RE:BEACH

Oceanside's Novel Sand Retention Pilot Project

→ California Shore & Beach Preservation Association
May 11, 2026

CITY OF OCEANSIDE

RE:BEACH

Oceanside, CA

A classic Southern California beach town, located between San Diego and Los Angeles

- Founded in 1888
- Population ~175,000 → 3rd largest city in San Diego County
- 42 sq. miles | 3.75 miles of beaches
- Iconic coastal landmarks: 1,942-ft wooden pier & harbor village

- World-class surf — official USA Surfing training site
- 5 million unique beach visitors annually
- Major regional transit hub
- Home to Caity Simmers, first CA surfing world champ (WCT) in 34 years

Oceanside Beach Conditions

Credit and Thanks to Save Oceanside Sand (SOS)

RE:BEACH Background

Beach Sand Feasibility Study (2020 – 2021)

Preliminary Engineering Evaluation Recommendations:

- **Beach nourishment program**
- **Sand retention**

Sand Nourishment and Retention Pilot Project
RE:BEACH (2023-2027)

- Community and Stakeholder Engagement
  - Design Competition (2023)
  - Siting Study (2024)
- Offshore Investigation (2024)
- Baseline Monitoring (2025 – 2027)
- Engineering, Analysis and Design (2024-2026)
- Environmental Compliance and Permitting (2025-2027)
- Fundraising (2024-2027)
- Construction – Anticipated as early as 2027/2028

