STRUCTURAL CALCULATIONS

Project:
Pioneer Cabin
Horizon Run Road
Eden, Utah

Project Number: 9235

Prepared For:
Scandinavian
6410 N. Business Park Loop Rd. Unit E
Park City, Utah 84098

Date:
July 2019

Prepared By:
Alex Hawkins, PE

Project Manager:
David A. Jenkins, PE, SE

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Project:	Pioneer Cabin	Project No.:	9235
By:	Alex Hawkins, PE	Checked By:	DAJ
Date:	July 2019		

GENERAL PROJECT INFORMATION

Client: **Scandinavian**

Project: **Pioneer Cabin**

Project Address: **Horizon Run Road**
Eden, Utah

Latitude:	41.367	North (Approximate)
Longitude:	-111.765	West (Approximate)
Elevation above Sea Level:	8,719	ft

PROJECT DESCRIPTION

Provide structural calculations for Scandinavian Log Home

GENERAL DESIGN CRITERIA

Structure Type:	Structure Type	Building Height, h_n (ft)	24
Design Code:	2018 IBC	Number of Stories	2
Risk Category:	II	Light-frame Construction?	No

DESIGN LOADS & SERVICEABILITY REQUIREMENTS

Dead Loads:

-Roof DL:

Total Roof DL:	20	psf

-Floor DL:

Total Floor DL:	20	psf

-Wall DL:

Exterior Walls:	20	psf
Interior Bearing Walls:	15	psf
Log Walls:	30	psf

Snow Loads:

Surface Roughness Category:	C	
Roof Exposure:	Partially Exposed	
Thermal Condition:	All other structures	
Roof Surface:	Non-Slippery (Rough)	
Obstructed?	No	
Roof Pitch	7	/12
Roof Angle, θ	30.3	
Ground Snow Load, p_g:	302	psf
Exposure Factor, C_e:	1.00	
Thermal Factor, C_t:	1.00	
Importance Factor, I_s:	1.00	
Slope Factor, C_s:	0.99	
Minimum Roof Snow Load, p_m:	20	psf
Flat Roof Snow Load, p_f:	**211**	**psf (Balanced)**
Sloped Roof Snow Load, p_s:	**210**	**psf (Balanced)**
Seismic Snow Load, $p_{f,seismic}$:	**42**	**psf**

Wind Loads:

Basic Wind Speed, V:	104	mph (3-second gust)
ASD Wind Speed, V_{asd}:	81	mph (3-second gust)
Exposure:	C	

Seismic Loads:

S_S:	0.829	g
S_1:	0.287	g
Site Soil Class:	D (Default)	
Sufficient Soil Properties Known?	No	
Importance Factor, I_E:	1.00	

Live Loads:

Roof Live:	20	psf
Floor Live:	40	psf
Main Floor Corridor / Stair:	40	psf
Corridors above Main Floor:	40	psf
Balconies:	60	psf

Deflection Limits:

		Total Load	Live Load
Roof:	L /	240	360
Floor:	L /	360	480
Horizontal:	L /	--	240

Rain Loads:

Rain Intensity, I (in/hr):	1.5	

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Project:	Pioneer Cabin	Project No.:	9235
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FOUNDATION CRITERIA & SPECIFICATIONS

Geotechnical Report:

Company:	Assumed
Date:	
Report / Project Number:	
Contact:	

Allowable Bearing Pressure:	1,500	psf
Allowable Bearing Increase for Wind & Seismic Loads:	1.33	

	Static Loading	Increase for Dynamic Loading	
Passive Pressure:	300	18	pcf
Active Pressure:	45	18	pcf
At Rest Pressure:	60	18	pcf

Coefficient of Friction, μ:	0.35

Foundation Type:

Footing Type:	Concrete Spread Footing
Min. Depth to Frost:	30 in

MATERIAL SPECIFICATIONS

CONCRETE & REINFORCING STEEL SPECIFICATIONS:

Concrete Strength, f'_c:

Footings:	3,000	psi (As allowed by Utah State Code Amendment)
Concrete Walls:	4,500	psi (Buried foundation walls can be 3000 psi as allowed by Utah State Code Amendment)
Grade Beams:	4,000	psi
Slab on Grade:	4,000	psi
Bearing/Shear Walls:	4,000	psi

Deformed Reinforcing Bars:	ASTM A615 Grade 60 ASTM A706 Grade 60 Weldable Rebar is to be used where welds are specified on contract documents
Welded Wire Fabric:	ASTM A185 - Flat sheets, not rolls

STEEL FRAMING SPECIFICATIONS

Structural Steel:

W-Shape:	ASTM A992, F_y = 50 ksi
Tubing:	ASTM A500, Grade B, F_y = 46 ksi
Channels, Plates and Angles:	ASTM A36, F_y = 36 ksi
Pipe:	ASTM A53, Grade B, F_y = 35 ksi
Machine Bolts:	ASTM A307
High-strength Bolts:	ASTM A325 or A490
Welds:	E70XX Electrodes, Comply with AWS D1.1

LIGHT GAUGE STEEL FRAMING SPECIFICATIONS

Steel Studs and Tracks:

16, 14 and 12 Gauge:	ASTM A653, Grade 50 (Galvanized Specification ASTM A924)
20 and 18 Gauge:	ASTM A653, Grade 33 (Galvanized Specification ASTM A924)
Welds:	E70XX Electrodes, Comply with AWS D1.1

Project:	Pioneer Cabin	Project No.:	9235
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WOOD FRAMING SPECIFICATIONS

Unless noted otherwise, the following species and grades of lumber shall be used.

