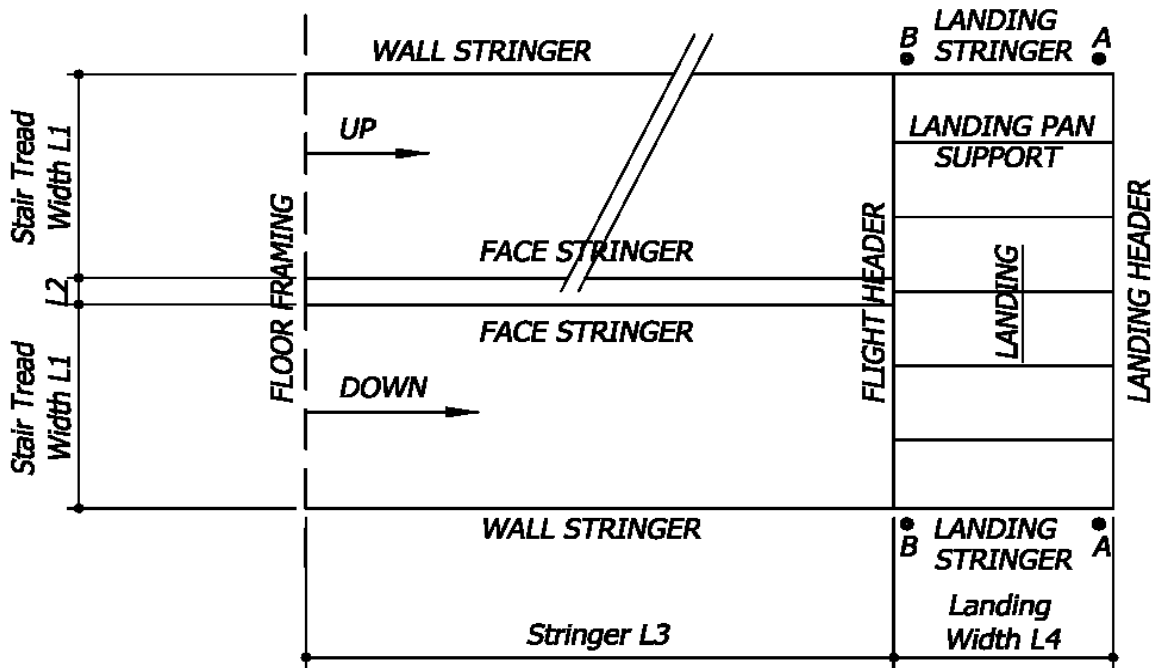


Analysis Method: **ASD**

Stair Number: Sample

Standard Stair Design
Based on 2005 Specification for Structural Steel Buildings

FRAMING AT STANDARD STAIR



Geometry

Tread Width L1 :	3.302 ft
Stringer Spacing L2 :	6.000 in
Stringer Length L3 :	10.670 ft
Landing Width L4 :	4.135 ft
Landing Pan Support Spacing:	1.900 ft
Concrete Fill at Treads :	2.00 in
Concrete Fill at Landing :	3.00 in

Loads

Treads:	Concrete = 25.00 psf
	Treads & Pans = 10.00 psf
	Misc = 5.00 psf
	Dead Load = 40.00 psf
	Live Load = 100.00 psf
Stringers:	Unif. Load = 66.04 plf
	Handrails = 50.00 plf
	Dead Load = 116.04 plf
	Live Load = 165.10 plf
	Total Load = 281.14 plf
Landing:	Concrete = 37.50 psf
	Pans = 3.00 psf
	Misc = 4.50 psf
	45.00 psf
	Live Load = 100.00 psf
	Total Load = 145.00 psf

Does Wall Stringer have Handrails?
No

Tread Design

Tread Gage =	14 GA
I =	16.60
S =	2.57
Max Imposed Load =	0.46 k
Max Tread Capacity =	9.34 k OK
Deflection =	0.016 in = L/2521

Face Stringer

max. deflection = 0.3557 in

Face Stringer Size =	MC12x14.3	Span = 10.670 ft	w = 295.44 plf	R = 1.58 k
Zx =	15.24 in ³		M = 4.20 k-ft	
Mark	Wt = 14.30 plf		$M_r/\Omega = 27.38$ k-ft	OK
S209S1	lx = 76.30 in4		deflection = 0.0389 in	= L/3288
Channel F _y :	36.00 ksi		Max Span for Strength = 27.23 ft	
F _u :	58.00 ksi		Max Span for Deflection = 18.55 ft	

