

# **Sand Nourishment & Retention Pilot Project**

A Coastal Resilience Design Competition

April 26, 2023

# Oceanside Sand Retention Design Competition

# Design Brief

The City of Oceanside (City) invites Design Teams to develop a sand retention pilot-project that builds coastal resilience along one of the most beloved and eroded coasts in California. On January 25, 2023, the City decided to move forward with a design competition process to generate innovative, multi-benefit solutions that solve a decades long problem of shoreline erosion. Each Design Team will work closely with a 'City Team' composed of representatives from key City planning and engineering divisions, as well as the 'Project Team,' led by GHD with Resilient Cities Catalyst, that will provide technical and resilience expertise and feedback through the process. A formal 'Jury'—composed of voting and non-voting members from the local, state, and federal agencies—and the local and regional community leaders and experts will also be part of the Design Competition process. Together, these groups provide expertise, guidance, and stewardship meant to validate, inform, and elevate the designs generated.

In responding to this Design Brief, teams are encouraged to partner with practitioners and firms, as needed, to approach the challenge of designing a sand retention pilot project in Oceanside that addresses coastal erosion. The most successful designs will also consider multiple benefits including habitat improvements, recreational and public use amenities, and coastal flood mitigation. When teaming, please consider that a great deal of coastal engineering has been done in Oceanside by multiple parties, and as part of Phase One of this Project. The Phase One feasibility study is included as supplemental material to this Design Brief), and the author of that study and project manager for Phase Two (this Project), GHD Inc., is available as a technical resource to all three finalist teams; to aid in the development of innovative solutions.

The Design Competition will take place over 8-months, planned for June 2023 – January 2024, culminating in the selection of a winning design by the Project Team and recommended by the Jury. The winning design will be presented to Oceanside's City Council for approval. Upon a passing vote, the winning design will move directly into final engineering and environmental compliance phases, with the GHD team. What sets this process apart from other, more traditional design competition processes, is its direct link to the engineering design and permitting phases for construction. The ultimate outcome of this process will be a shovel ready sand retention pilot project.

We are inviting a select list of design firms to respond by submitting a proposal which includes team Qualifications and Conceptual Approach (see below). The City Team, with input from the Project Team and Jury, will select 3-finalist teams to go through the Design Competition. Each finalist team will be provided with a stipend of \$25,000 USD for their work and engagement in the process. The City is actively fundraising to increase stipends for Design Teams to \$100,000 USD. Once selected, the teams will move through three rounds of design and feedback, including technical and resilience reviews, public workshops, design charrettes, and regional stakeholder briefings. The final designs submitted by selected teams will be evaluated based on their technical feasibility, financial viability, and environmental and social impacts (see criteria below). The winning team will be offered a contract (minimum \$100,000) with GHD to participate with and support the final engineering analysis, design, and permitting of the pilot project.

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## Project Background

The City of Oceanside (City) has a long and storied history of coastal erosion. Eighty years ago, the U.S. Army Corps of Engineers (USACE), constructed a Harbor complex that has directly and negatively impacted beaches in the City. The effect was described as an “erosional wave” whose effects were said to move down the Oceanside Littoral Cell, which spans from the Oceanside Harbor to La Jolla submarine canyon to the south.

Over the past 80 years (from the construction of the Harbor to present day), over 21M cubic yards (cy) of sand has been placed on City beaches to offset erosional impacts. Beach nourishment sand came from both the USACE’s annual harbor dredging program (13.5M cy) and one-off, local, or regional nourishment events (7.5M cy). This also includes a limited volume of sand from the USACE’s Experimental Sand Bypass System that was constructed in the 1980s in efforts to restore the natural transport pathway that was broken when the harbor was constructed. This project was unsuccessful due to a myriad of reasons and was decommissioned within a 5-year period.

The most recent, larger scale projects to take place in the City were two Regional Beach Sand Projects (RBSP) carried out in 2001 and 2012. These projects added over 300k cy each of a coarse gradation sand to the City’s sediment starved coastline. Though some short-term benefits were realized, the sand quickly migrated down coast after placement, as there are no rocky reefs or headlands that may encourage natural sand retention within the straight Oceanside coastline. Similarly, in the 2.5 miles south of the pier, there are no artificial mechanisms in place to retain sand. All these previous efforts have fallen short of providing the City with a sustained, dry sand beach for recreational enjoyment, ecological function, and coastal storm damage protection purposes.