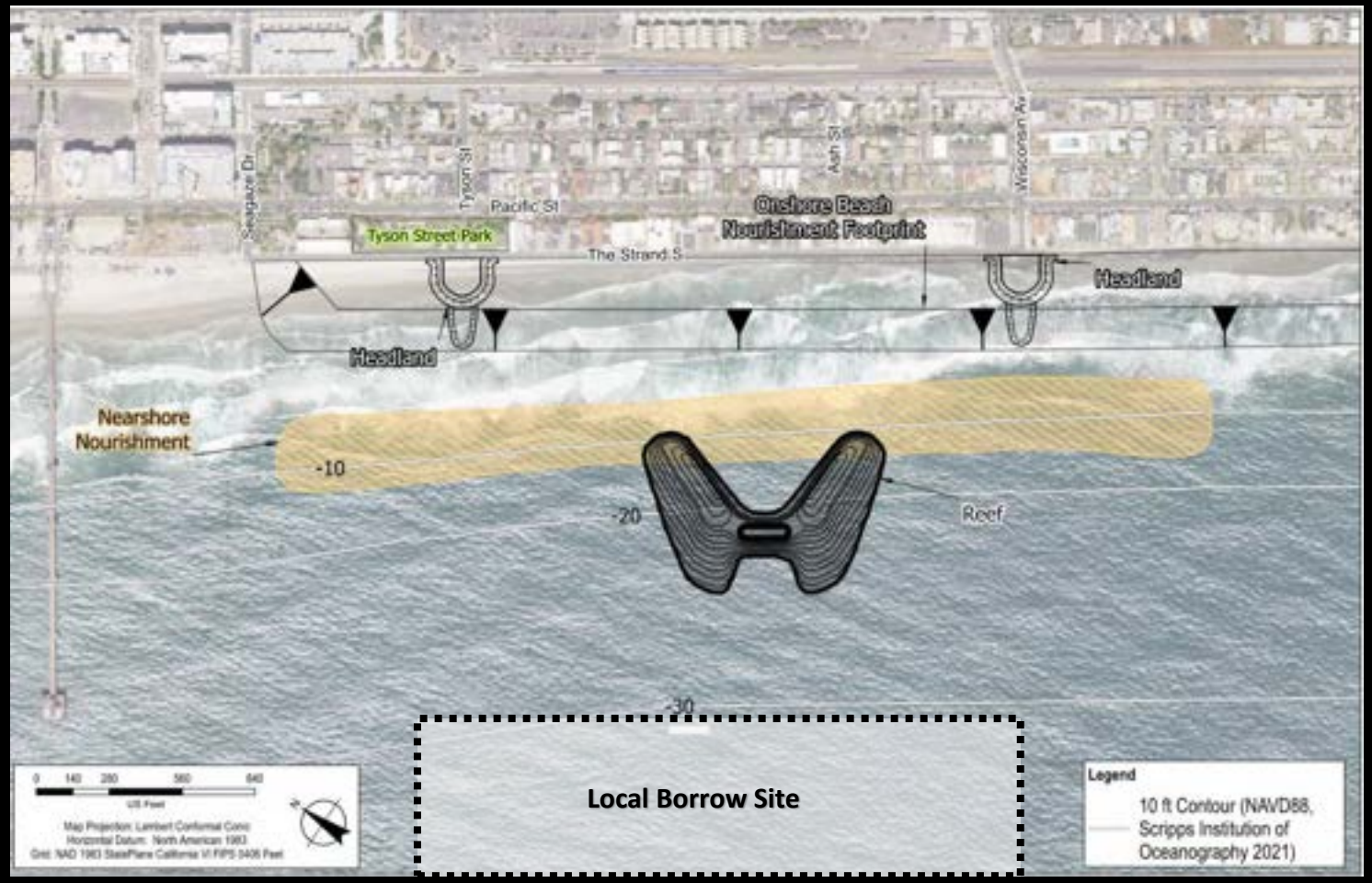
RE:BEACH OCEANSIDE OBJECTIVES

- **Main Objectives**
  - Buffer the coastline with sand
  - Extend sand nourishment efforts

- **Design Competition – WHY?**
  - Encourage innovative sand retention
  - Early regulatory involvement
  - Promotes public outreach
  - Transparency in decision making
  - Stimulates interest
  - Promotes international and nationwide coverage
  - Showcase solutions for others

RE:BEACH Pilot Project Goals

- Restore sandy beaches in Oceanside with an innovative, multi-benefit project
- Increase efficiency and extend the benefits of sand management efforts