Wall Stringer

max. deflection = 0.3557 in

Face Stringer Size =	MC12x14.3	Span = 10.670 ft	w = 245.44 plf	R = 1.31 k
Zx =	15.24 in ³		M = 3.49 k-ft	
Mark	Wt = 14.30 plf		$M_r/\Omega = 38.02$ k-ft	OK
S209S1	lx = 76.30 in4		deflection = 0.0323 in	= L/3958
Channel F _y :	50.00 ksi		Max Span for Strength = 35.20 ft	
F _u :	65.00 ksi		Max Span for Deflection = 19.43 ft	

Landing Pan Support

Header Size =	C4X5.4	Span = 4.135 ft	w = 280.90 plf	R = 0.58 k
Zx =	2.29		M = 0.60 k-ft	
Mark	W = 5.4		$M_r/\Omega = 4.11$ k-ft	OK
S223M1	lx = 3.85		deflection = 0.0165 in	= L/2998
b223	F _y :	36.00 ksi		
	F _u :	58.00 ksi		

Flight Header

Header Size =	C8X11.5	Span = 7.104 ft	w = 311.29 plf	R = 2.68 k
Zx =	9.63		P = 3.15 k	
Mark	W = 11.5		M = 7.56 k-ft	
S223M1	lx = 32.5		$M_r/\Omega = 20.66$ k-ft	OK
a222	F _y :	36.00 ksi	deflection = 0.0621 in	= L/1373
	F _u :	58.00 ksi		

Hanger Rod

Maximum load at B

Hanger Rod Size =	3/4	P = 5.31 k
A =	0.442 in ²	
Mark	Rod F _y :	36.00 ksi
S225M7	F _u :	58.00 ksi
	F _{nt} =	43.50 ksi
		$R_r/\Omega = 9.61$ k
		OK

Low Bracket

Bracket Size :	L6X4X1/2	e =	5.375 in	P =	5.31 plf	
Zx	7.71 in ³	M =	28.53 k-in	R _n /Ω =	68.40 k	
Mark	A	4.75 in ³	Sx	4.31 in ³	M _n /Ω =	92.91 k-in
S223M1	Angle F _y :	36.00 ksi	F _u :	58.00 ksi	Interaction =	0.385 < 1.0 OK
	Weld A =	20.00 in	Weld size req'd =	0.09 in		
	Weld S =	22.00 in ²	Weld Required =	3/16 Fillet	Both sides of angle	
	f _v =	0.27				
	f _b =	1.30				
	f _r =	1.32				

High Bracket

Bracket Size :	L5X3X3/8	P =	5.31 k
Zy	1.57 in ³	Hanger Weld to Bracket:	FBGW Effect. throat = 0.12 in
Mark	A	2.86 in ³	Equivalent Fillet Weld D = 2.65
S225M7	Sx	2.22 in ³	Weld Length required = 2.16 in
Angle F _y :	36.00 ksi	F _u :	58.00 ksi
Weld Length:	9.00 in	Weld Length furnished =	6.00 in OK for Hanger to Bracket
Tensile Yield Strength:	72.75 k	OK	
Weld Eccentricity:	0.975 in		
Weld A =	15.00 in	Weld size req'd =	0.03 in
Weld S =	21.00 in ²	Minimum Weld Required =	3/16 Fillet Bracket to Embed
f _v =	0.35		
f _b =	0.25		
f _r =	0.43		

Guard & Handrails

Posts : **Pipe1-1/4STD**
 Zx 0.31 in3
 A 0.62 in3
 Ix 0.18 in3
 Post F_y: **35.00 ksi**
 F_u: 60.00 ksi

Rails : **Pipe1-1/4STD**
 Zx 0.31 in3
 A 0.62 in3
 Ix 0.18 in3
 Rail F_y: **35.00 ksi**
 F_u: 60.00 ksi

Rail Height : **3'-6"**
 End Post Spacing : **3'-8"**
 Middle Post Spacing : **3'-8"**
 Concentrated Load : **200 lbs**
 Uniform Load : **50 lbs/ft**

C_{post} = 0.00438
 C_{rail} = 0.00418
 C_R = 0.95

Per NAAMM *Pipe Railing Systems Manual* Page 15, in lieu of looking up P_f,

At End posts 2-span Rail 0.85
 3 or more spans 0.82

At Intermediate posts 2-span Rail 0.65
 3 or more spans 0.60

End Post

Spans = **3**

M = 0.43 k-ft **OK**
 M_r/Ω = 0.53 k-ft

P_f = 0.82

Weld size req'd = 0.08 in
 Minimum Weld Required = **3/16 Fillet** Post to Channel Flange

Middle Posts

Spans = **3**

M = 0.32 k-ft **OK**
 M_r/Ω = 0.53 k-ft

P_f = 0.6

Weld size req'd = 0.06 in
 Minimum Weld Required = **3/16 Fillet** Post to Channel Flange

Rails

M = 0.11 k-ft **OK**
 M_r/Ω = 0.53 k-ft

P_f = 0.6