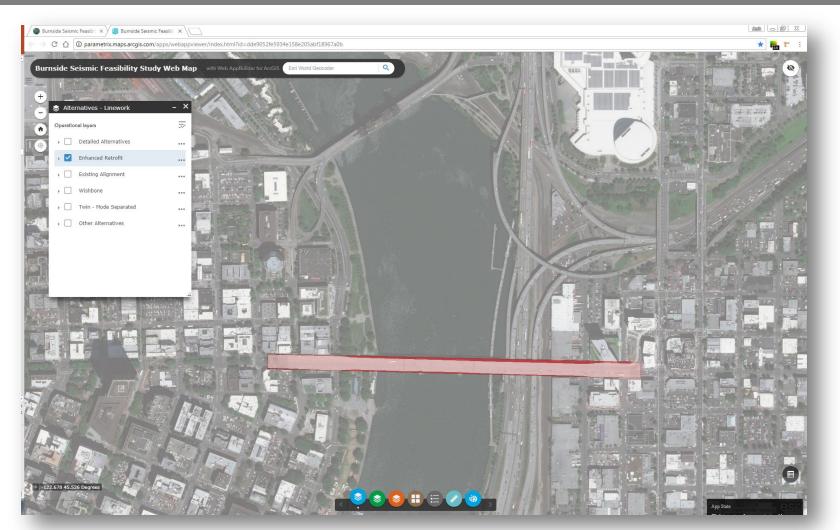


#### **Elevations**





#### **Replacement Options (see GIS tool)**





#### 21

# 3. Options Evaluation

## Screening Criteria

#### SEISMIC RESILIENCY

Support reliable and rapid emergency response after an earthquake.

#### **NON-MOTORIZED TRANSPORTATION**

Support access and safety for bicyclists, pedestrians and people with disabilities.

## CONNECTIVITY

Support street system integration and function for all modes.

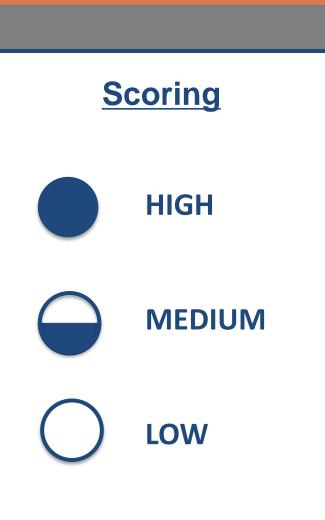
**EQUITY** Minimize adverse impacts to historically marginalized communities and promote transportation equity.

#### **BUILT ENVIRONMENT**

Promote land use compatibility and minimize impacts to parks and historic resources.

#### FINANCIAL STEWARDSHIP

Ensure public funds are invested wisely.







#### Screening Results – Evaluation Trends and Early Findings

		SEIS RESILI			N-MOTOR NSPORTA		CO	NNECTIV	ITY	EQI	JITY		BUILT	enviroi	NMENT			NCIAL Ardship	
		Unreinforced Masonry Risk	Disabled Yehicles Risk	Ease of Ped + Bike Use	Safe Ped + Bike Connections	Personal Security for Ped + Bikes	Street Network Connection	Crossing Safety and Convenience	Moveable Bridge (Periodic Delay)	Social Service Impacts	Low Income Housing Impacts	Visual Impacts to Existing Buildings	Commercial + Industrial Impact	Long Term Housing	Park + Recreation Impact	Historic Structures + District Impacts	Capital Cost	Longterm Maintenance	Score (0-100%)
LM	Low Existing Alignment (3a-1d)							$\Theta$	0	•				٠	٠		•	$\Theta$	85%
LM	Low Northeast Wishbone (3a-2b)				٠			٠	0				0	٠	٠	٠		$\Theta$	85%
ER	Enhanced Seismic Retrofit, No widening (4b1)				٠		•	$\Theta$	0			•	٠	٠	٠	٠		0	83%
ER	Enhanced Seismic Retrofit, Widened (4b2)				٠		•	$\Theta$	0			•	٠	٠	٠	٠		0	81%
LM	Low Southeast Wishbone (3a-3b1)			•	٠		$\Theta$	0	0				٠	٠	٠	٠	$\Theta$	$\Theta$	78%
97F	97' High Existing Alignment (3b-1b1)	$\Theta$		0	0		$\overline{}$	٠		$\overline{}$		$\Theta$	٠	٠	0	0		٠	67%
LM	Low North Twin - Mode Separated (3a-5d1)		$\Theta$		٠	$\bigcirc$	•	$\Theta$	0			•	0	٠	0	٠	$\Theta$	0	66%
LM	Low South Twin - Mode Separated (3a-7d1)		$\Theta$	•	٠	$\Theta$	$\Theta$	٠	0	•	٠	•	٠	٠	0	٠	$\Theta$	0	65%
LM	Low Stacked (3a-8d)		$\Theta$		0	0	$\Theta$	٠	0	$\overline{}$		$\Theta$	٠	٠	٠	$\Theta$		$\Theta$	63%
97F	97' High South Twin - Mode Separated (3b-7d1)	$\Theta$		0	٠	$\Theta$	$\Theta$	$\Theta$		$\overline{}$		$\Theta$	٠	٠	0	0	$\Theta$	$\Theta$	61%
97F	97' High Northeast Wishbone (3b-2b1)	$\Theta$	$\Theta$	0	0	•	$\Theta$	$\Theta$	٠	$\overline{}$		$\Theta$	0	٠	٠	0		٠	60%
97F	97' High Southeast Wishbone (3b-3b1)	$\Theta$	$\Theta$	0	0	•	0	0		$\overline{}$		$\Theta$	٠	٠	٠	0		٠	58%
97F	97' High North Twin - Mode Separated (3b-5d1)	$\Theta$		0	٠	0	$\Theta$	$\Theta$		$\overline{}$	٠	$\Theta$	0	٠	0	0	$\overline{}$	$\Theta$	55%
LM	Low Double Wishbone (3a-9d)	0	$\Theta$		$\Theta$		$\Theta$	0	0	$\Theta$		0	0	0		0		$\Theta$	49%
LM	Low North Twin (3a-4d1)	0	$\Theta$		$\Theta$		$\Theta$	0	0			$\Theta$	0	0	٠	0	0	0	45%
97F	97' High North Twin (3b-4d1)	0	$\Theta$	0	0		0	$\Theta$		$\overline{}$		0	0	0	٠	0	$\overline{}$	$\Theta$	42%
120F	120' High South Twin - Mode Separated (3b-7d2)	$\Theta$	0	$\bigcirc$		0	0	$\Theta$		$\overline{}$		0	٠	٠	0	0	0	0	42%
LM	Low South Twin (3a-6d1)	0	$\Theta$				0	0	0	$\bigcirc$	$\bigcirc$	$\Theta$	0	٠		0	$\Theta$	0	42%
т	Tunnel - Mode Separated (3c-1a)		0	$\bigcirc$	٠	$\bigcirc$	0	$\bigcirc$	$\Theta$		0		0	0	0		0	0	40%
120F	120' High North Twin - Mode Separated (3b-5d2)	$\Theta$	0	$\Theta$	٠	0	0	$\Theta$		$\overline{}$		0	0	٠	0	0	0	0	39%
97F	97' High South Twin (3b-6d1)	0	$\Theta$	0	0		0	0		$\Theta$	$\bigcirc$	0	0	٠	٠	0	$\Theta$	$\overline{}$	39%
120F	120' High Existing Alignment (3b-1b2)	$\Theta$	0	0	0		0			0	0	0	0	$\Theta$	0	0	0	$\Theta$	29%
120F	120' High Southeast Wishbone (3b-3b2)	$\Theta$	0	0	0		0	0		0	0	0	0	٠	0	0	0	$\Theta$	25%
120F	120' High Northeast Wishbone (3b-2b2)	0	0	0	0		0	$\Theta$		0	0	0	0	٠	0	0	0	$\Theta$	23%
120F	120' High North Twin (3b-4d2)	0	0	0	$\Theta$	•	0	$\Theta$		0	0	0	0	0	0	0	0	0	17%
120F	120' High South Twin (3b-6d2)	0	0	0	0		0	0		0	0	0	0		0	0	0	0	14%