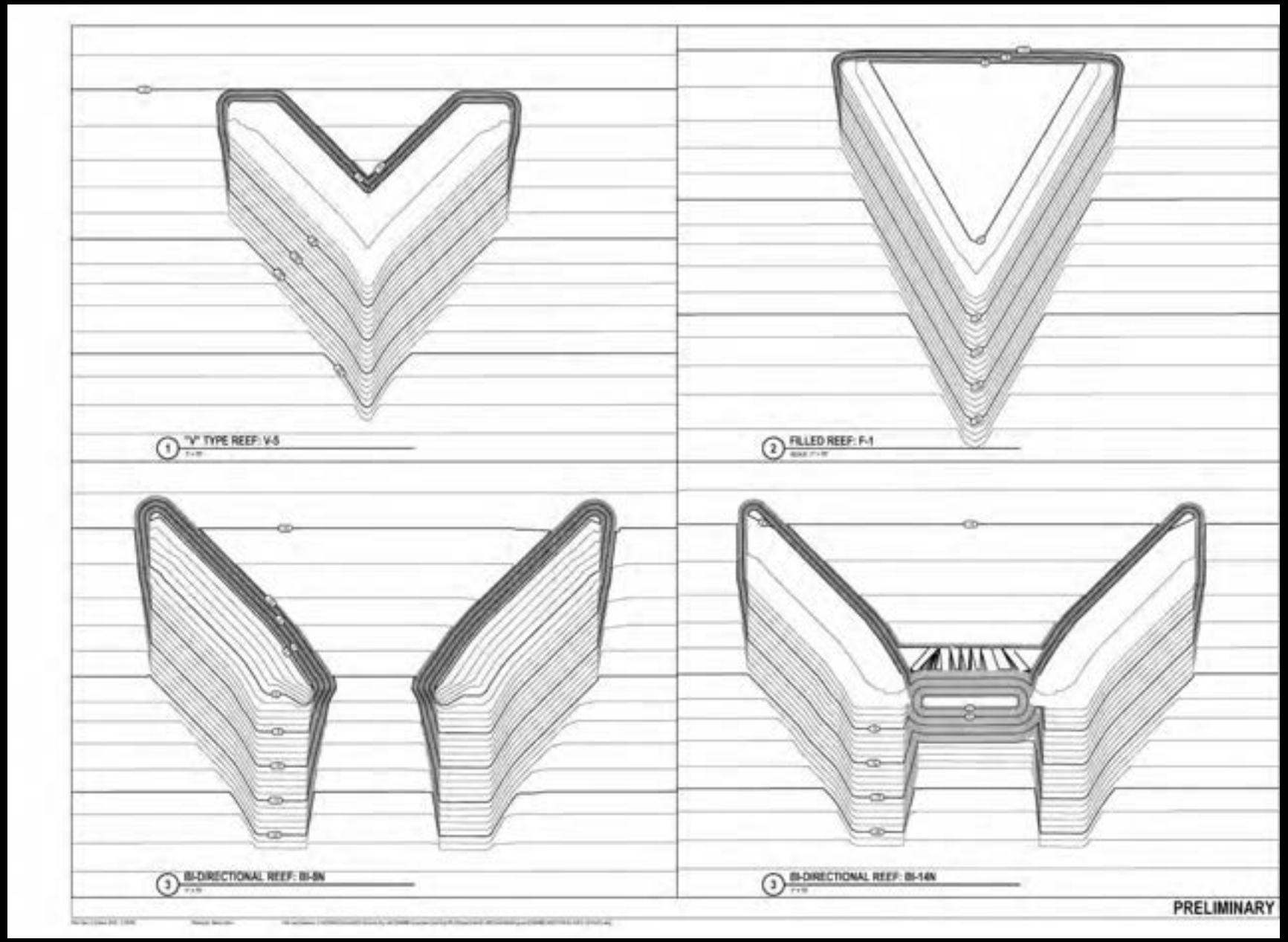


Pilot Project Elements

- Bidirectional artificial reef
- Two headlands
- Onshore and nearshore nourishment
- Local borrow site

