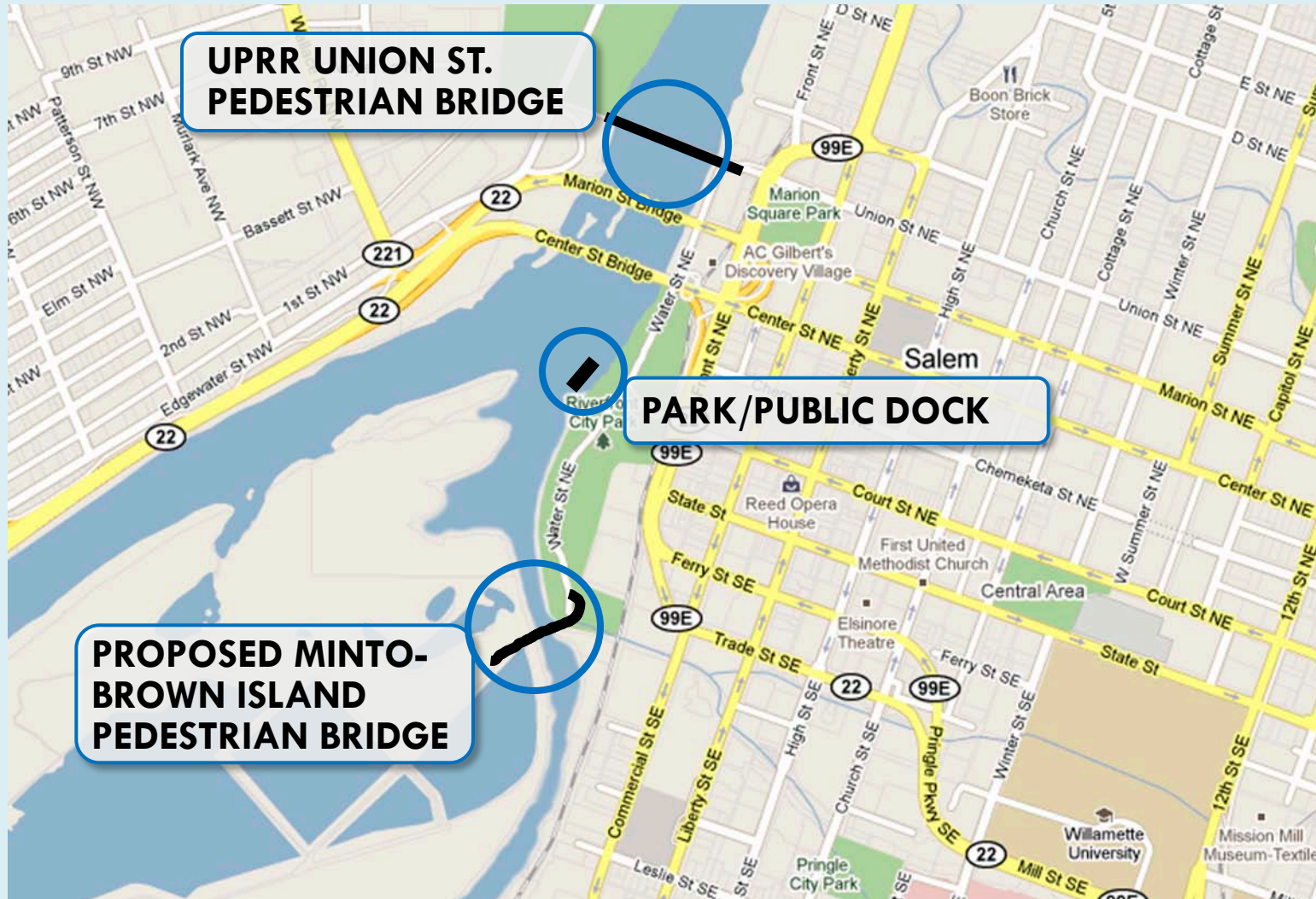


MINTO-BROWN ISLAND (MBI) PEDESTRIAN BRIDGE NAVIGATION STUDY



Map of Willamette River Main Stem & Willamette Slough, Salem, OR



MINTO-BROWN ISLAND (MBI) PEDESTRIAN BRIDGE NAVIGATION STUDY



Methodology

- **Determine navigability of Willamette River main stem for Sternwheeler (34' clearance required)**
- **Determine navigability of Willamette Slough at proposed MBI Pedestrian Bridge**
- **Average daily river stage based on 55 years of records at Salem (USGS national water surface statistics)**

