



POTTER MARSH BOARDWALK REPLACEMENT PROJECT

BY: EXTRON LLC

PRESENTERS: Patricia Notti, Ethan Hunstiger,
Hailey Swirbul & Jhon Landicho



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SCOPE OF WORK

Project Personnel, Scope of Work, Location

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ALTERNATIVES ANALYSIS

Design Criteria, Four Alternatives, Preferred Alternative Selection

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PREFERRED ALTERNATIVE

Foundation Design, Hydrologic Analysis, Environmental Impact, Structural Analysis and Design Modules

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PHASES

Phasing, Cost Estimate

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CONCLUSION

Summary



OUR COMPANY

Extron LLC is comprised of UAA Civil Engineering students:



Patricia Notti
Student Project
Manager



Hailey Swirbul
Structural Designer



Jhon Landicho
Structural Designer

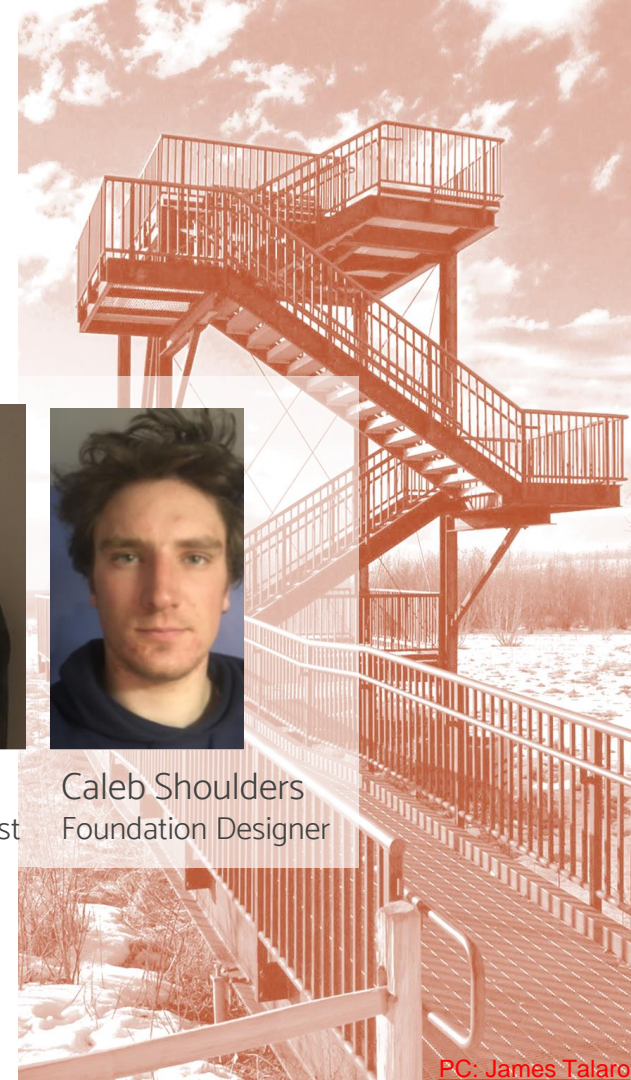


Ethan Hunstinger
Environmental Analyst



Caleb Shoulders
Foundation Designer

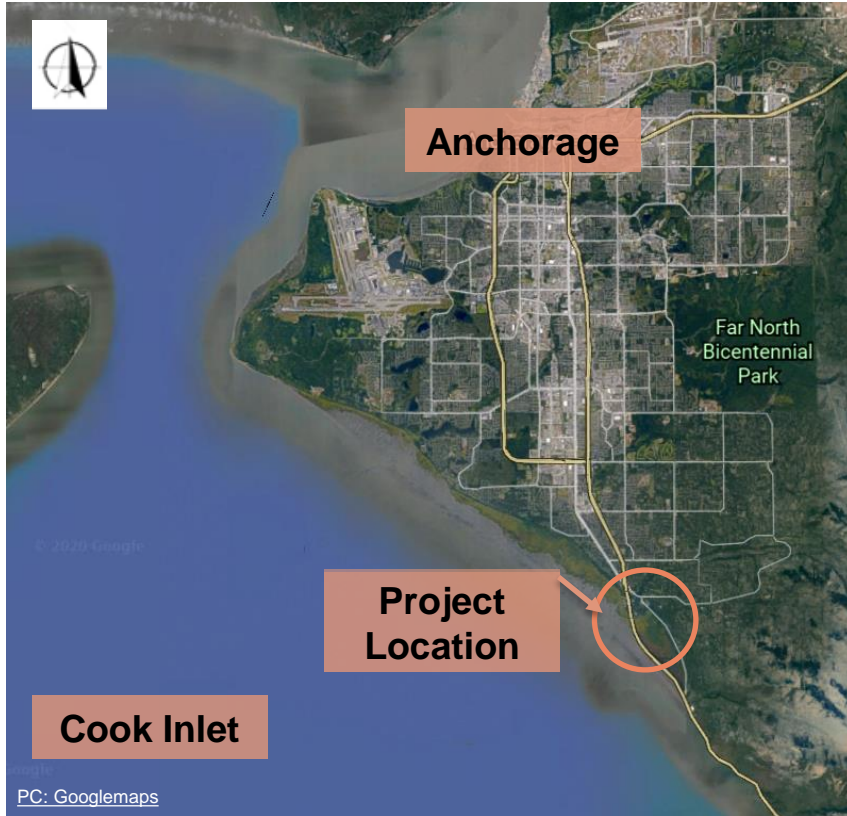
Not pictured: Arianna Sosnowski, Hydrologic Analyst



CLIENT AND MENTORS



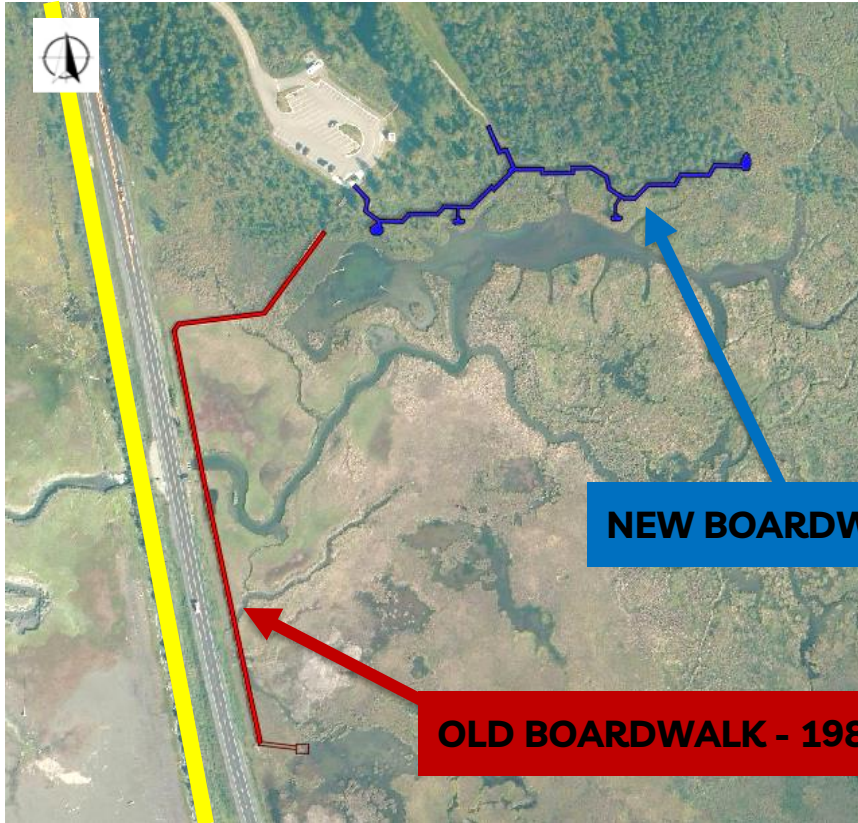
Client	Joe Meehan, AK Department of Fish and Game
Professional Mentor	Rys Miranda, PE, AK Department of Natural Resources
Academic Advisor	Dr. Zhaohui (Joey) Yang, PhD
Faculty Advisor	Dr. Scott Hamel, PE, PhD