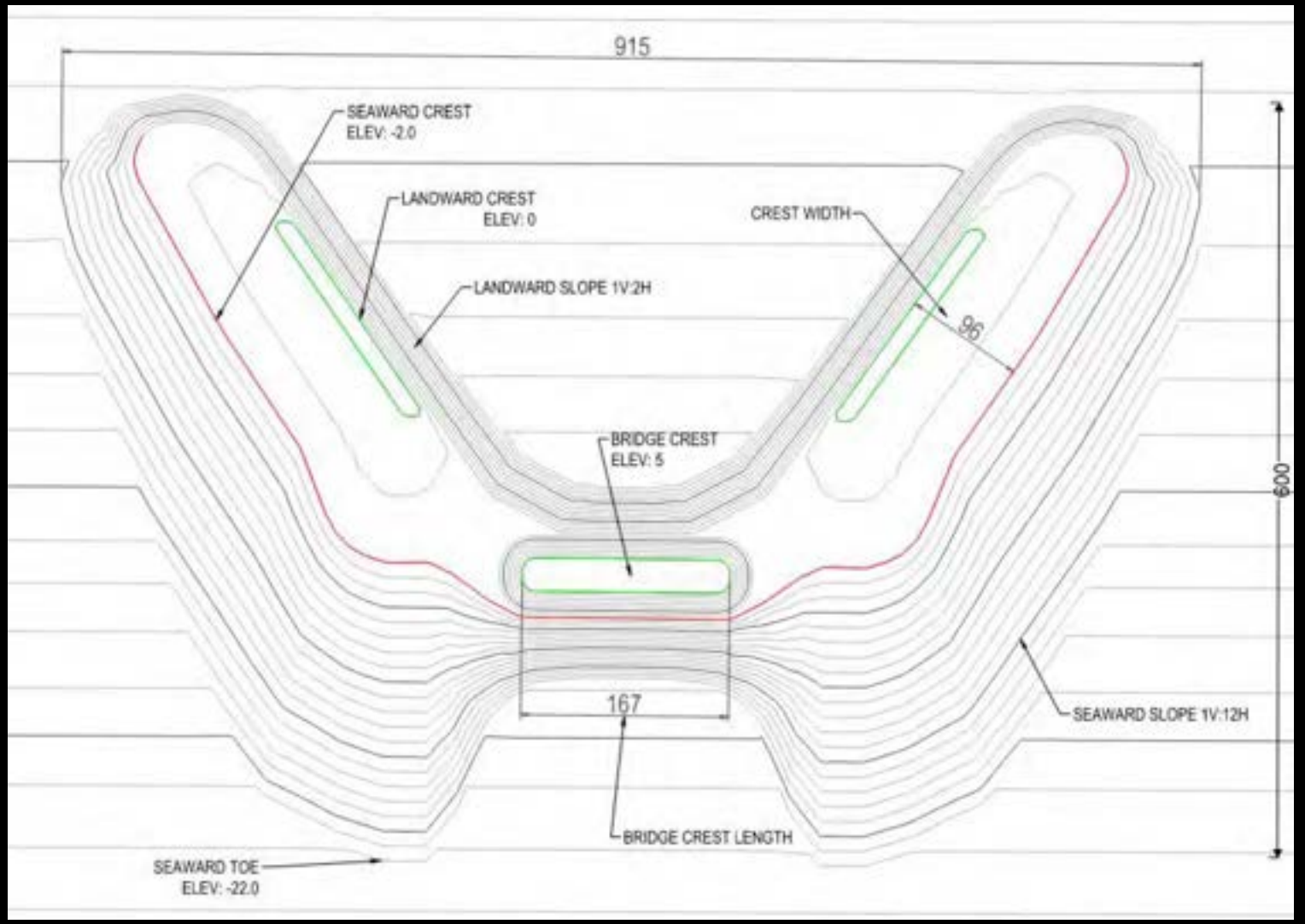
Artificial Reef Modeling

- Explored variety of shapes based on global case studies and literature
- >40 reef designs have been modeled in Oceanside
- 2 water levels, 5 wave conditions, 800+ simulations
- Measuring alongshore influence and wave energy transmission