MINTO-BROWN ISLAND (MBI) PEDESTRIAN BRIDGE NAVIGATION STUDY



Methodology

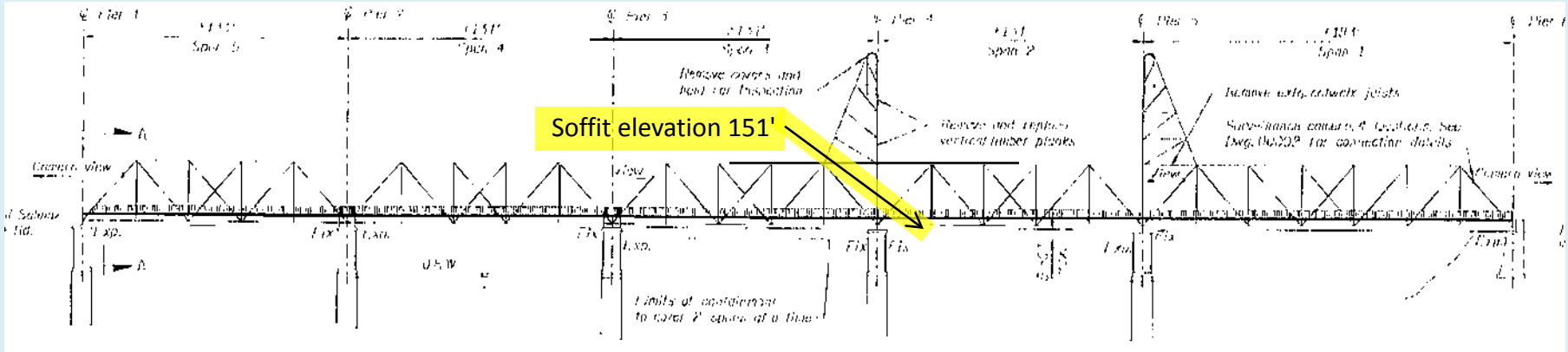
- **Develop stage data at Salem, Oregon**
- **Based on OBEC Hydraulic Regression Analysis**

Interval	River Flow (cfs)	Water Surface Elev. at M-B Island Site	Water Surface Elev. at Gage	Water Surface Elev. at Union St. RR Bridge
	20,000	116.0	115.5	115.1
	30,000	116.9	116.4	116.0
	40,000	119.3	118.8	118.4
	50,000	121.6	121.1	120.7
	60,000	123.6	123.1	122.7
	70,000	124.9	124.4	124.0
	80,000	125.3	125.8	125.4
	90,000	127.9	127.4	127.0
Approx. 1.2 years	100,000	129.1	128.6	128.2
10 years	163,000	136.9	136.4	136.0
50 years	232,000	141.7	141.2	140.8
100 years	269,000	143.7	142.9	142.0