PROJECT LOCATION



EXISTING BOARWALK



NEW BOARDWALK - 2008

OLD BOARDWALK - 1985



PC: Joe Meehan



PC: Hailey Swirbul



PC: Patricia Notti

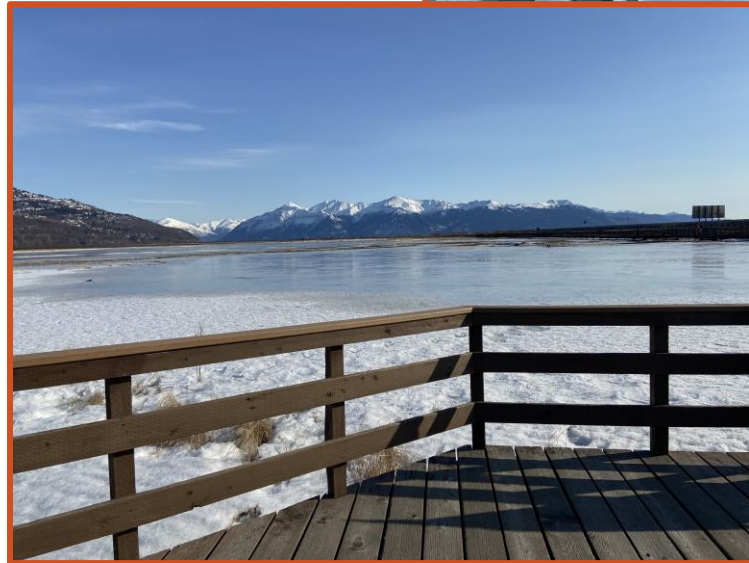
EXISTING CONDITIONS



PC: Patricia Notti

SCOPE OF WORK

- Redesign the 1985 Potter Marsh Boardwalk
- Comply with current codes
- Improve visitor's experience
 - Noise reduction
 - Design features
 - Interactive
- Preserve the natural habitat
- Provide 35% design documents



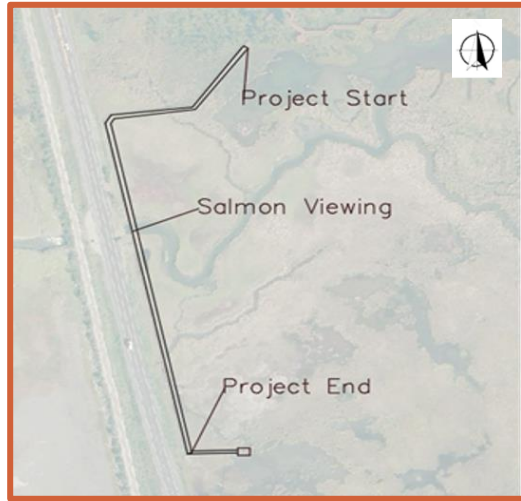
PC: [Hailey Swirbul](#)

ALTERNATIVES ANALYSIS

Design Considerations

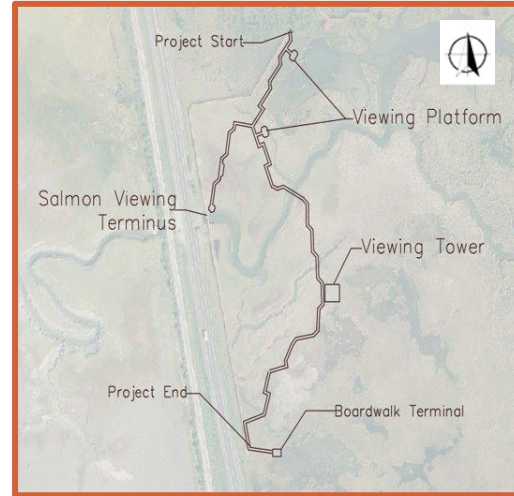
- Visitors Experience
- Environmental & Water Impact
- Design Features
- Foundation
- Cost

ALTERNATIVES



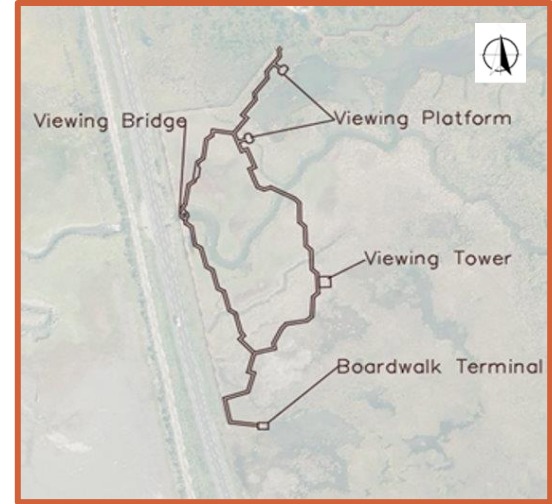
ALTERNATIVES I & II

Keeps the same alignment and no new features



ALTERNATIVE III

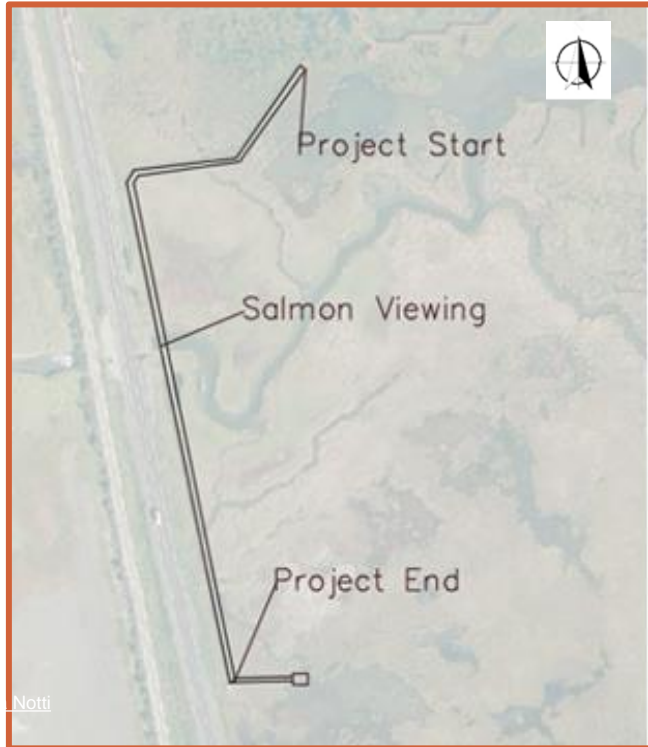
New path, viewing tower, and salmon viewing area



ALTERNATIVE IV

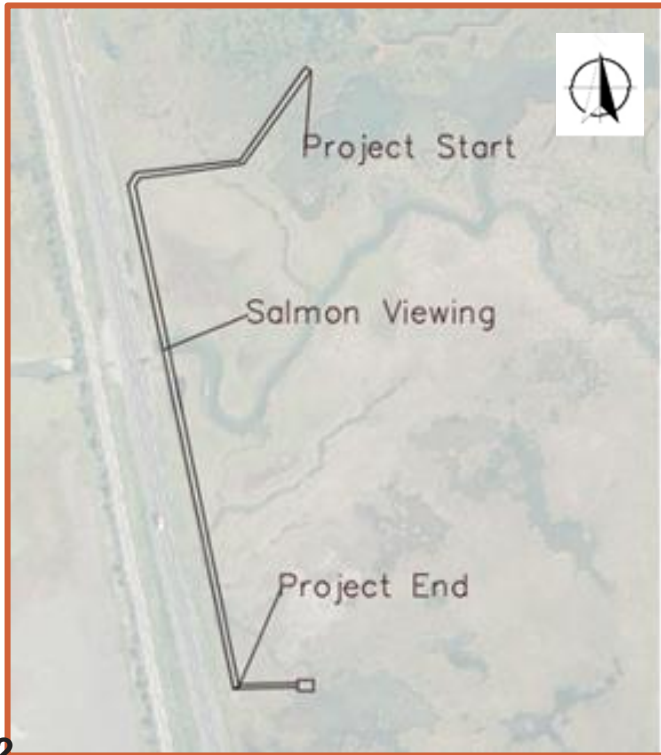
New path with a loop, viewing tower, and salmon viewing bridge