Sawn Lumber:	Species:	Douglas Fir-Larch (North)
	2x4 studs up to 8'-0" long:	Stud Grade
	2x4 studs over 8'-0" long:	Grade #2
	Other studs:	Grade #2
	Posts:	Grade #1
	Joists:	Grade #2
	Beams:	Grade #2
	Headers:	Grade #2
	Subpurlins:	Grade #2
	Purlins:	Grade #2
Glue Laminated Beams:	Species:	Douglas Fir-Larch (North)
	Simple Spans:	24F-V4
	Continuous Spans:	24F-V8
Sheathing:		APA Rated OSB
Framing Hardware:		Simpson Strong-Tie Connectors
Structural Nails:		Common Wire Type (unless noted otherwise)
Bolts in Wood:		ASTM A307

CONCRETE MASONRY UNITS

Units:	Light-weight units conforming to ASTM C90 specifications, minimum masonry compressive strength (f'_m) = 2,000 psi
Mortar:	Type S Mortar
Grout:	Greater of 2,500 psi at 28 days or f'_m + 500 psi
Deformed Reinforcing Bars:	ASTM A615 Grade 60 ASTM A706 Grade 60 Weldable Rebar is to be used where welds are specified on contract documents

Project:	Pioneer Cabin	Project No.:	9235
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SNOW DRIFT ANALYSIS - UNBALANCED SNOW LOADS FOR GABLE & HIP ROOFS

CHAPTER 7, ASCE 7-16 — *IBC 2018 / ASCE 7-16*

Design Parameters

Surface Roughness Category	C
Roof Exposure	Partially Exposed
Thermal Conditions	All other structures
Roof Surface	Non-Slippery (Rough)
Obstructed?	No
Roof Pitch	7 /12
Roof Angle, θ	30.3
Roof Type	Gable
Unbalance Roof Snow Load Analysis Required?	Yes

Ground Snow Load, p_g (psf)	302	*Utah Snow Load Study*	Snow Density, γ (pcf)	30.0	*Equation 7.7-1*
Exposure Factor, C_e	1.00	*Table 7.3-1*	Balanced Snow Load Height, h_b (ft)	7.00	p_f / γ
Thermal Factor, C_t	1.00	*Table 7.3-2*	Windward Eave to Ridge Distance, W (ft)	12.0	
Importance Factor, I_s	1.00	*Table 1.5-2*	Roof Slope Run for Rise of One, S	1.7	
Slope Factor, C_s:	0.99	*Figure 7.4-1*			
Flat Roof Snow Load, p_f (psf)	211	*Equation 7.3-1*			
Sloped Snow Load, p_s (psf):	210	*Equation 7.4-1*			

Unbalanced Roof Snow Load Analysis

Windward Snow Load (psf)	0.0
Leeward Snow Load (psf)	302.0
Leeward Surcharge Load (psf)	N/A

Drift Height, h_d (ft)	N/A	*Figure 7.6-1*
Drift Extent beyond Ridge (ft)	N/A	*Figure 7.6-2*

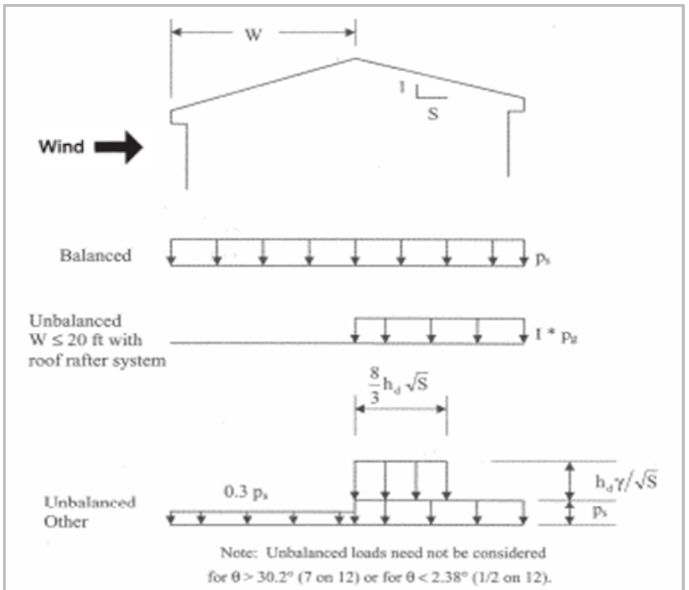

FIGURE 7.6-2 Balanced and Unbalanced Snow Loads for Hip and Gable Roofs

Project:	Pioneer Cabin	Project No.:	9235
By:	Alex Hawkins, PE	Checked By:	DAJ
Date:	July 2019		

SNOW DRIFT ANALYSIS - DRIFTS DUE TO ADJACENT STRUCTURES
RAMP

CHAPTER 7, ASCE 7-16 — *IBC 2018 / ASCE 7-16*

Design Parameters

Surface Roughness Category	C
Roof Exposure	Partially Exposed
Thermal Conditions	All other structures
Roof Surface	Non-Slippery (Rough)
Obstructed?	No
Roof Pitch	7 /12
Roof Angle, θ	30.3
Snow Drift Analysis Required?	Yes

Ground Snow Load, p_g (psf)	302	*Utah Snow Load Study*	Snow Density, γ (pcf)	30.0	*Equation 7.7-1*
Exposure Factor, C_e	1.00	*Table 7.3-1*	Balanced Snow Load Height, h_b (ft)	7.00	*p_f / γ*
Thermal Factor, C_t	1.00	*Table 7.3-2*	Horizontal Separation, s (ft)	0.0	
Importance Factor, I_s	1.00	*Table 1.5-2*	Vertical Separation, h (ft)	11.0	
Slope Factor, C_s:	0.99	*Figure 7.4-1*	Length of Upper Roof, L_u (ft)	48.0	
Flat Roof Snow Load, p_f (psf)	211	*Equation 7.3-1*	Length of Lower Roof, L_L (ft)	32.0	
Sloped Snow Load, p_s (psf):	210	*Equation 7.4-1*			

Snow Drift Analysis

Full Windward Drift Height, $h_{d,full\ windward}$ (ft)	3.18	*Section 7.7.1*
runcated Windward Drift Height, $h_{d,windward}$ (ft)	3.18	*Figure C7.7-3*
Full Leeward Drift Height, $h_{d,full\ leeward}$ (ft)	5.07	*Section 7.7.1*
Leeward Drift Height, $h_{d,leeward}$ (ft)	5.07	*Figure C7.7-3*
h_c (ft)	4.00	*h_r - h_b*
Design Drift Height, h_d (ft)	**4.00**	*Section 7.7.1*
Design Drift Width, w (ft)	**30.41**	*Section 7.7.1*
Maximum Drift Surcharge Load, p_d (psf)	**120.01**	*Section 7.7.1*

