

Parshall Deck Remodel

December 17, 2013

Portland, OR

TABLE OF CONTENTS

SM1 – SM2	Structural Mark Ups on Architectural
C1-C2	Support Calculations
BC1 – BC4	Beam Calculations



DESIGN CRITERIA

EXPIRES: 12-31-15

See page C1 for load criteria & material specifications. Load criteria based on the 2011 Oregon Residential Specialty Code. Hansen prefabricated railing system engineered by the manufacturer to Current IRC deck railing standards. Contractor to use Hansen sub-structure approved details for the rail post base connections.

Liability Limitations

Angle Design / Scott Bowman shall not be liable for the following:

- Existing Conditions
- Site conditions or temporary support during construction.
- Quality of construction or site inspections.

ANGLE DESIGN

Scott Bowman P.E.
30421 NE Hurt Rd.
Troutdale, OR 97060
503-766-3213
angledesign@comcast.net

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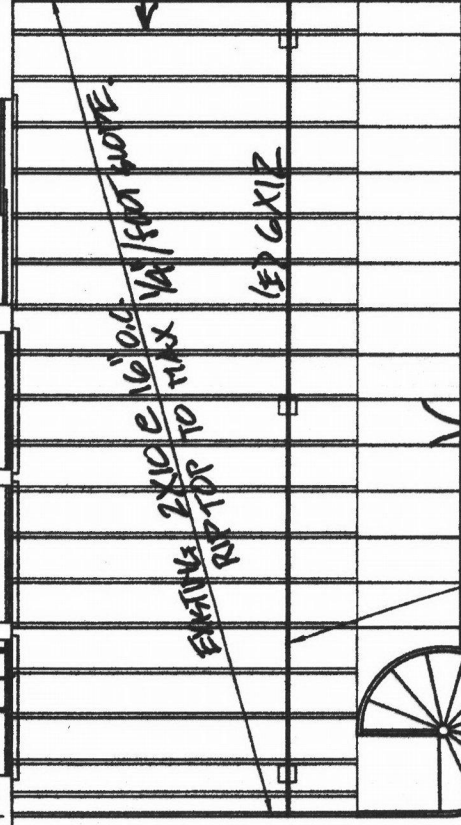
14-185349RS

SM1

NAIL NEW RIPPED 2X10'S TO EXISTING W/ ~~MIN~~ GALV 16d'S @ 12" O.C. TOP & BOTTOM (EQUIVALENT TO 6" O.C.)

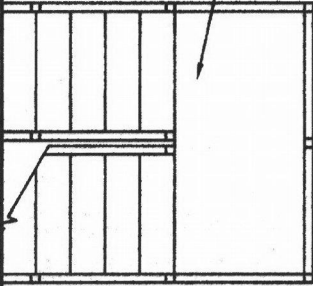
VERIFY (E) TO HAVE SIMPSON FAYREBENT HANKER (LEAVE IN PLACE)
24'-0"
PROVIDE L570'S ON OUTSIDE FACE OF NEW 2X10 CONT TO (E) LEDGER
(E) LEDGER P.T. 2X10 W/ 3/8" DIA. BOLTS @ 32" O.C. SPACED OK AS IS

EXISTING 8'-0"
2'-0"
3'-0" MAX
NEW JUST ADDED TO EXTEND DECK WIDTH TO 13'-0"



NEW JUST ADDED TO EXTEND DECK WIDTH TO 13'-0"