ALTERNATIVE I – No Build



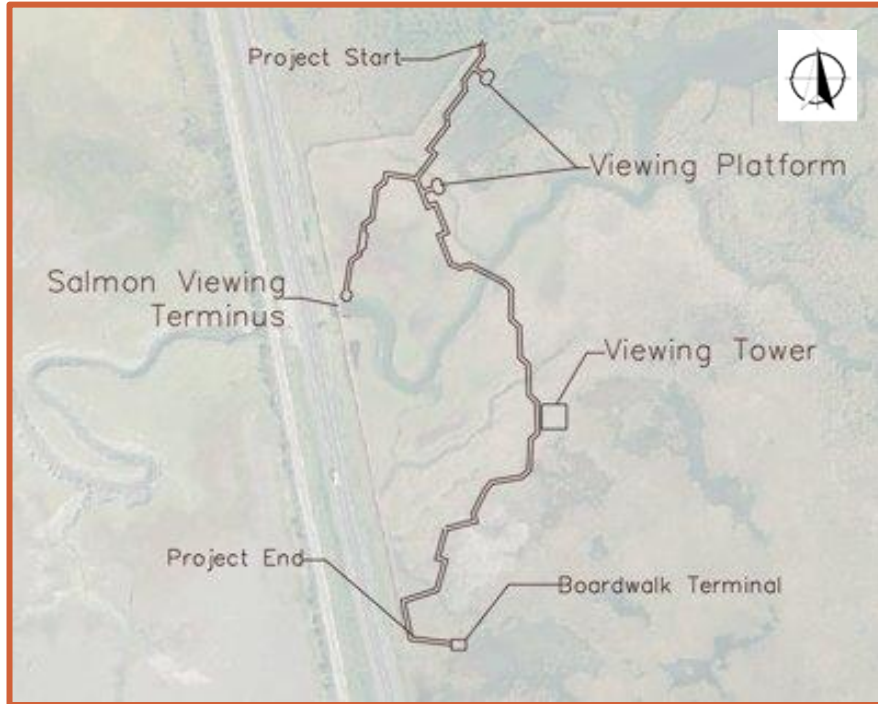
- Visitors Experience
- No Environmental & Water Impact
- Same Structure
- No New Foundations
- Cost: \$0

ALTERNATIVE II – Reuse Existing Foundations & Replace Superstructures



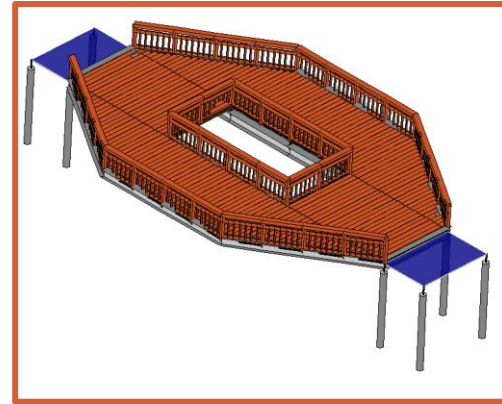
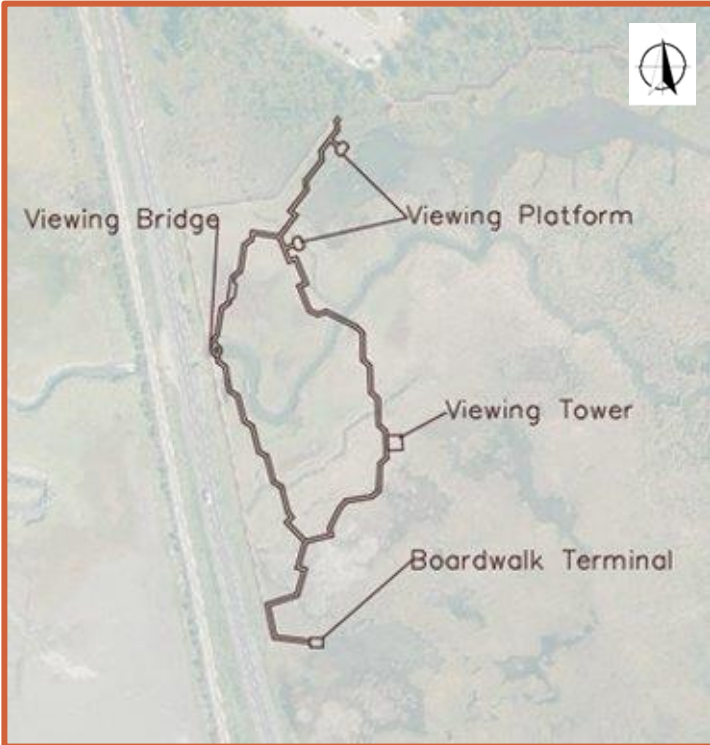
- Safer but same visitor experience
- No water impact
- Little environmental impact
- New Structure
- Use of the existing foundation
- Same elevation
- 1500-LF boardwalk redesign
- Cost: \$3.1 million

ALTERNATIVE III - Realignment



- Improved Visitors Experience
- Negligible Environmental & Water Impact
- Structure Features
- New Foundations
- 2000-LF Boardwalk
- Cost: \$5.5 million

ALTERNATIVE IV – Loop



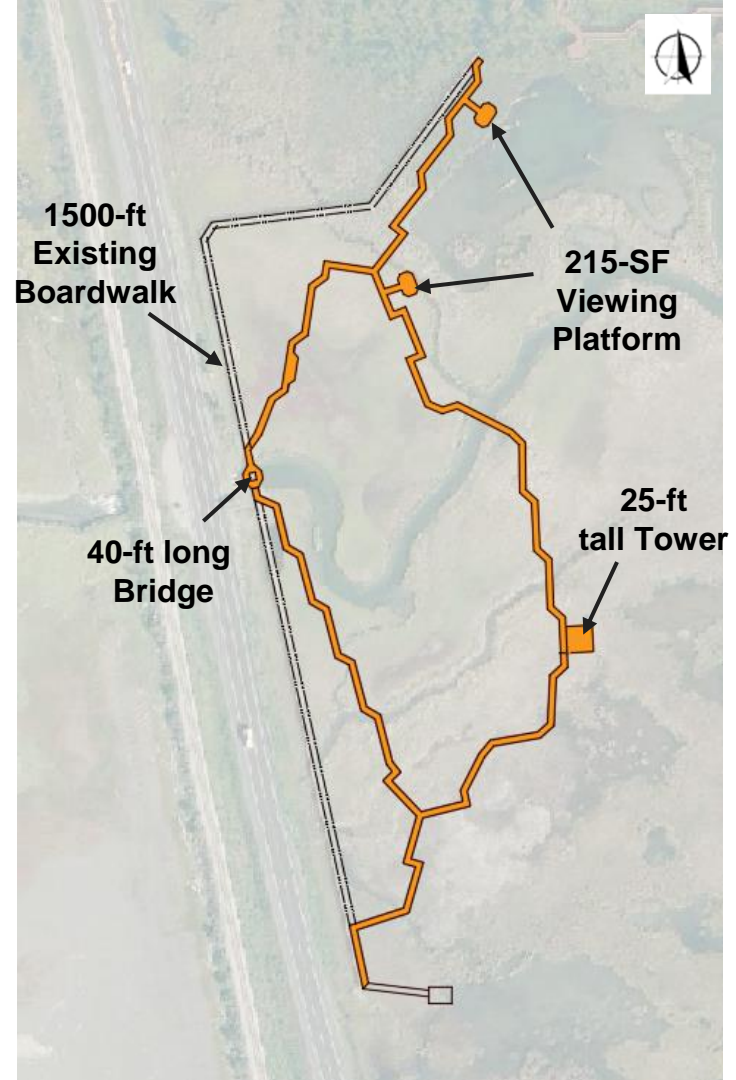
- Best Visitors Experience
- Little Environmental & Water Impact
- Structure Features
- New Foundations
- 2500-LF Boardwalk
- Cost: \$7.0 million