### **Screening Results – Evaluation Trends and Early Findings**

							S	ocial S	ervice	s	Low Income Housin	e   C	mpact Displac	emen		Hi	storic	apital Co	et .
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		silie			orize	Ч	Co	anoct	tivity	Equ	itv	Bui	t En	/ironr	nont		Fin	ancial	
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		Masonry Risk	Disabled Vehicles Risk		Safe Ped + Bike Connections	Personal Security for Ped + Bikes	Staat Matuark	Crossing Safety and Convenience	Moveable Bridge (Periodic Delay)	Mpacts		Visual Impacts to	And the second of the second s	Long Term Housin				Longterm Maintenance	Score (0-100%)
LM Low Existing Alignment (3a-1d)	ſ	•						•	0					٠				-	85%
LM Low Northeast Wishbone (3a-2b)		•	•	•		•	•		0	•		•	0	٠				-	85%
ER Enhanced Seismic Retrofit, No widening (4b1)		•		•		•		•	0				•	٠				0	83%
ER Enhanced Seismic Retrofit, Widened (4b2)		•		•		•		$\odot$	0				•	٠				0	81%
LM Low Southeast Wishbone (3a-3b1)		•		•		•	$\odot$	0	0				•				$\circ$	-	78%
97F 97' High Existing Alignment (3b-1b1)		$\bigcirc$		0	0	٠	$\odot$			$\Theta$		$\Theta$	•	٠	0	0			67%
LM Low North Twin - Mode Separated (3a-5d1)		•	•	•		-		•	0				0	٠	0		$\odot$	0	66%
LM Low South Twin - Mode Separated (3a-7d1)		•	$\odot$	•		$\Theta$	$\Theta$		0	•					0		$\odot$	0	65%
LM Low Stacked (3a-8d)		•	•	•	0	0	$\Theta$		0	•		•		٠	٠	$\bigcirc$		-	63%
97F 97' High South Twin - Mode Separated (3b-7d1)		$\bigcirc$		0		$\bigcirc$	$\Theta$	$\Theta$		-		$\Theta$		•	0	Ο	$\odot$	$\square$	61%
97F 97' High Northeast Wishbone (3b-2b1)		•	•	0	0	•	$\odot$	$\odot$		-		•	0	•		0			60%
97F 97' High Southeast Wishbone (3b-3b1)		$\bigcirc$	$\bigcirc$	0	0	٠	0	0	•	-		$\Theta$		•	٠	0		•	58%
97F 97' High North Twin - Mode Separated (3b-5d1)		$\Theta$	٠	0	•	0	•	-		-		•	0	•	0	0	$\odot$	•	55%
LM Low Double Wishbone (3a-9d)	16	0	$\mathbf{e}$	•	•	٠	•	0	0	•		0	0	0	٠	0		-	49%
LM Low North Twin (3a-4d1)	11	0	•	•	•	٠		0	0	•		•	0	0		0	0	0	45%
97F 97' High North Twin (3b-4d1)		0	•	0	0	٠	0	-	•	•		0	0	0	٠	0	-	$\bigcirc$	42%
120F 120' High South Twin - Mode Separated (3b-7d2)	11	$\Theta$	0	•		0	0	-	•	-		0	•		0	0	0	0	42%
LM Low South Twin (3a-6d1)		0	•	•		٠	0	0	0	•	•	•	0	٠		0	•	0	42%
T Tunnel - Mode Separated (3c-1a)		•	0	-		$\bigcirc$	0	$\odot$	•		0		0	0	0		0	0	40%
120F 120' High North Twin - Mode Separated (3b-5d2)		$\Theta$	0	$\odot$		0	0	$\odot$		$\bigcirc$	•	0	0	٠	0	0	0	0	39%
97F 97' High South Twin (3b-6d1)		0	•	0	0	٠	0	0		•	$\bigcirc$	0	0			0	$\odot$	-	39%
120F 120' High Existing Alignment (3b-1b2)		$\Theta$	0	0	0	٠	0			0	0	0	0	$\bigcirc$	0	0	0	-	29%
120F 120' High Southeast Wishbone (3b-3b2)		$\Theta$	0	0	0	٠	0	0		0	0	0	0		0	0	0	-	25%
120F 120' High Northeast Wishbone (3b-2b2)		0	0	0	0	٠	0	$\odot$		0	0	0	0	٠	0	0	0	-	23%
120F 120' High North Twin (3b-4d2)		0	0	0	•	٠	0	$\odot$		0	0	0	0	0	0	0	0	0	17%.
120F 120' High South Twin (3b-6d2)		0	0	0	0	٠	0	0		0	0	0	0	٠	0	0	0	0	14%



Feasibility Study Objective: Define the Range of Alternatives for NEPA

What is a "reasonable range" for an environmental study?

