



**FEMA**

October 16, 2023

Nancy Ward, Director  
Governor's Authorized Representative  
California Governor's Office of Emergency Services  
3650 Schriever Avenue  
Mather, California 95655

Reference: Application Approval, HMGP DR-4482-641-65R  
Crescent City Harbor District  
Tsunami and Sea Level Rise – Advance Assistance  
FIPS Code: 015-U53EE, Supplement 22

Dear Nancy Ward:

We approve and issue Hazard Mitigation Grant Program (HMGP) funds for the Crescent City Harbor District (Sub-recipient), DR-4482-641-65R, Tsunami and Sea Level Rise – Advance Assistance project.

The total project cost is \$1,500,000.00. As shown in the enclosed Obligation Report - Supplement 22, we are, obligating \$1,350,000.00 for the 90 percent Federal share; the 10 percent non-Federal share is \$150,000.00. We are obligating \$37,500.00 for the 100% Federal share Subrecipient Management Costs. These funds are available in SmartLink for immediate and eligible disbursements. The following is a summary of the approved funding:

<b>Funding Type:</b>	<b>Federal Share:</b>	<b>Non-Federal Share:</b>	<b>Total Project Cost:</b>
Supplement 22	\$1,350,000.00	\$150,000.00	\$1,500,000.00
Management Costs	\$37,500.00	\$0	\$37,500.00

This HMGP project approval and obligation of funds are subject to the following conditions:

- 1. Scope of Work (SOW)** – This project will include the development of mitigation strategies and obtaining data to prioritize, select, and develop mitigation projects and complete grant applications or construction funding of future harbor infrastructure improvements. Advanced Assistance activities will include evaluating existing conditions and studies, conducting field work if necessary, conducting planning studies, completing an alternatives analysis, completing 60% design for the preferred alternative, fulfilling California Environmental Quality Act for the preferred alternative, and completing a shovel ready FEMA Hazard Mitigation Assistance grant application to implement the preferred alternative.

- 2. Project Completion Date** – The work schedule included with the project application indicates that the project will take 36 months to complete; therefore, the activity completion date is October 16, 2026. Please inform the sub-recipient that work completed after this date is not eligible for federal funding, and that federal funds may be de-obligated for work completed outside the completion date when there is no approved time extension.
- 3. Project Closeout** – Within 120 days of project completion, all project funds must be liquidated and final closeout documentation for the project must be submitted to FEMA. Please note the project must comply with Code of Federal Regulations Title 2, Part 200 reporting requirements at the time of closeout.
- 4. Record of Environmental Considerations (REC)** – This project has been determined to be Categorically Excluded from the need to prepare either an Environmental Impact Statement or Environmental Assessment in accordance with FEMA Instruction 108-1-1 and FEMA Directive 108-1-1 as authorized by DHS Instruction Manual 023-01-001-01, Revision 1. Categorical Exclusions A4 (information gathering, data analysis and processing, information dissemination, review, interpretation, and development of documents) and A7 (the commitment of resources, personnel, and funding to conduct audits, surveys, and data collection of a minimally intrusive nature) have been applied. Particular attention should be given to the project conditions before and during project implementation. Failure to comply with these conditions may jeopardize federal assistance including funding.
- 5. Standard Conditions** – This project approval is subject to the enclosed *Standard Mitigation Grant Program (HMGP) Conditions*, amended August 2018. Please note that federal funds may be de-obligated for work that does not comply with these conditions.

If you have any questions, please contact Jared Peri, Hazard Mitigation Specialist, by email [jared.peri@fema.dhs.gov](mailto:jared.peri@fema.dhs.gov), or phone (202) 374-4957.

