June 8, 2006

425 S. Palos Verdes Street

Post Office Box 151

San Pedro, CA 90733-0151

Tel/TDD 310 SEA-PORT

www.portoflosangeles.org

Mr. Ed O'Connell
Facilities Engineering Awards Program
American Association of Port Authorities
1010 Duke Street
Alexandria, VA 22314-3589

Re: 2006 Facilities Engineering Awards

Dear Mr. O'Connell:

The Port of Los Angeles (POLA) is pleased to submit the enclosed application for the 2006 Facilities Engineering Awards. The title of our project is "POLA Seismic Engineering Program".

As one of the largest seaports in the nation, it is also situated in an active seismic zone. As a result of POLA's commitment to the development of a seismic engineering program, great strides have been made in developing seismic engineering criteria and guidelines for container wharves. Over the years, POLA has collaborated with experts in the fields of geology, seismology, geotechnical engineering, structural engineering and earthquake engineering to develop a performance-based seismic code. Since 1990, several workshops have been conducted and several documents were published.

In developing the POLA Seismic Engineering Program, the port researched available materials; evaluated lessons learned from past construction projects and utilized earthquake data to develop performance based design code for container wharves. In addition, POLA has invested significant resources in a testing program working with the University of California, San Diego to enhance its seismic methodology and practice.

We believe that the POLA Seismic Engineering Program will have a positive impact on seismic design of container wharves throughout the nation. Therefore, we thought it would be appropriate for POLA to apply for this award.

If you have any questions, please contact Mr. Peter Yin of my staff, at (310) 732-3324.

Very truly yours,

ANTONIO V. GIOIELLO
Chief Harbor Engineer

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Attachment

AAPA American Association of Port Authorities

Alliance of the Ports of Canada, the Caribbean, Latin America and the United States

2006 FACILITIES ENGINEERING AWARDS

ENTRY FORM

This form must be submitted with each Facilities Engineering Award application. AAPA will send an e-mail notification when the submission has been received and processed. Please complete this form and include a copy with your electronic submission.

PROJECT NAME **Port of Los Angeles Seismic Engineering Program**

PORT **Los Angeles**

CONTACT PERSON **Tony Gioiello/Peter Yin**

PHONE **(310) 732-3877/(310) 732-3324** **FAX** **(310) 521-0332** **E-MAIL** **tgioiello@portla.org**
pyin@portla.org

PERSON TO RECEIVE AWARD **Tony Gioiello**

AAPA may post my application summary on its Web site (Check One) ___√___ **YES** _____ **NO**

AAPA may post my complete application on its Web site (Check One) ___√___ **YES** _____ **NO**

ENTRY CHECKLIST

1. Follow application guidelines
2. E-mail your cover letter and your full application
3. Send your entry fee of $65, made payable to "American Association of Port Authorities," with this entry form to:

   Ed O'Connell
   Facilities Engineering Awards Program
   American Association of Port Authorities
   1010 Duke Street
   Alexandria, VA 22314-3589

5. Do observe the June 1, 2006, deadline

DATE RECEIVED _____ **AAPA INITIAL** _____

AAPA FACILITIES ENGINEERING AWARDS APPLICATION

a. Cover Page

Title of Project: POLA Seismic Engineering Program

Name of Applicant: Port of Los Angeles

Person to Receive Award: Tony Gioiello, P.E., Chief Harbor Engineer
Port of Los Angeles

Date Submitted: June 8, 2006

Contact Information: Peter Yin, S. E., Program Manager
Port of Los Angeles
(310) 732-3324
pyin@portla.org

Design Team Members: Tony Gioiello, P.E., Chief Harbor Engineer
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b. Table of Contents

c. Project Description

The Port of Los Angeles (POLA) Seismic Engineering Program will provide uniform standards and procedures for the seismic design and construction of new wharves and upgrade of existing wharves. This program will significantly reduce cost and minimize potential delays during construction. These performance-based design standards make use of the state-of-the-art information available in the areas of geology, seismology, geotechnical engineering, structural engineering, and seismic design to develop the most cost-effective and constructible solutions for container wharves. Two-level seismic hazard evaluation criteria is utilized that allows the assessment of seismic risk in a more realistic way. The POLA seismic standards will be the first of its kind in the nation for container wharves and it is expected that these standards will be adopted as the model for the national seismic standards for piers and wharves. The following figure shows the POLA Container Wharf Upgrade Program ($200 million) that will utilize the POLA Seismic Engineering Program's recommendations and conclusions.

d. Introduction – Project Highlights

Over the years, experts have collaborated with POLA staff in a continuous effort to develop a modern seismic code for container wharves. Since 1990, several workshops have been conducted and technical documents have been published. The current code emphasizes the performance-based design and soil-structure interaction to reflect the challenges of designing in the active fault region of Southern California.

