ICCE 2018
36TH INTERNATIONAL CONFERENCE ON COASTAL ENGINEERING 2018
Baltimore, Maryland | July 30 – August 3, 2018
The State of the Art and Science of Coastal Engineering

Albany Beach Shoreline Stabilization and Beach/Dune Nourishment

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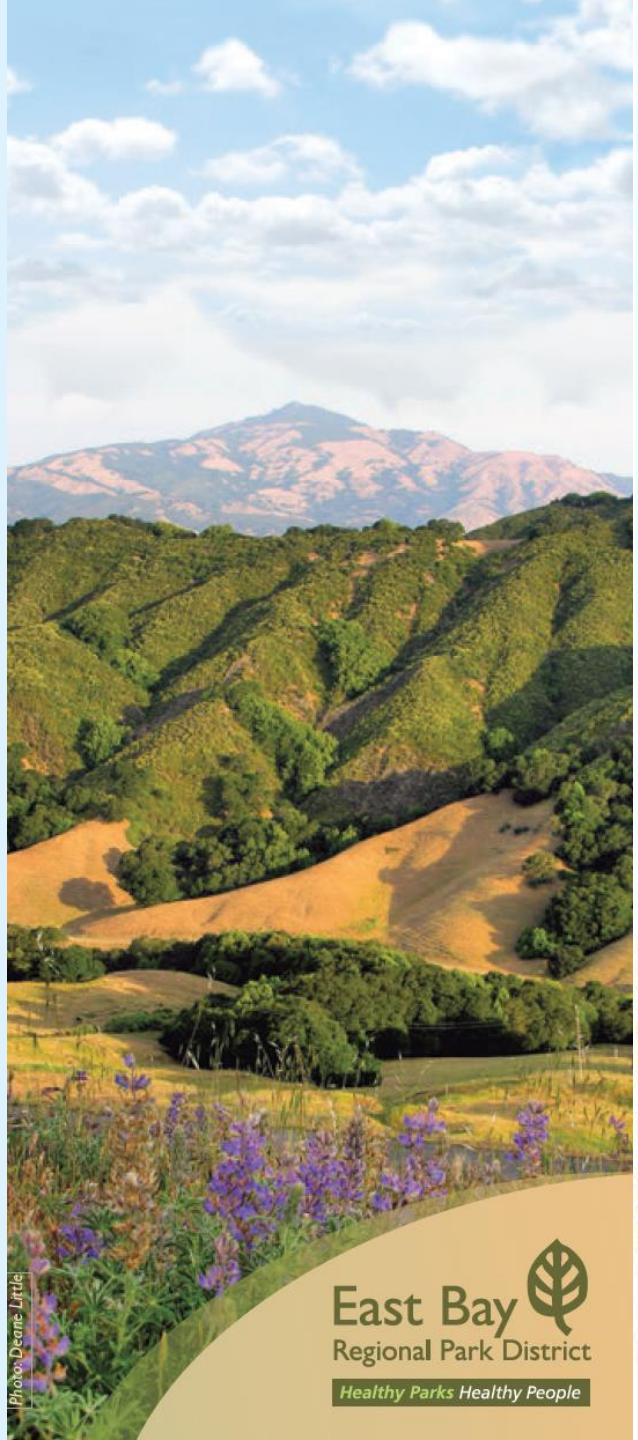
East Bay Regional Park District

- California 2-County Special District Established in 1934
- 130,000 Acres Parks/Open Space, 55 Miles of Shoreline
- 25 Million Visits Annually
- Parks have grown to preserve the best natural areas for current and future generations.
  - +2 Million New Residents since 1934
  - +700,000 by 2050



Albany Beach Restoration and Public Access Project

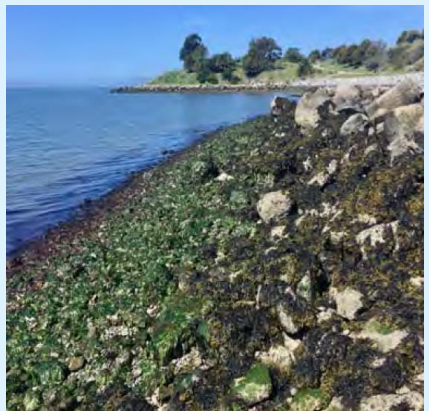
Phase 1 ($3.3M) [COMPLETE 2016]

- Landfill repair
- Accessible shoreline trail
- Subtidal restoration and enhancement

Phase 2 ($13.4M) [IN PROGRESS]

- Beach and dune restoration
- Prolong life of beach
- Accommodate multiple recreation uses
- Close a 1-Mile Bay Trail gap