Sincerely,

**KATHRYN J LIPIECKI**

Digitally signed by KATHRYN J  
LIPIECKI  
Date: 2023.10.18 13:49:00 -07'00'

Kathryn Lipiecki  
Director, Mitigation Division  
FEMA Region 9

Enclosures (3):

Obligation Report – Supplement 22  
Record of Environmental Considerations (REC)  
Standard Mitigation Grant (HMGP) Conditions



January 10, 2024

Timothy Petrick  
Harbormaster/CEO  
Crescent City Harbor District  
101 Citizens' Dock Road  
Crescent City, CA 95531

Subject: **Notification of Post-Obligation Documents**  
Hazard Mitigation Grant Program  
FEMA-**4482**-DR-CA, Project #**AP00641**, FIPS #**015-91000**,  
Supplement #**22**

Dear Mr. Petrick:

The California Governor's Office of Emergency Services (Cal OES) has received all required subaward post-obligation documents. Our review has found the Governing Body Resolution to be current and complete and the Grant Subaward Assurances to be properly signed. A copy of the Supplemental Grant Subaward Information form Cal OES 2-101a is enclosed for your records. Please note that your organization must maintain an active registration in the SAM.gov (System for Award Management) database for the duration of this grant subaward.

Payments will be made on a reimbursement basis using the Hazard Mitigation Reimbursement Request Form. A ten percent (10%) retention will be withheld from all reimbursement payments and will be released as part of the subaward closeout process.

If you have any questions or need assistance, please contact the Recovery Financial Processing Unit at (916) 845-8110 or at [HMGrantsPayments@caloes.ca.gov](mailto:HMGrantsPayments@caloes.ca.gov).

Recovery Financial Processing Unit

Enclosures

c: Subrecipient's Project File



3650 SCHRIEVER AVENUE • MATHER, CA 95655  
RECOVERY FINANCIAL PROCESSING UNIT  
(916) 845-8110

**California Governor's Office of Emergency Services  
SUPPLEMENTAL GRANT SUBAWARD INFORMATION SHEET**

The California Governor's Office of Emergency Services (Cal OES), makes a Grant Subaward of funds set forth to the following:

**1. Subrecipient:** Crescent City Harbor District **1a. SAM ID:** J2TBA1ALH3Q6

**2. Implementing Agency:** Crescent City Harbor District **2a. SAM ID:** J2TBA1ALH3Q6

**3. Implementing Agency Address:** 101 Citizens' Dock Road Crescent City CA 95531-4435  
Street City State ZIP+4

**4. Location of Project:** Crescent City Del Norte 95531-4435  
City County ZIP+4

**5. Federal Award Identification Number:** FEMA-4482-DR-CA **6. Performance Period:** 10/16/2023 to 10/16/2026

**7. Indirect Cost Rate:**  N/A  10% de minimis  Federally Approved ICR: \_\_\_\_\_

**8. Federal Awarding Agency Section**

Federal Program Fund / CFDA #	Federal Awarding Agency	Total Approved Project Amount
Hazard Mitigation Grant Program / 97.039	U.S. Department of Homeland Security, Federal Emergency Management Agency	\$1,537,500.00

**9. Primary Authorized Agent:**

Name: Timothy Petrick Title: Harbormaster/CEO

Phone: (707) 954-0129 Email: tpetrick@ccharbor.com

Payment Mailing Address: 101 Citizens' Dock Road Crescent City CA 95531-4435  
Street City State ZIP+4

**10. Additional Correspondence Contacts (optional):**

Name: Mike Bahr Email: mike.bahr@cssgrants.org

Name: Aislene Delane Email: aislene.delane@cssgrants.org

## **Scope of Work**

The selected firm shall have the qualifications and experience to perform the scope of work for the Phase I and Phase II Environmental Site Assessment.

### **Phase I Environmental Site Assessment (ESA):**

The scope of work for this category may include, but is not necessarily limited to, the following components:

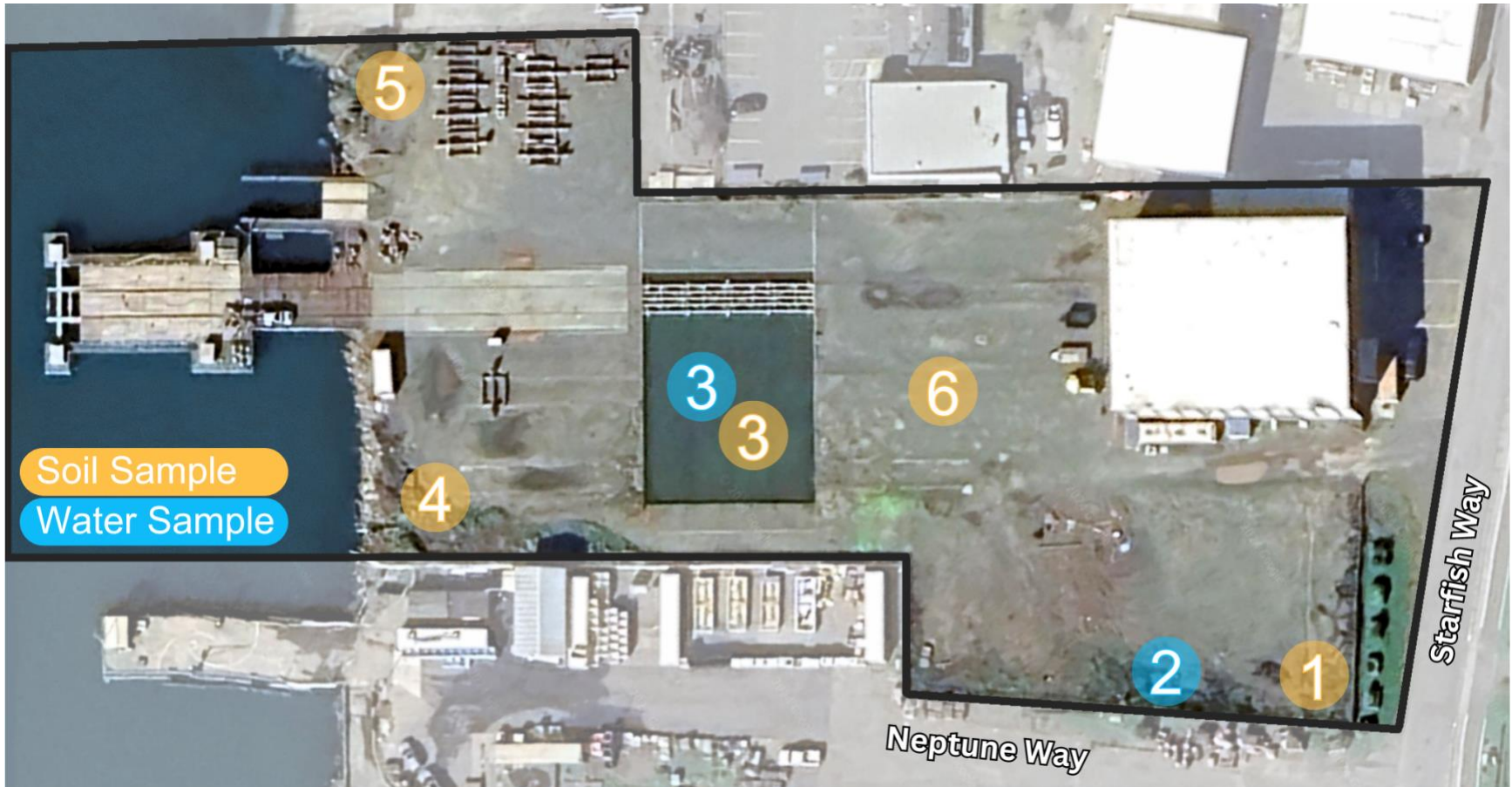
1. Perform a records review to obtain and review records that will help identify recognized environmental conditions in connection with the property. This includes, but is not limited to, federal, tribal, state, and local government records, any history of known or potential hazardous substance releases, and contaminants of concern, and any permits issued for work on the property.
2. Perform a records review of historical property use information (topographic maps, aerial photographs, fire insurance maps, existing reports, etc.).
3. Conduct an onsite reconnaissance of the property to obtain information indicating the likelihood of identifying recognized environmental conditions in connection with the property.
4. Conduct interviews, including but not limited to, with owners, occupants, and governmental officials, to obtain information regarding recognized environmental conditions in connection with the property for boatyard and/or related or unrelated uses.
5. Prepare and present evaluations and reports to the District staff and, separately, to the Harbor Board of Commissioners. Evaluations and reports must include findings, opinions, conclusions, components, and recommendations.
6. Identify recognized environmental conditions constituted by the presence or likely presence of any hazardous substances on the property or in the soil, groundwater, or surface water of the property.
7. Provide expert witness services relating to Phase I Environmental Site Assessments.