ALTERNATIVES COST SUMMARY

	ALTERNATIVE 1 <i>No Build</i>	ALTERNATIVE 2 <i>Replace superstructure</i>	ALTERNATIVE 3 <i>Realignment w/ tower & additions</i>	ALTERNATIVE 4 <i>Complete loop w/ tower & additions</i>
COST	\$0	\$3.1 Mil	\$5.5 Mil	\$7.0 Mil

PREFERRED ALTERNATIVE

- Alternative IV
- Best Visitors Experience
- Little Environmental & Water Impact
- Structure Features
- New Foundations
- Cost: \$7.0 million



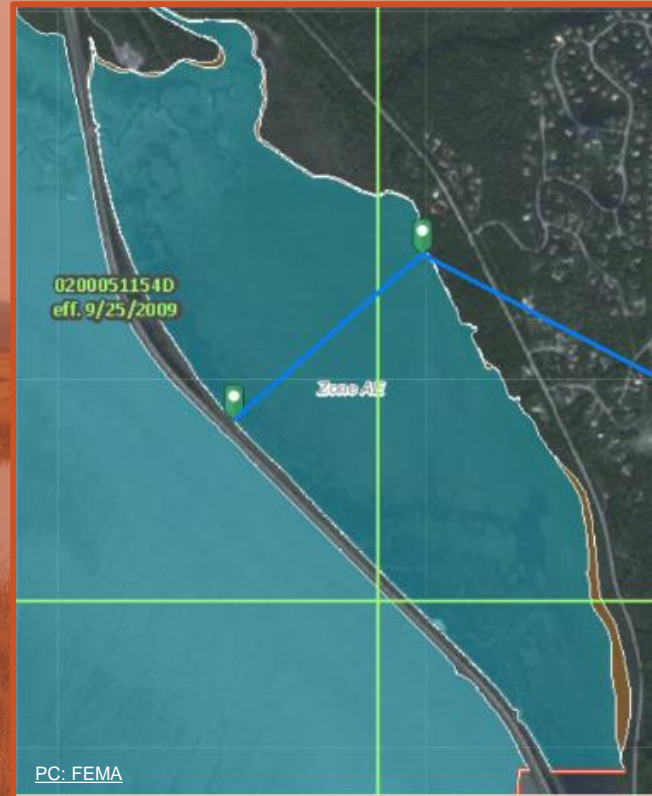
PREFERRED ALTERNATIVE

- Foundation Design
- Hydrologic Analysis
- Environmental Impact
- Structural Analysis and Design
- Modules



HYDROLOGIC ANALYSIS

- Flood Zone AE
 - 16 ft
- No significant increase in floodplain
 - 16.001 ft



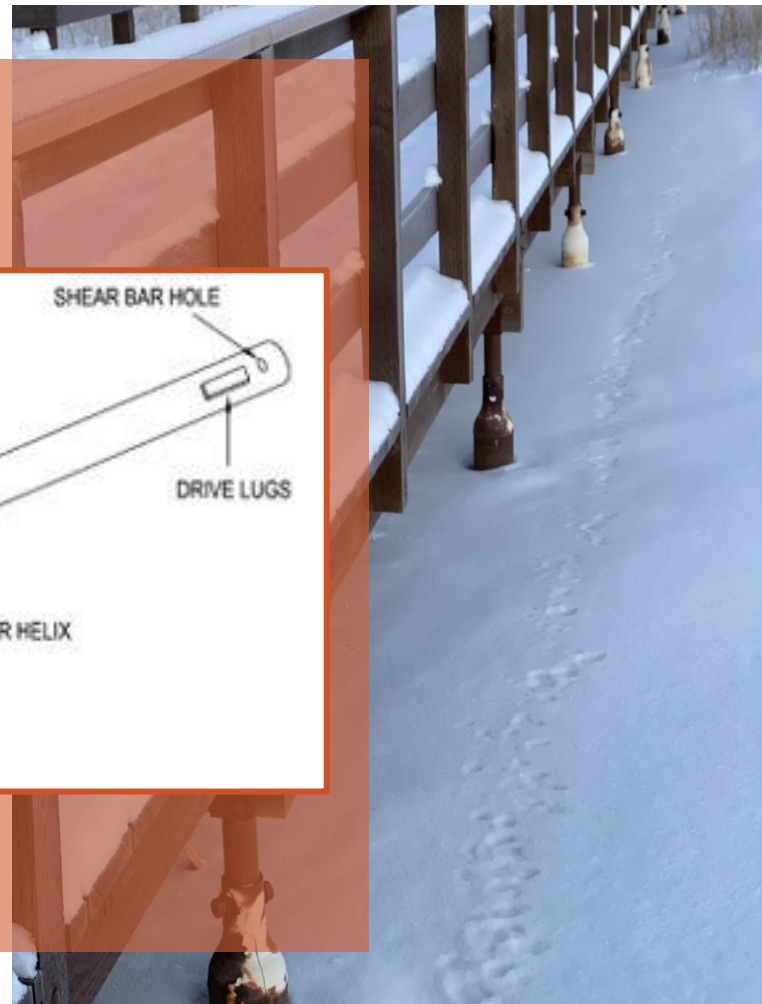
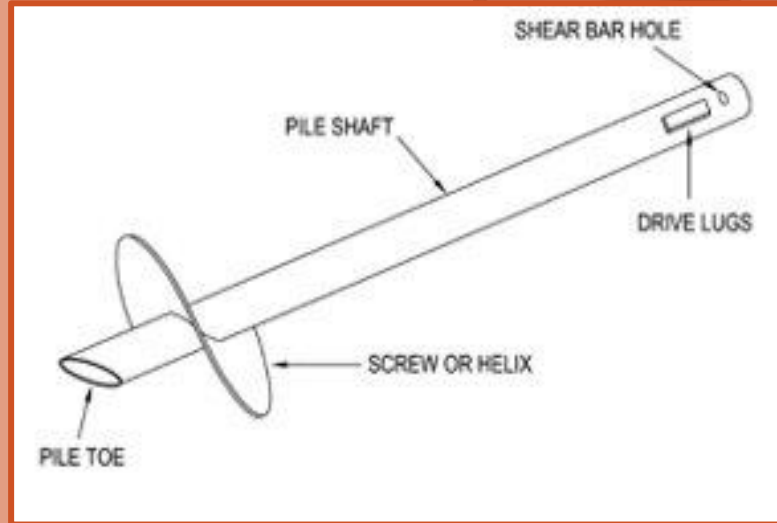
A white seabird, possibly a booby, is captured in mid-flight over a body of water. The bird has a dark cap and a red beak. The background is filled with tall, green reeds. The image is partially overlaid by a semi-transparent orange rectangle containing the title.