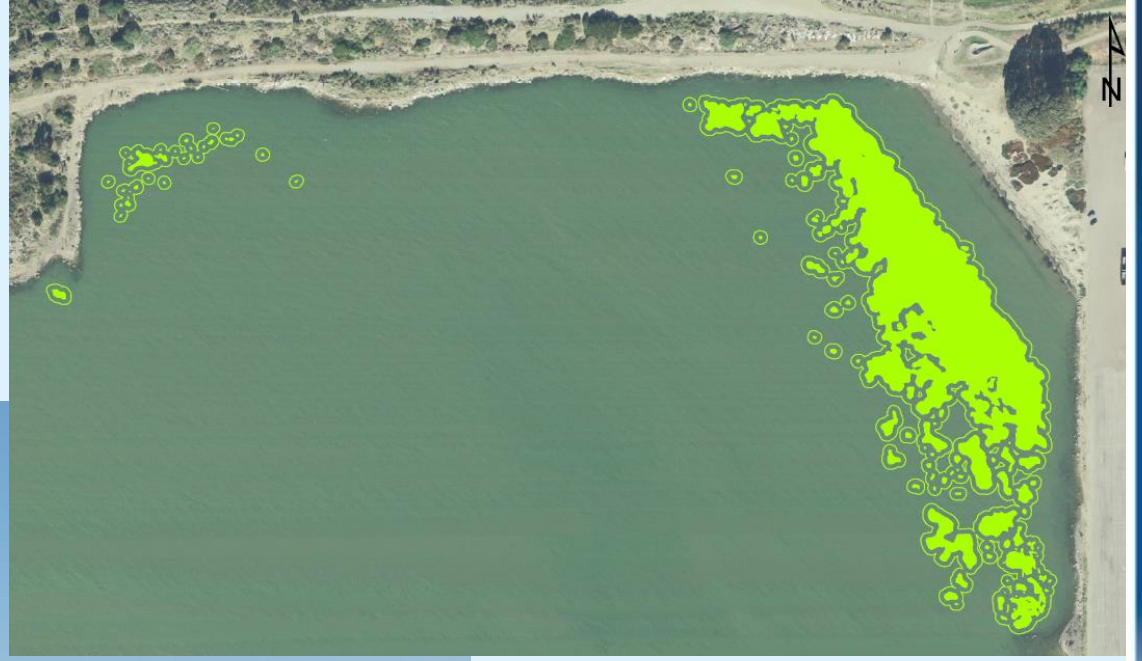
Reasons For Building Habitat Into Shoreline Protection



1. **Agency Mission and Goals**
   - Environmental Stewardship
   - Climate Change Resiliency
2. **Implement Regional Plans**
   - SF Bay Subtidal Habitat Goals Report
3. **Economies of Scale**
4. **Available Grant Funding**
   - San Francisco Bay Restoration Authority (Measure AA)
   - State and Federal Grants (climate change, water quality, sustainability, green infrastructure)

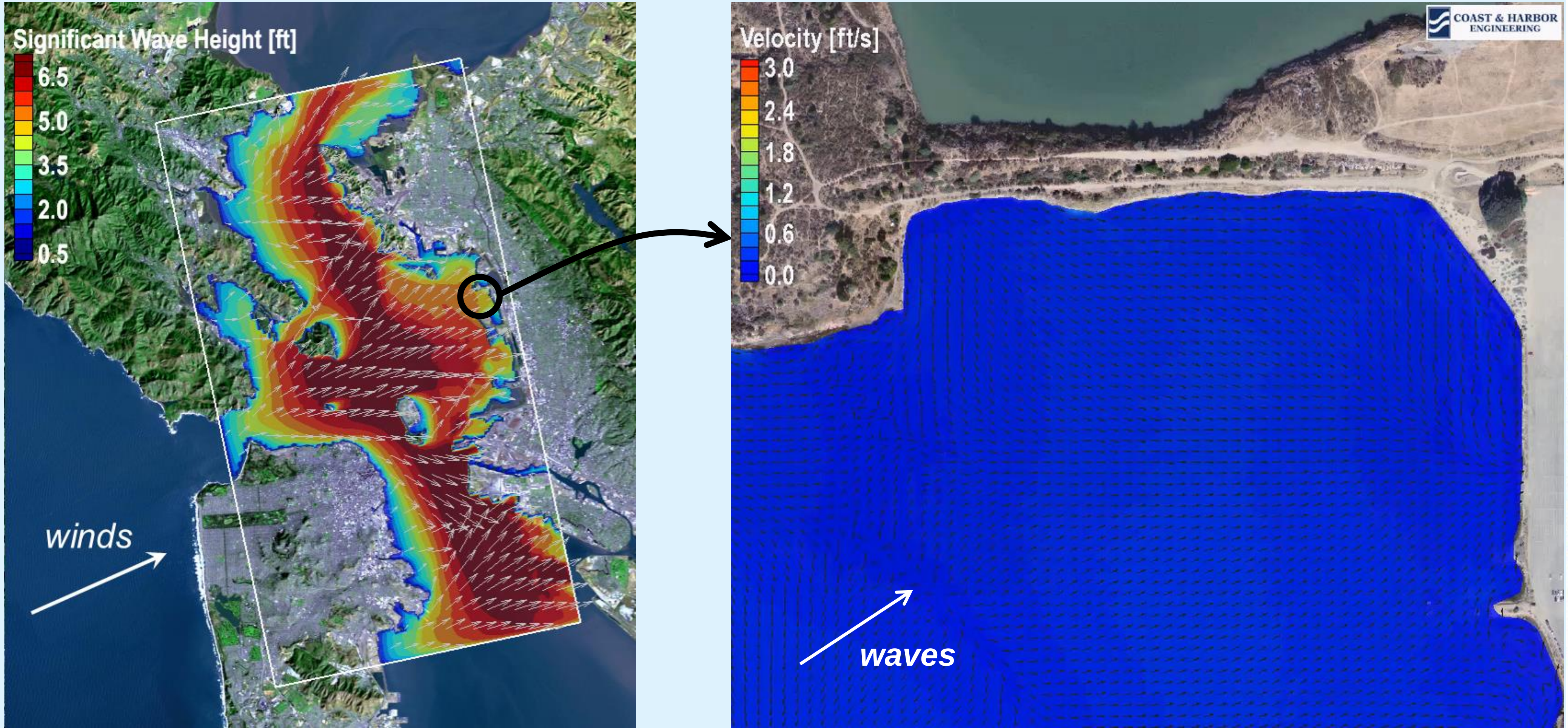
Site Conditions

- Eroding landfill/rubble shoreline
- Significant eelgrass habitat
- Relatively energetic conditions