Depending on the evidence found during the initial phases of the project, there may be a need for Phase II Environmental Review tests and analyses, such as soil borings and the collection of soil and water samples. Laboratory analysis of these samples would be part of this project. This may involve only portions of the property or the entire property.

Locations identified for water and soil tests are included in the maps section at the end of this RFP.

The District reserves the right to extend this contract to include Phase II SOW or to issue a new RFP for Phase II Environmental Review.

Map of proposed soil & water samples if Level II is required





Phone: (707) 441-8855 Email: info@shn-engr.com Web: shn-engr.com  
812 W. Wabash Avenue, Eureka, CA 95501-2138

Reference: 024000.067

September 30, 2024

Kristina Hanks  
Crescent City Harbor District  
121 Starfish Way  
Crescent City, CA 95531

by email: [khanks@ccharbor.com](mailto:khanks@ccharbor.com)

**Subject: Proposal for Phase I Environmental Site Assessment at 121 Starfish Way, Crescent City, California; Crescent City Harbor District**

Dear Selection Committee:

Thank you for offering SHN the opportunity to provide environmental services for Phase I environmental site assessment (ESA), and potentially a Phase II ESA. It is our understanding that the ESAs will be performed on a portion of Del Norte County Assessor's parcel number 117-020-016-000, 121 Starfish Way (subject property).

SHN understands that the Phase I ESA is required for due diligence. This letter outlines SHN's qualifications, relevant project experience, project organization, proposed approach/scope of services, costs, and schedule.

## 1.0 SHN's Experience and Qualifications

### 1.1 General Firm Overview

Founded in 1979, SHN is a multi-disciplinary firm meeting the needs of communities in Northern California and Southern Oregon for more than 45 years. SHN supports six regional offices (Willits, Fort Bragg, Eureka, and Redding, California; and Coos Bay and Klamath Falls, Oregon). Our firm is comprised of more than 115 employees who represent various disciplines, including civil engineering, environmental services, planning and permitting, geosciences, surveying, biological sciences, and materials testing/special inspections.

Through the application of both time-tested and contemporary methods, SHN offers its clients efficient, practical, sustainable solutions to challenging problems. SHN strives to contribute to a socially responsible and rewarding environment for its clients, employees, and community at large.

While SHN had been registered as a California Small Business Enterprise (SBE) for more than a decade, our firm now is comprised of too many employees to meet the State's SBE classification requirements. However, SHN is recognized as a federal small business entity.



## **1.2 General ESA Services**

SHN has completed more than 400 environmental assessments for the purpose of assessing properties for the presence or absence of regulated or hazardous materials, as defined in the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), and Title 22 of the California Code of Regulations. SHN uses a comprehensive site assessment report format developed to meet the requirements to qualify for the innocent landowner defense to CERCLA liability. SHN's report format is in compliance with the ASTM-International (ASTM) Standard E1527-21; "Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process," or ASTM Standard E2247-23; "Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process for Forestland or Rural Property."

SHN has completed environmental site assessments for a variety of commercial, industrial, agricultural, undeveloped, and proposed conservation properties located throughout northern California and southern Oregon. SHN specializes in serving the needs of our clients and has acquired expertise in working with the types of businesses and activities found in property transfers typical for the region. SHN's projects have included full-scale state and federal superfund and Brownfield sites, as well as numerous smaller, independent investigations. SHN tailors site investigations to meet the specific regulatory and financial needs of each client.

## **1.3 Recent Phase I/II ESA Projects**

Within the last 5 years, SHN has successfully completed Phase I ESAs for a variety of clients, including local and state municipalities, school districts, non-profit organizations, Native American rancherias, automobile dealership and service station owners, corporate lenders, REALTORS®, residential and commercial builders, private property owners, multi-family housing, feedlots, and other entities.