ENVIRONMENTAL IMPACT

- Ice Roads
- Pile Driving
- Winter construction

FOUNDATION DESIGN

- 3.5 in. diameter with 8 in. helices
- Driven to a minimum depth of 20-ft
- Low Impact Installation
- Superior heave protection



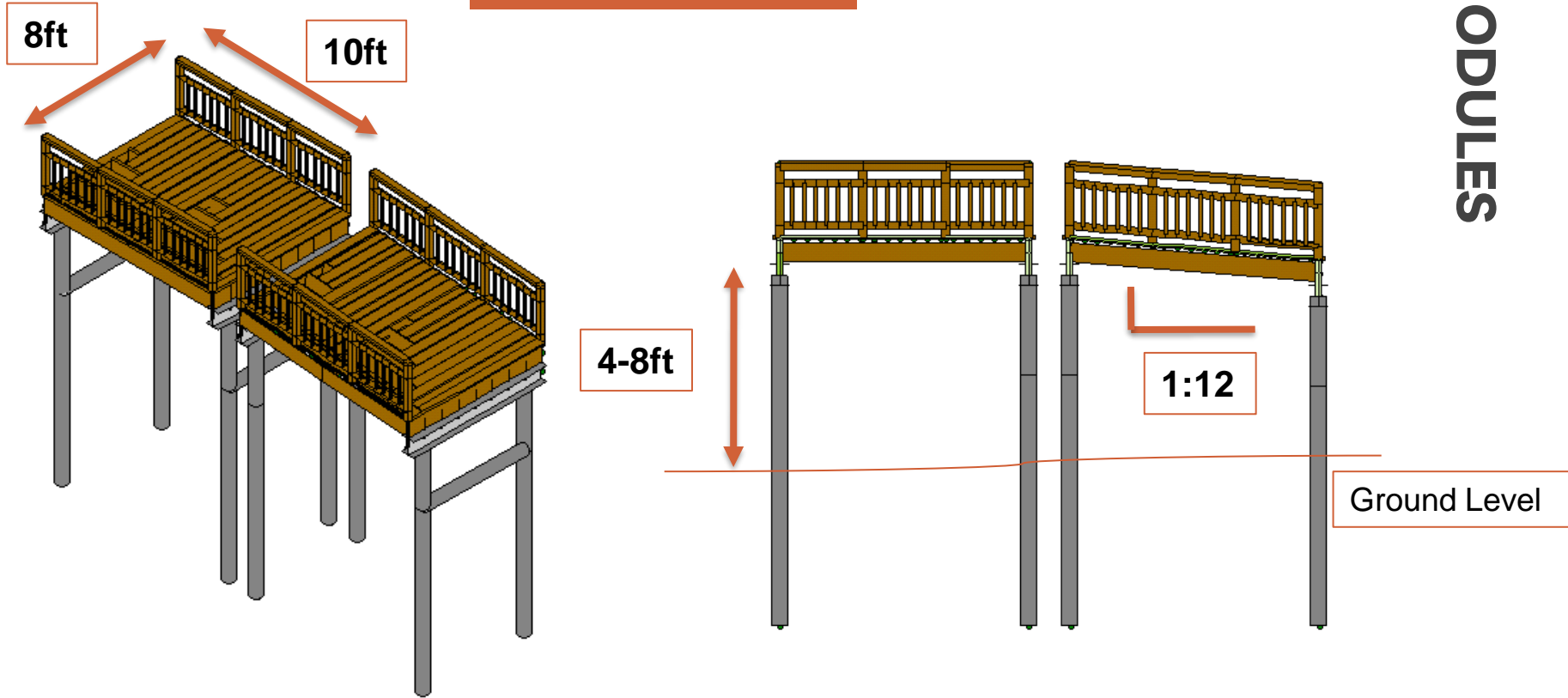
STRUCTURAL ASPECTS: CODES

- ASCE 7-16 : Minimum Design Loads and Associated Criteria for Buildings and Other Structures
- AISC Steel Construction Manual 15th Edition
- National Design Specification for Wood Construction
- 2018 International Building Code
- 2010 ADA Standards for Accessible Design