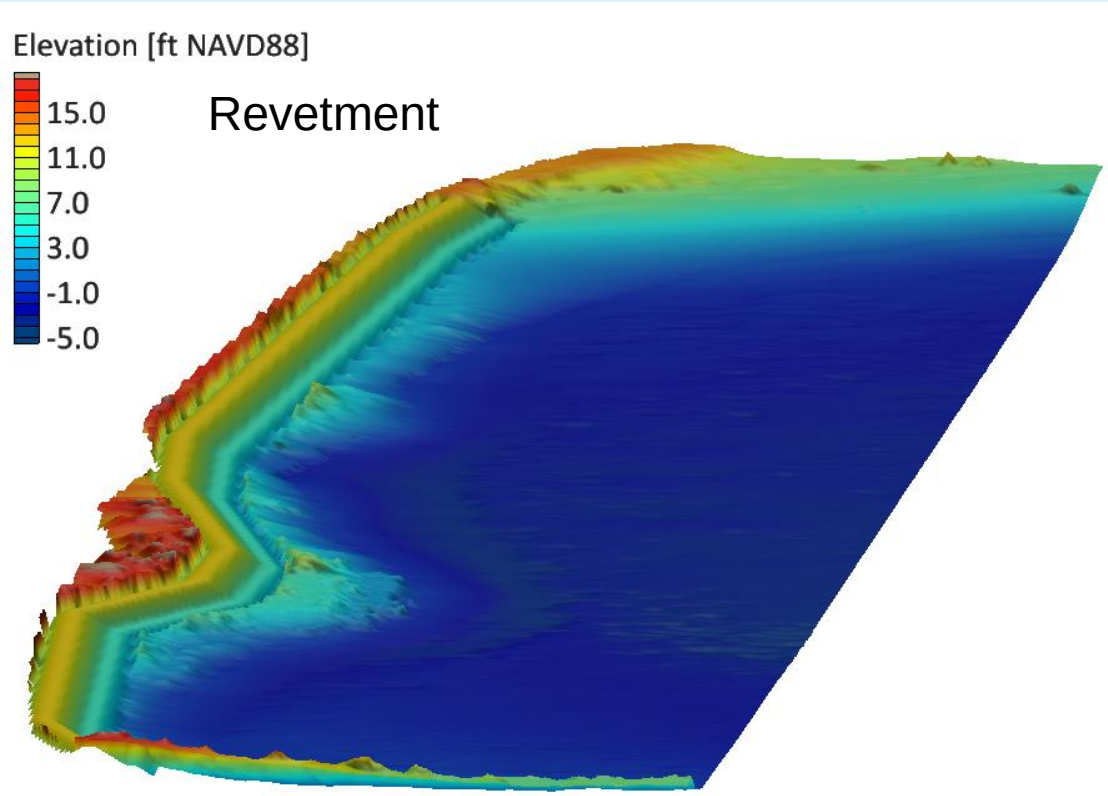
Coastal Engineering Analysis

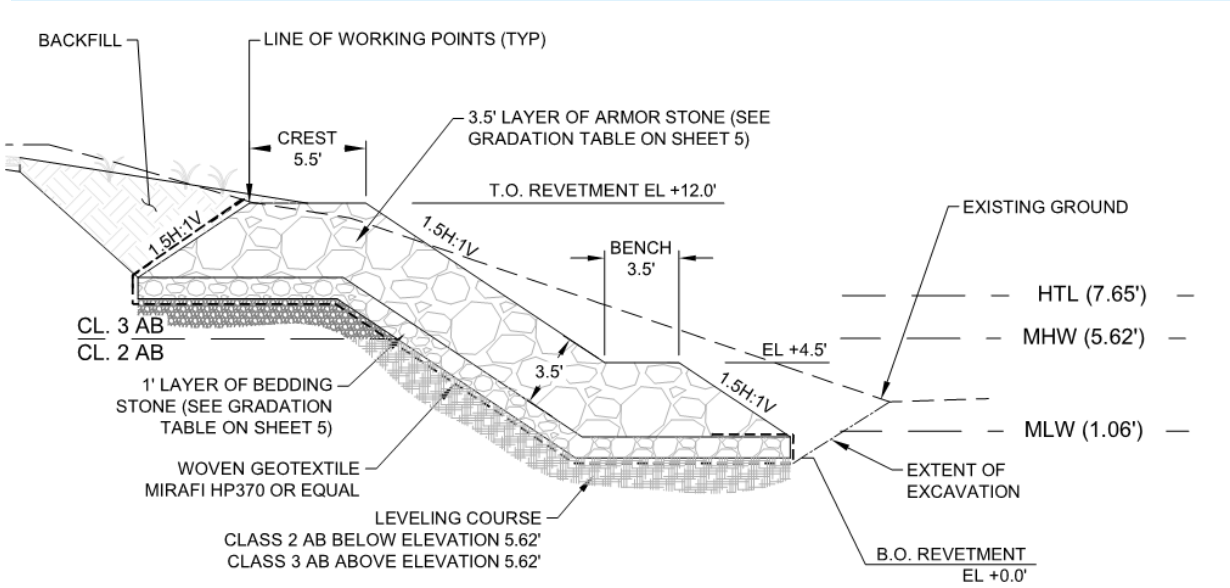
- Bay-wide wind-wave growth and transformation
- Local wave transformation, wave-generated currents, transport
- Analysis of design conditions, impacts