MINTO-BROWN ISLAND (MBI) PEDESTRIAN BRIDGE NAVIGATION STUDY

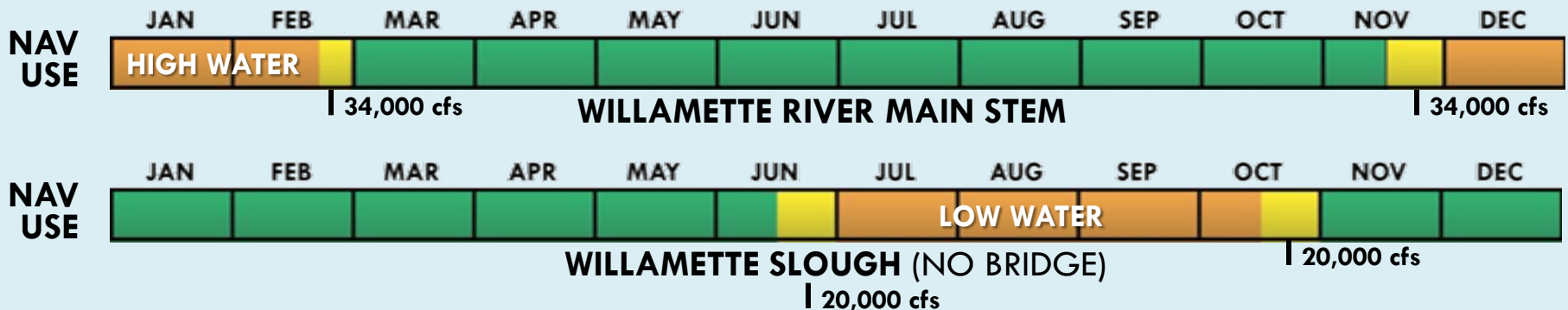


Navigation Condition at Union Street Railroad Pedestrian Bridge



- Historic lift span (permanently closed)
- Bridge soffit elevation 151.0
- 34' clearance (stacks down + 1' clearance)
- Sternwheeler navigation use **80% of the time on main stem, 100% on both**

INADEQUATE CLEARANCE
TRANSITIONAL NAV.
ADEQUATE CLEARANCE



MINTO-BROWN ISLAND (MBI) PEDESTRIAN BRIDGE NAVIGATION STUDY



Council-Approved Alternative L-1



Low-level, clear spans Willamette Slough, provides clearance for 100-year high water and smaller recreational boating

MINTO-BROWN ISLAND (MBI) PEDESTRIAN BRIDGE NAVIGATION STUDY



Proposed MBI Bridge Alternative L-1



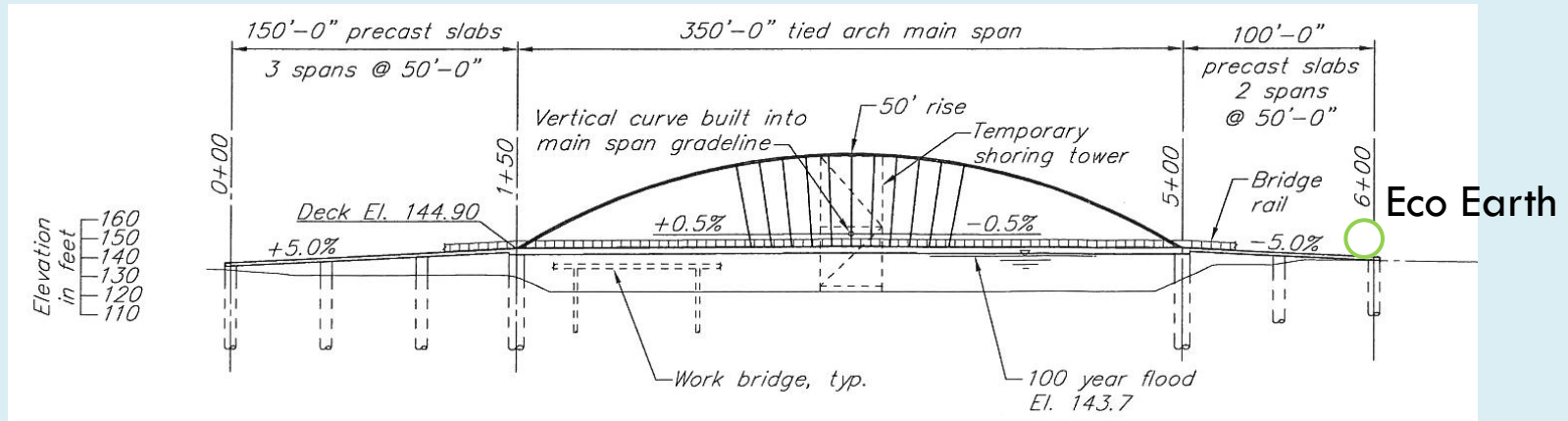
Alt -L1 Elevation – Low Arch Alternative (OBEC Report 9/2008)

- Tied arch main span/**600'** long overall
- Bridge soffit elevation 144.7
- 100-year HW elevation 143.7 (1' freeboard)