- 25 is too many for detailed NEPA analysis
- Eliminate those that perform poorly
- For sub-groups of similar alternatives, advance the better performing (as representative)
- Include a range of types, features and functionality





#### What is rising to the top...

#### Enhanced Seismic Retrofit

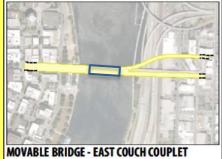


**ENHANCED SEISMIC RETROFIT - WIDENED** 

#### **Replacement: Existing Alignment**



#### **Replacement: Wishbones**





#### **Replacement: Mode-Separated**









#### **Trends Discussion**

		SEISI RESILI			I-MOTOR		со	NNECTIV	ΊTY	EQU	ЛТҮ		BUILT I	enviroi	NMENT			NCIAL ARDSHIP	
		Unreinforced Masonry Risk	Disabled Vehicles Risk	Ease of Ped + Bike Use	Safe Ped + Bike Connections	Personal Security for Ped + Bikes	Street Network Connection	Crossing Safety and Convenience	Moveable Bridge (Periodic Delay)	Social Service Impacts	Low Income Housing Impacts	Visual Impacts to Existing Buildings	Commercial + Industrial Impact	Long Term Housing	Park + Recreation Impact	Historic Structures + District Impacts	Capital Cost	Longterm Maintenance	Score (0-100%)
LM	Low Existing Alignment (3a-1d)							$\Theta$	0				٠	٠	٠	٠		$\Theta$	85%
	Low Northeast Wishbone (3a-2b)							٠	0		٠		0	٠				$\bigcirc$	85%
	Enhanced Seismic Retrofit, No widening (4b1)							$\Theta$	0					٠	٠			0	83%
ER	Enhanced Seismic Retrofit, Widened (4b2)							$\Theta$	0					٠				0	81%
LM	Low Southeast Wishbone (3a-3b1)						$\Theta$	0	0					٠	٠		$\overline{}$	$\Theta$	78%
	97' High Existing Alignment (3b-1b1)	$\Theta$		0	0		$\bigcirc$	٠		$\Theta$		$\Theta$	٠	٠	0	0		٠	67%
LM	Low North Twin - Mode Separated (3a-5d1)		$\Theta$	٠		$\Theta$		•	0			•	0	٠	0	٠	$\overline{}$	0	66%
	Low South Twin - Mode Separated (3a-7d1)		$\Theta$			$\bigcirc$		٠	0	$\Theta$			٠	٠	0	٠	$\overline{}$	0	65%
LM	Low Stacked (3a-8d)		$\Theta$		0	0	$\Theta$	٠	0	$\Theta$		$\Theta$	٠	٠	٠	$\Theta$		$\Theta$	63%
97F	97' High South Twin - Mode Separated (3b-7d1)	$\overline{}$		0		$\bigcirc$		$\Theta$		$\Theta$		$\overline{}$	٠	٠	0	0	$\overline{}$	$\Theta$	61%
97F	97' High Northeast Wishbone (3b-2b1)	$\Theta$	$\Theta$	0	0		$\overline{}$	$\Theta$		$\Theta$		$\overline{\mathbf{O}}$	0	٠	٠	0		٠	60%
97F	97' High Southeast Wishbone (3b-3b1)	$\overline{}$	$\Theta$	0	0		0	0		$\Theta$		$\overline{}$	٠	٠	٠	0		٠	58%
	97' High North Twin - Mode Separated (3b-5d1)	$\Theta$		0		0	$\overline{}$	$\Theta$		$\Theta$		$\Theta$	0	٠	0	0	$\overline{}$	$\Theta$	55%
	Low Double Wishbone (3a-9d)	0	$\Theta$		$\Theta$		•	0	0	$\Theta$		0	0	0	٠	0		$\bigcirc$	49%
	Low North Twin (3a-4d1)	0	$\Theta$		$\Theta$		$\overline{}$	0	0			$\Theta$	0	0	٠	0	0	0	45%
	97' High North Twin (3b-4d1)	0	$\Theta$	0	0		0	$\Theta$		$\Theta$		0	0	0	٠	0	$\overline{}$	$\bigcirc$	42%
	120' High South Twin - Mode Separated (3b-7d2)	-	0	$\Theta$		0	0	$\Theta$		$\Theta$		0	٠	٠	0	0	0	0	42%
	Low South Twin (3a-6d1)	0	$\Theta$				0	0	0	$\Theta$	$\bigcirc$	$\Theta$	0	٠	٠	0	$\Theta$	0	42%
	Tunnel - Mode Separated (3c-1a)		0	$\Theta$		$\Theta$	0	$\Theta$	$\Theta$		0	•	0	0	0	٠	0	0	40%
	120' High North Twin - Mode Separated (3b-5d2)	-	0	$\Theta$		0	0	$\Theta$		$\Theta$		0	0	٠	0	0	0	0	39%
	97' High South Twin (3b-6d1)	0	$\Theta$	0	0		0	0		$\Theta$	$\Theta$	0	0	٠		0	$\Theta$	$\Theta$	39%
120F	120' High Existing Alignment (3b-1b2)	-	0	0	0		0	•		0	0	0	0	$\Theta$	0	0	0	$\Theta$	29%
	120' High Southeast Wishbone (3b-3b2)	-	0	0	0		0	0		0	0	0	0	٠	0	0	0	$\Theta$	25%
120F	120' High Northeast Wishbone (3b-2b2)	0	0	0	0		0	•		0	0	0	0	٠	0	0	0	•	23%
120F	120' High North Twin (3b-4d2)	0	0	0	•		0	-		0	0	0	0	0	0	0	0	0	17%
120F	120' High South Twin (3b-6d2)	0	0	0	0		0	0		0	0	0	0		0	0	0	0	14%