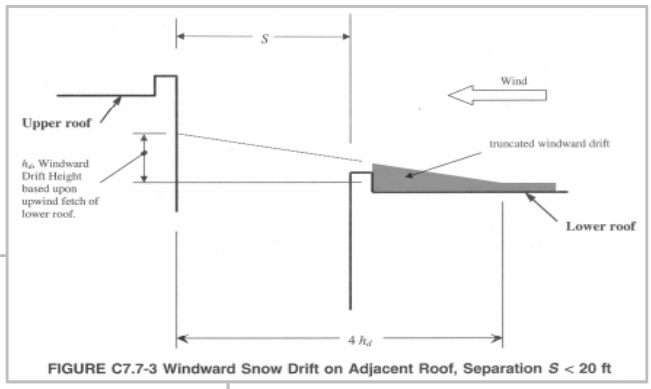

FIGURE C7.7-3 Windward Snow Drift on Adjacent Roof, Separation S < 20 ft

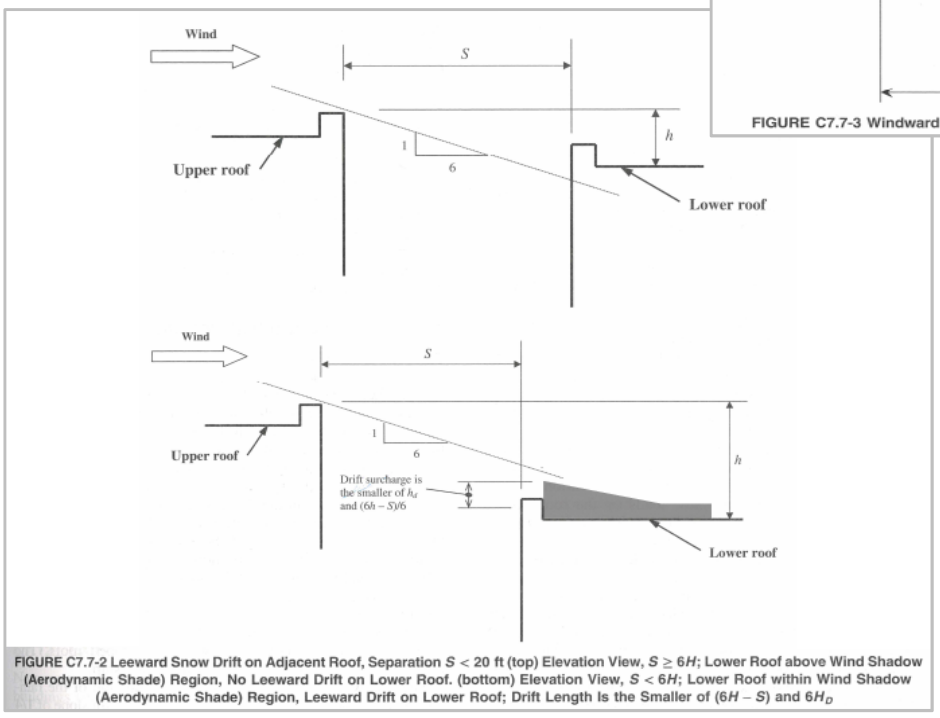

FIGURE C7.7-2 Leeward Snow Drift on Adjacent Roof, Separation S < 20 ft (top) Elevation View, $S \geq 6H$; Lower Roof above Wind Shadow (Aerodynamic Shade) Region, No Leeward Drift on Lower Roof. (bottom) Elevation View, $S < 6H$; Lower Roof within Wind Shadow (Aerodynamic Shade) Region, Leeward Drift on Lower Roof; Drift Length Is the Smaller of $(6H - S)$ and $6H_D$

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By: Alex Hawkins, PE | Checked By: DAJ
Date: July 2019

SEISMIC FORCE ANALYSIS - EQUIVALENT LATERAL FORCE PROCEDURE

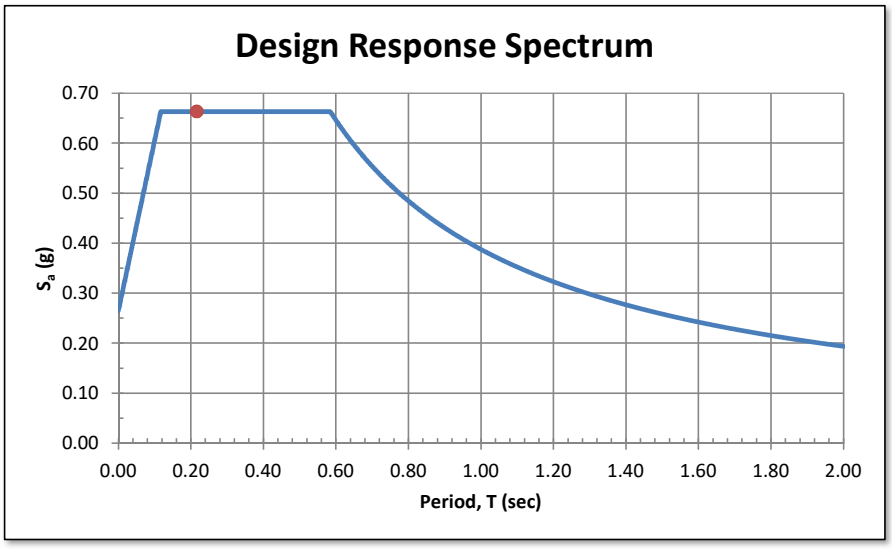
CHAPTER 12, ASCE 7-16 — *IBC 2018 / ASCE 7-16*