MINTO-BROWN ISLAND (MBI) PEDESTRIAN BRIDGE NAVIGATION STUDY

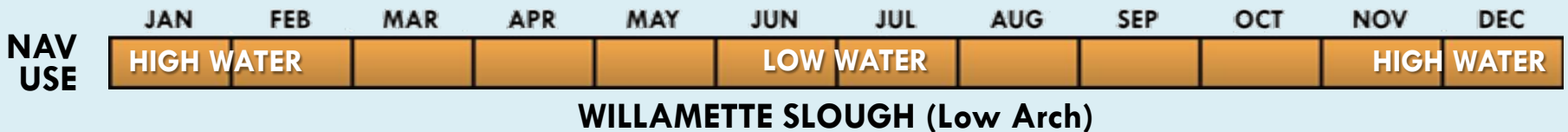
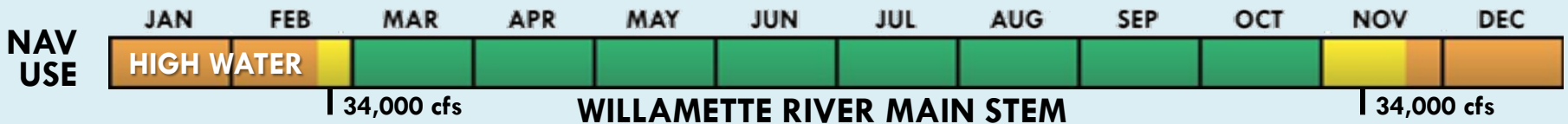


Alt L-1 – Low Arch Alternative



- Tied arch main span/**600'** long overall
- Bridge soffit elevation 144.7
- Sternwheeler navigation use
80% of the time (main stem only)
- **Cost: \$5.6 million (14' deck)**