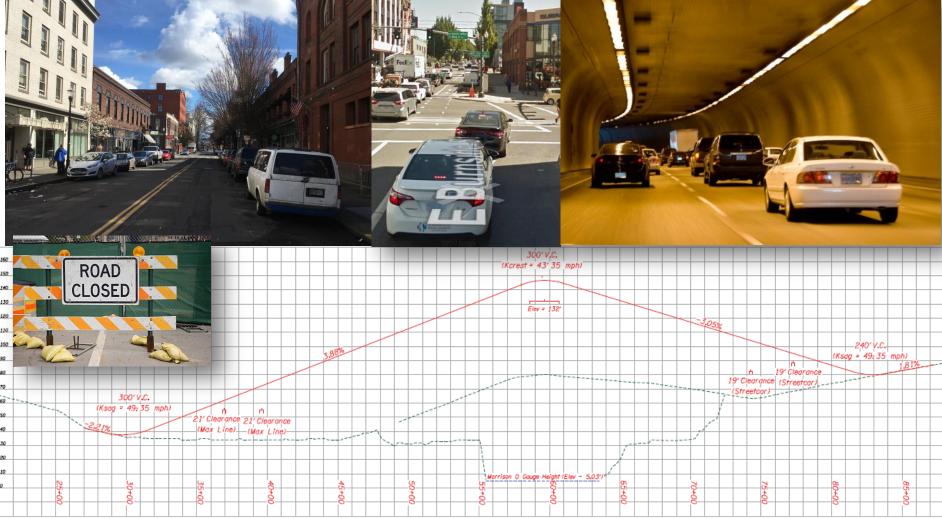


#### **Trends Discussion – Tunnel and 120s**

		SEISI RESILI			N-MOTOR		со	NNECTIV	ІТҮ	EQL	YTIL		BUILT	enviro	NMENT			NCIAL RDSHIP	
		Unreinforced Masonry Risk	Disabled Vehicles Risk	Ease of Ped + Bike Use	Safe Ped + Bike Connections	Personal Security for Ped + Bikes	Street Network Connection	Crossing Safety and Convenience	Moveable Bridge (Periodic Delay)	Social Service Impacts	Low Income Housing Impacts	Visual Impacts to Existing Buildings	Commercial + Industrial Impact	Long Term Housing	Park + Recreation Impact	Historic Structures + District Impacts	Capital Cost	Longterm Maintenance	Score (0-100%)
LM	Low Existing Alignment (3a-1d)							$\Theta$	0				٠	٠	۲	٠		$\Theta$	85%
	Low Northeast Wishbone (3a-2b)								0				0	٠	٠	٠		$\Theta$	85%
	Enhanced Seismic Retrofit, No widening (4b1)							$\Theta$	0				٠	٠	٠	٠		0	83%
	Enhanced Seismic Retrofit, Widened (4b2)							$\bigcirc$	0				٠	٠		٠		0	81%
	Low Southeast Wishbone (3a-3b1)						$\Theta$	0	0					٠	٠	٠	$\Theta$	$\Theta$	78%
	97' High Existing Alignment (3b-1b1)	$\Theta$		0	0		$\overline{}$	•		$\bigcirc$		$\Theta$	٠	٠	0	0		٠	67%
LM	Low North Twin - Mode Separated (3a-5d1)		$\Theta$		٠	$\Theta$		$\Theta$	0		•		0	٠	0	٠	$\Theta$	0	66%
LM	Low South Twin - Mode Separated (3a-7d1)		$\Theta$			$\Theta$	$\overline{}$	•	0	$\bigcirc$			٠	٠	0	٠	$\Theta$	0	65%
	Low Stacked (3a-8d)		$\Theta$		0	0	$\overline{}$	•	0	$\Theta$		$\Theta$	٠	٠	٠	$\Theta$		$\Theta$	63%
97F	97' High South Twin - Mode Separated (3b-7d1)	$\Theta$		0		$\bigcirc$	$\overline{}$	$\Theta$		$\Theta$		$\overline{}$	٠	٠	0	0	$\Theta$	$\Theta$	61%
	97' High Northeast Wishbone (3b-2b1)	$\Theta$	$\Theta$	0	0		$\Theta$	$\Theta$		$\Theta$		-	0	٠	٠	0		•	60%
	97' High Southeast Wishbone (3b-3b1)	$\overline{\mathbf{e}}$	$\Theta$	0	0		0	0		$\overline{}$		$\Theta$	٠	٠	٠	0	•	٠	58%
	97' High North Twin - Mode Separated (3b-5d1)	$\Theta$		0		0	-	$\Theta$		$\Theta$	٠	$\Theta$	0	٠	0	0	•	$\Theta$	55%
	Low Double Wishbone (3a-9d)	0	•	•	$\Theta$		•	0	0	•	٠	0	0	0	٠	0	•	$\Theta$	49%
	Low North Twin (3a-4d1)	0	$\Theta$	•	$\Theta$		-	0	0	•		$\Theta$	0	0	٠	0	0	0	45%
97F	97' High North Twin (3b-4d1)	0	$\Theta$	0	0		0	•		•	٠	0	0	0	٠	0	•	-	42%
120F	120' High South Twin - Mode Separated (3b-7d2)	•	0	$\Theta$		0	0	$\Theta$		•		0	٠	٠	0	0	0	0	42%
LM	Low South Twin (3a-6d1)	0	•	•		٠	0	0	0	•	$\Theta$	$\Theta$	0	٠	•	0	$\Theta$	0	42%
Т	Tunnel - Mode Separated (3c-1a)		0	•		$\Theta$	0	•	•		0		0	0	0		0	0	40%
120F	120' High North Twin - Mode Separated (3b-5d2)	•	0	•		0	0	$\Theta$		•		0	0		0	0	0	0	39%
97F	97' High South Twin (3b-6d1)	0	•	0	0		0	0		•	$\Theta$	0	0	٠		0	•	$\Theta$	39%
120F	120' High Existing Alignment (3b-1b2)	-	0	0	0		0	٠		0	0	0	0	$\Theta$	0	0	0	$\Theta$	29%
120F	120' High Southeast Wishbone (3b-3b2)	$\Theta$	0	0	0		0	0		0	0	0	0		0	0	0	$\Theta$	25%
120F	120' High Northeast Wishbone (3b-2b2)	0	0	0	0		0	•		0	0	0	0	•	0	0	0	•	23%
120F	120' High North Twin (3b-4d2)	0	0	0	•		0	•		0	0	0	0	0	0	0	0	0	17%
120F	120' High South Twin (3b-6d2)	0	0	0	0		0	0		0	0	0	0		0	0	0	0	14%