Design Parameters

Risk Category	II	*Table 1604.5*	Structure Type	All other structural systems	
Importance Factor, I_E	1.00	*Table 1.5-2*	T_0 (sec)	0.117	*Section 11.4.6*
Sufficient Soil Properties Known?	No		T_S (sec)	0.585	*Section 11.4.6*
S_S (g)	0.829	*Mapped*	T_L (sec)	8	*Section 11.4.6*
S_1 (g)	0.287	*Mapped*	S_a (g)	N/A	*if $T<T_0$ (Equation 11.4-5)*
Site Class	D (Default)	*Geotech Report*	S_a (g)	0.663	*$T_0<T<T_S$ (Section 11.4-6)*
F_a	1.20	*Table 1613.2.3(1)*	S_a (g)	N/A	*$T_S<T<T_L$ (Equation 11.4-7)*
F_v	2.03	*Table 1613.2.3(2)*	C_t	0.02	*Table 12.8-2*
S_{MS} (g)	0.995	*$F_a S_S$*	x	0.75	*Table 12.8-2*
S_{M1} (g)	0.581	*$F_v S_1$*	T_a (sec)	0.217	*Equation 12.8-7*
S_{DS} (g)	0.663	*2/3(S_{MS})*	Response Modification Factor, R	2.5	*Table 12.2-1*
S_{D1} (g)	0.388	*2/3(S_{M1})*	Overstrength Factor, Ω_0	2.5	*Table 12.2-1*
Seismic Design Category	D	*Table 1613.2.5(1,2)*	$C_{S,Calculated}$	0.265	*Equation 12.8-2*
Building Height, h_n (ft)	24		$C_{S\ MAX}$	0.715	*Equation 12.8-3 & 12.8-4*
Number of Stories	2		$C_{S\ MIN}$	0.029	*Equation 12.8-5 & 12.8-6*
Light-frame Construction?	No		**C_S**	**0.265**	*Section 12.8.1.1*

Vertical Distribution of Seismic Forces

Component	Unit Weight (psf)	Area (ft^2)	Weight, w_i (kips)	Elevation, h_i (ft)	$w_i h_i^k$ (kip-ft)	F_i (kips)	$0.7F_i$ (kips)
Roof Level:			-		-	-	-
Roof + Seismic Snow	62	1,152	71.75	24	1,721.92	25.11	17.58
N & S Elevation Walls	30	240	7.20	24	172.80	2.52	1.76
E & W Elevation Walls	30	480	14.40	24	345.60	5.04	3.53
Main Level:			-		-	-	-
Level 3 Floor	20	1,152	23.04	10	230.40	3.36	2.35
N & S Elevation Walls	30	480	14.40	10	144.00	2.10	1.47
E & W Elevation Walls	30	960	28.80	10	288.00	4.20	2.94
			-		-	-	-
			-		-	-	-
			-		-	-	-
			-		-	-	-
		Σw_i	160	$\Sigma w_i h_i^k$	2,903	**V_x (kips)**	**42.34**
Notes:				k	1	$0.7V_x$ (kips)	29.63



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By: Alex Hawkins, PE | Checked By: DAJ
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SEISMIC FORCE ANALYSIS - DIAPHRAGM FORCES

CHAPTER 12, ASCE 7-16 — *IBC 2018 / ASCE 7-16*

Design Parameters

Risk Category	II	*Table 1604.5*	S_{DS} (g)	0.663	*2/3(S_{MS})*
S_S (g)	0.829	*Mapped*	S_{D1} (g)	0.388	*2/3(S_{M1})*
S_1 (g)	0.287	*Mapped*	Seismic Design Category	D	*Table 1613.2.5(1,2)*
Site Class	D (Default)	*Geotech Report*	Importance Factor, I_E	1.00	*Table 1.5-2*

Diaphragm Design Forces - North-South Direction

Level	Strength Level F_i (k)	Sum F_i (k)	w_{px} (k)	Sum w_i (k)	F_{px} (k) *Eq. 12.10-1*	$F_{px,min}$ (k) *Eq. 12.10-2*	$F_{px,max}$ (k) *Eq. 12.10-3*	**LRFD: $F_{px,design}$ (k)**	Scale Factor F_{px} / F_x
Roof	27.63	27.6	78.95	78.9	27.6	10.5	20.9	**20.9**	1.00
Main	5.46	33.1	37.44	116.4	10.6	5.0	9.9	**9.9**	1.82
		-		-	-	-	-	**-**	-
		-		-	-	-	-	**-**	-
		-		-	-	-	-	**-**	-
		-		-	-	-	-	**-**	-
		-		-	-	-	-	**-**	-
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		-		-	-	-	-	**-**	-
		-		-	-	-	-	**-**	-

Diaphragm Design Forces - East-West Direction

Level	Strength Level F_i (k)	Sum F_i (k)	w_{px} (k)	Sum w_i (k)	F_{px} (k) *Eq. 12.10-1*	$F_{px,min}$ (k) *Eq. 12.10-2*	$F_{px,max}$ (k) *Eq. 12.10-3*	**LRFD: $F_{px,design}$ (k)**	Scale Factor F_{px} / F_x
Roof	30.15	30.2	86.15	86.1	30.2	11.4	22.9	**22.9**	1.00
Main	7.56	37.7	51.84	138.0	14.2	6.9	13.8	**13.8**	1.82
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		-		-	-	-	-	**-**	-
		-		-	-	-	-	**-**	-
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		-		-	-	-	-	**-**	-
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SEISMIC FORCE ANALYSIS - STRUCTURAL WALLS AND THEIR ANCHORAGE

CHAPTER 12, ASCE 7-16 — *IBC 2018 / ASCE 7-16*

Design Parameters

Risk Category	II	*Table 1604.5*
Importance Factor, I_E	1.00	*Table 1.5-2*
Sufficient Soil Properties Known?	No	
S_S (g)	0.829	*Mapped*
S_1 (g)	0.287	*Mapped*
Site Class	D (Default)	*Geotech Report*
F_a	1.20	*Table 1613.2.3(1)*
F_v	2.03	*Table 1613.2.3(2)*
S_{MS} (g)	0.995	$F_a S_S$
S_{M1} (g)	0.581	$F_v S_1$
S_{DS} (g)	0.663	$2/3(S_{MS})$
S_{D1} (g)	0.388	$2/3(S_{M1})$
Seismic Design Category	D	*Table 1613.2.5(1,2)*
Building Height, h_n (ft)	24	
Number of Stories	2	
Light-frame Construction?	No	

Calculation Comments:

Out-of-Plane Forces on Structural Walls and their Anchorage

Component	*12.11.1 - Wall Forces*		*12.11.2 - Anchorage Forces*				
	Unit Weight (psf)	**Unit Force, f_p (psf)**	Diaphragm Length, L_f (ft)	Trib. Wall Height (ft)	Trib. Wall Width (ft)	Amplification Factor, k_a	**Wall Anchor Force, F_p (lb)**
		-				-	-
Log Wall	30	**8.0**	48	10	2	1.48	**236**
		-				-	-
		-				-	-
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WIND FORCE ANALYSIS - DIRECTIONAL PROCEDURE

