

# MEMORANDUM

## State of Alaska

Department of Transportation & Public Facilities  
Statewide Design & Engineering Services Division/Bridge Design

**TO:** Mark O'Brien  
Chief Contracts Officer

**DATE:** April 23, 2013

**FROM:**   
Richard Pratt, P.E.  
Chief Bridge Engineer

**FILE :** 1143

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25-13-017-PIF

**RE:** IM-0A4-4(15)/61275  
Parks Highway  
MP 239-263 Rehabilitation

**CONTACT:** Travis Arndt, P.E.  
(907) 465-8892

**SUBJECT:** Justification for Specifying  
Friction Pendulum Bearings  
from Earthquake Protection  
Systems, Inc.

We request approval to specify a patented, propriety, name brand product for the subject project. This project will be federally funded. The brand specific bearings will be purchased and installed by the successful Contractor as part of this project.

We analyzed the existing Nenana River Bridge at Moody. This analysis showed that the existing rocker bearings would perform poorly during a seismic event and transfer loads that could overload the bridge piers and foundations. The failure could result in the catastrophic loss of the Nenana River Bridge. The most economical solution is to replace the existing bearings with seismic isolation bearings.

The Highway Innovative Technology Evaluation Center (HITEC) tested eight different brands of seismic isolation devices, and the results of this testing were published in 1998. Of the bearings that appeared to give acceptable performance at an ambient temperature of 70 degrees F., only the Friction Pendulum bearings yielded similar design performance values when tested at cold temperatures. When tested at cold temperatures, the other potentially viable bearing types were found to vary from ambient performance by between 20% and 60%, an unacceptable amount. The Friction Pendulum bearings, after conditioning for 22 hours at - 40 degrees F., varied only 6% from ambient temperature performance.

The only isolation bearings that will give acceptable performance for the range of design temperatures at the bridge site are Friction Pendulum bearings. Earthquake Protection Systems, Inc. (EPS) is the only manufacturer for Friction Pendulum bearings.

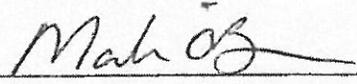
We have used this brand specific or sole source procurement on three prior contracts, the seismic retrofit for the Susitna River Bridge in 2007, the Robertson River Bridge in 2002, and the Kodiak-Near Island Bridge in 1999. Purchasing information for the Friction Pendulum Bearings we wish to use at the Nenana River Bridge is attached.

If approved, the purchase of bridge related Friction Pendulum Bearings from EPS is valid for three (3) years from the date of the Chief Contracts Officer's signature, on the condition that the Chief Bridge Engineer annually survey the market to determine if there are any other manufacturers of this type of seismic isolation device that meets the same standards as the EPS bearings.

The determination satisfies 23 CFR 635.411(a)(2) and 2 AAC 12.100. No equally suitable alternate exists and this is the only product that will satisfy the state's needs.