## **Tunnel and 120 High Bridge Options**







#### **Trends Discussion – Twin Multi-Modals**

		SEISI RESILI			I-MOTOF		со	NNECTIV	ΊΤΥ	EQU	ЛТҮ		BUILT	enviroi	NMENT			ANCIAL ARDSHIP	
		Unreinforced Masonry Risk	Disabled Yehicles Risk	Ease of Ped + Bike Use	Safe Ped + Bike Connections	Personal Security for Ped + Bikes	Street Network Connection	Crossing Safety and Convenience	Moveable Bridge (Periodic Delay)	Social Service Impacts	Low Income Housing Impacts	Visual Impacts to Existing Buildings	Commercial + Industrial Impact	Long Term Housing	Park + Recreation Impact	Historic Structures + District Impacts	Capital Cost	Longterm Maintenance	Score (0-100%)
LM	Low Existing Alignment (3a-1d)							$\Theta$	0				٠	٠	٠	٠		$\Theta$	85%
	Low Northeast Wishbone (3a-2b)								0				0	٠	٠	٠		$\Theta$	85%
	Enhanced Seismic Retrofit, No widening (4b1)							$\Theta$	0					٠	٠			0	83%
	Enhanced Seismic Retrofit, Widened (4b2)							$\Theta$	0					٠				0	81%
	Low Southeast Wishbone (3a-3b1)		•		•		$\Theta$	0	0					٠	٠	٠	$\Theta$	$\Theta$	78%
	97' High Existing Alignment (3b-1b1)	$\Theta$		0	0		$\bigcirc$	•		$\Theta$		$\Theta$	٠	٠	0	0		٠	67%
LM	Low North Twin - Mode Separated (3a-5d1)		$\Theta$		•	$\Theta$	•	$\Theta$	0				0	٠	0	٠	$\Theta$	0	66%
	Low South Twin - Mode Separated (3a-7d1)		$\Theta$			$\bigcirc$		٠	0	$\Theta$			٠	٠	0	٠	$\overline{}$	0	65%
	Low Stacked (3a-8d)		$\Theta$		0	0	$\Theta$	•	0	$\Theta$		$\Theta$		٠		$\Theta$	•	$\Theta$	63%
	97' High South Twin - Mode Separated (3b-7d1)	•	•	0	•	$\overline{}$	•	$\Theta$	•	$\Theta$	•	•	٠	٠	0	0	•	$\Theta$	61%
	97' High Northeast Wishbone (3b-2b1)	$\Theta$	$\Theta$	0	0		$\Theta$	$\Theta$		$\Theta$		-	0	٠		0		٠	60%
	97' High Southeast Wishbone (3b-3b1)	•	$\Theta$	0	0		0	0		$\Theta$		$\Theta$	٠	٠	٠	0	•	٠	58%
	97' High North Twin - Mode Separated (3b-5d1)	$\Theta$		0	•	0	$\Theta$	$\Theta$		$\Theta$		$\Theta$	0	٠	0	0	-	$\Theta$	55%
LM	Low Double Wishbone (3a-9d)	0	$\Theta$		$\Theta$		•	0	0	$\Theta$		0	0	0	٠	0	•	$\Theta$	49%
LM	Low North Twin (3a-4d1)	0	•		$\Theta$		$\Theta$	0	0			$\Theta$	0	0		0	0	0	45%
97F	97' High North Twin (3b-4d1)	0	•	0	0		0	$\Theta$		$\Theta$		0	0	0		0	$\Theta$	$\Theta$	42%
120F	120' High South Twin - Mode Separated (3b-7d2)	$\Theta$	0	$\Theta$		0	0	•		$\Theta$		0			0	0	0	0	42%
LM	Low South Twin (3a-6d1)	0	•				0	0	0	$\Theta$	$\Theta$	$\Theta$	0			0	•	0	42%
	Tunnel - Mode Separated (3c-1a)		0	$\Theta$		$\Theta$	0	$\Theta$	•		0		0	0	0		0	0	40%
120F	120' High North Twin - Mode Separated (3b-5d2)	-	0	-		0	0	-		-		0	0	•	0	0	0	0	39%
97F	97' High South Twin (3b-6d1)	0	•	0	0		0	0		$\Theta$		0	0			0		$\Theta$	39%
	120' High Existing Alignment (3b-1b2)	•	0	0	0		0			0	0	0	0	•	0	0	0	$\Theta$	29%
	120' High Southeast Wishbone (3b-3b2)	$\Theta$	0	0	0		0	0		0	0	0	0		0	0	0	$\overline{}$	25%
	120' High Northeast Wishbone (3b-2b2)	0	0	0	0		0	•		0	0	0	0	•	0	0	0	9	23%
	120' High North Twin (3b-4d2)	0	0	0	•		0	•		0	0	0	0	0	0	0	0	0	17%
120F	120' High South Twin (3b-6d2)	0	0	0	0		0	0		0	0	0	0		0	0	0	0	14%



#### **Twin Multi-modal Bridges**







#### **Trends Discussion – Double Wishbone**

		SEISI RESILI			I-MOTOR		со	NNECTIV	ΙТΥ	EQU	ITY		BUILT E	enviroi	NMENT			NCIAL ARDSHIP	
		Unreinforced Masonry Risk	Disabled Vehicles Risk	Ease of Ped + Bike Use	Safe Ped + Bike Connections	Personal Security for Ped + Bikes	Street Network Connection	Crossing Safety and Convenience	Moveable Bridge (Periodic Delay)	Social Service Impacts	Low Income Housing Impacts	Visual Impacts to Existing Buildings	Commercial + Industrial Impact	Long Term Housing	Park + Recreation Impact	Historic Structures + District Impacts	Capital Cost	Longterm Maintenance	Score (0-100%)
LM	Low Existing Alignment (3a-1d)							$\Theta$	0					٠	٠	٠		$\Theta$	85%
	Low Northeast Wishbone (3a-2b)								0				0	٠	٠			$\Theta$	85%
	Enhanced Seismic Retrofit, No widening (4b1)							$\Theta$	0					٠	٠			0	83%
	Enhanced Seismic Retrofit, Widened (4b2)							$\Theta$	0					٠				0	81%
	Low Southeast Wishbone (3a-3b1)		•			•	$\Theta$	0	0				•	٠	٠		$\Theta$	$\Theta$	78%
	97' High Existing Alignment (3b-1b1)	$\Theta$	•	0	0		$\bigcirc$			$\Theta$		$\Theta$		٠	0	0		٠	67%
	Low North Twin - Mode Separated (3a-5d1)		$\Theta$		•	$\Theta$		$\Theta$	0	•			0	٠	0	٠	$\overline{}$	0	66%
	Low South Twin - Mode Separated (3a-7d1)		$\Theta$			$\Theta$			0	$\Theta$				٠	0	٠		0	65%
	Low Stacked (3a-8d)		$\Theta$		0	0	$\overline{}$		0	$\Theta$		$\Theta$		٠	٠	$\Theta$		$\Theta$	63%
	97' High South Twin - Mode Separated (3b-7d1)	$\overline{}$	•	0		$\Theta$		$\Theta$		$\Theta$		$\Theta$		٠	0	0		$\Theta$	61%
	97' High Northeast Wishbone (3b-2b1)	$\Theta$	$\Theta$	0	0		$\overline{}$	$\Theta$	•	$\Theta$		$\Theta$	0	٠	٠	0		٠	60%
	97' High Southeast Wishbone (3b-3b1)	-	$\Theta$	0	0		0	0		$\Theta$	•	•		٠	٠	0	•	٠	58%
97F	97' High North Twin - Mode Separated (3b-5d1)	$\Theta$	•	0	•	0	$\overline{}$	$\Theta$		$\Theta$		$\Theta$	0	٠	0	0	$\Theta$	$\Theta$	55%
LM	Low Double Wishbone (3a-9d)	0	-		$\Theta$		$\Theta$	0	0	$\Theta$		0	0	0		0		$\Theta$	49%
LM	Low North Twin (3a-4d1)	0	-		$\Theta$		$\overline{}$	0	0			-	0	0		0	0	0	45%
	97' High North Twin (3b-4d1)	0	$\Theta$	0	0		0	$\Theta$		$\Theta$		0	0	0		0	$\Theta$	$\Theta$	42%
120F	120' High South Twin - Mode Separated (3b-7d2)	-	0	$\Theta$		0	0	•		$\Theta$		0		٠	0	0	0	0	42%
	Low South Twin (3a-6d1)	0	•				0	0	0	$\Theta$	•	•	0	٠		0	-	0	42%
т	Tunnel - Mode Separated (3c-1a)		0	$\Theta$		$\Theta$	0	•	$\Theta$		0		0	0	0		0	0	40%
	120' High North Twin - Mode Separated (3b-5d2)	$\overline{\mathbf{a}}$	0	$\Theta$		0	0	•		$\Theta$		0	0		0	0	0	0	39%
	97' High South Twin (3b-6d1)	0	-	0	0		0	0		$\Theta$	•	0	0	•		0	-	•	39%
	120' High Existing Alignment (3b-1b2)	-	0	0	0		0			0	0	0	0	$\Theta$	0	0	0	•	29%
	120' High Southeast Wishbone (3b-3b2)	-	0	0	0	•	0	0	•	0	0	0	0	•	0	0	0	•	25%
	120' High Northeast Wishbone (3b-2b2)	0	0	0	0	•	0	•	•	0	0	0	0	•	0	0	0	•	23%
	120' High North Twin (3b-4d2)	0	0	0	•		0	•		0	0	0	0	0	0	0	0	0	17% O L
120F	120' High South Twin (3b-6d2)	0	0	0	0		0	0		0	0	0	0		0	0	0	0	14%