CHAPTER 27 (PART 1), ASCE 7-16 — *IBC 2018 / ASCE 7-16*

Design Parameters

Basic Wind Speed, V (mph)	104	*Section 26.5*	K_{zt} Factor Applicable?	No	
Exposure Category	C	*Section 26.7*	Height of Hill or Ridge, H (ft)	N/A	*Table 26.8-1*
Ground Elevation (ft)	8,719		L_h (ft)	N/A	*Table 26.8-1*
Enclosure Classification	Enclosed	*Section 26.2*	H / L_h	0.00	
Positive / Negative?	Positive		x (ft)	N/A	*Table 26.8-1*
Internal Press. Coef., GC_{pi}	0.18	*Table 26.13-1*	Horizontal Attenuation, μ	N/A	*Table 26.8-1*
Mean Roof Height, h (ft)	24		Height Attenuation, γ	N/A	*Table 26.8-1*
Building Length, L (ft)	48		K_1 / (H / L_h)	N/A	*Table 26.8-1*
Building Width, B (ft)	24		K_1	0.00	*Table 26.8-1*
L/B	2.00		K_2	0.00	*Table 26.8-1*
h/L	0.50		K_3	0.00	*Table 26.8-1*
Roof Pitch	7	/12	Topographic Factor, K_{zt} at h	1.00	*Section 26.8*
Roof Angle, θ	30.3		Wind Directionality Factor, K_d	0.85	*Section 26.6*
Terrain Constant, α	9.5	*Table 26.11-1*	Ground Elevation Factor, K_e	0.73	*Section 26.9*
Terrain Constant, z_g (ft)	900	*Table 26.11-1*	Gust Effect Factor, G	0.85	*Section 26.11*
Exposure Coefficient, K_h	0.937	*Table 26.10-1*	**Velocity Pressure, q_h (psf)**	**16.09**	*Equation 26.10-1*

MWFRS Wind Pressure Analysis

				Pressure Coefficients, C_p	*Walls*			*Parapets*	
					Windward	Leeward	Side	Windward	Leeward
					0.80	-0.30	-0.70	1.50	-1.00
Surface Mark	Surface Type	z (ft)	K_z	q_z (psf)	Wind Pressure, p (psf)				
Gable	Wall	24	0.937	16.1	8.04	-7.00	-12.47	-	-
Upper Wall	Wall	20	0.902	15.5	7.63	-7.00	-12.47	-	-
Main Wall	Wall	10	0.849	14.6	7.01	-7.00	-12.47	-	-
			-	-	-	-	-	-	-
			-	-	-	-	-	-	-
			-	-	-	-	-	-	-

Roof Type	Pressure Coefficients, C_p	*Roof*						
		Normal to Ridge for θ ≥ 10°		Parallel to Ridge for all θ				Windward Overhang
Gable		Windward	Leeward	0 to h/2	h/2 to h	h to 2h	> 2h	
		-0.20	-0.60	-0.90	-0.90	-0.50	-0.30	
		0.21	-0.60	-0.18	-0.18	-0.18	-0.18	0.80
Surface Mark	Surface Type	Wind Pressure, p (psf)						
Gable	Wall	-	-	-	-	-	-	-
Upper Wall	Wall	-	-	-	-	-	-	-
Main Wall	Wall	-	-	-	-	-	-	-
-		-	-	-	-	-	-	-
-		-	-	-	-	-	-	-
-		-	-	-	-	-	-	-

Surface Forces

North-South, Positive Internal Pressure

Surface Mark	Surface Type	Windward or Leeward Surface?	Projected Horizontal Pressure, p (psf)	Tributary Height (ft)	Unit Force (plf)	Surface Width, W (ft)	Force (kips)	
Gable	Wall	Both	16.00	4	64.0	24	1.5	
Upper Wall	Wall	Both	16.00	5	80.0	24	1.9	Total Design Base Shear
Main Wall	Wall	Both	16.00	10	160.0	24	3.8	
-		Both	-		-		-	LRFD / ASD
-		Both	-		-		-	V_x (kips) / $0.6V_x$ (kips)
-		Both	-		-		-	**7.3** / **4.4**

ENSIGN
THE STANDARD IN ENGINEERING

Project: Pioneer Cabin | Project No.: 9235
By: Alex Hawkins, PE | Checked By: DAJ
Date: July 2019

WIND FORCE ANALYSIS - DIRECTIONAL PROCEDURE

CHAPTER 27 (PART 1), ASCE 7-16 — *IBC 2018 / ASCE 7-16*

Design Parameters

Basic Wind Speed, V (mph)	104	*Section 26.5*	K_{zt} Factor Applicable?	No	
Exposure Category	C	*Section 26.7*	Height of Hill or Ridge, H (ft)	N/A	*Table 26.8-1*
Ground Elevation (ft)	8,719		L_h (ft)	N/A	*Table 26.8-1*
Enclosure Classification	Enclosed	*Section 26.2*	H / L_h	0.00	
Positive / Negative?	Positive		x (ft)	N/A	*Table 26.8-1*
Internal Press. Coef., GC_{pi}	0.18	*Table 26.13-1*	Horizontal Attenuation, μ	N/A	*Table 26.8-1*
Mean Roof Height, h (ft)	24		Height Attenuation, γ	N/A	*Table 26.8-1*
Building Length, L (ft)	24		K_1 / (H / L_h)	N/A	*Table 26.8-1*
Building Width, B (ft)	48		K_1	0.00	*Table 26.8-1*
L/B	0.50		K_2	0.00	*Table 26.8-1*
h/L	1.00		K_3	0.00	*Table 26.8-1*
Roof Pitch	7	/12	Topographic Factor, K_{zt} at h	1.00	*Section 26.8*
Roof Angle, θ	30.3		Wind Directionality Factor, K_d	0.85	*Section 26.6*
Terrain Constant, α	9.5	*Table 26.11-1*	Ground Elevation Factor, K_e	0.73	*Section 26.9*
Terrain Constant, z_g (ft)	900	*Table 26.11-1*	Gust Effect Factor, G	0.85	*Section 26.11*
Exposure Coefficient, K_h	0.937	*Table 26.10-1*	**Velocity Pressure, q_h (psf)**	**16.09**	*Equation 26.10-1*