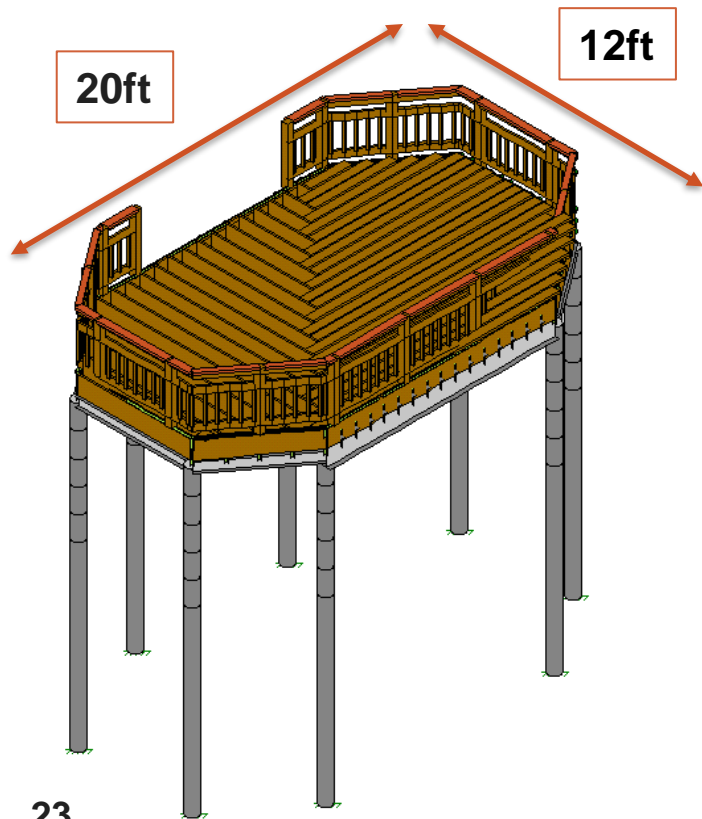


BOARDWALK

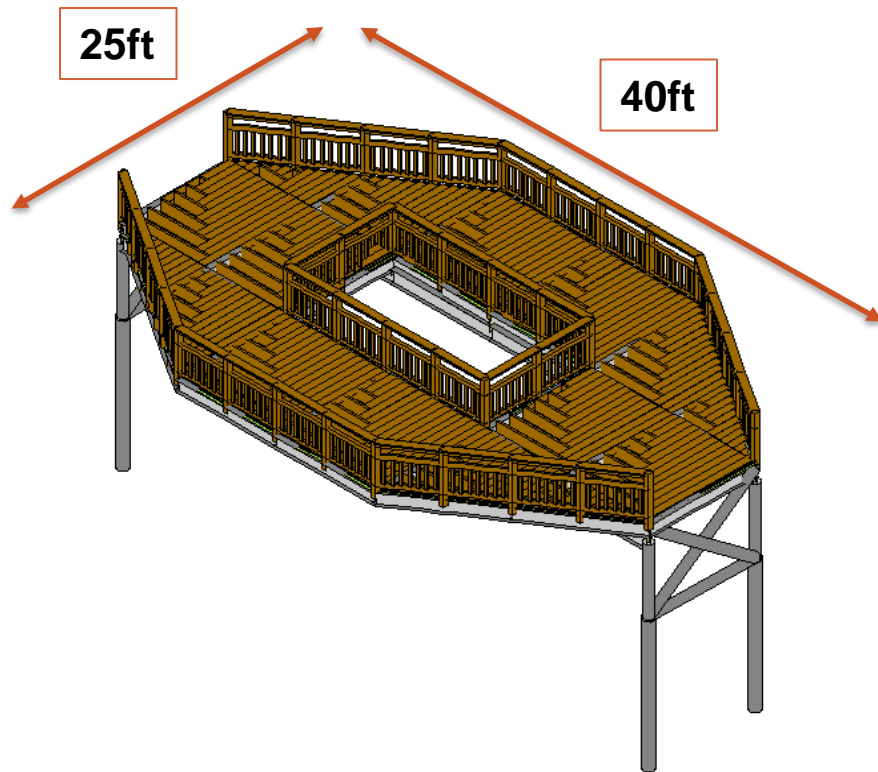
MODULES



PLATFORM MODULE



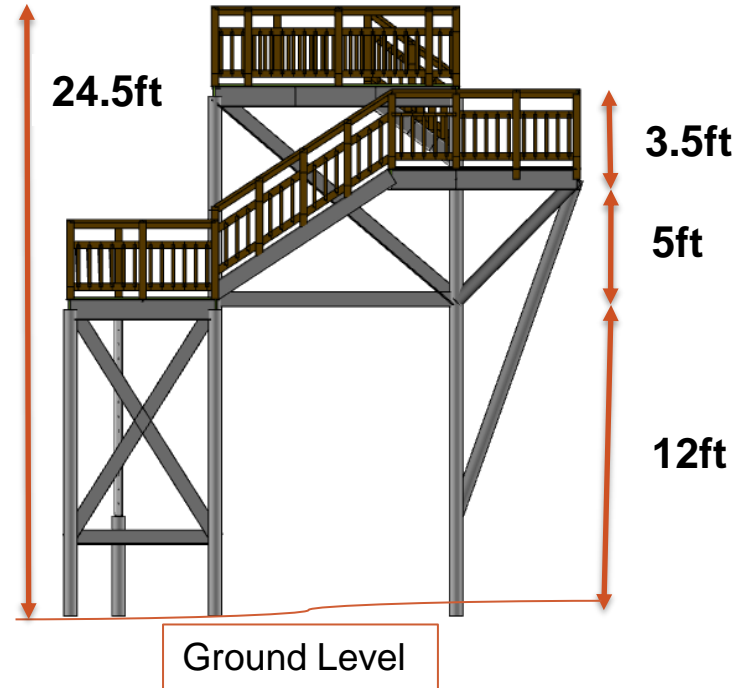
DONUT BRIDGE MODULE



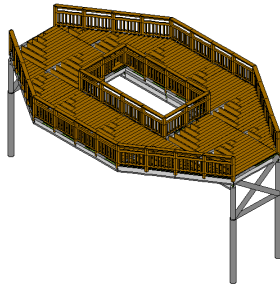
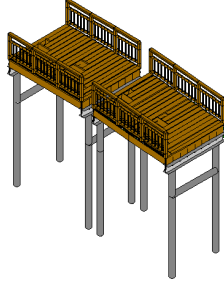
TOWER MODULE



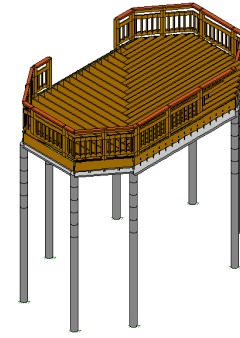
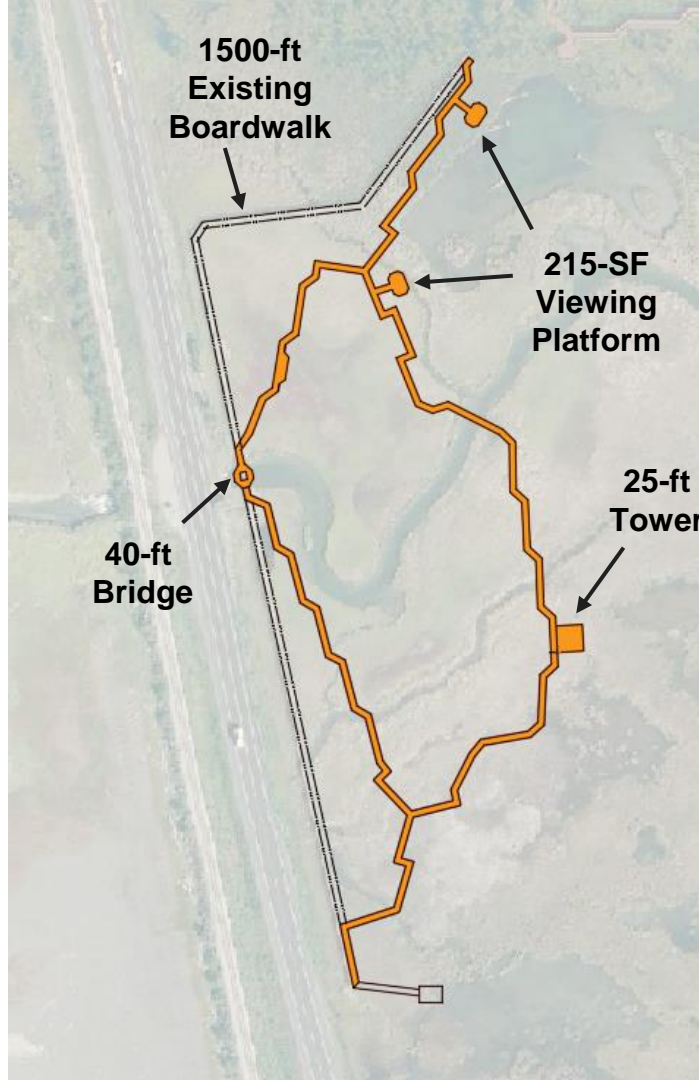
- 285 square ft of deck