#### **Trends Discussion – 97 Wishbone**

		SEIS RESILI			I-MOTOR		со	NNECTIV	ΊTY	EQU	YTIL		BUILT I	enviroi	NMENT			NCIAL RDSHIP	
		Unreinforced Masonry Risk	Disabled Yehicles Risk	Ease of Ped + Bike Use	Safe Ped + Bike Connections	Personal Security for Ped + Bikes	Street Network Connection	Crossing Safety and Convenience	Moveable Bridge (Periodic Delay)	Social Service Impacts	Low Income Housing Impacts	Visual Impacts to Existing Buildings	Commercial + Industrial Impact	Long Term Housing	Park + Recreation Impact	Historic Structures + District Impacts	Capital Cost	Longterm Maintenance	Score (0-100%)
LM	Low Existing Alignment (3a-1d)							$\Theta$	0					٠				$\Theta$	85%
LM	Low Northeast Wishbone (3a-2b)								0				0					$\Theta$	85%
ER	Enhanced Seismic Retrofit, No widening (4b1)							$\Theta$	0				٠	٠	٠	٠		0	83%
ER	Enhanced Seismic Retrofit, Widened (4b2)							$\Theta$	0					٠				0	81%
LM	Low Southeast Wishbone (3a-3b1)							0	0					٠			•	$\Theta$	78%
97F	97' High Existing Alignment (3b-1b1)	$\Theta$		0	0		$\overline{}$			$\Theta$		$\Theta$	٠	٠	0	0		٠	67%
	Low North Twin - Mode Separated (3a-5d1)		$\Theta$			$\Theta$		$\Theta$	0				0	٠	0	٠	$\overline{\mathbf{O}}$	0	66%
LM	Low South Twin - Mode Separated (3a-7d1)		$\Theta$			$\bigcirc$	•		0	$\Theta$			٠	٠	0	٠	$\overline{}$	0	65%
LM	Low Stacked (3a-8d)		$\Theta$		0	0	$\Theta$		0	$\Theta$		$\Theta$	٠	٠	٠	$\Theta$	•	$\Theta$	63%
97F	97' High South Twin - Mode Separated (3b-7d1)	$\Theta$		0		$\bigcirc$	•	$\Theta$		$\Theta$		$\Theta$	٠	٠	0	0	$\overline{}$	$\Theta$	61%
97F	97' High Northeast Wishbone (3b-2b1)	$\Theta$	$\Theta$	0	0		$\Theta$	$\Theta$		$\Theta$		$\Theta$	0	٠		0		٠	60%
97F	97' High Southeast Wishbone (3b-3b1)	$\Theta$	$\Theta$	0	0		0	0		$\Theta$		$\Theta$		٠		0		٠	58%
	97' High North Twin - Mode Separated (3b-5d1)	$\Theta$		0		0	$\Theta$	$\Theta$		$\Theta$		$\Theta$	0	٠	0	0	$\Theta$	$\Theta$	55%
LM	Low Double Wishbone (3a-9d)	0	$\Theta$		$\Theta$		$\Theta$	0	0	$\Theta$		0	0	0		0		$\Theta$	49%
LM	Low North Twin (3a-4d1)	0	•		•		$\overline{\mathbf{e}}$	0	0			-	0	0		0	0	0	45%
97F	97' High North Twin (3b-4d1)	0	•	0	0		0	$\Theta$		-		0	0	0		0	-	-	42%
120F	120' High South Twin - Mode Separated (3b-7d2)	-	0	•		0	0	$\overline{}$		-		0			0	0	0	0	42%
LM	Low South Twin (3a-6d1)	0	•				0	0	0	-	•	•	0	•		0	-	0	42%
т	Tunnel - Mode Separated (3c-1a)		0	•		•	0	$\bigcirc$	•		0		0	0	0	•	0	0	40%
120F	120' High North Twin - Mode Separated (3b-5d2)	•	0	•		0	0	$\Theta$		•		0	0	•	0	0	0	0	39%
97F	97' High South Twin (3b-6d1)	0	•	0	0		0	0		•	•	0	0	•		0	•	•	39%
120F	120' High Existing Alignment (3b-1b2)	•	0	0	0		0			0	0	0	0	•	0	0	0	•	29%
120F	120' High Southeast Wishbone (3b-3b2)	•	0	0	0		0	0		0	0	0	0		0	ō	0	•	25%
	120' High Northeast Wishbone (3b-2b2)	0	o	Ō	0	•	õ	•		0	õ	Ō	õ		õ	õ	0	•	23%
	120' High North Twin (3b-4d2)	õ	o	Ō	ŏ		õ	•		0	o	Ō	õ	0	õ	õ	0	0	17%
120F	120' High South Twin (3b-6d2)	0	0	0	0		0	0		0	0	0	0		0	0	0	0	14%