The current condition of many City beaches is dismal for beach recreation, with many areas having little to no dry beach during the majority of the tidal cycle. Furthermore, coastal infrastructure is at risk with wave events impacting the shoreline with greater frequency and severity. This has resulted in the need for frequent maintenance and improvements to coastal infrastructure and shoreline protection systems. Projected sea level rise threatens to make these conditions worse. A third Regional Beach Sand Project is now being considered and pursued regionally by the San Diego Association of Governments (SANDAG) Shoreline Preservation Working Group. Additionally, a dormant USACE mitigation study to investigate solutions to Harbor impacts has recently been reinitiated after receiving federal funding and support to move forward. The City is simultaneously updating its General Plan, including the Local Coastal Program, to aid in providing solutions to coastal erosion from the Harbor construction. Despite these other ongoing efforts to study and mitigate the City’s shoreline problems and regional coastal erosion concerns, the City decided to pursue an independent study in 2021 to understand what opportunities might exist to restore sandy beaches in the City. This study was led by GHD and was called the Oceanside Beach Sand Replenishment and Retention Device Project (referred to as ‘Phase One’). The study looked at a multitude of local, regional, and international project examples as the basis for developing five (short-list) alternatives to be analyzed to protect beaches from long-term shoreline erosion in an environmentally sensitive and financially feasible way for the city.

The five alternatives analyzed were:

- **No Project:** No Project assumes continuation of the status quo in which Harbor maintenance dredging is the only program adding sand to the city beaches on a regular basis. The city would continue to participate in regional nourishment efforts similar to the RBSP I and II on an ad-hoc basis.
- **Alternative 1 - Beach Nourishment:** Beach Nourishment assumes a more frequent beach nourishment program is carried out by the city to deliver 300,000 cy of sand once every five years, approximately doubling the frequency of prior RBSP efforts.
- **Alternative 2 - Groins:** Groins assumes construction of four, 600-foot long, rubble mound groins spaced 1,000 feet apart along the Pilot Reach. The proposed groins are shore-perpendicular and would extend seaward from the existing rock revetment with a crest elevation of 10' MLLW. A 300,000-cy initial nourishment was included to pre-fill the groin field with subsequent nourishment volumes reduced by about 50%.
- **Alternative 3 – San Luis Rey Groin Extension:** San Luis Rey Groin Extension assumes construction of a 350-foot extension of the existing groin to capture sand moving northward toward the harbor. The sand trapped in this filet could possibly be used as a source for downcoast receiver beaches. This alternative includes a beach nourishment component identical to Alternative 2.
- **Alternative 4 – Multi-purpose Artificial Reef:** Multi-purpose Artificial Reefs assumes construction of two 1,000-foot long, rubble mound reefs spaced 1,200 feet apart along the Pilot Reach. Each reef would have emergent and submergent crest sections along their lengths to dissipate wave energy and potentially create a surfable wave on each end of the reef. A 300,000-cy initial nourishment was included to pre-fill the reef salient with subsequent nourishment volumes reduced by about 50%.

A multi-criteria analysis (MCA) was performed to compare alternatives based on a wide range of criteria that reflects the diversity of opinions and input received from the outreach activities. Each alternative was evaluated against 11 criteria, organized into three categories of Technical Performance, Financial, and Environmental. The results of the MCA indicated the highest ranked alternative was Groins, followed by Multi-purpose Reefs. These top two alternatives were separated by 8% from one another in total score, which was meaningful when considering the sensitivity of the scoring and weighting system. Beach Nourishment ranked third, about 17% lower than the Groins and 9% lower than Multi-purpose Artificial Reef. The No Project alternative ranked last with very low scores in the Technical Performance and Environmental categories.

The result of a robust alternative feasibility exercise, numerical modeling, lifecycle economic evaluation, and multi-criteria analysis, suggested a pilot-scale Groin concept be advanced for further analysis, additional public/agency outreach and preliminary design to prepare for the environmental review and permitting process. It was recommended that additional analysis of the Groin alternative involve sensitivity analyses on groin length and spacing, the pre-fill volumes, and sand management systems required to mitigate potential impacts.