The following list presents several Northern California Phase I ESA's that SHN has conducted recently:

- California Indian Environmental Alliance, Crescent City, CA
- Confidential Client, 2 Phase I ESA's in Crescent City
- City of Eureka, Six Phase I ESAs, Eureka, CA
- Trinidad Rancheria, Trinidad, CA
- Michigan-California Timber, northeast CA (108,000 acres)
- Save the Redwoods League, Elk Meadow, Humboldt County, CA
- Save the Redwoods League, Burbeck Creek, Mendocino County, CA
- Scotia Union School District, Scotia, CA
- Jacoby Creek School, Arcata, CA
- Humboldt County Department of Public Works, 3 Phase I ESAs, Eureka, CA
- P&B Labs, Eureka, CA
- Hochgraef Property, Laytonville, CA
- Humboldt State University, DeMassa Residence, Arcata, CA





- Shipwreck Site, Fields Landing, CA
- City of Eureka, Marina Way, Eureka, CA
- City of Eureka, Hilfiker Lane, Eureka, CA
- Open Door Community Health Center, Arcata, CA
- Proposed Plaza Property, Blue Lake, CA
- Scotia Union School District Gymnasium, Scotia, CA

In addition, the following list presents several Northern California and Southern Oregon Phase II ESA's that SHN has conducted recently:

- Louisiana Pacific, Samoa, CA (Phase II ESA/Groundwater Monitoring)
- Little Lakes Brownfield, Arcata, CA (Phase II ESA)
- Pelican Bay State Prison, Crescent City, CA (Phase II ESA)
- City of Eureka, Waterfront Drive (Phase II ESA)
- Eureka High School (Phase II ESA)
- City of Lakeside WWTP, Lakeside, OR (Phase II ESA / Groundwater Monitoring)
- Jordan Cove Landfill, Coos Bay, OR (Phase II ESA / Groundwater Monitoring)
- Dunes Ranch, Coos County, OR (Phase II ESA / Groundwater Monitoring)
- JCE Landfill Closure, Coos Bay, OR (Phase II ESA / Soil Gas Monitoring)
- Dunes KOA, Coos County, OR (Phase II ESA / Groundwater Monitoring)

## **1.4 Relevant Project Experience**

In addition to the bulleted project experience listed above, the following information describes two recent and similar projects in which SHN provided ESA services.

- **Confidential Client – Multiple Phase I and II ESAs**

In 2024, SHN completed 15 Phase I ESA's and 14 Phase II ESA's for a property transfer for properties scattered throughout southwestern Oregon for a petroleum retailer. Due to a narrow timeframe, the Phase I and Phase II ESAs were performed concurrently. SHN was able to complete the requested work within an aggressive timetable, to meet the needs of the client.

- **City of Eureka – Five Phase I ESAs**

In 2023, SHN completed four Phase I ESA's and one Phase I ESA update for 5 properties in the City of Eureka. The properties included parcels in the Old Town neighborhood and former boatyards along the Humboldt Bay waterfront. SHN completed these Phase I's in a narrow timeline to meet the deadlines of the client. No recognized environmental conditions were found, so Phase II work was not warranted.



## 1.5 Project Organization

The following table presents our team’s proposed organization to complete the project. The project will be managed by Roland Rueber, PG. Roland is a Senior Geologist with more than 28 years of professional experience and he has completed more than 300 Phase I and II ESAs. Summary-level resumes are provided in Attachment 1.

SHN Team Member	Project Role	Years of Experience
Roland Rueber, PG	Project Manager	28
Diana Ward	Environmental Services Coordinator	23
Roger Klakken	Staff Geologist	11
Julia Maddox	Staff Geologist	4

## 2.0 Project Approach

### 2.1 Phase I ESA

SHN’s proposed scope of work is designed to comply with the ASTM Standard E1527-21 “Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process.” Work will be completed under the direct supervision of a California professional geologist.

