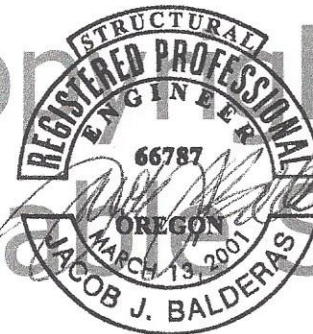
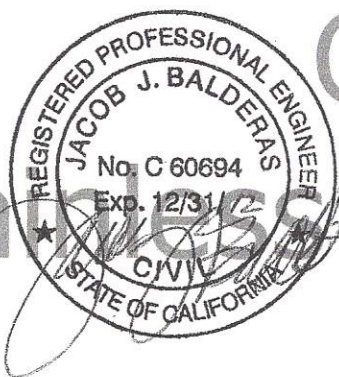


**Structural Calculations
For
Residential Cable Guardrail System
Stainless Railing Solutions**

JHI Project No. 10-1100

Date: April 11, 2012



EXPIRES: 12/31/15



Exp 4/7/15

Prepared by: Jacob Balderas, P.E., S.E.

Client: **Stainless Railing Solutions**
Project: **Residential Guardrail Calculations**
Project Number: **10-1100**
Date: **April 2012**
By: **J. Balderas**

Scope of Work

JHI Engineering, Inc. (JHI) has provided structural calculations for the termination posts, intermediate posts, corner posts, cables, connections for guardrails and handrails, and attachment to the base material (decking or concrete):

Building Codes:

- 2010 Oregon Structural Specialty Code
 - 20010 Washington State Building Code
 - 2010 California Building Code
- All state codes based on the 2009 International Building Code (IBC)
- AISC 360-05
 - NDS 2005

Materials:

- A554 Stainless Steel Grade 304
 $F_y = 40$ ksi per mill certification provided by Stainless Railing Solutions (attached herein)
- 308L-16 stainless steel covered electrode
 $F_y = 64$ ksi
- Type 316 Stainless Steel Wire Rope
 - 1x19 Strand Core
1/8" dia. with breaking strength = 1,869-lbs
3/16" dia. with breaking strength = 4,183-lbs
 - 7x7 Strand Core
1/8" dia. with breaking strength = 1,566-lbs
3/16" dia. with breaking strength = 3,293-lbs

Guardrail Loading Conditions

- Manufacturer recommended cable prestressing of 275-lbs per cable
- Uniform Load: Per 2009 IBC §16017.7.1, 50 plf applied to the handrail in any direction is applicable *only* to commercial projects with public access. Uniform loading not applicable to residential guardrails.
- Concentrated Load: Per IBC § 1607.7.1.1, 200-lb concentrated load applied to the handrail in any direction
- Per IBC § 1607.7.1.2, components including the cables shall be designed for 50-lbs applied on an area $A=1$ ft².

Guardrail System Summary

Post Height:	40.5", including base plate
End Posts:	UTP39: 2" Sq. x 0.25" wall thickness
Corner Posts:	UTP39: 2" Sq. x 0.25" wall thickness
Intermediate Posts:	UIP39: 2" Sq. x 0.138" wall thickness
Intermediate Post Spacing:	6'-0" o.c.
Maximum Termination Post spacing:	80 feet o.c.
Base Plate:	5" Sq. x 5/16" thick with 1/8" fillet weld at post
Picket:	1" Sq. x 0.062" wall thickness stainless steel tube centered in between guardrail posts
Top Rail:	3.5" x 5/4" wood with 20 Gauge 304 SS skin, <i>blocking between posts for direct bearing against posts to resist cable pretensioning</i>
Sub Rail Blocking:	1-1/2" x 2" clear grain Ipe
Wire Rope:	1x19 or 7x7
Number of cables:	12
Cable Prestressing:	275-lbs
Cable Spacing:	3"
<u>Base plate and anchorage:</u>	Concrete slab: ITW 3/8" diameter Trubolt wedge anchor with 2-5/8" embedment, spacing = 3-3/8" o.c., PL 5/16" x 5" Sq., minimum concrete edge distance = 5", minimum concrete thickness = 5".

Wood Deck: 3/8" diameter through bolts with blocking.

- Attachment of the base plate to the supporting structure is highly variable in nature. Conditions outside of those shown in the analysis must be performed by a qualified engineer.