Following the completion of Phase One, stakeholders, residents, and several cities to the south of Oceanside expressed concern about the potential for a Groin project to cause erosional impacts along down coast beaches. Additionally, there was a desire from the region, stakeholders, and the public to explore more innovative and/or nature-based solutions to the City's sand retention problem. The approach of the Phase Two Design Competition is to leverage technical data and knowledge gained through Phase One, while addressing these local and regional concerns and needs.



## Problem Statement

The history of Oceanside's severe coastal erosion is rooted in a local context of significant sediment reductions to its coast—Oceanside's beaches have been disappearing and along some parts of the coast a rock-revetment is all that remains. The City is not unique in this challenge, as urbanized watersheds, dam construction, coastal development/ armoring and harbor developments have created significant disruptions to the flow of sediment to coastlines around the world. These disruptions many times result in the need to actively manage coastal systems to restore broken sediment pathways with frequent beach nourishment and use of structures to slow the loss of sand—such as use of retention systems.

The Design Competition process seeks to inspire solutions to add and retain sand where it is needed most in the City through innovative and creative concepts. The Design Competition process is meant to embrace and address the complexity of erosion in Oceanside, as well as the broader context across the region, with an eye to the broader global challenge of the 21st Century, where sea level rise meets critical infrastructure.

Four Problem Statements have been developed to help establish context around the most pressing City needs and desired outcomes from this Design Competition. Within each problem statement, there is consideration for:

- Decades of historic coastal development that has directly reduced sediment supply thereby increasing the effects of erosion in the City of Oceanside (for example, the Oceanside Harbor, watershed development, creek channelization, back beach stabilization).
- Existing coastal management strategies within the City and the County have yet to result in sufficient stabilization of the beach for both human recreation and sandy beach ecosystems (for example, Regional Beach Sand Project I & II and annual USACE Maintenance Dredging of the Oceanside Harbor).
- Within the State of California, traditional sediment retention structures have been criticized for their potential negative impacts to downdrift and regional jurisdictions, resulting in an inability to test, build, permit, and finance novel pilot or demonstration projects as potential solutions.
- The environmental history of Oceanside and the San Diego region, combined with best available science on sea level rise and future storm impacts, provides high certainty that, without interventions, erosion and loss of beach width is all but inevitable. There is greater and greater need for regional (and statewide) demonstration and pilot project concepts for sediment retention to utilize innovative techniques that provide multiple benefits for coastal communities.

The four Problem Statements are below. Design Teams are invited to address a set of broad problem statements, that when combined with more specific design criteria, enable innovative pilot design solutions.

**Problem Statement One:**

How might we design a sand retention pilot project that succeeds in the near (3 years) to short term (20-30 years) at retaining sand while simultaneously providing ecological and flood resilience benefits, limiting negative downdrift impacts and impacts to surfing resources, and is removable if necessary?

**Problem Statement Two:**

How might a sand retention pilot project open pathways for Oceanside to explore longer term coastal adaptation?

**Problem Statement Three:**

How might we successfully build and monitor a pilot sand retention project that informs future regional coastal adaptation approaches?

**Problem Statement Four:**

How might a pilot sand retention project be scaled to benefit a greater reach of the City shoreline?



# Design Criteria

The design criteria are meant to fulfill two core objectives: (1) provide a boundary of the scope of design for the proposed solution and (2) generate a set of goals that Design Teams, and their solutions can be measured against. To guide the criteria development, the Project is focused on a mission:

**To construct an innovative, multi-benefit, sand retention project on the City of Oceanside's beaches that serves both local and regional benefits.**

Any proposed solution should fulfill this mission, requiring all designs to meet the bare minimum objectives:

- Align with the community character and history of place within the City of Oceanside.
- Leverage previous analysis and feasibility studies completed to-date.
- Maintain a forward-thinking design that incorporates adaptive capacity of solutions to future coastal conditions while addressing chronic erosion issues.
- Be technically feasible, financially viable, and environmentally and socially acceptable.