A Technical Advisory Board consisting of experts in structural, geotechnical, and earthquake engineering disciplines has reviewed the development of the code at all stages. Recent wharf construction at the port ascertained the practicality of the design procedure and construction details. In addition, the Port sponsored and funded an experimental program at the University of California at San Diego to confirm code assumptions. In September 2005, the POLA and the Coasts, Oceans, Ports, and Rivers Institute (COPRI) of ASCE co-sponsored a workshop to present the first version of the seismic code and commentary and solicit comments from the marine design community. These comments are being addressed and incorporated in a revised version of the code and commentary.

A port-wide ground motion and fault study program was undertaken to develop uniform seismic ground motion and fault hazards for the entire port to augment our future projects and develop more consistent designs.

The POLA is in the process of preparing a book to present its efforts on seismic code development of container wharves. The book will include: (1) Latest version of the code and commentary, (2) Background information to explain the theory behind the code provisions, (3) Design example(s), and (4) Experimental program findings. It is hoped that this comprehensive seismic code development program will provide useful information to other port agencies and marine structure designers both nationally and internationally.

e. Goals and Objectives/Business Problem

The goals of the POLA Seismic Engineering Program are:

1. To minimize costs by providing uniform standards for the design and streamline the construction on new container wharves and upgrading of existing container wharves.
2. To minimize business interruption caused by earthquake and to effectively reduce impact to local and national economy.

f. Discussion

Background:

Earthquake events through the years have highlighted the vulnerability of Ports, not only to strong earthquakes in the near vicinity but also to events farther away. Events such as Loma Prieta earthquake in 1989 and Kobe earthquake in Japan, 1995 caused significant damage to Port facilities. Business losses were enormous and a strong sense of awareness by all Ports of the risks associated with seismic events was created. Situated in an active seismic zone, the Port of Los Angeles has long been aware of such risks and has subsequently made major strides in its Seismic Engineering Program to build seismic resisting facilities and safeguard its business and economical interest.

These events are magnified by loose soft soil conditions typical for Ports sites such as Port of Oakland and POLA. Following the damages to the Port of Oakland facilities from the Loma Prieta earthquake in 1989, FEMA required specific seismic codes for wharf design to regulate reimbursements for wharf reconstruction.

Objectives and Methodology:

Objectives:

- Develop a state-of-art seismic code that can be used as guidelines for the design and construction of container wharves at POLA
- Recognized by FEMA or other public or private agencies when work with POLA on the wharf design, construction and repair

Metholodology:

- Two level Earthquake Criteria: Define two levels of performance criteria
    - Level 1: Maintain business operation after more frequently occurred earthquakes (around 6.5 in Richter scale)
    - Level 2: No long term repair time after strong and less frequent earthquake (around 7.0 in Richter scale)
- Develop engineering criteria and material strain limits for designers to follow
- Ask Institution (University of California, San Diego) to verify engineering criteria and design assumption
- Incorporate lessons from past and current construction projects at POLA into the code

Hardware/software applications:

No special hardware or software was required for this project.

Project Cost:

The total cost of the POLA Seismic Engineering Program is estimated to be $2 million. The short-term and long-term benefits to POLA by implementing the Seismic Engineering Program are expected to significantly outweigh the cost of this program.

Performance Measures:

In 2005, POLA and the Coasts, Oceans, Ports, and Rivers Institute (COPRI) of ASCE co-sponsored a workshop to present the first version of the seismic code and solicit

comments from the marine design community. These comments are considered in a revised version of the code and commentary.

In a typical 1,000 ft long wharf, over a million dollars of savings in construction is achieved as a result of the test of pile to deck connections performance as port of this program.

How the project fulfills the award criteria:

The POLA Seismic Engineering Program specifically applies to marine design and construction. This program will result in significant benefits to POLA such as reduced design and construction costs and schedules, reduced risk and minimized business interruptions due to future earthquakes. Anticipated benefits from this program are listed below:

- Minimizes design cost and schedule by providing uniform requirements for all container wharf design.
- Minimizes construction cost and schedule by optimizing construction procedures.
- Minimizes interruptions of wharf operations due to future earthquakes.
- Allows POLA Management to assess earthquake risk realistically using probabilistic estimates of seismic hazards and develop emergency planning accordingly.

g. Conclusion

The POLA has dedicated its resource and effort in the past decades to develop cutting edge seismic engineering criteria and guidelines to safeguard its tremendous investment and continuous business growth. The current POLA Seismic Engineering Program is the first of its kind in the nation.

This program achieved its goals by developing new seismic design standards for container wharves. The uniqueness of this program is in its comprehensive approach to achieve its goals. The POLA worked with a team of experts from the beginning of process to address all aspects of wharf design. In addition, all design assumptions were verified by a comprehensive experimental program at a reputable university.

The POLA has implemented this new methodology in the construction of many of our recent projects including: Pier 400, Berths 100-102, and Berth 144. Business interruption will be minimized if the criteria of POLA code is followed in container wharf design. The impact will extend beyond POLA and California ports that follow the conclusion of this Program. The POLA Seismic Engineering Program's influence to the marine design community and its effort in dedicating resource and energy in this effort make it as the strong candidate for the 2006 Facilities Engineering Awards from AAPA.