Within this scope of work to complete this ESA, SHN will perform the following work tasks:

- Conduct a site inspection of the subject property to identify visual evidence of surface contamination and potential subsurface sources of contamination.
- Conduct a survey of sites near the subject property to identify ones that may use, produce, or store hazardous materials and/or generate hazardous waste.
- Conduct interviews with regulatory authorities and/or people familiar with the use of the parcel.
- Examine aerial photographs of the subject property taken over the past 50 to 60 years, historical Sanborn Maps, United States Geological Survey (USGS) topographic maps, and archived permit records and business (street) directories, as available. These examinations will seek to develop a continuous site history dating back to 1940 or the first known development of the parcel, whichever is earlier, as recommended by the ASTM guideline.
- Using the ASTM-designated search radii, review federal, state, county, and other regulatory agency lists and databases (including Comprehensive Environmental Response Compensation and Liability Information System [CERCLIS], National Priorities List [NPL], and Cal-sites) for sites with known hazardous materials contamination and/or registered underground storage tanks located on or near the subject property.
- Review regulatory agency files, if necessary, for identified contaminated sites to determine if the listed sites are potential hazardous-material threats to the subject property.



- Review previous site investigations or ESAs for the subject property, if available.
- Identify existing or proposed municipal infrastructure for the subject property and vicinity, including potable water, wastewater, and stormwater provisions, as mandated by the ASTM guidelines.
- Describe local and regional geological and groundwater conditions in the vicinity of the subject property.
- Complete a land-use questionnaire (supplied by SHN).
- Provide photographs of the subject property and areas of concern.
- One report will be prepared for the subject property. SHN will provide one PDF on disc or by download link of the Phase I ESA report presenting the results of the investigation for the parcel. The report will include topographic, vicinity, and parcel maps, and present findings regarding current and former operations pertaining to hazardous materials usage, storage, or disposal, discuss recognized environmental conditions (RECs), and identify data gaps, if any.

## **2.2 Assumptions**

SHN's proposed Phase I work scope and costs assume the following:

- Client will provide authorization for SHN to access the subject property in a timely manner.
- Client will provide available information regarding the past operations at the subject property (that is not publicly available), and preliminary title reports (if available).
- Client will provide SHN the contact information of the property owner and the user of the Phase I to complete the ESA questionnaires. The persons identified should be able to provide information regarding the subject property's former and current uses in a timely manner.

## **2.3 Phase II ESA**

The following scope is based on the information provided in the RFP, and visual observations made during the preliminary site walk. Additional sampling locations may need to be added pending the completion of the Phase I ESA.

### **2.3.1 Subsurface Sampling**

SHN will perform the following tasks at the subject property:

- Coordinate with a drilling subcontractor.
- Procure boring permits from the Del Norte County Division of Environmental Health.
- Mark the site with white paint and notify Underground Service Alert North.
- Have the near surface samples analyzed for cadmium, chromium, nickel, lead, and zinc.
- Install five Geoprobe borings to approximately 16 feet below ground surface (BGS), with at least two soil samples collected from each boring for laboratory analysis.



- Install a temporary wellpoint in two of the borings for the collection of a groundwater sample for laboratory analysis.
- Have soil and groundwater samples from the Geoprobe borings analyzed for:
  - Soil - metals (cadmium, chromium, nickel, lead, and zinc).
  - Soil and groundwater - total petroleum hydrocarbons as motor oil (TPHMO), as diesel (TPHD), and as gasoline (TPHG), benzene, toluene, ethylbenzene, total xylenes, naphthalene, fuel oxygenates.
  - Groundwater - dissolved metals (cadmium, chromium, nickel, lead, and zinc).
- Install one hand augered boring near the above ground transformer.
- Collect two soil samples from the hand augered boring and submit for the analysis of polychlorinated biphenyls (PCBs).
- Properly dispose of decontamination water from the boring installations.
- Prepare a summary report for submittal to the Harbor District.

### **2.3.2 Assumptions**

SHN's proposed work scope and costs assume the following:

- Client will provide authorization for SHN to access the site in a timely manner.
- Any waste soil will be placed in a steel drum and left on site.

## **3.0 Fees**

SHN's cost estimated for labor and expenses to provide the required professional services is:

- Phase I ESA: \$7,500
- Phase II ESA: \$20,000

## **4.0 Timeline**

The Phase I ESA can be completed within 30 to 45 days from authorization. The Phase II report can be submitted within 60 days of completing the field sampling; however, timing for the field sampling is dependent on the drilling subcontractor's schedule.



Crescent City Harbor District

**Proposal for Phase I Environmental Site Assessment at 121 Starfish Way**

September 30, 2024

Page 7

Please contact me at 707-845-5909 if you have any questions about this proposal.