With both the mission and objectives in mind, the design criteria are as follows:

## **Design Criteria One: Physical**

- Designs should be in the coastal zone south of Oceanside Pier, focusing on the City's most highly eroded beaches.
- Designs should accommodate or be adaptive to up to 2-3 ft of sea level rise (that assumes 20-to-30-year design life), with minimal maintenance. The ability to accommodate or have adaptive capacity to greater amounts of sea level rise would be scored favorably.
- Identify a clear pathway for scaling of the pilot if it succeeds in its intention.
- Reference known design parameters from sand retention alternatives studied through the Phase One report .
- Designs should be structured with the ability to perform sand retention and retain structural integrity under impacts from existing and projected future coastal conditions, including:
  1. Extreme waves (100 yr. return interval – from northern and southern hemispheres), tides and winds (see companion documents, including Phase One report).
  2. Extreme temperatures.
  3. Public use, trampling & vandalism.
  4. Performance goals of a particular design should be articulated.  
For example:
    - (a) Retain a particular average annual beach width within a particular reach
    - (b) Prevent overtopping beyond the beach at particular thresholds, such as 100-year total water level (TWL) and sea level rise scenario
  5. For any performance goals, teams should define the anticipated time-scale during which the project would be able to perform as designed.
- Designs should include natural and nature-based features, where feasible, which may

include onsite or imported materials, and/ or innovative materials designed for ocean compatibility.

### **Design Criteria Two: Financial**

- Construction estimates for the designs should be presented for initial construction costs, annual operation and maintenance costs, and removal costs. Creative use or reuse of materials is encouraged to lower costs.
- Designs should articulate the maintenance activities and cost for design to maintain key functions such as retaining sand, providing recreational benefits, and/or minimizing impacts to downdrift sand supply.
- Creative solutions to finance the project are encouraged that fully value the proposed project's range of benefits (social, regional, economic, ecological). Especially if construction costs for designs exceed \$50M.

### **Design Criteria Three: Environmental**

- Designs should encourage the rehabilitation of sandy beach habitat.
- Designs should minimize impacts to sandy beach ecosystems and nearshore marine ecology.
- Designs should be sensitive to where and which habitats may be converted as part of the design, what enhancements to ecology may occur, and where restoration of historic ecosystems may occur.
- All design references to ecological benefits should be qualified with detailed information on habitat classifications, quality, change over time, and uncertainties clearly explained.

### **Design Criteria Four: Social**

- A successful sand retention project should increase usable beach space supporting coastal access and multiple opportunities for recreation.
- Designs should prioritize preserving or enhancing surfing resources and minimizing impacts to existing surf resources.
- Designs should seek to increase or maintain the existing aesthetic of the beach.
- Designs prioritize public safety and low-cost recreational user experiences.
- Designs should maximize public benefit.

### **Design Criteria Five: Regional**

- Designs should provide a regional and statewide opportunity to pilot, test, and evaluate novel sand retention solutions.
- Designs should strive to positively impact the region both directly (i.e., by increasing sediment in the littoral cell) and indirectly (i.e., by providing knowledge beneficial to how to best design and implement retention strategies).
- Designs should be particularly sensitive to the potential for sand retention strategies to impact the flow of sediment through littoral systems and be designed to eliminate, minimize, or mitigate potential negative impacts to downdrift sand supply.

**Project Assumptions:**

- Pilot project designs will represent reasonable proof-of-concept sand retention strategies that can be piloted, scaled up, and/or repeated if appropriate.
- The objective is to create more time and space for the City to develop a comprehensive adaptation strategy for coastal resources.
- Project designs will assume that 300,000 cy of beach nourishment sand will be available initially within the project area and then for every five years for ongoing sediment management within the project area. The design teams can utilize this sand within their designs and propose various sand placement types within their concepts.
- Project designs will communicate uncertainty of their design's success.
- As pilots, project designs should be able to be adapted or removed if the project does not provide its intended multiple benefits over time.
- Project designs should be implementable, and should reflect an understanding of an ultimate need to be permitted and reviewed based on their adherence to existing laws, including the California Coastal Act. Throughout the competition, teams will be given guidance from experts to help ensure this outcome.