MWFRS Wind Pressure Analysis

				Pressure Coefficients, C_p	*Walls*			*Parapets*	
					Windward	Leeward	Side	Windward	Leeward
					0.80	-0.50	-0.70	1.50	-1.00
Surface Mark	Surface Type	z (ft)	K_z	q_z (psf)	Wind Pressure, p (psf)				
Roof	Wall	24	0.937	16.1	8.04	-9.73	-12.47	-	-
Upper Wall	Wall	20	0.902	15.5	7.63	-9.73	-12.47	-	-
Main Wall	Wall	10	0.849	14.6	7.01	-9.73	-12.47	-	-
			-	-	-	-	-	-	-
			-	-	-	-	-	-	-
			-	-	-	-	-	-	-

Roof Type	Pressure Coefficients, C_p	*Roof*						
		Normal to Ridge for θ ≥ 10°		Parallel to Ridge for all θ				Windward Overhang
Gable		Windward	Leeward	0 to h/2	h/2 to h	h to 2h	> 2h	
		-0.29	-0.60	-1.30	-0.70	-0.70	-0.70	
		0.20	-0.60	-0.18	-0.18	-0.18	-0.18	0.80
Surface Mark	Surface Type	Wind Pressure, p (psf)						
Roof	Wall	-	-	-	-	-	-	-
Upper Wall	Wall	-	-	-	-	-	-	-
Main Wall	Wall	-	-	-	-	-	-	-
-		-	-	-	-	-	-	-
-		-	-	-	-	-	-	-
-		-	-	-	-	-	-	-

Surface Forces

East-West, Positive Internal Pressure

Surface Mark	Surface Type	Windward or Leeward Surface?	Projected Horizontal Pressure, p (psf)	Tributary Height (ft)	Unit Force (plf)	Surface Width, W (ft)	Force (kips)	
Roof	Wall	Both	17.78	8	142.2	48	6.8	
Upper Wall	Wall	Both	17.36	5	86.8	48	4.2	Total Design Base Shear
Main Wall	Wall	Both	16.75	10	167.5	48	8.0	
-		Both	-		-		-	LRFD
-		Both	-		-		-	V_x (kips)
-		Both	-		-		-	**19.0**

ASD
$0.6V_x$ (kips)
11.4

ENSIGN
THE STANDARD IN ENGINEERING

Project: Pioneer Cabin | Project No.: 9235
By: Alex Hawkins, PE | Checked By: DAJ
Date: July 2019

WIND FORCE ANALYSIS - COMPONENTS & CLADDING

CHAPTER 30, ASCE 7-16 — *IBC 2018 / ASCE 7-16*

Design Parameters

Basic Wind Speed, V (mph)	104	*Section 26.5*	K_{zt} Factor Applicable?	No	
Exposure Category	C	*Section 26.7*	Height of Hill or Ridge, H (ft)	N/A	*Table 26.8-1*
Ground Elevation (ft)	8,719		L_h (ft)	N/A	*Table 26.8-1*
Enclosure Classification	Enclosed	*Section 26.2*	H / L_h	0.00	
Positive / Negative?	Positive		x (ft)	N/A	*Table 26.8-1*
Internal Press. Coef., GC_{pi}	0.18	*Table 26.13-1*	Horizontal Attenuation, μ	N/A	*Table 26.8-1*
Mean Roof Height, h (ft)	24		Height Attenuation, γ	N/A	*Table 26.8-1*
Building Length, L (ft)	48		$K_1 / (H / L_h)$	N/A	*Table 26.8-1*
Building Width, B (ft)	24		K_1	0.00	*Table 26.8-1*
h/B	1.00		K_2	0.00	*Table 26.8-1*
Roof Type	Gable		K_3	0.00	*Table 26.8-1*
Roof Pitch	7	/12	Topographic Factor, K_{zt} at h	1.00	*Section 26.8*
Roof Angle, θ	30.3		Wind Directionality Factor, K_d	0.85	*Section 26.6*
Is there a Parapet?	No		Ground Elevation Factor, K_e	0.73	*Section 26.9*
Parapet Height, h_p (ft)	N/A		**Velocity Pressure, q_h (psf)**	**16.09**	*Equation 26.10-1*
Terrain Constant, α	9.5	*Table 26.11-1*	Exposure Coefficient, K_p	N/A	*Table 26.10-1*
Terrain Constant, z_g (ft)	900	*Table 26.11-1*	Topographic Factor, K_{zt} at h_p	N/A	*Section 26.8*
Exposure Coefficient, K_h	0.937	*Table 26.10-1*	**Velocity Pressure, q_p (psf)**	**N/A**	*Equation 26.10-1*

External Pressure Coefficients, GC_p

Location		TRIBUTARY AREA (ft^2)				
		< 10	20	50	100	>500
Walls	Zone 5: Within 3-ft of building corner	-1.4	-1.3	-1.2	-1.1	-0.8
	Zone 4: All other areas	-1.1	-1.1	-1.0	-0.9	-0.8
	Zone 4 & 5: Positive Pressures	1.0	1.0	0.9	0.8	0.7
Roof	Zone 3e: Within 3-ft of roof corners	-3.2	-2.2	-1.8	-1.5	-1.0
	Zone 3r & 2n: Within 3-ft of roof ridge at gable ends & within 3-f	-2.0	-1.8	-1.5	-1.3	-1.0
	Zone 2r, 2e & 1: Within 3-ft of roof ridge, roof edge & in roof fiel	-1.8	-1.5	-1.1	-0.8	-0.8
	All Zones: Positive Pressures	0.9	0.8	0.6	0.5	0.5
	N/A	-	-	-	-	-
	N/A	-	-	-	-	-