Shoreline Protection Design

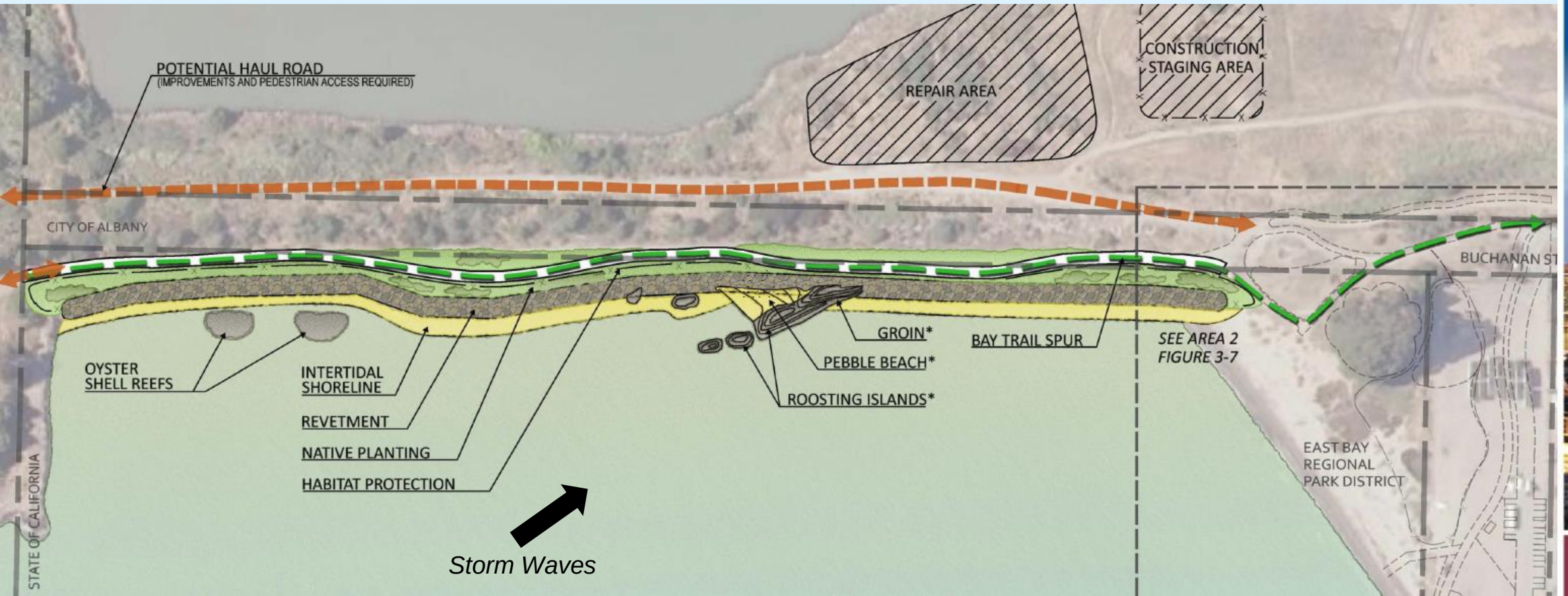
- Steep slope to minimize volumes/impacts
- Launched toe to manage scour
- High-resolution field data resulted in accurate volumes





Living Shoreline Elements

- Energetic wave conditions – mobile materials require containment
- “Hard living shoreline” elements developed
- Rock protection/formation for all features
- Oyster reef in more protected area, groin/islands and pebble beach in more exposed area



Phase 1 Constructed

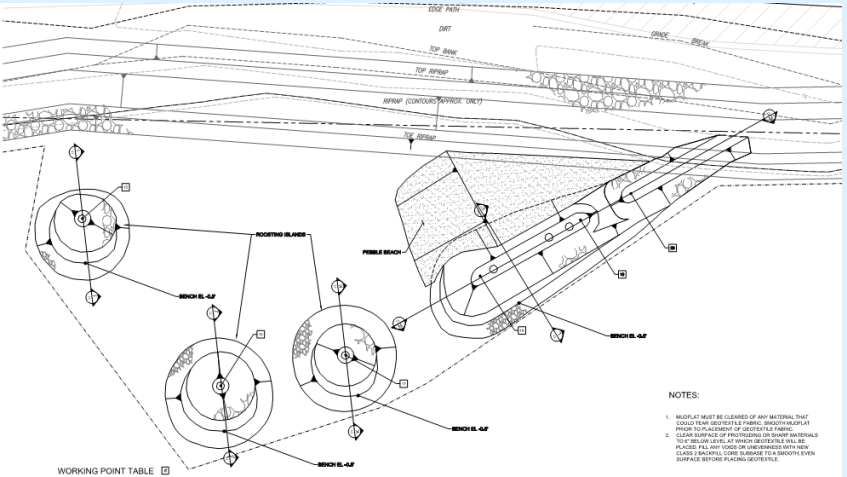
- Landfill erosion halted
- 12,000 tons of armor stone, 4,000 tons of bedding