Stair Below



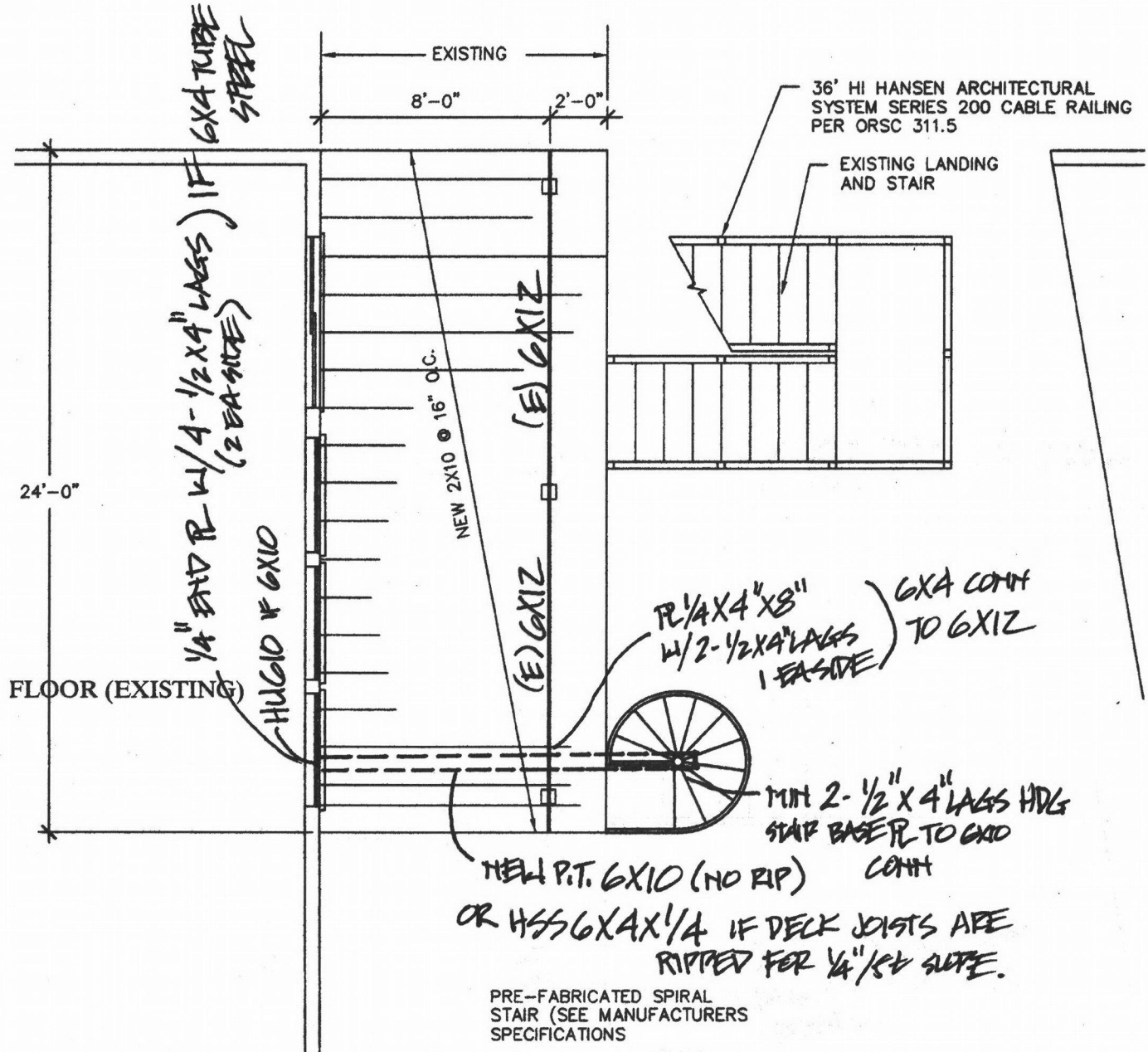
NEW SLOPE RIPPED 2X10'S - 13' LONG @ 16" O.C. FULL DEPTH @ HOUSE 6" DEPTH @ END/OUTSIDE

EXISTING 6x12 BEAM OK FOR ADDITIONAL LOAD

PRE-FABRICATED SPIRAL STAIR (SEE MANUFACTURERS SPECIFICATIONS)

SM 1 THIRD FLOOR PLAN VIEW
SCALE: 1/4" = 1'-0"