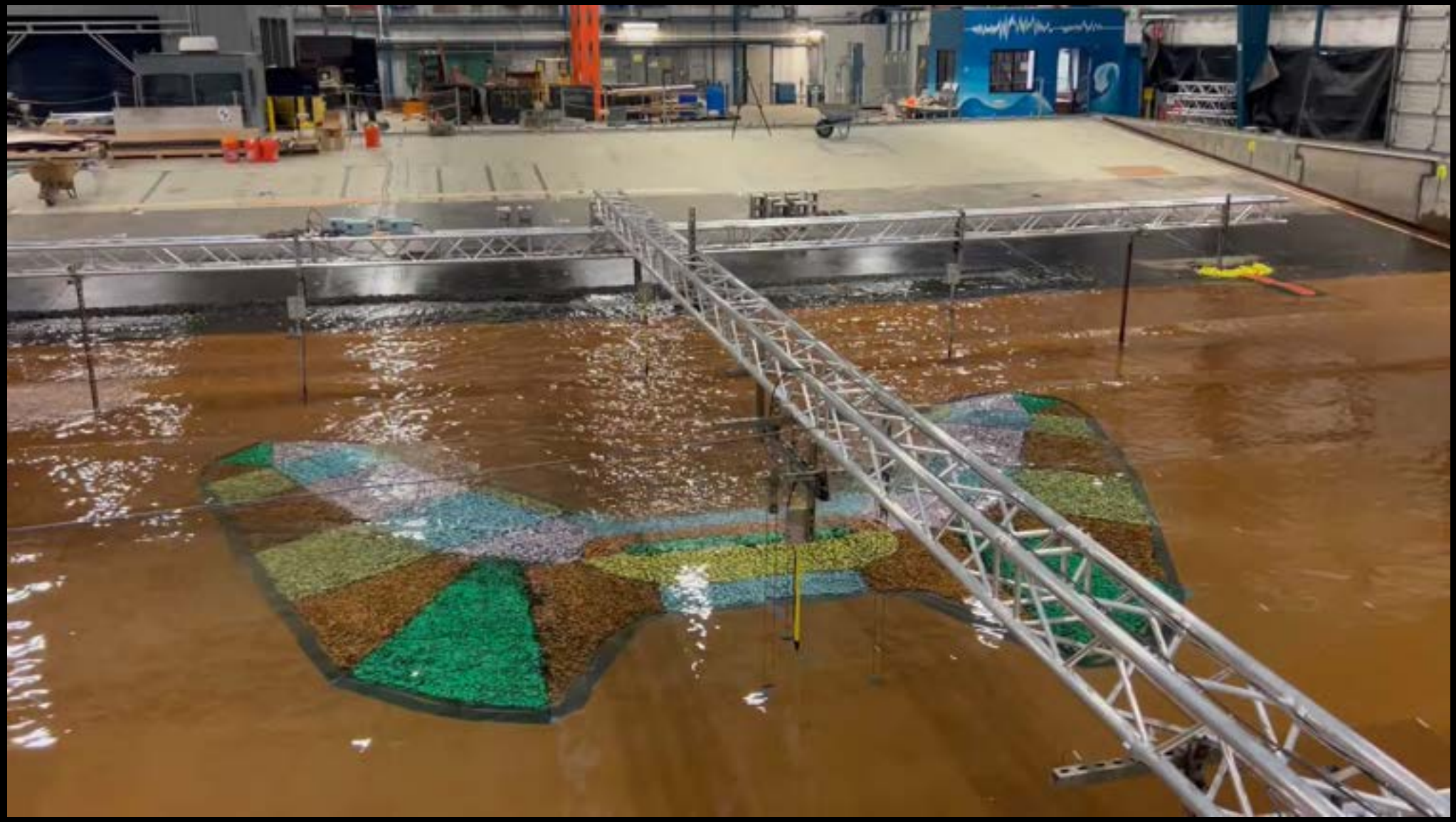


Artificial Reef – Parent Reef Design

- Dozens of reef designs and hundreds of simulations resulted in ‘parent reef’ moving forward to morphological and physical modeling
- Additional modifications of parent reef will be explored in upcoming modeling to be finalized in early 2026