#### **Trends Discussion – 97 Mode-Separated**

		SEISI RESILI			I-MOTOR		со	NNECTIV	ITY	EQU	уЛТҮ		BUILT	enviroi	NMENT			ncial Rdship	
		Unreinforced Masonry Risk	Disabled Vehicles Risk	Ease of Ped + Bike Use	Safe Ped + Bike Connections	Personal Security for Ped + Bikes	Street Network Connection	Crossing Safety and Convenience	Moveable Bridge (Periodic Delay)	Social Service Impacts	Low Income Housing Impacts	Visual Impacts to Existing Buildings	Commercial + Industrial Impact	Long Term Housing	Park + Recreation Impact	Historic Structures + District Impacts	Capital Cost	Longterm Maintenance	Score (0-100%)
LM	Low Existing Alignment (3a-1d)							$\Theta$	0				٠	٠	٠			$\Theta$	85%
	Low Northeast Wishbone (3a-2b)								0				0	٠				$\Theta$	85%
	Enhanced Seismic Retrofit, No widening (4b1)							$\Theta$	0				٠	٠				0	83%
	Enhanced Seismic Retrofit, Widened (4b2)							$\Theta$	0				٠	٠				0	81%
	Low Southeast Wishbone (3a-3b1)		•			•	$\overline{}$	0	0	•			٠	٠	٠		$\Theta$	$\Theta$	78%
	97' High Existing Alignment (3b-1b1)	$\Theta$		0	0		$\overline{}$	٠		$\Theta$		$\overline{}$	٠	٠	0	0			67%
LM	Low North Twin - Mode Separated (3a-5d1)		•			$\Theta$		$\Theta$	0				0		0		$\Theta$	0	66%
LM	Low South Twin - Mode Separated (3a-7d1)		•			$\Theta$	$\Theta$	٠	0	$\Theta$				٠	0		$\Theta$	0	65%
LM	Low Stacked (3a-8d)		•		0	0	$\overline{}$	٠	0	$\Theta$		$\overline{}$	٠	٠		$\Theta$		$\Theta$	63%
97F	97' High South Twin - Mode Separated (3b-7d1)	$\Theta$		0		$\Theta$	$\Theta$	$\Theta$		•		$\Theta$			0	0	$\Theta$	$\Theta$	61%
97F	97' High Northeast Wishbone (3b-2b1)	$\overline{}$	•	0	0		-	$\Theta$		$\overline{}$		$\overline{}$	0	٠		0			60%
	97' High Southeast Wishbone (3b-3b1)	$\Theta$	$\Theta$	0	0		0	0		$\Theta$		$\Theta$				0			58%
97F	97' High North Twin - Mode Separated (3b-5d1)	$\Theta$		0		0	$\Theta$	$\Theta$		$\Theta$		$\Theta$	0		0	0	$\Theta$	$\Theta$	55%
LM	Low Double Wishbone (3a-9d)	0	•		$\Theta$		$\Theta$	0	0	$\Theta$		0	0	0		0		$\Theta$	49%
	Low North Twin (3a-4d1)	0	•		$\Theta$		$\Theta$	0	0			$\overline{}$	0	0		0	0	0	45%
	97' High North Twin (3b-4d1)	0	$\Theta$	0	0		0	$\Theta$		$\Theta$		0	0	0		0	$\Theta$	$\Theta$	42%
120F	120' High South Twin - Mode Separated (3b-7d2)	$\overline{}$	0	$\Theta$		0	0	$\Theta$		$\Theta$		0			0	0	0	0	42%
	Low South Twin (3a-6d1)	0	$\Theta$				0	0	0	$\Theta$	$\Theta$	$\Theta$	0			0	$\Theta$	0	42%
т	Tunnel - Mode Separated (3c-1a)		0	$\Theta$		$\Theta$	0	$\Theta$	$\Theta$		0		0	0	0		0	0	40%
	120' High North Twin - Mode Separated (3b-5d2)	$\overline{}$	0	$\Theta$		0	0	$\Theta$		$\Theta$		0	0		0	0	0	0	39%
97F	97' High South Twin (3b-6d1)	0	•	0	0		0	0		$\Theta$	$\Theta$	0	0			0	•	$\Theta$	39%
120F	120' High Existing Alignment (3b-1b2)	$\Theta$	0	0	0		0			0	0	0	0	•	0	0	0	$\Theta$	29%
120F	120' High Southeast Wishbone (3b-3b2)	-	0	0	0		0	0		0	0	0	0		0	0	0	$\Theta$	25%
	120' High Northeast Wishbone (3b-2b2)	0	0	0	0		0	•		0	0	0	0		0	0	0	-	23%
	120' High North Twin (3b-4d2)	0	0	0	•		0	•	•	0	0	0	0	0	0	0	0	0	17%
120F	120' High South Twin (3b-6d2)	0	0	0	0		0	0		0	0	0	0		0	0	0	0	14%

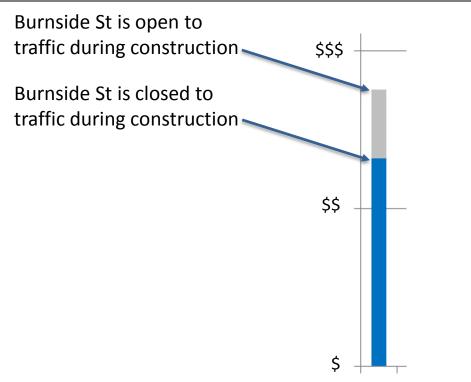


#### **Trends Discussion – What is rising to the top...**

		SEISI RESILI			I-MOTOF		со	NNECTIV	ΊTY	EQU	ЛТҮ		BUILT	enviroi	NMENT			NCIAL RDSHIP	
		Unreinforced Masonry Risk	Disabled Vehicles Risk	Ease of Ped + Bike Use	Safe Ped + Bike Connections	Personal Security for Ped + Bikes	Street Network Connection	Crossing Safety and Convenience	Moveable Bridge (Periodic Delay)	Social Service Impacts	Low Income Housing Impacts	Visual Impacts to Existing Buildings	Commercial + Industrial Impact	Long Term Housing	Park + Recreation Impact	Historic Structures + District Impacts	Capital Cost	Longterm Maintenance	Score (0-100%)
LM	Low Existing Alignment (3a-1d)							$\Theta$	0					٠	٠	٠		$\Theta$	85%
	Low Northeast Wishbone (3a-2b)					٠		٠	0				0	٠	٠	٠		$\Theta$	85%
	Enhanced Seismic Retrofit, No widening (4b1)							$\Theta$	0					٠				0	83%
	Enhanced Seismic Retrofit, Widened (4b2)							$\bigcirc$	0					٠				0	81%
	Low Southeast Wishbone (3a-3b1)						$\Theta$	0	0					٠	٠	٠	$\Theta$	$\Theta$	78%
	97' High Existing Alignment (3b-1b1)	$\Theta$		0	0		$\Theta$	٠	•	$\bigcirc$		$\Theta$		٠	0	0		٠	67%
LM	Low North Twin - Mode Separated (3a-5d1)		$\Theta$		•	$\Theta$		•	0				0	٠	0	٠	$\Theta$	0	66%
	Low South Twin - Mode Separated (3a-7d1)		$\Theta$		•	$\Theta$		٠	0	$\bigcirc$				٠	0	٠	$\Theta$	0	65%
	Low Stacked (3a-8d)		$\Theta$		0	0	$\overline{}$	٠	0	$\Theta$		$\Theta$	•	٠	٠	$\Theta$	•	$\Theta$	63%
	97' High South Twin - Mode Separated (3b-7d1)	$\Theta$		0		$\Theta$	$\Theta$	$\Theta$		$\Theta$		$\Theta$			0	0	-	$\Theta$	61%
	97' High Northeast Wishbone (3b-2b1)	$\overline{\mathbf{e}}$	•	0	0		$\overline{}$	•		•		-	0			0			60%
	97' High Southeast Wishbone (3b-3b1)	$\Theta$	$\Theta$	0	0		0	0		$\Theta$		$\Theta$				0			58%
	97' High North Twin - Mode Separated (3b-5d1)	$\overline{}$		0		0	$\overline{}$	$\Theta$		$\overline{}$		$\overline{}$	0		0	0	$\overline{}$	$\overline{}$	55%
	Low Double Wishbone (3a-9d)	0	-		$\Theta$		$\overline{}$	0	0	$\overline{}$		0	0	0		0		$\Theta$	49%
	Low North Twin (3a-4d1)	0	$\Theta$		$\Theta$		$\Theta$	0	0			$\Theta$	0	0		0	0	0	45%
	97' High North Twin (3b-4d1)	0	$\Theta$	0	0		0	-		$\Theta$		0	0	0		0	$\overline{}$	$\Theta$	42%
120F	120' High South Twin - Mode Separated (3b-7d2)	$\overline{}$	0	$\Theta$		0	0	-		$\Theta$		0			0	0	0	0	42%
	Low South Twin (3a-6d1)	0	$\Theta$				0	0	0	$\Theta$	$\Theta$	$\Theta$	0			0		0	42%
	Tunnel - Mode Separated (3c-1a)		0	$\Theta$		$\Theta$	0	$\Theta$	$\Theta$		0		0	0	0		0	0	40%
	120' High North Twin - Mode Separated (3b-5d2)	$\Theta$	0	$\Theta$		0	0	$\Theta$		$\Theta$		0	0		0	0	0	0	39%
97F	97' High South Twin (3b-6d1)	0	$\Theta$	0	0		0	0		$\Theta$	$\odot$	0	0			0	$\Theta$	$\Theta$	39%
	120' High Existing Alignment (3b-1b2)	•	0	0	0		0			0	0	0	0	•	0	0	0	•	29%
	120' High Southeast Wishbone (3b-3b2)	•	0	0	0		0	0		0	0	0	0		0	0	0	•	25%
	120' High Northeast Wishbone (3b-2b2)	0	0	0	0		0	•		0	0	0	0		0	0	0	$\Theta$	23%
	120' High North Twin (3b-4d2)	0	0	0	-		0	•		0	0	0	0	0	0	0	0	0	17%
120F	120' High South Twin (3b-6d2)	0	0	0	0		0	0		0	0	0	0		0	0	0	0	14%