SM2



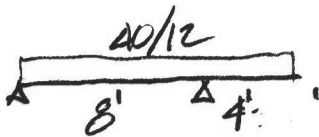
SM 2 SECOND FLOOR PLAN VIEW
 SCALE: 1/4" = 1'-0"

PARSHALL DECK EXTENSION / RETOVEL

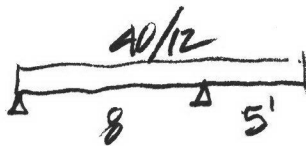
C1

LL = 40 PSF
DL = 12 PSF

UPPER FLOOR JOISTS



+M1 = 225'lb
M_e support = 440'lb
M_c 2 = -110'lb
UNBALANCED UPLIFT



+M1 = 155
M_e support = 650'lb $M/S = 7800/17.5 = 445$ PSI OK
M_c 2' = 238'lb $M/S = 298 \times 12 / 8.54 = 334$ PSI OK
M_e
UNBALANCED UPLIFT = -33

6' CASE

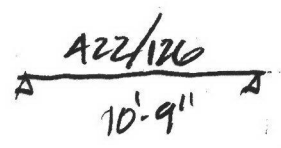
+M1 = 80
M_e support = -936
M_c 2' = -436
LATERAL UPLIFT = 69
} TOO MUCH DEFLECTION.

DEPTH SUPPORT = $9\frac{1}{4}'' - \frac{1}{4}(8) = 7\frac{1}{4}'' = 2 \times 8$ C SUPPORT @ 8" O.C.
DEPTH @ 2' OFF = $7\frac{1}{4}'' - \frac{1}{4}(2) = 6\frac{3}{4}'' \times 1.5'' @ 16" O.C.$
DEPTH @ END IF 5' = 6"
IF 4' = 6\frac{1}{4}''

APPX Δ_T @ UNBALANCED = .34" = $24/350 < 24/200$ OK

PARSHALL CONT

CHECK EXISTING GIRD W/ NEW LOAD

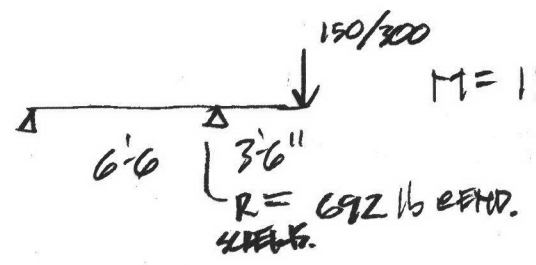
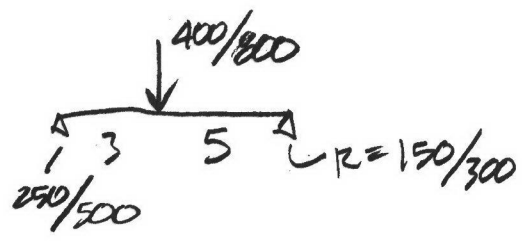


EXIST GIRD OK FOR NEW LOAD FROM EXT CANTILEVER.

SPIRAL SUPPORT

STAIR WEIGHT = 400 lbs.

ASSUME 4 200 lb MORE = 800 lb = 40 PSF ON 5' DIA



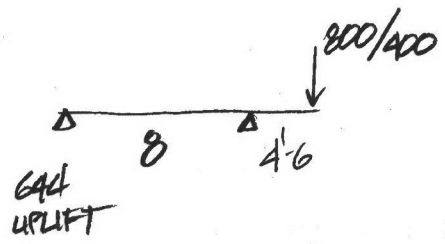
$M = 1575'$

$M/3 \text{ TEL GIRD} = 298 \text{ PSI} < 875$

$\Delta = 450(42)^3 / (3 \times 11,000)(395) = .019''$

24/4293 OK

OPTION OF STAIR ON BACK



P.T. GIRD OK

Project: PARSHALL - Location: 3rd flr deck joists

Summary:

1.5 IN x 6.75 IN x 13.0 FT (8 + 5) @ 12 O.C. / #2 - Douglas-Fir-Larch - Dry Use
 Section Adequate By: 21.2% Controlling Factor: Moment of Inertia / Depth Required 6.33 In

Center Span Deflections:

Dead Load:	DLD-Center=	-0.01	IN
Live Load:	LLD-Center=	0.06	IN = L/1602
Total Load:	TLD-Center=	-0.06	IN = L/1549

Right Cantilever Deflections:

Dead Load:	DLD-Right=	0.07	IN
Live Load:	LLD-Right=	0.28	IN = 2L/436
Total Load:	TLD-Right=	0.34	IN = 2L/351

Center Span Left End Reactions (Support A):

Live Load:	LL-Rxn-A=	160	LB
Dead Load:	DL-Rxn-A=	25	LB
Total Load:	TL-Rxn-A=	185	LB

Design For Uplift Loads (Includes Uplift Factor of Safety)

Bearing Length Required (Beam only, support capacity not checked):	Rxn-A-min=	-38	LB
	BL-A=	0.20	IN

Center Span Right End Reactions (Support B):

Live Load:	LL-Rxn-B=	422	LB
Dead Load:	DL-Rxn-B=	146	LB
Total Load:	TL-Rxn-B=	569	LB

Bearing Length Required (Beam only, support capacity not checked):	BL-B=	0.61	IN
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Dead Load Uplift F.S.:	FS=	1.0	
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Joist Data:

Center Span Length:	L2=	8.0	FT
Right Cantilever Length:	L3=	5.0	FT

Floor sheathing applied to top of joists-top of joists fully braced.
 Sheathing or Sheetrock applied to bottom of joists-bottom of joists fully braced.

Live Load Duration Factor:	Cd=	1.00	
Live Load Deflect. Criteria:	L/	360	
Total Load Deflect. Criteria:	L/	240	

Center Span Loading:

Uniform Floor Loading:

Live Load:	LL-2=	40.0	PSF
Dead Load:	DL-2=	12.0	PSF
Total Load:	TL-2=	52.0	PSF
Total Load Adjusted for Joist Spacing:	wT-2=	52	PLF

Right Cantilever Loading:

Uniform Floor Loading:

Live Load:	LL-3=	40.0	PSF
Dead Load:	DL-3=	15.0	PSF
Total Load:	TL-3=	55.0	PSF
Total Load Adjusted for Joist Spacing:	wT-3=	55	PLF

Properties For: #2- Douglas-Fir-Larch

Bending Stress:	Fb=	900	PSI
Shear Stress:	Fv=	180	PSI
Modulus of Elasticity:	E=	1600000	PSI
Adjusted Modulus of Elasticity:	E-Min=	580000	PSI
Stress Perpendicular to Grain:	Fc-perp=	625	PSI

Adjusted Properties

Fb' (Compression Face in Tension):	Fb'=	1242	PSI
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Adjustment Factors: Cd=1.00 CF=1.20 Cr=1.15

Fv':	Fv'=	180	PSI
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Adjustment Factors: Cd=1.00

Design Requirements:

Controlling Moment:

Over right support of span 2 (Center Span)	M=	-688	FT-LB
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Critical moment created by combining all dead loads and live loads on span(s) 2, 3

Controlling Shear:

At a distance d from right support of span 2 (Center Span)	V=	265	LB
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Critical shear created by combining all dead loads and live loads on span(s) 2, 3

Comparisons With Required Sections:

Section Modulus (Moment):	Sreq=	6.64	IN3
	S=	11.39	IN3
Area (Shear):	Areq=	2.21	IN2
	A=	10.13	IN2
Moment of Inertia (Deflection):	Ireq=	31.72	IN4
	I=	38.44	IN4

.Project: PARSHALL - Location: Existing deck beam

Summary:

5.5 IN x 11.5 IN x 10.75 FT / #2 - Douglas-Fir-Larch - Dry Use

Section Adequate By: 8.9% Controlling Factor: Section Modulus / Depth Required 11.02 In

Center Span Deflections:

Dead Load:	DLD-Center=	0.05	IN
Live Load:	LLD-Center=	0.14	IN = L/922
Total Load:	TLD-Center=	0.19	IN = L/693

Center Span Left End Reactions (Support A):

Live Load:	LL-Rxn-A=	2268	LB
Dead Load:	DL-Rxn-A=	751	LB
Total Load:	TL-Rxn-A=	3019	LB
Bearing Length Required (Beam only, support capacity not checked):	BL-A=	0.88	IN

Center Span Right End Reactions (Support B):

Live Load:	LL-Rxn-B=	2268	LB
Dead Load:	DL-Rxn-B=	751	LB
Total Load:	TL-Rxn-B=	3019	LB
Bearing Length Required (Beam only, support capacity not checked):	BL-B=	0.88	IN

Beam Data:

Center Span Length:	L2=	10.75	FT
Center Span Unbraced Length-Top of Beam:	Lu2-Top=	0.0	FT
Center Span Unbraced Length-Bottom of Beam:	Lu2-Bottom=	10.75	FT
Live Load Duration Factor:	Cd=	1.00	
Live Load Deflect. Criteria:	L/	360	
Total Load Deflect. Criteria:	L/	240	

Center Span Loading:

Uniform Load:

Live Load:	wL-2=	422	PLF
Dead Load:	wD-2=	126	PLF
Beam Self Weight:	BSW=	14	PLF
Total Load:	wT-2=	562	PLF

Properties For: #2- Douglas-Fir-Larch

Bending Stress:	Fb=	875	PSI
Shear Stress:	Fv=	170	PSI
Modulus of Elasticity:	E=	1300000	PSI
Adjusted Modulus of Elasticity:	E-Min=	470000	PSI
Stress Perpendicular to Grain:	Fc_perp=	625	PSI

Adjusted Properties

Fb' (Tension):	Fb'=	875	PSI
Adjustment Factors: Cd=1.00 CF=1.00			
Fv':	Fv'=	170	PSI
Adjustment Factors: Cd=1.00			

Design Requirements:

Controlling Moment:	M=	8114	FT-LB
5.375 Ft from left support of span 2 (Center Span)			
Critical moment created by combining all dead loads and live loads on span(s) 2			
Controlling Shear:	V=	2536	LB
At a distance d from right support of span 2 (Center Span)			
Critical shear created by combining all dead loads and live loads on span(s) 2			

Comparisons With Required Sections:

Section Modulus (Moment):	Sreq=	111.28	IN3
	S=	121.23	IN3
Area (Shear):	Areq=	22.38	IN2
	A=	63.25	IN2
Moment of Inertia (Deflection):	Ireq=	272.16	IN4
	I=	697.07	IN4

Project: PARSHALL - Location: spiral stair support back option steel

Summary:

HSS 6 x 4 x 1/4 x 12.5 FT (8 + 4.5) / ASTM A500-GR.B-46
 Section Adequate By: 54.2% Controlling Factor: Moment of Inertia

Center Span Deflections:

Dead Load:	DLD-Center=	-0.02	IN
Live Load:	LLD-Center=	-0.04	IN = L/2278
Total Load:	TLD-Center=	-0.06	IN = L/1529

Right Cantilever Deflections:

Dead Load:	DLD-Right=	0.10	IN
Live Load:	LLD-Right=	0.19	IN = 2L/561
Total Load:	TLD-Right=	0.29	IN = 2L/370

Center Span Left End Reactions (Support A):

Live Load:	LL-Rxn-A=	0	LB
Dead Load:	DL-Rxn-A=	-185	LB
Total Load:	TL-Rxn-A=	-185	LB

Design For Uplift Loads (Includes Uplift Factor of Safety)