Physical Modeling – Artificial Reef testing



Physical Modeling – Artificial Reef testing

Why Physical Modeling

Closest Tool to Reality

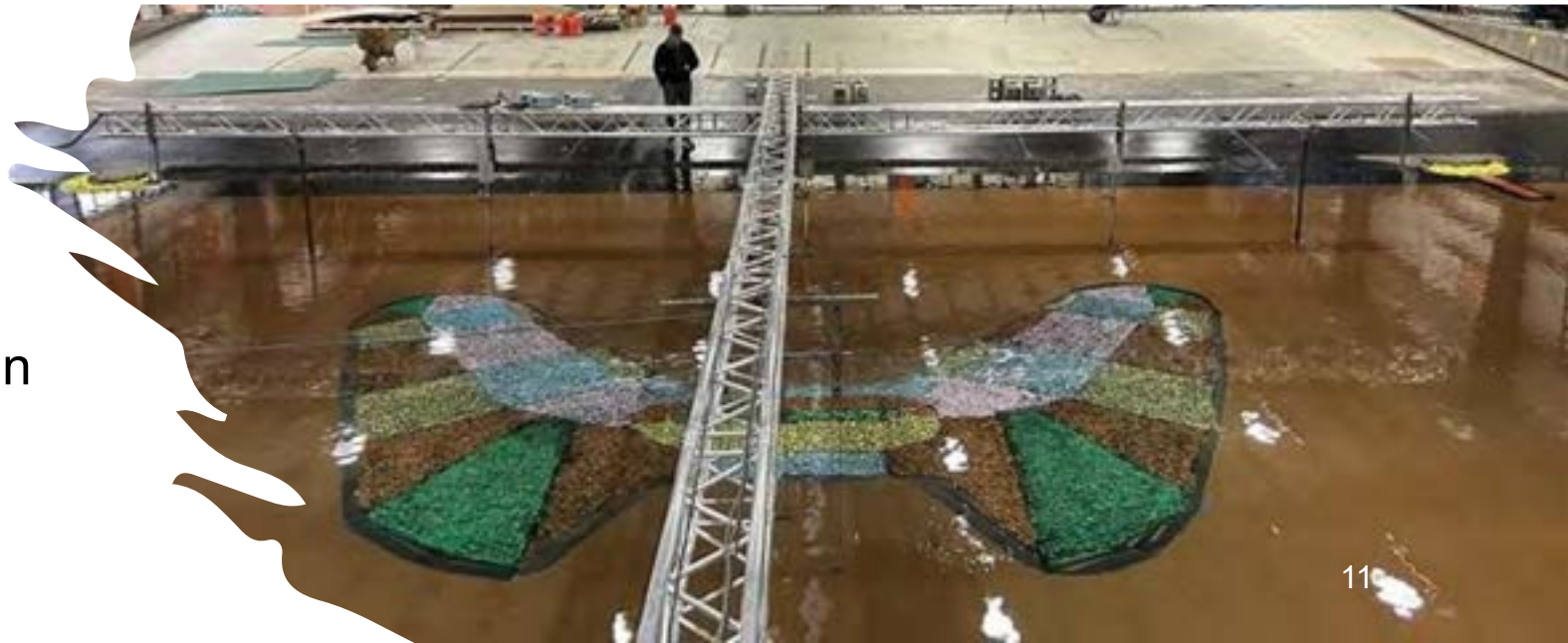
- Utilize most technical tools to create best design.

Evaluation of Performance Metrics

- All key parameters can be assessed in the physical model.

Novel Strategy

- As an innovative concept, a physical model builds confidence that the design can be constructed and meet project goals.



Goals of RE:BEACH Physical Model

Test 1: Wave Transmission Testing

–Assess trade-offs in reef performance due to changing bridge crest height

–Observe dynamics occurring around reef: current velocities, wave breaking, wave transmission

Test 2: Materials Testing

–Find stable rock sizing under extreme conditions

–Measure rock movement under progressive loading

Test 3: Evaluate Sand Transport Patterns

–Place material in basin and observe moveable bed trends and potential sand movement

Test 4: Value Engineering

–Measure performance with reduced crest width on arms

Test 5: Surfability

–Assess trade-offs in wave breaking from modified arm angle and shoulder geometry