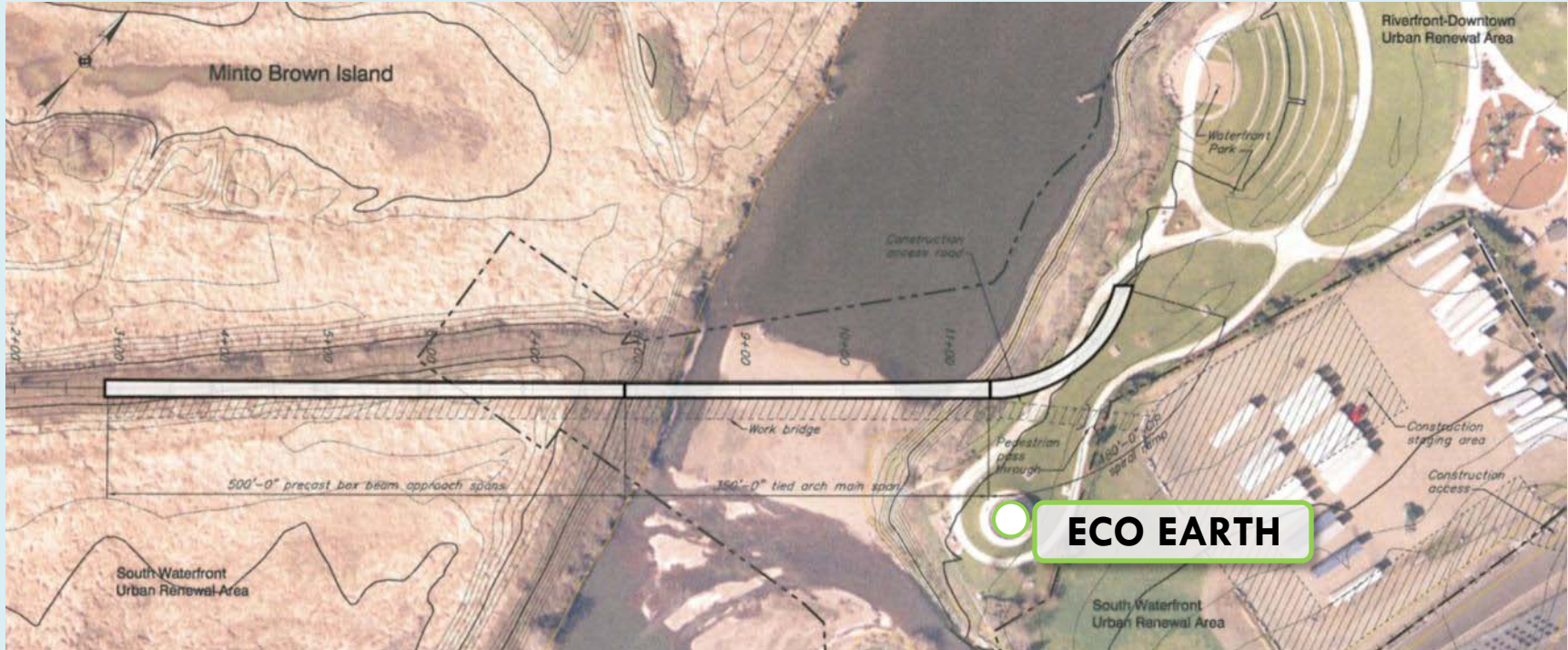
INADEQUATE CLEARANCE
TRANSITIONAL NAV.
ADEQUATE CLEARANCE



MINTO-BROWN ISLAND (MBI) PEDESTRIAN BRIDGE NAVIGATION STUDY



Proposed MBI Bridge Alternative H-1



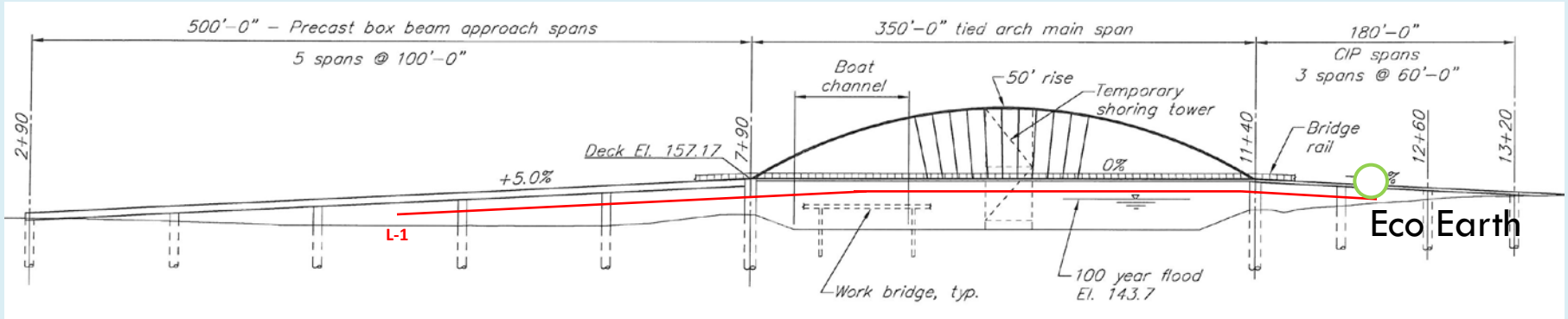
Alt -H1 Plan – High Arch Alternative - 1

- Tied arch main span/**1,030'** long overall
- Bridge soffit elevation 156.0

MINTO-BROWN ISLAND (MBI) PEDESTRIAN BRIDGE NAVIGATION STUDY

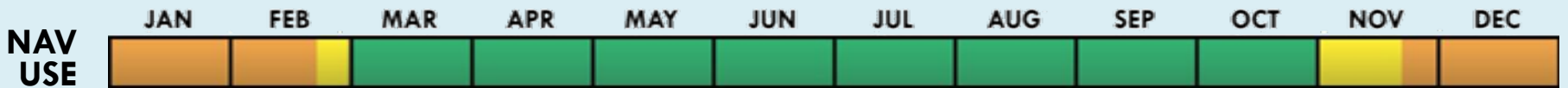


Alt H-1 - High Arch Alternative

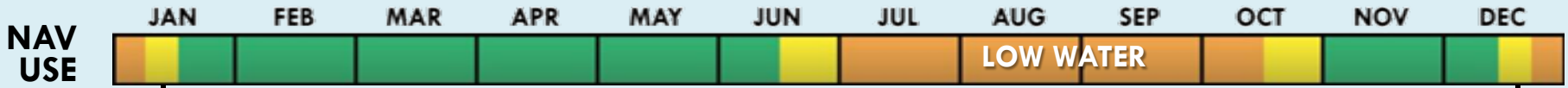


- Tied arch main span/**1,030'** long overall
- Bridge soffit elevation 156.0
- 34' clearance (stacks down + 1' clearance)
- Sternwheeler navigation use **92% of the time**
- **Cost \$8.3 million (14' deck)**