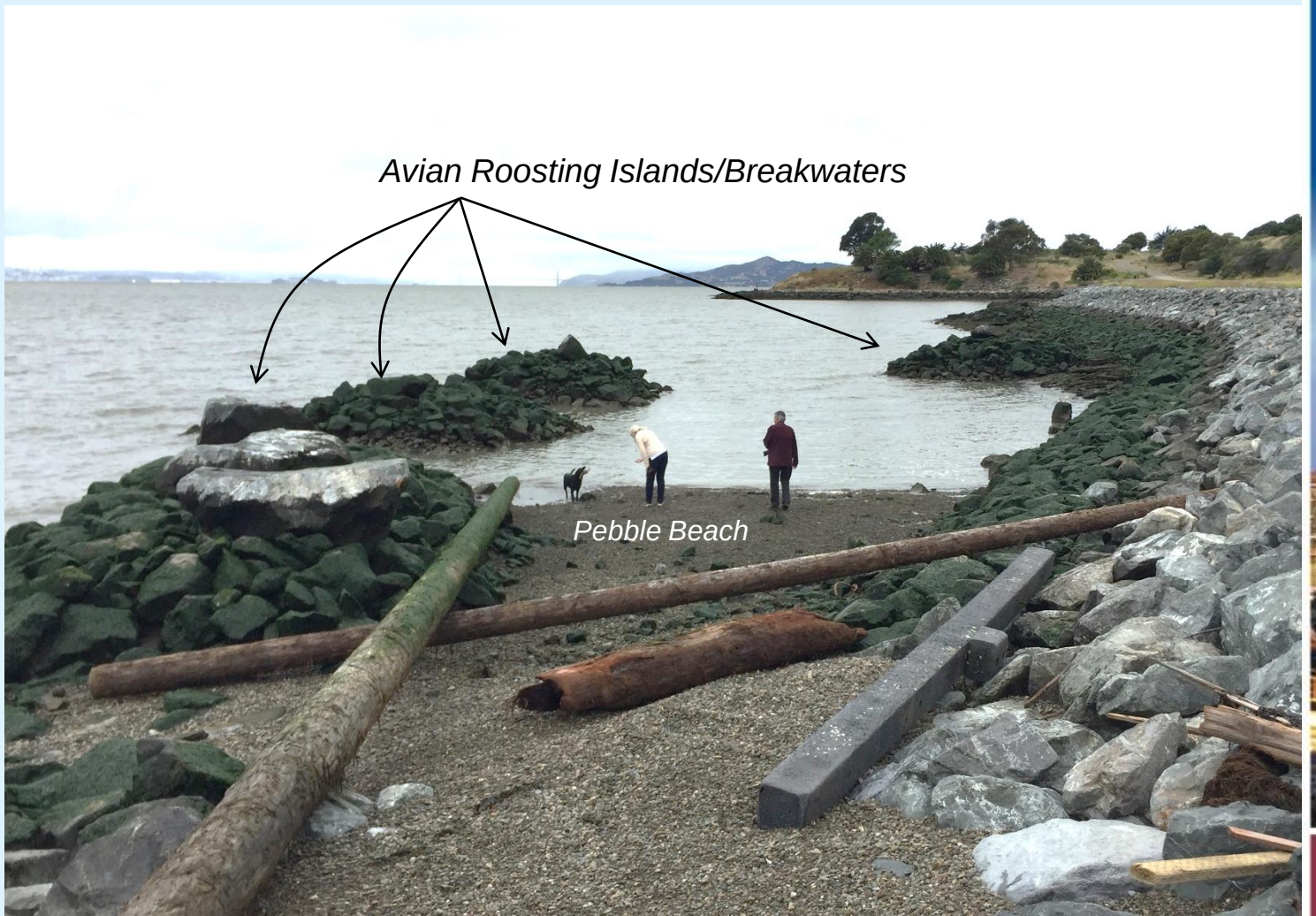
Phase 1 Constructed

- 1,800 feet of Bay Trail improved
- Trail constructed of durable, composite resin

Phase 1 Constructed

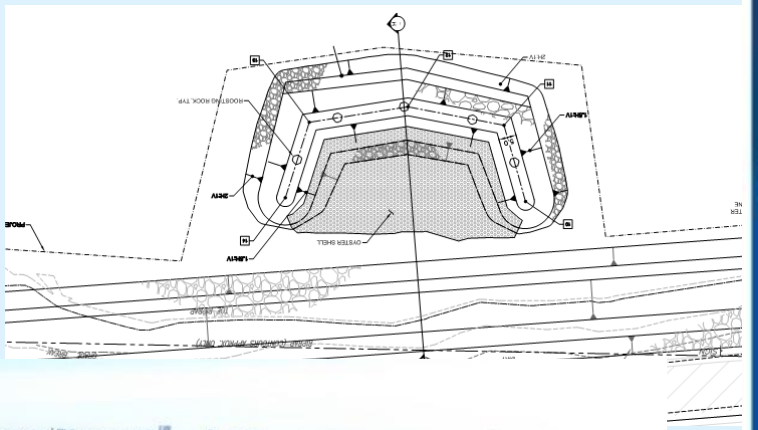
- Rocky intertidal habitat
- Rock groin for pebble beach retention
- Roosting islands as wave protection
- Public access in new area