Bearing Length Required (Beam only, support capacity not checked):	Rxn-A-min=	-635	LB
	BL-A=	0.00	IN

Center Span Right End Reactions (Support B):

Live Load:	LL-Rxn-B=	1250	LB
Dead Load:	DL-Rxn-B=	768	LB
Total Load:	TL-Rxn-B=	2018	LB

Bearing Length Required (Beam only, support capacity not checked):	BL-B=	0.47	IN
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Dead Load Uplift F.S.:	FS=	1.0	
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Beam Data:

Center Span Length:	L2=	8.0	FT
Center Span Unbraced Length-Top of Beam:	Lu2-Top=	0.0	FT
Center Span Unbraced Length-Bottom of Beam:	Lu2-Bottom=	8.0	FT
Right Cantilever Length:	L3=	4.5	FT
Right Cantilever Unbraced Length-Top of Beam:	Lu3-Top=	0.0	FT
Right Cantilever Unbraced Length-Bottom of Beam:	Lu3-Bottom=	4.5	FT
Live Load Deflect. Criteria:	L/	360	
Total Load Deflect. Criteria:	L/	240	

Center Span Loading:

Uniform Load:

Live Load:	wL-2=	0	PLF
Dead Load:	wD-2=	0	PLF
Beam Self Weight:	BSW=	15	PLF
Total Load:	wT-2=	15	PLF

Right Cantilever Loading:

Uniform Load:

Live Load:	wL-3=	0	PLF
Dead Load:	wD-3=	0	PLF
Beam Self Weight:	BSW=	15	PLF
Total Load:	wT-3=	15	PLF

Point Load 1

Live Load:	PL1-3=	800	LB
Dead Load:	PD1-3=	400	LB
Location (From left end of span):	X1-3=	4.5	FT

Properties for:HSS 6 x 4 x 1/4/A500-GR.B-46

Steel Yield Strength:	Fy=	46.0	KSI
Modulus of Elasticity:	E=	29000	KSI
Tube Steel Section: (X Axis):	dx=	6.00	IN
Tube Steel Section: (Y Axis):	dy=	4.00	IN
Tube Steel Wall Thickness:	t=	0.233	IN
Area:	A=	4.30	IN2
Moment of Inertia (X Axis):	Ix=	20.90	IN4
Section Modulus (X Axis):	Sx=	6.96	IN3

Design Properties per AISC Steel Construction Manual:

Flange Buckling Ratio:	FBR=	25.75	
Allowable Flange Buckling Ratio:	AFBR=	28.01	
Controlling Unbraced Length:	Lb=	8.0	FT
Limiting Unbraced Length for Fb=.66*Fy:	Lc=	8.7	FT
Allowable Bending Stress:	Fb=	30.4	KSI
Web Width to Thickness Ratio:	(dx-2*t)/t=	23.75	
Limiting Width to Thickness Ratio for Fv=.4*Fy:	AWSL=	56.03	
Allowable Shear Stress:	Fv=	18.4	KSI

Design Requirements Comparison:

Controlling Moment:	M=	-5548	FT-LB
Over right support of span 2 (Center Span)			
Critical moment created by combining all dead loads and live loads on span(s) 2, 3			
Nominal Moment Strength:	Mr=	17609	FT-LB
Controlling Shear:	V=	1266	LB
At left support of span 2 (Center Span)			
Critical shear created by combining all dead loads and live loads on span(s) 2, 3			
Nominal Shear Strength:	Vr=	47451	LB
Moment of Inertia (Deflection):	Ireq=	13.56	IN4
	I=	20.90	IN4

Project: PARSHALL - Location: spiral stair support back option

Summary:

5.5 IN x 9.5 IN x 12.5 FT (8 + 4.5) / #2 - Douglas-Fir-Larch - Wet Use

Section Adequate By: 8.9% Controlling Factor: Section Modulus / Depth Required 9.11 In

Center Span Deflections:

Dead Load:	DLD-Center=	-0.02	IN
Live Load:	LLD-Center=	-0.05	IN = L/1920
Total Load:	TLD-Center=	-0.07	IN = L/1287

Right Cantilever Deflections:

Dead Load:	DLD-Right=	0.12	IN
Live Load:	LLD-Right=	0.23	IN = 2L/473
Total Load:	TLD-Right=	0.35	IN = 2L/313

Center Span Left End Reactions (Support A):

Live Load:	LL-Rxn-A=	0	LB
Dead Load:	DL-Rxn-A=	-194	LB
Total Load:	TL-Rxn-A=	-194	LB

Design For Uplift Loads (Includes Uplift Factor of Safety)

Bearing Length Required (Beam only, support capacity not checked):	Rxn-A-min=	-644	LB
	BL-A=	0.00	IN

Center Span Right End Reactions (Support B):

Live Load:	LL-Rxn-B=	1250	LB
Dead Load:	DL-Rxn-B=	736	LB
Total Load:	TL-Rxn-B=	1986	LB

Bearing Length Required (Beam only, support capacity not checked):	BL-B=	0.86	IN
Dead Load Uplift F.S.:	FS=	1.0	

Beam Data:

Center Span Length:	L2=	8.0	FT
Center Span Unbraced Length-Top of Beam:	Lu2-Top=	0.0	FT
Center Span Unbraced Length-Bottom of Beam:	Lu2-Bottom=	8.0	FT
Right Cantilever Length:	L3=	4.5	FT
Right Cantilever Unbraced Length-Top of Beam:	Lu3-Top=	0.0	FT
Right Cantilever Unbraced Length-Bottom of Beam:	Lu3-Bottom=	4.5	FT
Live Load Duration Factor:	Cd=	1.00	
Live Load Deflect. Criteria:	L/	360	
Total Load Deflect. Criteria:	L/	240	

Center Span Loading:

Uniform Load:

Live Load:	wL-2=	0	PLF
Dead Load:	wD-2=	0	PLF
Beam Self Weight:	BSW=	11	PLF
Total Load:	wT-2=	11	PLF

Right Cantilever Loading:

Uniform Load:

Live Load:	wL-3=	0	PLF
Dead Load:	wD-3=	0	PLF
Beam Self Weight:	BSW=	11	PLF
Total Load:	wT-3=	11	PLF

Point Load 1

Live Load:	PL1-3=	800	LB
Dead Load:	PD1-3=	400	LB
Location (From left end of span):	X1-3=	4.5	FT

Properties For: #2- Douglas-Fir-Larch

Bending Stress:	Fb=	875	PSI
Shear Stress:	Fv=	170	PSI
Modulus of Elasticity:	E=	1300000	PSI
Adjusted Modulus of Elasticity:	E-Min=	470000	PSI
Stress Perpendicular to Grain:	Fc_perp=	625	PSI

Adjusted Properties

Fb' (Compression Face in Tension):	Fb'=	871	PSI
Adjustment Factors: Cd=1.00 Ci=1.00 CF=1.00			
Fv':	Fv'=	170	PSI
Adjustment Factors: Cd=1.00			
Fc'_perp:	Fc'_perp=	419	PSI
Adjustment Factors: Cm=1.00 Ci=1.00			

Design Requirements:

Controlling Moment:	M=	-5515	FT-LB
Over right support of span 2 (Center Span)			
Critical moment created by combining all dead loads and live loads on span(s) 2, 3			
Controlling Shear:	V=	1242	LB
At a distance d from left support of span 3 (Right Span)			
Critical shear created by combining all dead loads and live loads on span(s) 2, 3			

Comparisons With Required Sections:

Section Modulus (Moment):	Sreq=	76.00	IN3
	S=	82.73	IN3
Area (Shear):	Areq=	10.96	IN2
	A=	52.25	IN2
Moment of Inertia (Deflection):	Ireq=	301.64	IN4
	I=	392.96	IN4