INADEQUATE CLEARANCE
TRANSITIONAL NAV.
ADEQUATE CLEARANCE



WILLAMETTE RIVER MAIN STEM



WILLAMETTE SLOUGH (High Arch)

50,000 cfs

LOW WATER

50,000 cfs

MINTO-BROWN ISLAND (MBI) PEDESTRIAN BRIDGE NAVIGATION STUDY



Proposed MBI Bridge Alternative H-1 +6 feet



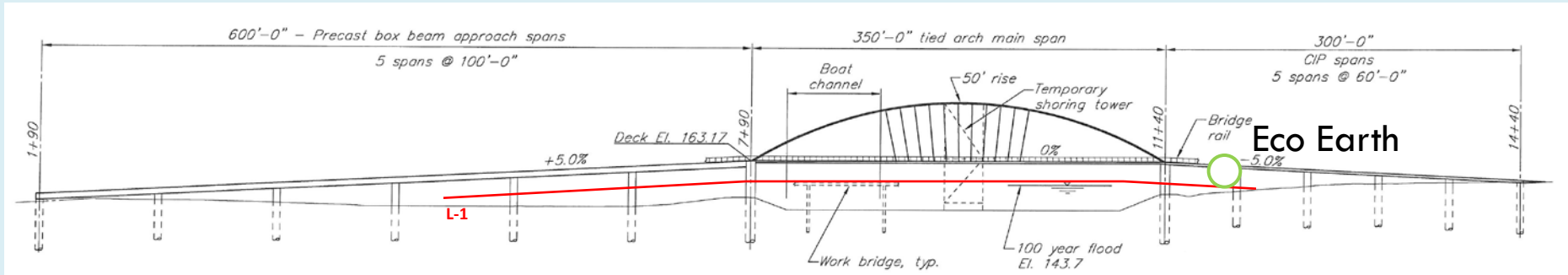
Alt -H1 + 6' Elevation – High Arch Alternative + 6'

- Tied arch main span/**1,250'** long overall
- Bridge soffit elevation 162.0

MINTO-BROWN ISLAND (MBI) PEDESTRIAN BRIDGE NAVIGATION STUDY

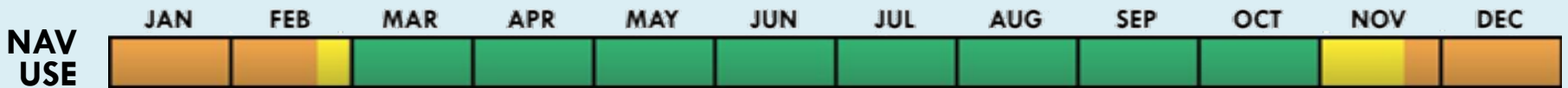


Alt – H1 +6' – High Arch Alternative + 6 feet

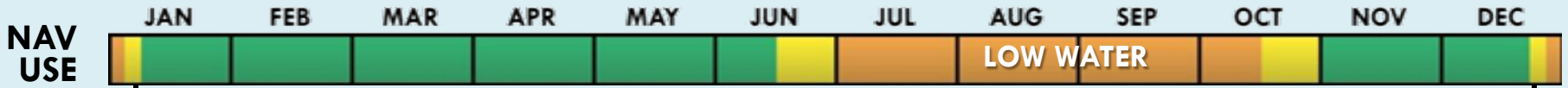


- Tied arch main span/**1,250'** long overall
- Bridge soffit elevation 162.0
- 34' clearance (stacks down + 1' clearance)
- Sternwheeler navigation use **98% of the time**
- **Cost \$9.7 million (14' deck)**

INADEQUATE CLEARANCE
TRANSITIONAL NAV.
ADEQUATE CLEARANCE



WILLAMETTE RIVER MAIN STEM



WILLAMETTE SLOUGH (High Arch +6')