Respectfully,

**SHN**

A handwritten signature in blue ink, appearing to read "Roland Rueber", is written over a light blue rectangular background.

Roland Rueber, PG  
Senior Geologist

RMR:dla

Attachment 1. SHN Project Team Resumes



# CRESCENT CITY HARBOR DISTRICT BOAT HAULOUT PIER Structural Evaluation

Prepared for:  
Crescent City Harbor District  
101 Citizens Dock Road  
Crescent City, CA 95538



Prepared by:  
PND Engineers Inc.  
2175 NW Raleigh Street  
Suite 110  
Portland, Oregon 97210



ENGINEERS, INC.

April 2021

PND Proj. No. 214020



Figure 2-2. Example of steel H-pile (B3) major to severe damage rating



Figure 2-3 Pile A1 with major damage rating

### 3 LOAD ANALYSIS

#### 3.1 Overview

Load rating was considered for vertical loads only, for the loads detailed below. The vertical loading analysis was limited to the finger piers only to support the Travelift. The timber deck areas and a horizontal load analysis is outside the scope of this study. In general, lateral load system is limited to the batter piles and the concrete abutment. The batter pile connection to the pier appears to be inadequate to develop the capacity of the batter pile.

A design-level earthquake will likely cause significant, and possibly catastrophic, damage and/or collapse to the dock and warehouse.

### 3.2 References

The following references were used to determine loads and member capacities for the load rating analysis:

1. Minimum Design Loads and Associated Criteria for Buildings and Other Structures (ASCE 7-16). American Society of Civil Engineers, 2016.
2. American Institute of Steel Construction 360, Specification for Structural Steel Buildings, 2016.

### 3.3 Loads

The following loads were considered for load analysis of the floor structure and piles:

1. Dead load of all structural members.
  - a. Self-weight of members.
  - b. Peripheral timber deck applies a 50 lbs/ft load to the finger pier.
2. Live loads on Finger Pier.
  - a. The weight of the Travelift is assumed to 28,000 lbs and carries a 60,000 lbs load. The load is eccentric to the wheel spacing (loading is 2/3 of wheel spacing in both directions). Given the vintage of the Travelift no specifications were found for this equipment. However, the vehicle weight is based on the 35 BFM II Marine Travelift with a similar size and capacity.
  - b. No impact from the Travelift is considered. All loading is assumed to occur in a slow and controlled fashion.

### 3.4 Methodology and Calculations

The finger piers were evaluated using steel Load Reduction Factored Design. The dead weight was evaluated using hand methods and tables. The live loading was evaluated using the structural finite element modeling program, RISA 3D. The wheel loads were applied to a model of the finger pier as a moving load.

Both the double steel pile caps and steel H-piles were evaluated for vertical loading. The concrete abutment was assumed to be able carry the loading from the Travelift. The pile caps were checked for both shear and bending forces. The piles were checked for axial compression forces only. The piles were evaluated assuming the full section of steel is intact. A secondary evaluation was performed based on the worst corrosion condition observed on the piles (pile B3).

Given the lack of available information on the Pier, all steel is assumed to be A36. This assumption is credible, and conservative given the apparent vintage of the pier.

Detailed calculations are provided in Appendix D.

### 3.5 Summary of Results

The finger piers in their current condition cannot safely support the loading from the Travelift operating at full 30-ton (60,000 lbs) capacity. Table 3-1 summarizes the members and loads. A unity check for each member is also included. This unity check is the demand/capacity (D/C) ratio, or the factor load divided by the design strength of the member. Where values less than 1, this indicates that the member has the sufficient capacity to support the loads. Where D/C values greater than 1, this indicates that the member is not capable of safely supporting the load. As shown in the table, the corroded piles cannot safely support the dead load plus the weight of the loaded Travelift.