- **Canada goose sedge flats**



- **Salmon congregation**

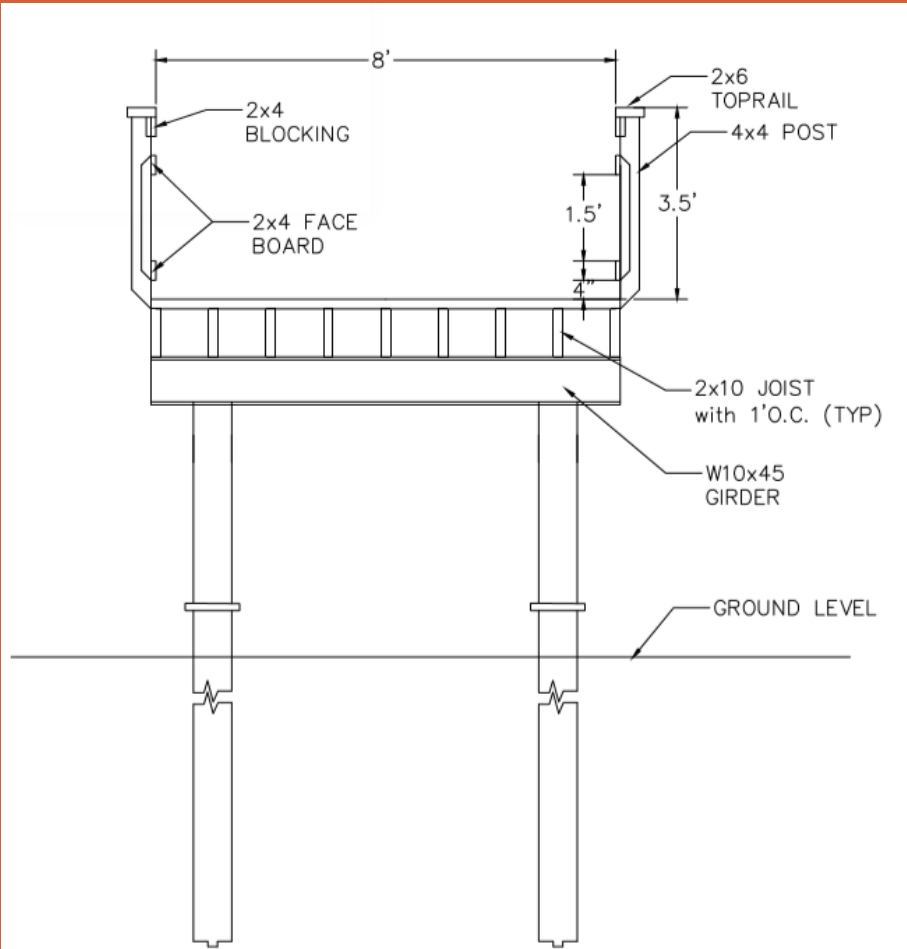


- **Waterfowl and shorebirds common here**



- **Shorebird Ponds**

MATERIALS

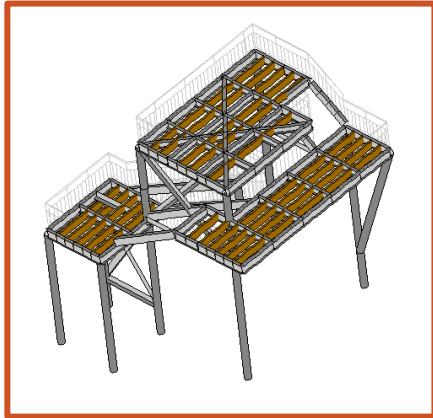


- A992 steel
- Douglas Fir Timber
- All modules use a combination

STRUCTURAL ASPECTS: LIVE LOADS

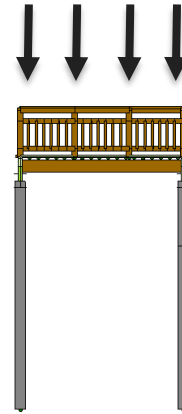
Assembly Areas

- Tower and viewing platforms
- 100 psf



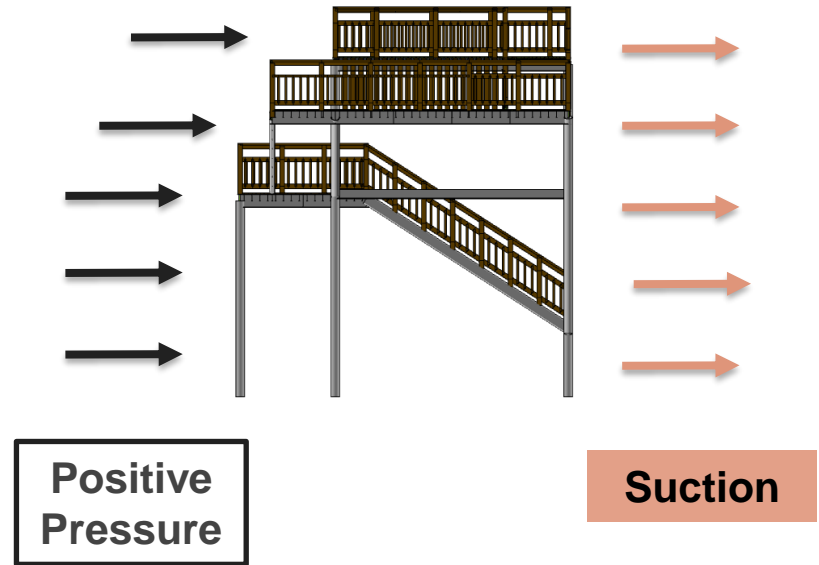
Elevated Walkways

- Boardwalk walkways and staircases
- 60psf



STRUCTURAL ASPECTS: WIND LOADS

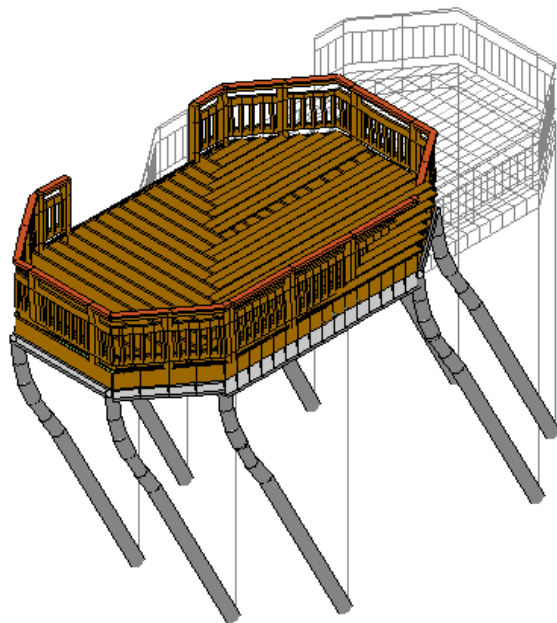
- Calculated for 50 year wind storm
 - 155 mph winds
- Tower- 24 kips distributed
- Per 10 ft section of boardwalk- 17 kips distributed



STRUCTURAL ASPECTS: EARTHQUAKE LOADS

- Tower- 4 kip applied at decks
- Per 10 ft section boardwalk- < 1 kip applied at deck

	WIND	SEISMIC
TOWER	24 kip	4 kip
BOARDWALK	17 kip	<1 kip



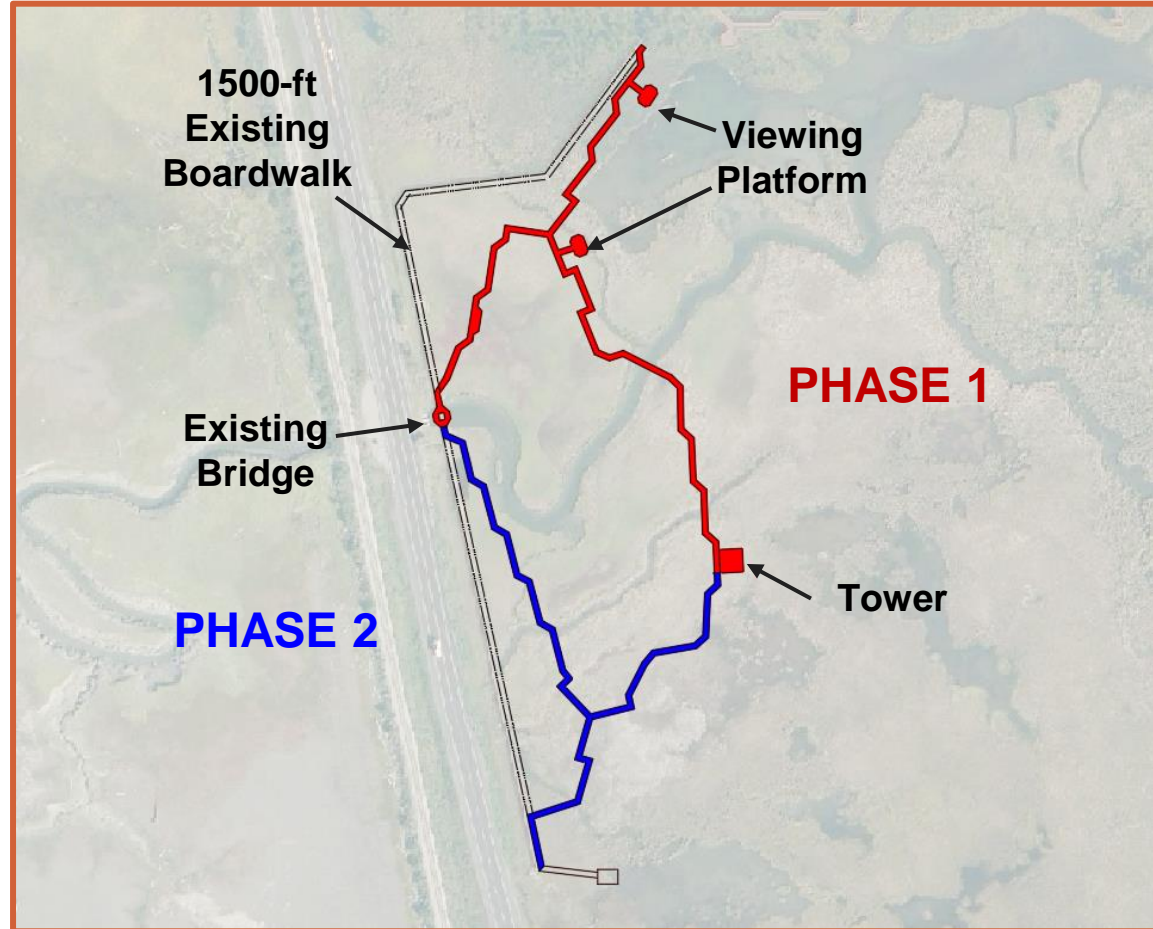
STRUCTURAL ASPECTS: HANDRAILS

- 42 inches high
- A 4-inch sphere must not pass through openings
- Composite railings



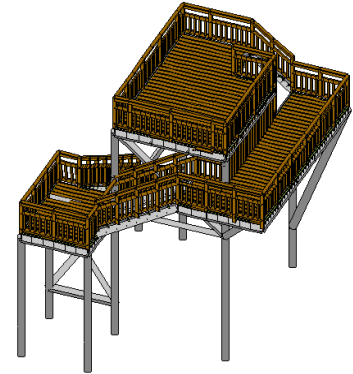
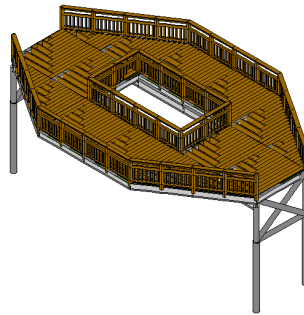
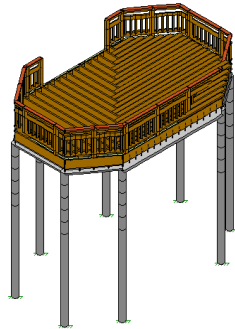
PHASES