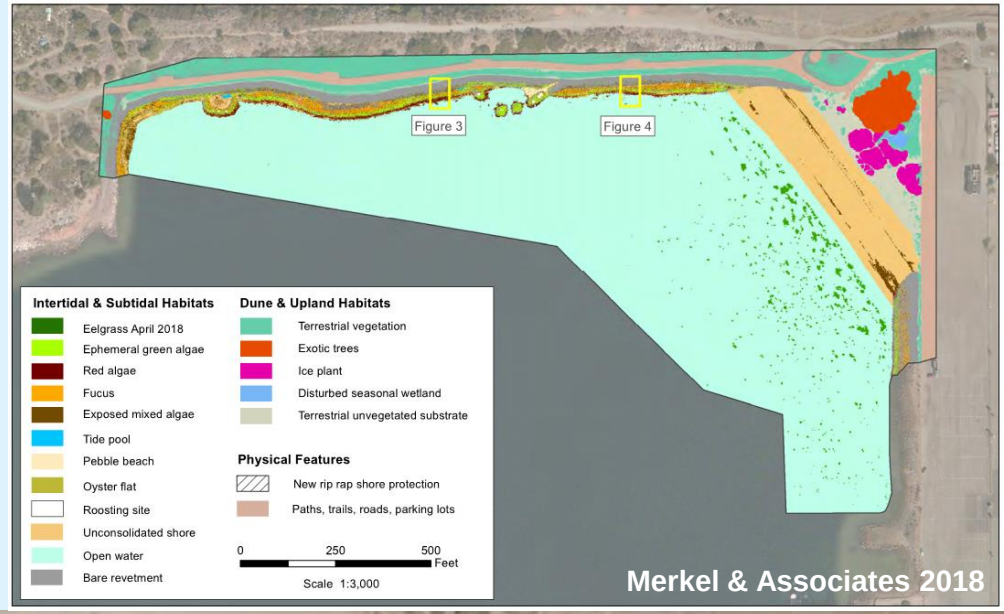
Phase 1 Constructed

- Rocky intertidal habitat
- Crescent oyster reef with oyster shell backfill
- Oyster colonization appears soon after construction



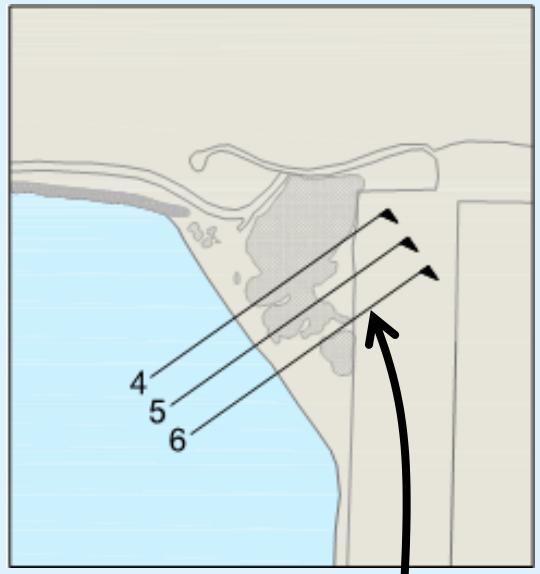
Phase 1 Monitoring (4 years later)

- Pebble beach stable
- Oyster reef stable
- Rocky habitat proves to be productive
- Eelgrass habitat increased
- Trail in good condition, low maintenance