Table 3-2. Structural Analysis Summary Table



Force Check	Member		
	DBL Steel HP14x89 Pile Cap	Full-Section Steel HP12x74 Piles	Corroded Steel HP12x74 Piles
Ultimate Shear Demand (kip)	57	-	-
Design Shear Capacity (kip)	367	-	-
Shear Unity Check	<b>0.16</b>	-	-
Ultimate Positive Bending Demand (kip*ft)	58	-	-
Ultimate Negative Bending Demand (kip*ft)	307	-	-
Design Bending Capacity (kip*ft)	769	-	-
Bending Unity Check	<b>0.40</b>	-	-
Ultimate Axial Compression Demand (kip)	-	88	88
Design Axial Compression Demand (kip)	-	300	56
Axial Unity Check	-	<b>0.29</b>	<b>1.57</b>
Result	<b>OK</b>	<b>OK</b>	<b>OK</b>

## 4 CONCLUSIONS AND RECOMMENDATIONS

### 4.1 Discussion of Findings

The following summarizes the primary findings of the load rating analysis:

1. The severely corroded steel H-piles can no longer safely support the loads from the Pier and Travelift.
2. The piles are in major or severe damage condition and continue to deteriorate as no coating or other corrosion protection is present. Piles in the worst condition can only support 20% of their original capacity and will continue to corrode in the marine environment to the point where the piles will not be able to safely support the weight of the structure. Without significant repairs, the Haulout Pier can not be safely used.
3. The timber stringers under the timber portion of the Pier have a major to severe damage condition and can only support light and limited personnel loading.

It is PND’s recommendation to continue to restrict Travelift operations on the Boat Haulout Pier and to begin the process of replacement or significant repairs to the Pier. Additionally, loads on the timber deck should be limited to light personnel access only.

### 4.2 Alternative Options and Rough Order of Magnitude Cost Estimates

Since the piles supporting the Boat Haulout pile all have a major to severe damage condition and the superstructure has a total loss of coating/corrosion protection, PND recommends CCHD begin the planning

process to repair or replace the structure in the short term. The following options provide a possible forward path for the future of the Boat Haulout Pier. A breakdown of cost for the two alternatives is included in Appendix E.

**Alternative 1 - Replacement of the Boat Haulout Pier** – In this alternative, the Boat Haulout would be replaced by a new Boat Haulout. A new Boat Haulout would have the following features:

- Precast concrete finger piers.
- Cast-in-place concrete pile caps.
- Steel pipe piles with corrosion resistance coating and anodes.
- Total estimated cost: **\$851,000**

Pros:

- Longer service life of the structures (~50 years).
- Ability to upgrade capacity or adapt to future upland development.
- Structure will be designed to meet current seismic/tsunami requirement in building codes.
- Lower maintenance cost over time.

Cons:

- Higher upfront cost.
- The new structure will require mobilization of heavy construction equipment.
- Longer downtime due to replacement of the Boat Haulout Pier.

**Alternative 2: Structural Repairs and Corrosion Protection** – In this alternative the existing Boat Haulout would be repaired with corrosion project measures implemented for the steel elements. For this concept, the following repairs would be performed:

- Piles would be jacketed to prevent further corrosion.
- Pile caps to be recoated to prevent further corrosion and transverse pile caps to be replaced.
- Timber deck and stringers would be removed and replaced.
- Total estimated cost: **\$491,000**

Pros:

- Lowest upfront cost alternative.
- Limited downtime while the Boat Haulout is repaired.
- Can be repaired without large construction equipment.

Cons:

- Higher maintenance costs over time.
- The repaired structure will likely not be able to resist a design level seismic event.
- The repaired structure will have a limited remaining service life (~10 years).
- Limited options for expanding the capacity of the Boat Haulout.



Photograph No. 1

**Description:**

Boat Haulout Pier overview



Photograph No. 2

**Description:**

West finger of Boat Haulout Pier



Photograph No. 3

**Description:**

West finger of Boat Haulout Pier



**Photograph No. 4**

**Description:**

Looking down West Finger of Boat Haulout Pier



**Photograph No. 5**

**Description:**

Looking down East Finger of Boat Haulout Pier



**Photograph No. 6**

**Description:**

Corrosion on Pile B3



**Photograph No. 10**

**Description:**

Undermining of concrete abutment.



**Photograph No. 11**

**Description:**

Corrosion of transverse steel beams supporting timber deck area



**Photograph No. 12**

**Description:**

30 AMO Marine Travelift (currently out of commission)