90,000 cfs

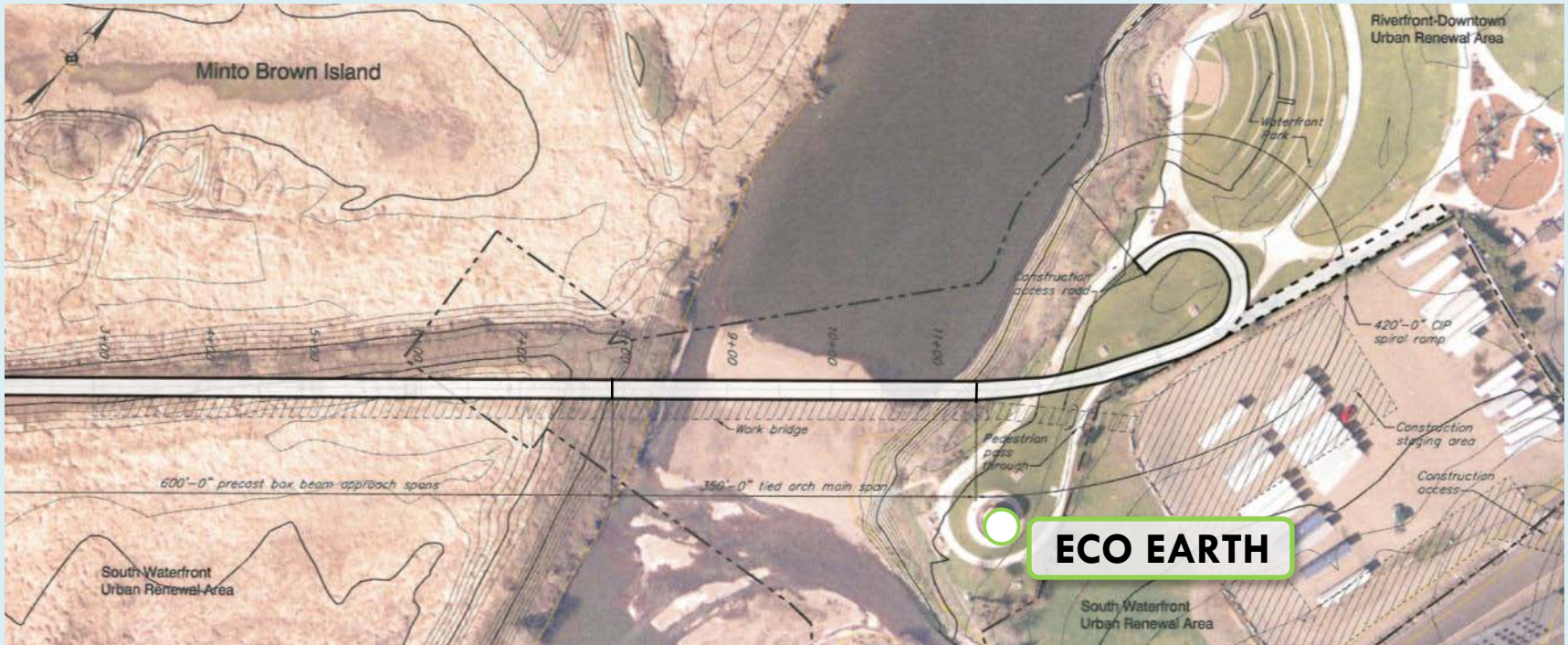
90,000 cfs

LOW WATER

MINTO-BROWN ISLAND (MBI) PEDESTRIAN BRIDGE NAVIGATION STUDY



Proposed MBI Bridge Alternative H-1 +11'