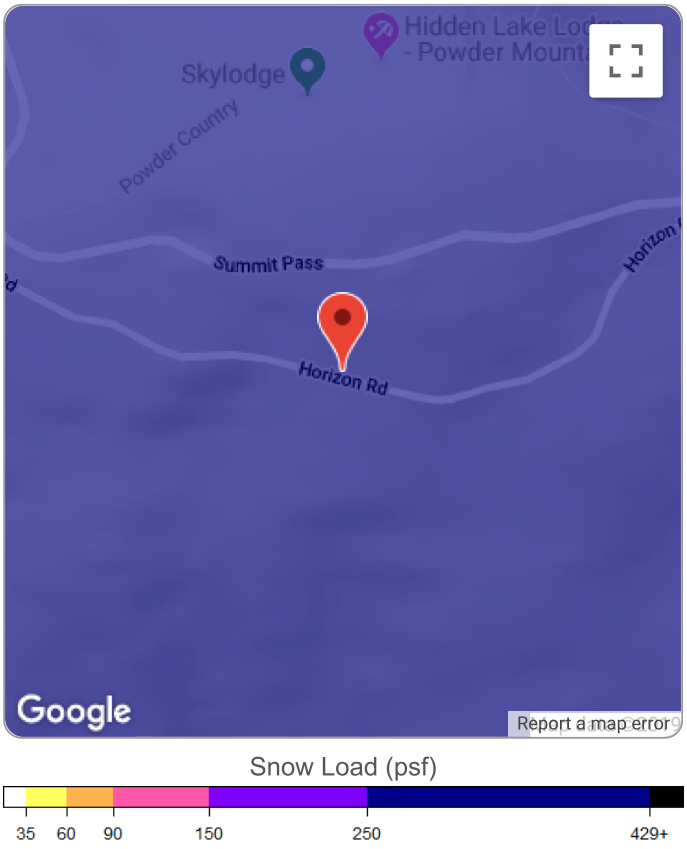
Component & Cladding Design Wind Pressure

Location			Tributary Area (ft^2)				
			< 10	20	50	100	>500
Walls	Zone 5: Within 3-ft of building corner		-25.4	-23.8	-21.4	-19.8	-16.0
	Zone 4: All other areas		-20.6	-19.8	-19.0	-17.8	-16.0
	Zone 4 & 5: Positive Pressures		16.0	16.0	16.0	16.0	16.0
Roof	Zone 3e: Within 3-ft of roof corners		-54.4	-38.3	-31.9	-27.0	-19.0
	Zone 3r & 2n: Within 3-ft of roof ridge at gable ends & within 3-f		-35.1	-31.9	-27.0	-23.0	-19.0
	Zone 2r, 2e & 1: Within 3-ft of roof ridge, roof edge & in roof fiel		-31.9	-27.0	-20.6	-16.0	-16.0
	All Zones: Positive Pressures		16.0	16.0	16.0	16.0	16.0
	N/A		-	-	-	-	-
	N/A		-	-	-	-	-
Parapets	N/A	A	-	-	-	-	-
		B	-	-	-	-	-
	N/A	A	-	-	-	-	-
		B	-	-	-	-	-

2018 Utah Ground Snow Load Map

Latitude: 41.367
Longitude: -111.765
Elevation: 8,397 ft

Ground Snow Load:
302 psf / 14.49 kPa



Snow Load (psf)

35 60 90 150 250 429+

*This document is not legally binding. The user is urged to verify ground snow load values with the local authority having jurisdiction.

These ground snow load values represent 50-year ground snow load estimated value at a 2% probability of exceedance for the location given. The grid used in the map is 3350ft by 3350ft. Elevations for these grid cells were estimated by aggregating data from 100ft by 100ft USGS digital elevation models and may not coincide with the actual site elevation. These predictions are calculated using the process outlined in The Utah Snow Load Study.1

Final predictions given are bounded at a lower limit for a minimum ground snow load of 21 psf to meet ASCE 7. Estimated values for snow loads at elevations significantly higher than all nearby stations lead to unreasonably high snow load estimates, therefore, the predictions in the map are not allowed to extend beyond the highest 50-year station ground snow load of 429 psf. Elevations over 9,000 ft are also considered less accurate due to the limited number of stations at these elevations. The results shown in this report have included a warning if the results have reached or exceeded the upper limit.

While great efforts have been made to ensure these predictions are as accurate as possible, designers must use expert judgement to ensure that such predictions are appropriate for their particular project. The SEAU and the authors cannot accept responsibility for prediction errors or any consequences resulting therefrom.

1 Bean, Brennan; Maguire, Marc; and Sun, Yan, "The Utah Snow Load Study" (2018). Civil and Environmental Engineering Faculty Publications. Paper 3589.

Hazards by Location

Search Information

Coordinates: 41.367, -111.765

Elevation: 8719 ft

Timestamp: 2019-07-16T16:00:38.828Z

Hazard Type: Seismic

Reference Document: ASCE7-16

Risk Category: II

Site Class: D-default

Basic Parameters

Name	Value	Description
S_S	0.829	MCE_R ground motion (period=0.2s)
S_1	0.287	MCE_R ground motion (period=1.0s)
S_{MS}	0.994	Site-modified spectral acceleration value
S_{M1}	* null	Site-modified spectral acceleration value
S_{DS}	0.663	Numeric seismic design value at 0.2s SA
S_{D1}	* null	Numeric seismic design value at 1.0s SA

* See Section 11.4.8

Additional Information

Name	Value	Description
SDC	* null	Seismic design category
F_a	1.2	Site amplification factor at 0.2s
F_v	* null	Site amplification factor at 1.0s
CR_S	0.897	Coefficient of risk (0.2s)
CR_1	0.897	Coefficient of risk (1.0s)
PGA	0.362	MCE_G peak ground acceleration
F_{PGA}	1.238	Site amplification factor at PGA
PGA_M	0.448	Site modified peak ground acceleration
T_L	8	Long-period transition period (s)
SsRT	0.829	Probabilistic risk-targeted ground motion (0.2s)
SsUH	0.924	Factored uniform-hazard spectral acceleration (2% probability of exceedance in 50 years)
SsD	1.764	Factored deterministic acceleration value (0.2s)

SsD	1.764	Factored deterministic acceleration value (0.2s)
S1RT	0.287	Probabilistic risk-targeted ground motion (1.0s)
S1UH	0.32	Factored uniform-hazard spectral acceleration (2% probability of exceedance in 50 years)
S1D	0.772	Factored deterministic acceleration value (1.0s)
PGAd	0.69	Factored deterministic acceleration value (PGA)

* See Section 11.4.8

The results indicated here DO NOT reflect any state or local amendments to the values or any delineation lines made during the building code adoption process. Users should confirm any output obtained from this tool with the local Authority Having Jurisdiction before proceeding with design.