Headlands and Strand Integration

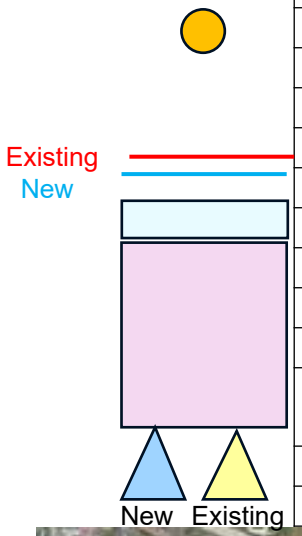
Artificial Headland

Multiple Benefits

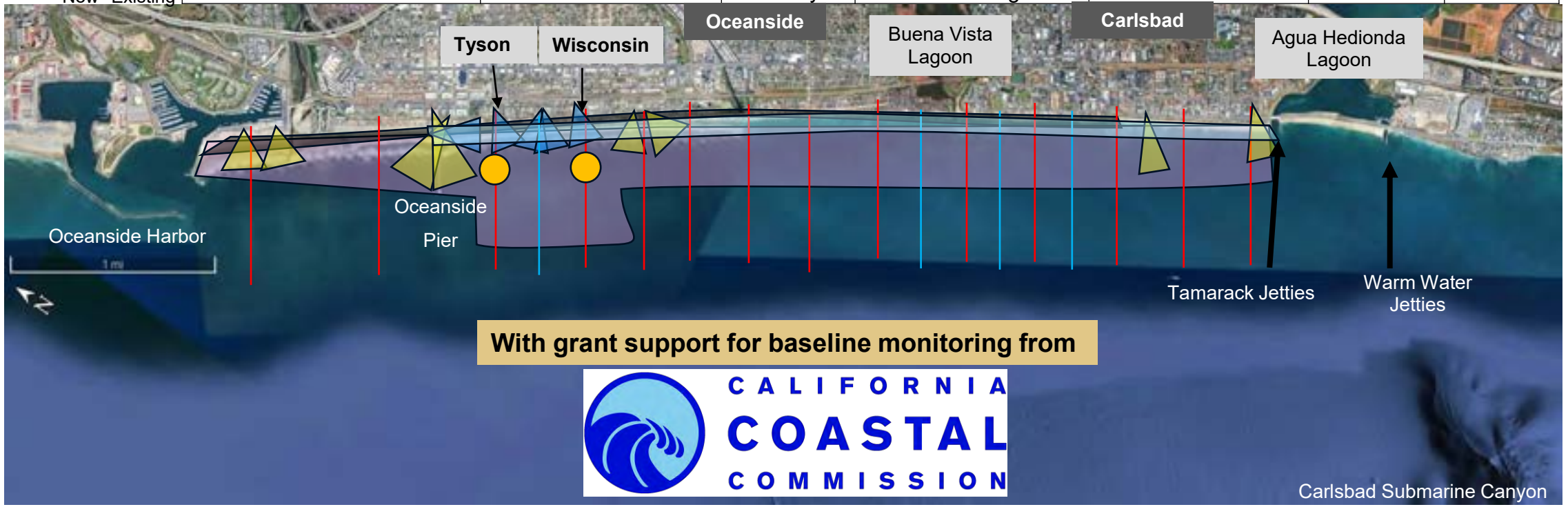
Improved beach amenities and accessibility:

- Dry sand/back beach retention
- Marine safety tower
- At grade access, Mobi-mat
- Bike racks
- Surf racks
- Stepped seating and coastal viewing space
- Signage and local art

Baseline Monitoring



	Technique	Frequency	Range	Coverage	Start	End
Currents						
	ADCP	Hourly	Water Column	Tyson & Wisconsin	2025	2027
Shoreline Profiles						
SOS - Community Science	RTK	Monthly	Subaerial	~Harbor - Oak	2020	2027
SANDAG Transects	RTK/Laser Level	Biannually	Subaerial to DOC	Harbor - Tamarack	1997	2027
Ortho	Drone	Quarterly	Subaerial	Pier - Tamarack	2025	2027
Bathymetry						
	Sidescan	Quarterly	Subtidal	Harbor - Tamarack	2025	2027
Biological						
	Sidescan with grab samples and divers	Biannually	Subtidal	Harbor - Tamarack	2025	2027
Surf						
Surfline	Camera	Hourly	Wave Breaking Field	Harbor - Tamarack	2023	2027