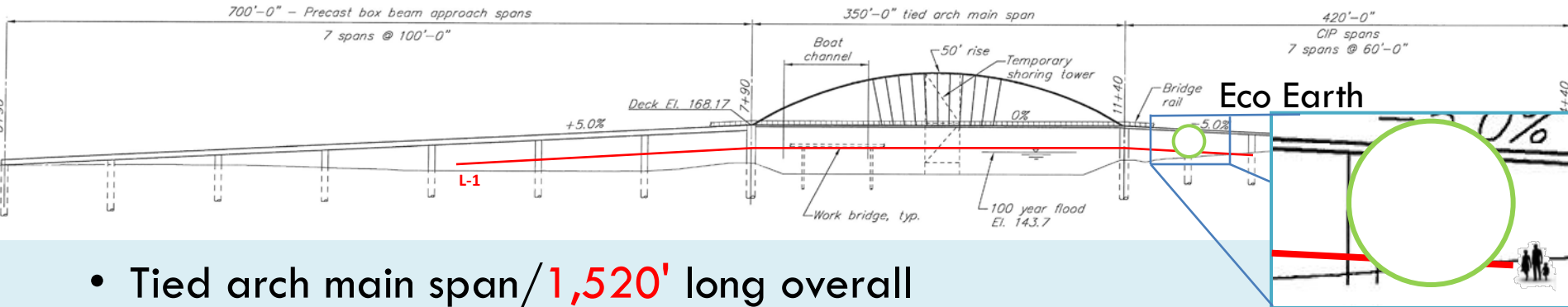
Alt -H1 + 11' Elevation – High Arch Alternative + 11'

- Tied arch main span / **1,520'** long overall
- Bridge soffit elevation 167.0

MINTO-BROWN ISLAND (MBI) PEDESTRIAN BRIDGE NAVIGATION STUDY



Alt H-1 +11' – High Arch Alternative +11 feet



- Tied arch main span/**1,520'** long overall
- Bridge soffit elevation 167.0
- 34' clearance (stacks down + 1' clearance)
- Sternwheeler navigation use **99% of the time**
- **Cost \$11.4 million (14' deck)**

INADEQUATE CLEARANCE

TRANSITIONAL NAV.

ADEQUATE CLEARANCE



WILLAMETTE RIVER MAIN STEM



LOW WATER

WILLAMETTE SLOUGH (High Arch +11')

130,000 cfs

130,000 cfs

MINTO-BROWN ISLAND (MBI) PEDESTRIAN BRIDGE NAVIGATION STUDY



Estimated Costs of Bridge Alternates

- Arch alternatives only (14'-wide deck comparison basis)
- Spiral ramp approach in park
- 2010 costs
- Comparison of four arch bridges of varying height
- Approximately 15% savings can be obtained if 12'-wide deck is considered

Option		West Approach Spans	Main Span	East Approach Spans	2010 Const Cost Est	2010 Planning Est
L-1*	Length (Ft)	150	350	100		
	Cost (\$/SF)	300	550	300		
	Cost (\$)	\$540,000	\$2,310,000	\$360,000	\$3,745,000	\$5,618,000
H-1	Length (Ft)	500	350	180		
	Cost (\$/SF)	300	550	300		
	Cost (\$)	\$1,800,000	\$2,310,000	\$648,000	\$5,551,000	\$8,327,000
H-1 + 6'	Length (Ft)	600	350	300		
	Cost (\$/SF)	300	550	300		
	Cost (\$)	\$2,160,000	\$2,310,000	\$1,080,000	\$6,475,000	\$9,713,000
H-1 + 11'	Length (Ft)	750	350	420		
	Cost (\$/SF)	300	550	300		
	Cost (\$)	\$2,700,000	\$2,310,000	\$1,512,000	\$7,609,000	\$11,414,000

* L1 approved March 2009 by City Council

NOTE: 2010 Planning Estimate represents the total project cost, including project development costs (1.5 x construction cost)

MINTO-BROWN ISLAND (MBI) PEDESTRIAN BRIDGE NAVIGATION STUDY



Conclusions & Observations

- **Without a new pedestrian bridge**
 - Near 100% navigation availability between Willamette River and Slough
- **With a new pedestrian bridge**
 - 80% navigation availability (*Alternative L-1*)
 - 92% navigation availability (*Alternative H-1*)
 - 98% navigation availability (*Alternative H-1 +6*)
 - 99% navigation availability (*Alternative H-1 +11*)
- **The cost premium for providing additional navigation availability**
 - Cost of 12% more navigation availability: \$2.7 million (*going from L-1 to H-1*)
 - Cost of 6% more navigation availability: \$1.4 million (*going from H-1 to H-1 +6*)
 - Cost of 1% more navigation availability: \$1.7 million (*going from H-1 +6 to H-1 +11*)
- **Analysis is based on preliminary design, and is subject to refinement.**