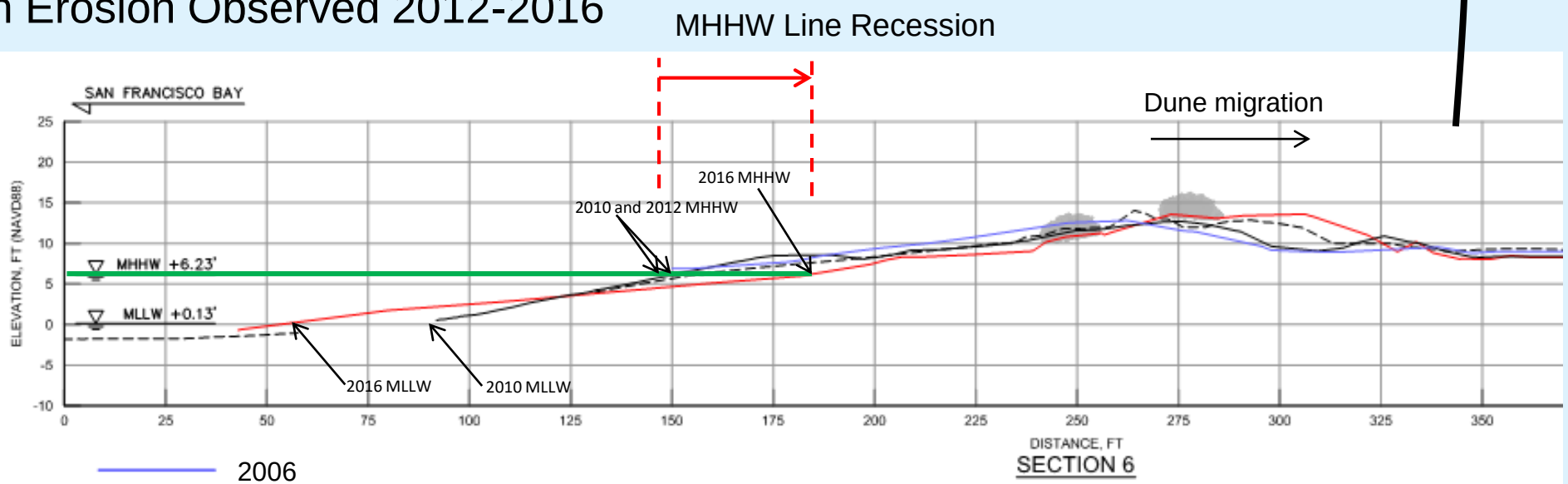


Phase 2 Goals

- Accommodate multiple recreational uses
- Close a gap in the Bay Trail
- Beach and dune enhancement
- Prolong life of beach