# Competition Structure

Three selected Design Teams will participate in a Design Competition. Design Teams will develop innovative sand retention solutions using the Design Brief and Design Criteria as core guidance. The development of designs will be supported by the Project Team over three Design Rounds, which will include Internal Reviews by the Project Team, Charrettes, Regional Briefings, and Public Workshops (see below for more detail). A final review after the third round will be made by a Jury, and their recommendation will be provided to the City of Oceanside's City Council, who will vote on the winning design.

## Design Rounds

Each of three Design Rounds will take place over an eight week period. The first four weeks of each round will be largely driven by Design Teams working independently, although the Project Team will be available to respond to clarifying questions or requests for more information at any time. At the end of each four weeks, the Project Team will provide an Internal Review, which will be followed by Charrettes in week five or six, and Public Workshops and Regional Briefings in week 8.

## Internal Review

To provide initial guidance and feedback to Design Teams, the Project Team will review submitted materials halfway through each Design Round, and will provide feedback through a video conference within five working days of receiving materials.

## Charrettes

Design Teams will be required to participate in a Charette in the fifth or sixth week of each of the three Design Rounds where the Project Team, and other project advisors will provide feedback and comments on progress made on pilot project concepts. These will be hybrid events, although in-person participation is encouraged if possible in Oceanside.

## Charrette One

- Setting the stage, getting input from the City Team and the Project Team.
- Presentations from local groups on the Oceanside community, coastal resources, and coastal vision for Oceanside and the greater North County San Diego Region.
- Opportunities to tour the coast. The Project Team will provide general information for teams to take self-guided tours.

## Charrette Two

- Design Teams will share preliminary concepts and approaches.
- Project Team and advisors will provide feedback on preliminary design concepts.
- Opportunity for Design Teams to ask questions and gain insight on how to improve designs.

## Charrette Three

- Design Teams have developed refined approaches and concepts.
- Opportunity to gather insight on fine tuning designs.

## **Public Workshops**

The Project Team will host a Public Workshop after each Charette to share the progress on developing the pilot-project design concepts. The public will have the opportunity at each workshop to see the evolution of the design process as details and provide comment and input to assist in refining the approaches. Each Design Team will be required to provide the Project Team with figures, graphics, maps, and resources as required that can be used during the Public Workshops. Material requirements will be specified well in advance of each workshop

### **Public Workshop One - Exploration of Approach**

The first public workshop will aim to gather broad input on the teams' initial design approaches. Design Teams will work to gain perspective on community stakeholders' goals and desires for the coast, and collect directional feedback to inform the designs going forward.

### **Public Workshop Two - Refining the Design**

The second public workshop will present more developed designs, with specific components and elements visualized with opportunities for feedback.

### **Public Workshop Three- Final Designs and Feedback**

The third public workshop will feature final designs. Teams will clearly show how stakeholder input shaped their designs, and why they arrived at the final solutions. Public comment will be gathered and analyzed, and provided to the Jury and City Team as an input to decision making.

## **Regional Briefings**

Given the regional interest and potential impact of the Project at various scales, at the end of each Design Round, the Project Team may organize a Regional Briefing to share updates with regional stakeholders. Representatives from Design Teams will be invited to participate, although no new materials would be expected to be developed.

## **Jury**

The Design Competition Jury consists of 10-voting members from various sectors and interest groups, reflecting community, regional and stakeholder interests in the implementation of a pilot sand retention project. Additionally, 5-non-voting, advisory members will also be invited to advise, share their perspectives and participate. Jurors applied to participate in this role, and the jury's composition was established to create a portfolio of expertise and perspective that is beneficial to the final pilot project outcome. Jurors will be invited to Public Workshops (though are not expected to attend all). After the 3rd design round, the Jury will review the final designs, and vote to select a preferred design, and will draft a recommendation which the Project Team will submit to City Council for a final decision.

Below is a complete list of jurors assembled for this project.