Approved MO

Disapproved     

  
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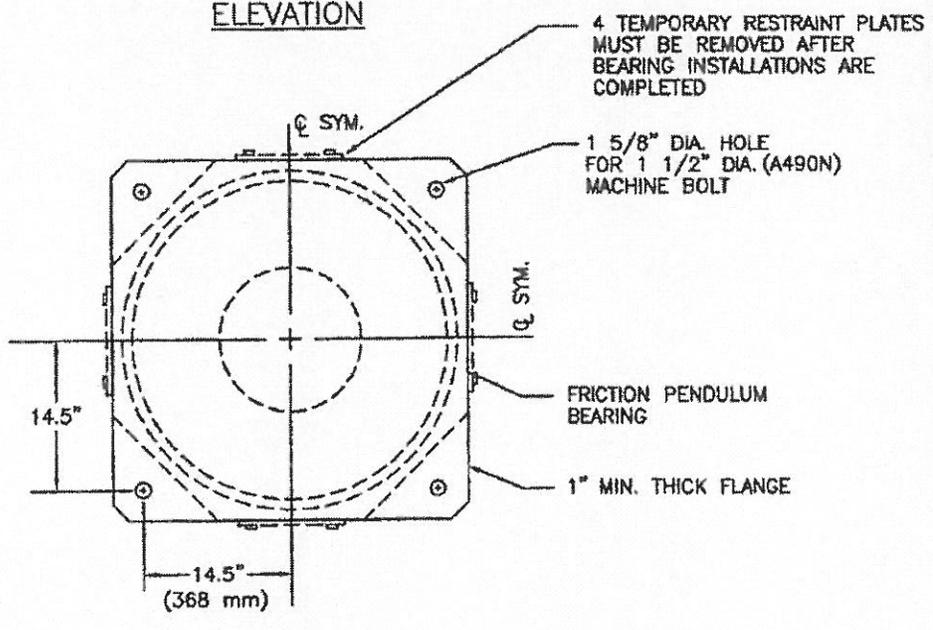
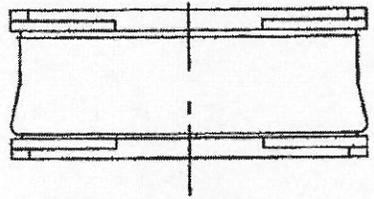
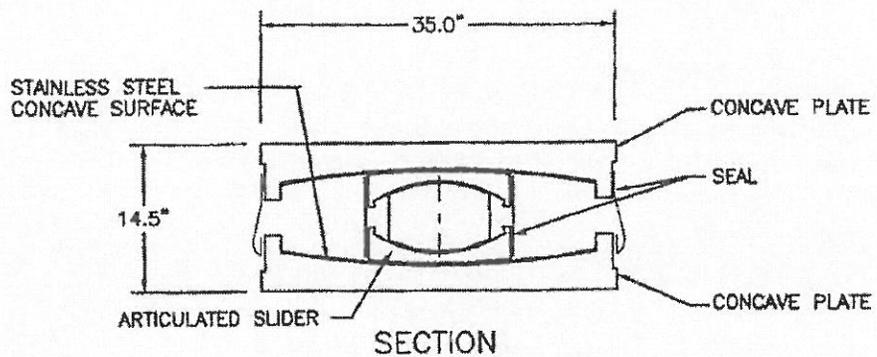
Mark O'Brien, Chief Contracts Officer

4-23-13

Date

TWA/bm

Attachments



**PLAN VIEW**

<b>FRICION PENDULUM BEARING</b> BEARING: FPT8831/14-12/10-7	<b>EARTHQUAKE PROTECTION SYSTEMS</b> VALLEJO, CALIFORNIA (707) 644-5993	
FRICION PENDULUM BEARING DESIGN FOR CHILE LNG TANKS	DATE 3/15/07	DRAWING
	SCALE	FPT8831/114-12/10-7

## BEARING SPECIFICATIONS

FPT8831/14-12/10-7

### Bearing Capacities

Lateral Displacement Capacity = 18 inches +/- 0.3 inches.

Rated Vertical Load Capacity (D+L) = 1370 kips maximum.

Rated Vertical Load Capacity (D+L+E) = 1900 kips maximum.

Rated vertical load capacities are based on concave plates bearing against 4600 psi concrete.

### Bearing Properties

Effective Period (T) = 3.0 sec +/- 0.3 sec, at 12 inch lateral displacement.

Effective Stiffness = 6.83 kips/inch +/- 0.68 kips/inch, as determined from the Quality Control Test.

Effective Damping = 30% +/- 5%, as determined from the Quality Control Test.

### Quality Control Test

The Quality Control Test shall be a three cycle compression-shear test at an average vertical test load of 599 kips +/- 59 kips, and a lateral test displacement of +/- 12.0 inches, +/- 0.5 inches. The Quality Control Test shall be performed in accordance with standard EPS testing procedures and equipment.

### Materials

The material of the concave plate shall be ASTM A536. The material of the main concave spherical surface shall be ASTM A240, Grade 304 stainless steel. The material of the slider components shall be ASTM A536, or ASTM A576 Grade 1045. The perimeter seal shall be an ethylene propylene material. Equivalent materials may be used at EPS's discretion. Material requirements, material certificates, and equivalent materials shall be in conformance with EPS's Manufacturing Standards and Specifications.

### Painting

All metal surfaces of the bearing (excluding stainless steel) that are exposed to the atmosphere shall be blasted to SSPC/SP-6, and painted with high solids epoxy paint, minimum 5 mils DFT. The top and bottom bearing surfaces that bear against concrete or steel after installation shall be painted with steel primer, minimum 1 mils DFT.

### Tolerances

The external bearing dimensions shall be within  $\pm 0.5$  in. of the values shown on the bearing drawing. The tolerance on the location of the bolt holes which are used for bearing installation shall be  $\pm 0.03$ ". The internal bearing dimensions and tolerances shall be in conformance with EPS's Manufacturing Standards and Specifications.