Beach Erosion Observed 2012-2016

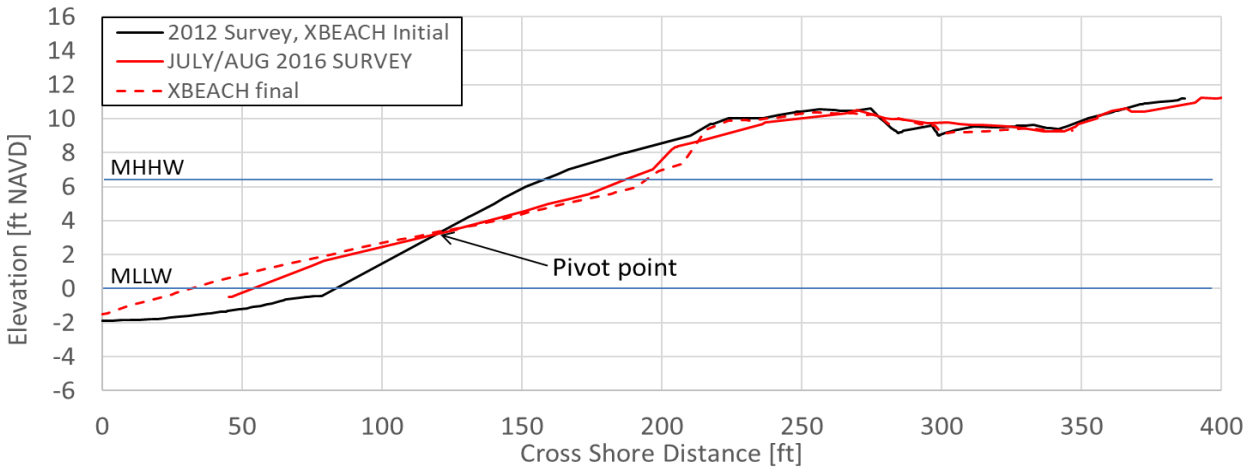


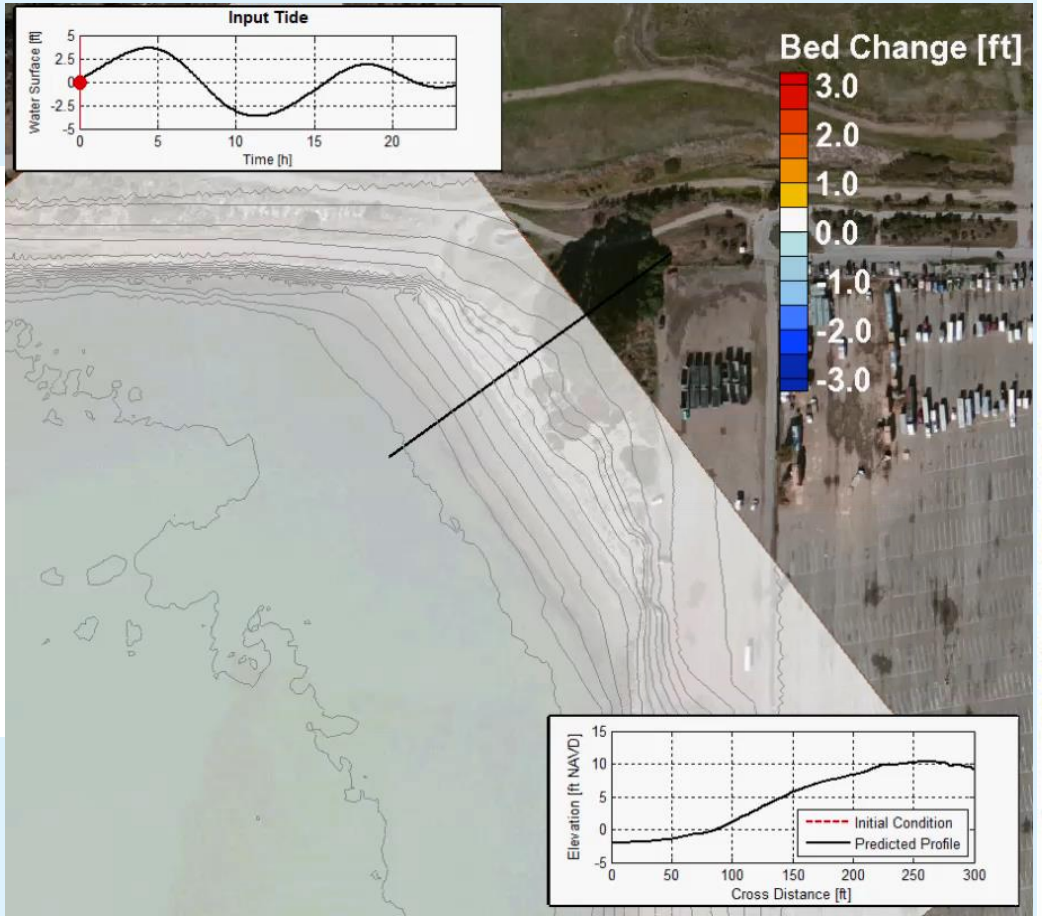
Intertidal beach slopes

- 2010 – 10H:1V
- 2012 – 15H:1V
- 2016 – 24H:1V

Phase 2 Analysis

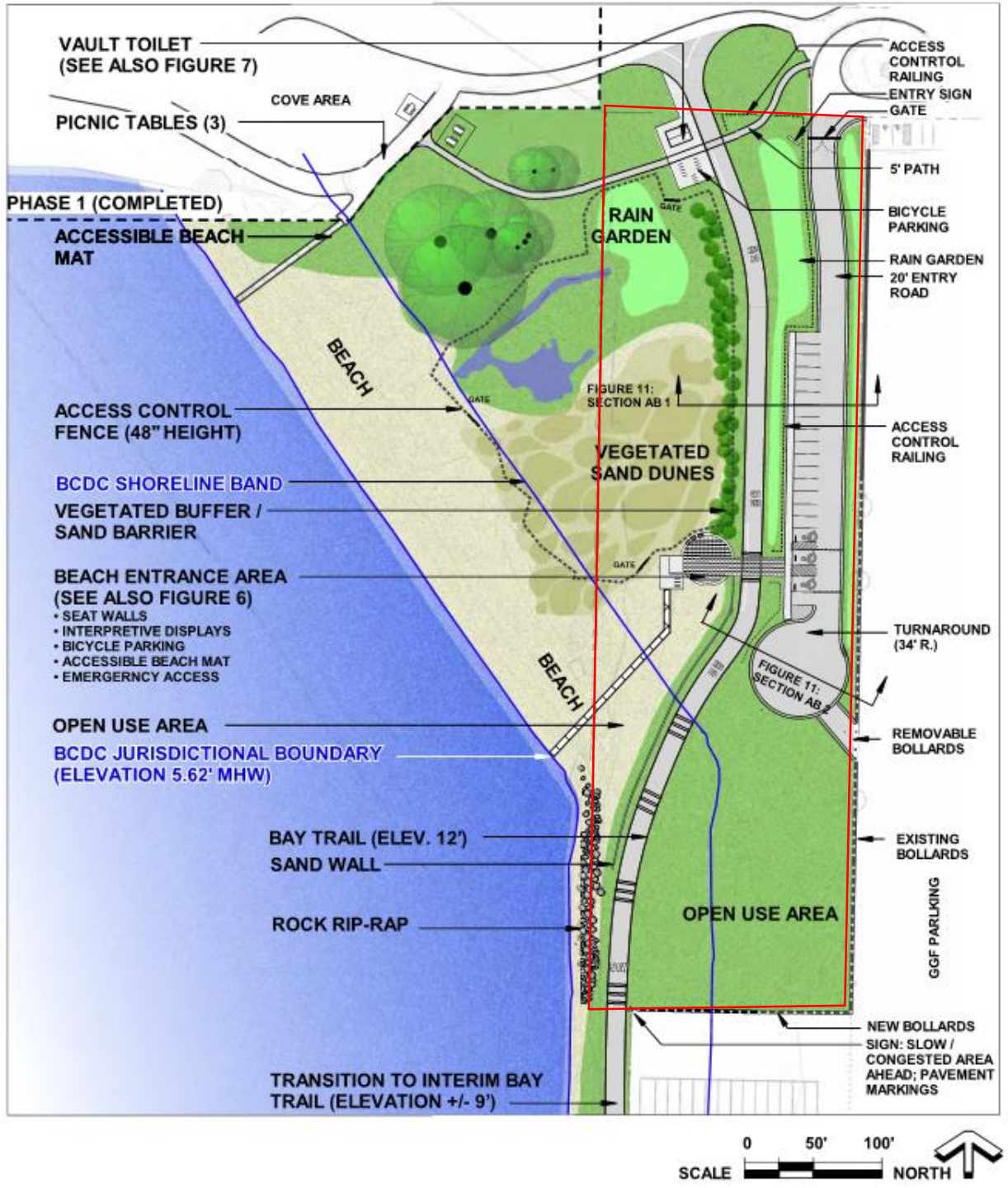
- Coastal analysis performed to determine need for nourishment
- Reproduce measured recession
- “No Action” shown to result in continuing recession
- Nourishment desired





Phase 2 Concept

- Replacement of native sand with coarser imported sand above MHHW
- Re-use of native sand in dune enhancement
- Invasive species removal, dune planting with native species
- Rock berm for protection against runup/overtopping
- Expanded wetlands
- Public access improvements.



Conclusions

- Phase 1 successfully addressed erosion
- Cost-effective, accurately bid design
- Stable living shoreline elements – “hard” elements still create significant habitat
- Significant public access and educational improvements, proved extremely popular
- Phase 2 to provide significant increase in beach stability, long-term access.
- Phase 2 construction underway.

Questions?

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