With grant support for baseline monitoring from

CALIFORNIA COASTAL COMMISSION

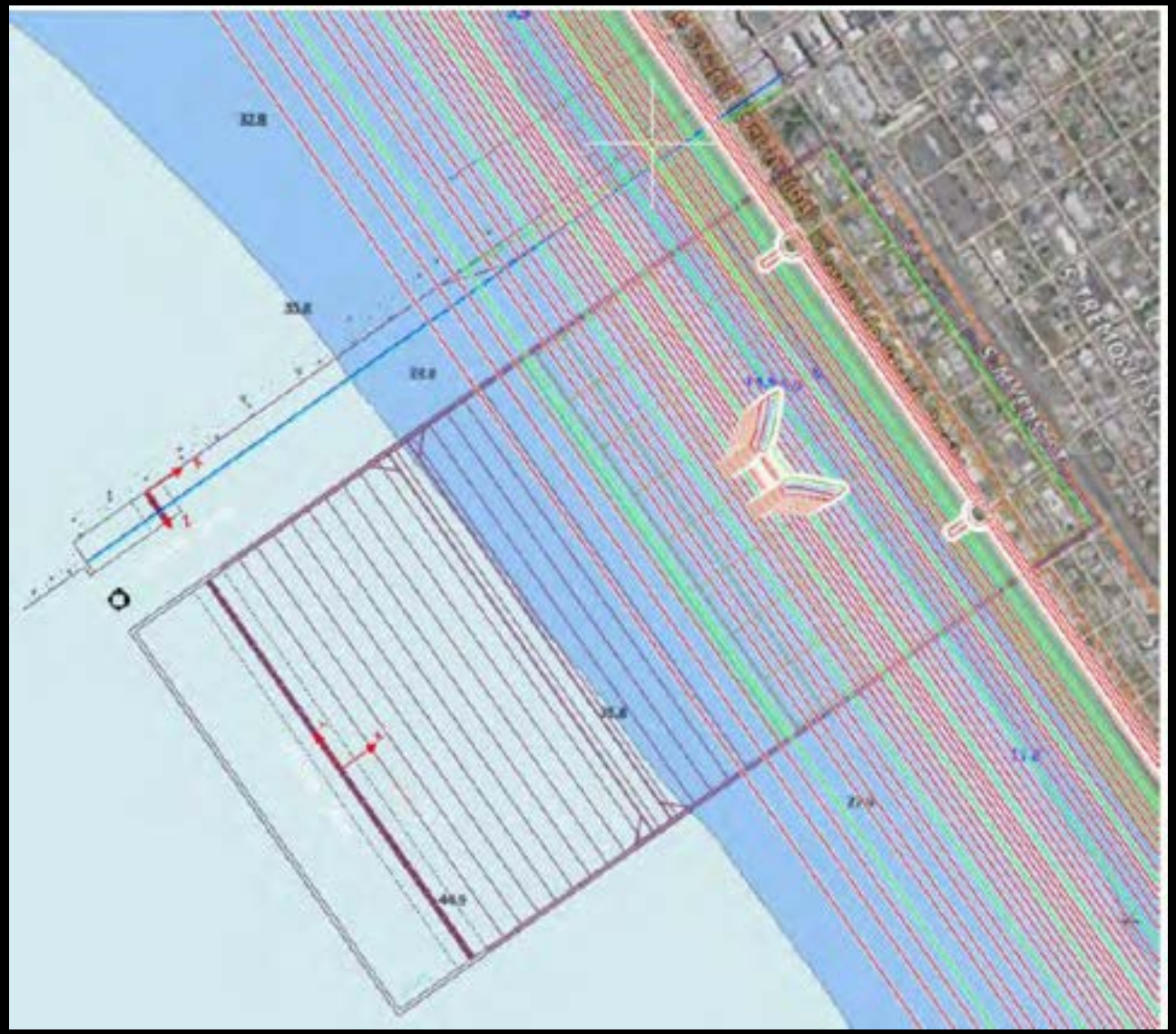
Adaptive Management Program

Baseline Monitoring and Adaptive Project Elements

- Baseline monitoring program is extensive
  - Tracks currents, beach width, habitat, surf, beach and ocean use
- Pilot project, first-of-its-kind
  - Comparison of project before and after (well after)
  - Supports regional sand management strategies and corroboration
- Adaptive triggers guide adjustments
  - Change in beach width = add sand though sand nourishment program or SCOUP

Elements of Project In Progress

- **Fundraising** ★
- Physical and Morphological Modeling
- Adaptive Management Plan
- CEQA and NEPA
- Continued Outreach and Engagement
- Baseline Monitoring
- Permitting



Physical modeling schematic

Thank you! What questions do you have?