#### Financial Stewardship: Preliminary Cost



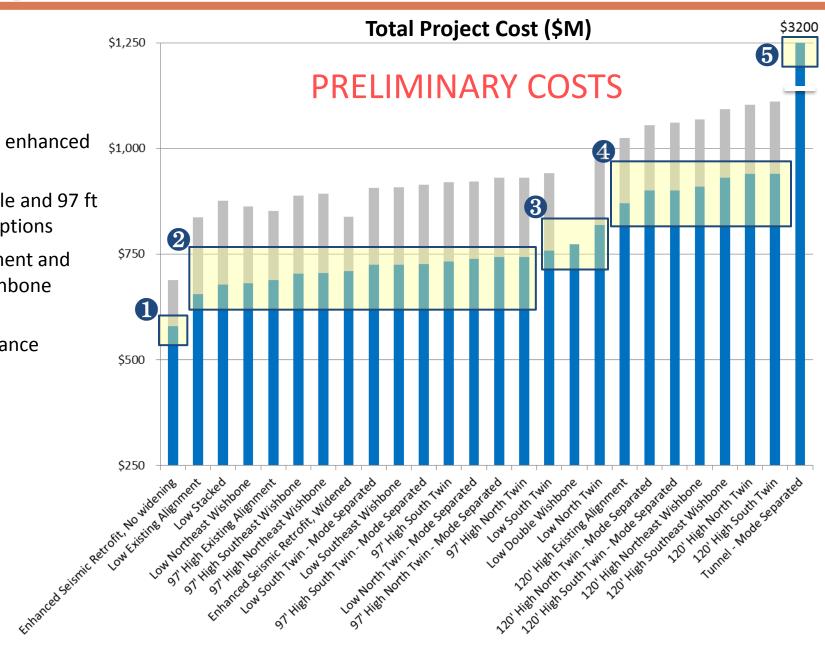


#### Notes:

- Total Project Cost (\$M)
- 1. Project costs includes NEPA, Design, ROW Acquisition, and Construction phases
- 2. Project costs are escalated to the year of construction







#### Notes:

- 1. Unwidened enhanced retrofit
- 2. Low movable and 97 ft clearance options
- 3. Twin alignment and Double wishbone options
- 4. 120 ft clearance options
- 5. Tunnel



#### What is rising to the top...

#### Enhanced Seismic Retrofit

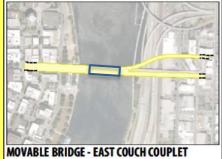


**ENHANCED SEISMIC RETROFIT - WIDENED** 

#### **Replacement: Existing Alignment**

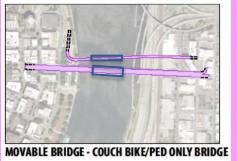


#### **Replacement: Wishbones**





#### **Replacement: Mode-Separated**

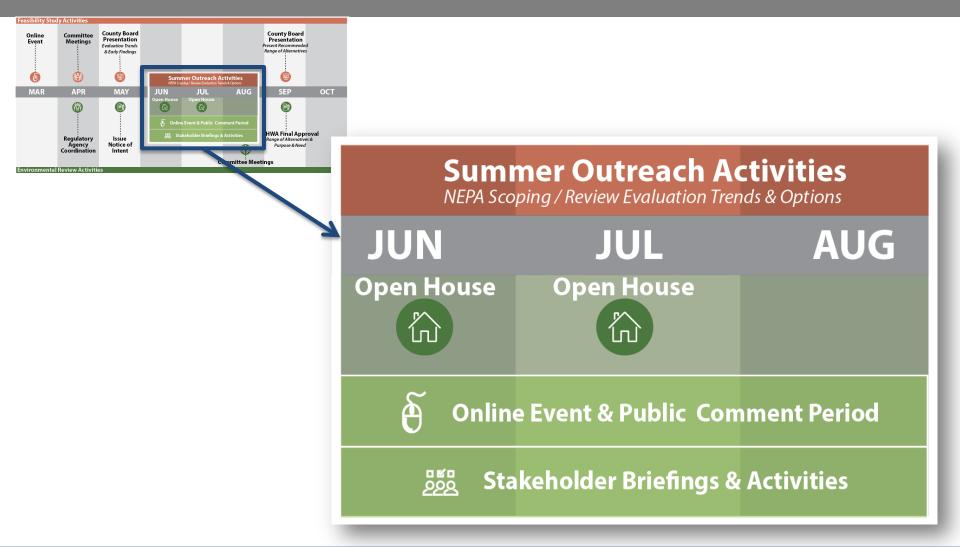






## 4. Next Steps











# Do you have anything you would like to share?



## 6. Closing Remarks