**Voting Members:**

1. **Coastal Management Expert—Dr. Lesley Ewing PE**, former Sr. Coastal Engineer, California Coastal Commission
2. **Permitting Viability Expert—Dr. Charles Lester, Director**, Ocean and Coastal Policy Center, Marine Science Institute, UC Santa Barbara
3. **Surf Resource Preservation—Chris Abad**, Director, Oceanside Boardriders Club
4. **Nearshore Marine Expert—Dr. Dan Pondella**, Professor, Biology; Director, Vantuna Research Group, Occidental College
5. **Nearshore Marine Expert—Karen Green**, Division Manager, Marine and Aquatic Ecosystem Resources, Tierra Data, Inc.
6. **Coastal City Representative— Councilmember Dwight Worden**, Del Mar City Council, Chair of SANDAG Shoreline Preservation Working Group
7. **Coastal City Representative— Councilmember Joy Lyndes**, Encinitas City Council
8. **Community Representative—Bob Ashton**, President/CEO, Save Oceanside Sand (SOS)
9. **Community Representative—Scott Ashton**, Chief Executive Officer, Oceanside Chamber of Commerce
10. **Community Representative—Ernie Prieto III**, Local Business Owner (Oceanside Sea Center), Boat Captain and sits on City of Oceanside Harbor and Beaches Committee

**Non-Voting Members:**

1. **Federal Agency— Dr. Arye Janoff**, Coastal Geomorphologist, Planner, and Manager
2. **State Agency—Jeremy Smith**, Coastal Engineer, California Coastal Commission
3. **Grant Funder—Megan Cooper**, Deputy Regional Manager, California State Coastal Conservancy
4. **NGO—Mitch Silverstien, Policy Coordinator**, Surfrider Foundation San Diego Chapter
5. **NGO—Curt Busk, President**, Buena Vista Audubon Society

## Anticipated Deliverables and Final Submission

At the beginning of each Design Round, details on specific deliverables required will be provided by the Project Team. Examples of types of deliverables include presentation decks, project narratives, and printable display board files.

For final deliverables, details will be provided as the competition progresses, but teams can expect that final submissions will consist of an electronically submitted final Pilot-Project Concept Design that includes:

1. Brief narrative of the final proposed approach
2. Architectural drawings and conceptual renderings
3. Technical drawings of approach and component parts
4. Environmental and social considerations
5. Additional figures and maps
6. Estimated cost



# Design Timeline

## Contracting & Onboarding

May 31	—————	week 1	Notice Sent	notify 3-teams selected
June 5	—————	week 2	Onboarding Begins	
June 12	—————	week 3	Onboarding Sessions	optional site-visits
June 19	—————	week 4	Onboarding Sessions	optional site-visits
June 26	—————	week 5	Contracts Finalized	

## Design Round One

July 3	—————	week 1		4th of July Holiday
July 10	—————	week 2		
July 17	—————	week 3		
July 24	—————	week 4	Internal Review	virtual, with the Project Team
July 31	—————	week 5		
August 7	—————	week 6	Charrette	hybrid, in-person & remote
August 14	—————	week 7		
August 21	—————	week 8	Public Workshop	in-person, confirmed site-visit

## Design Round Two

August 28	—————	week 1		
September 4	—————	week 2		Labor Day Holiday
September 11	—————	week 3		
September 18	—————	week 4	Internal Review	virtual, with the Project Team
September 25	—————	week 5		
October 2	—————	week 6	Charrette	hybrid, in-person & remote
October 9	—————	week 7		
October 16	—————	week 8	Public Workshop	in-person

## Design Round Three

October 23	—————	week 1		
October 30	—————	week 2		
November 6	—————	week 3		
November 13	—————	week 4	Internal Review	virtual, with the Project Team
November 20	—————	week 5	Charrette	hybrid, in-person & remote
November 27	—————	week 6		Thanksgiving Holiday
December 4	—————	week 7		
December 11	—————	week 8	Public Workshop	in-person

## City Council Vote & Public Event

December 18	—————	week 1	Jury Vote	Jury selects one preferred option to bring to City Council
December 25	—————	week 2		Christmas & New Years Holiday
January 1	—————	week 3	Consistency Review	GHD conducts consistency review of preferred design
January 8	—————	week 4		
January 15	—————	week 5		
January 22	—————	week 6	City Council Vote	hybrid, preferred Design Team should be in-person
January 29	—————	week 7	Public Event	in-person