- Two Phases
- Cost Estimates

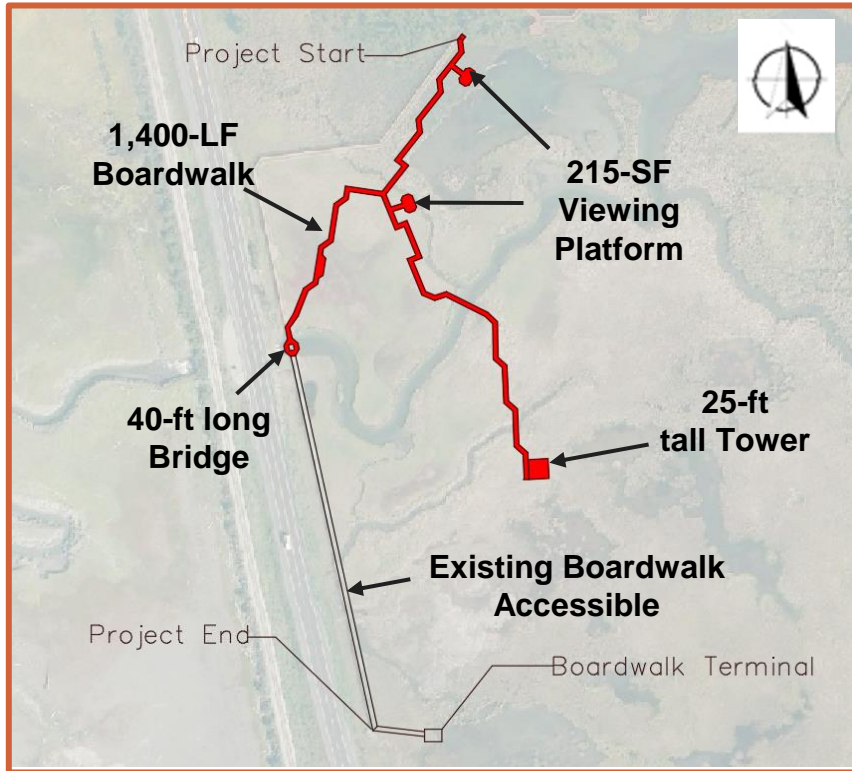


COST MODULES

Boardwalk	Viewing Platform	Bridge	Tower
\$205/SF	\$51,600	\$96,300	\$130,000



PHASE 1



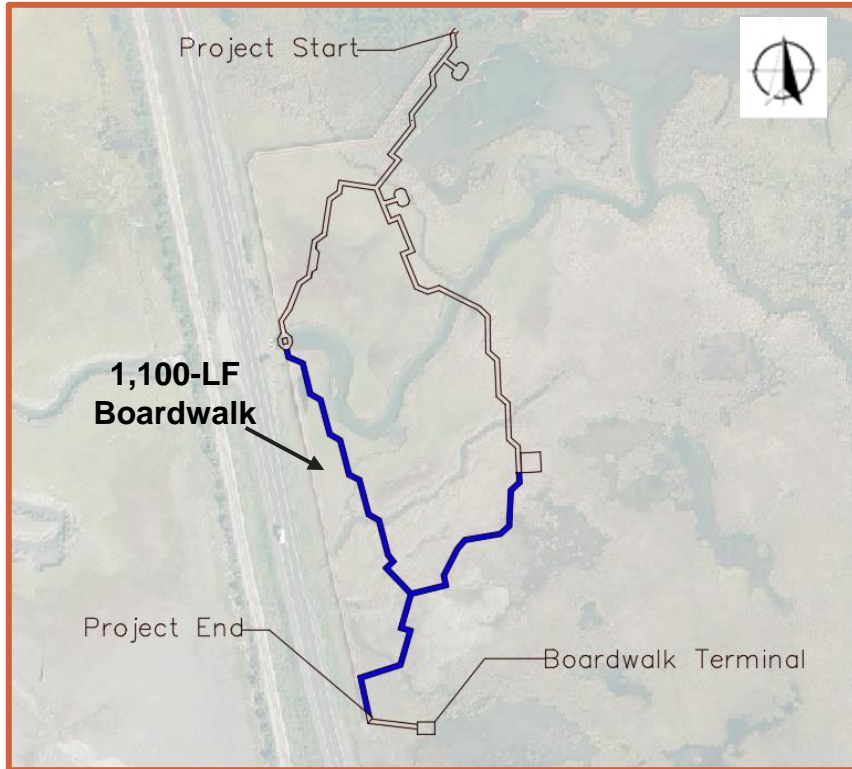
Modules

- 1,400 LF of boardwalk
- 2 Viewing Platforms
- Viewing Bridge
- 1985 Boardwalk Accessible

Cost:

- Total: \$4.00 mil

PHASE 2



Modules added:

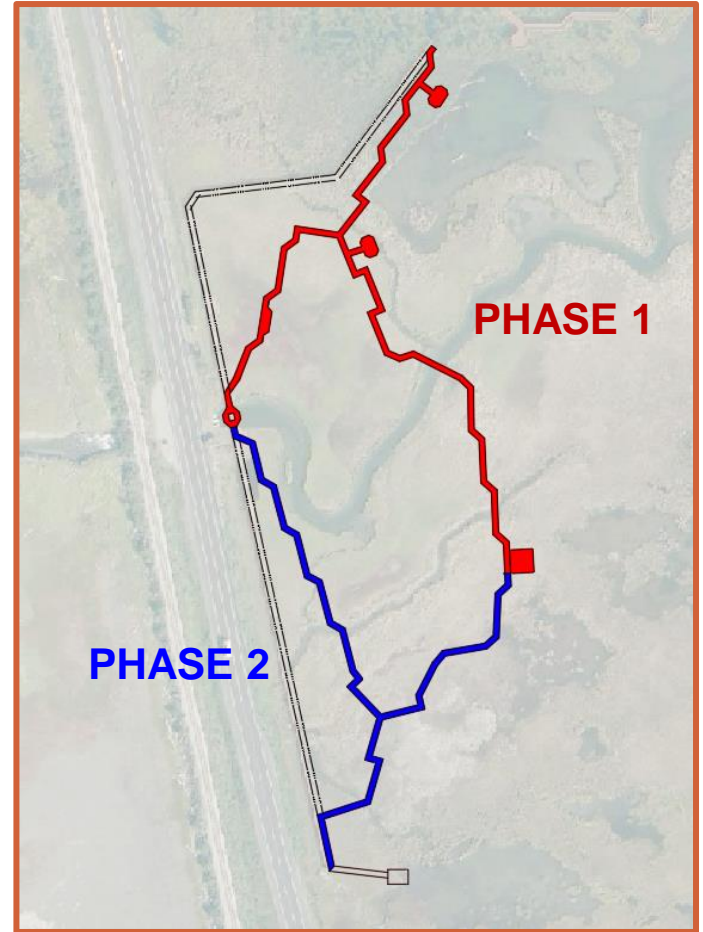
- 1,100 LF of boardwalk

Cost:

- Total Cost: \$2.8 Mil

PHASING COST SUMMARY

PHASE 1	PHASE 2
\$4.0 Mil	\$2.8 Mil



RECAP

- Scope of Work
- Four Alternatives
- Alternative IV is preferred
- Small Hydrologic and Environmental Impact
- Modular Components
- Phasing





THANK YOU!

Any Questions?

Our Location: 2900 Spirit Dr, Anchorage, AK 99508

Availability: Mon-Fri 9am-5pm

Zoom: 409365502

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CREDITS

Photos:

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Google Earth

FEMA

Anchorage.net

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Hailey Swirbul

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Dr. Scott Hamel, PE, PhD

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Caleb Shoulders and Ethan Hunstiger

