Materials:

Channels	→ f_y= 36 ksi
Tubes	→ f_y= 46 ksi
Steel Pipes	→, f_y=35 ksi
Plates and angles	→ f_y= 36 ksi
Bolts	→ A325
Electrodes	→ E70xx

Applicable Codes:

IBC 2018

ASD 16th Edition

NAAMM 1995

Loading

Rails:

Hand rails and guardrails: Designed withstand concentrated load of 200 lb applied in any direction at any point along the top, and uniform load of 50 plf applied in any direction at the top. Uniform loads and concentrated loads do not act concurrently. Infill panels: 50 lb applied on 1 sq-ft area

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Note: Scope of this design and certification is limited to design hand rails, capacity of existing structures supporting rails are not part of this design and certification

Check Rails: Drw: E100 &E101

Check posts:

HSS 2x2 x $^{3}/_{16"}$ $Z=0.797\ in^3$

Post spacing = 4' max.

Post working height; $h=36+2-1.66/2=37.2"$

Lateral load; $P1=50x4=200$ lb

Base moment; $M=0.2x37.2=7.43$ k-in

Allowable moment $Mp=0.797x46/1.67= 21.91$ k-in➔ OK

Check post base:

4" embedment in concrete➔ OK

Check rails:

Pipe 1¼" Ø SCH 40 $Z=0.305in^3$

Post spacing = 4' max.

Moment $M1=0.050x4^2/8=0.1$ k-ft

Moment $M2=0.2x4/4=0.2$ k-ft

Allowable moment $Mp=0.305x35/1.67= 6.39/12=0.53$k-ft➔ **OK**

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