Disclaimer

Hazard loads are provided by the U.S. Geological Survey Seismic Design Web Services.

While the information presented on this website is believed to be correct, ATC and its sponsors and contributors assume no responsibility or liability for its accuracy. The material presented in the report should not be used or relied upon for any specific application without competent examination and verification of its accuracy, suitability and applicability by engineers or other licensed professionals. ATC does not intend that the use of this information replace the sound judgment of such competent professionals, having experience and knowledge in the field of practice, nor to substitute for the standard of care required of such professionals in interpreting and applying the results of the report provided by this website. Users of the information from this website assume all liability arising from such use. Use of the output of this website does not imply approval by the governing building code bodies responsible for building code approval and interpretation for the building site described by latitude/longitude location in the report.

Hazards by Location

Search Information

Coordinates: 41.367, -111.765

Elevation: 8719 ft

Timestamp: 2019-07-16T15:17:47.669Z

Hazard Type: Wind

ASCE 7-16

MRI 10-Year	74 mph
MRI 25-Year	80 mph
MRI 50-Year	85 mph
MRI 100-Year	90 mph
Risk Category I	98 mph
Risk Category II	104 mph
Risk Category III	110 mph
Risk Category IV	114 mph

ASCE 7-10

MRI 10-Year	76 mph
MRI 25-Year	84 mph
MRI 50-Year	90 mph
MRI 100-Year	96 mph
Risk Category I	105 mph
Risk Category II	115 mph
Risk Category III-IV	120 mph

ASCE 7-05

ASCE 7-05 Wind Speed	90 mph

The results indicated here DO NOT reflect any state or local amendments to the values or any delineation lines made during the building code adoption process. Users should confirm any output obtained from this tool with the local Authority Having Jurisdiction before proceeding with design.

Disclaimer

Hazard loads are interpolated from data provided in ASCE 7 and rounded up to the nearest whole integer. Per ASCE 7, islands and coastal areas outside the last contour should use the last wind speed contour of the coastal area – in some cases, this website will extrapolate past the last wind speed contour and therefore, provide a wind speed that is slightly higher. NOTE: For queries near wind-borne debris region boundaries, the resulting determination is sensitive to rounding which may affect whether or not it is considered to be within a wind-borne debris region.

Mountainous terrain, gorges, ocean promontories, and special wind regions shall be examined for unusual wind conditions.

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ENSIGN
THE STANDARD IN ENGINEERING

Project: Pioneer Cabin
By: Alex Hawkins, PE
Date: July 2019

Project No.: 9235
Checked By: DAJ

SINGLE-STORY WOOD SHEAR WALLS

CHAPTER 4.3, AWC SDPWS-2015 *IBC 2018 / ASCE 7-16*

NOTES: 1. Typically when seismic is found to govern wind loads will not be checked here. However, if wind loads are found to govern both wind and seismic need to be checked in order to account for the difference in shearwall capacities.
2. ASD loads are to be entered here.

S_{DS}=	0.66
I_e=	1.00
C_d=	4

Grid 1	Wind Force on Wall Line:	2,474	lbs	lbs / Dowel:	2,750	Total:	**8,250**	lbs
2nd Floor	Seismic Force on Wall Line:	7,915	lbs	# of Dowels	3		**OK**	
Grid 1	Wind Force on Wall Line:	4,282	lbs	lbs / Dowel:	2,750	Total:	**13,750**	lbs
1st Floor	Seismic Force on Wall Line:	9,900	lbs	# of Dowels:	5		**OK**	
				Length (ft):	10	Anchor Bolts:	**AB16**	
Grid 2	Wind Force on Wall Line:	3,298	lbs	lbs / Dowel:	2,750	Total:	**11,000**	lbs
2nd Floor	Seismic Force on Wall Line:	10,554	lbs	# of Dowels	4		**OK**	
Grid 2	Wind Force on Wall Line:	5,709	lbs	lbs / Dowel:	2,750	Total:	**16,500**	lbs
1st Floor	Seismic Force on Wall Line:	13,200	lbs	# of Dowels:	6		**OK**	
				Length (ft):	20	Anchor Bolts:	**AB24**	
Grid 3	Wind Force on Wall Line:	825	lbs	lbs / Dowel:	2,750	Total:	**8,250**	lbs
2nd Floor	Seismic Force on Wall Line:	2,638	lbs	# of Dowels	3		**OK**	
Grid 3	Wind Force on Wall Line:	1,427	lbs	lbs / Dowel:	2,750	Total:	**11,000**	lbs
1st Floor	Seismic Force on Wall Line:	3,300	lbs	# of Dowels:	4		**OK**	
				Length (ft):	11	Anchor Bolts:	**AB32**	
Grid A	Wind Force on Wall Line:	1,037	lbs	lbs / Dowel:	2,750	Total:	**16,500**	lbs
2nd Floor	Seismic Force on Wall Line:	9,672	lbs	# of Dowels	6		**OK**	
Grid A	Wind Force on Wall Line:	2,189	lbs	lbs / Dowel:	2,750	Total:	**22,000**	lbs
1st Floor	Seismic Force on Wall Line:	11,583	lbs	# of Dowels:	8		**OK**	
				Length (ft):	37	Anchor Bolts:	**AB32**	
Grid B	Wind Force on Wall Line:	1,037	lbs	lbs / Dowel:	2,750	Total:	**11,000**	lbs
2nd Floor	Seismic Force on Wall Line:	9,672	lbs	# of Dowels	4		**OK**	
Grid B	Wind Force on Wall Line:	2,189	lbs	lbs / Dowel:	2,750	Total:	**16,500**	lbs
1st Floor	Seismic Force on Wall Line:	11,583	lbs	# of Dowels:	6		**OK**	
				Length (ft):	30	Anchor Bolts:	**AB32**	

ENSIGN
THE STANDARD IN ENGINEERING

Project: Pioneer Cabin
By: Alex Hawkins, PE
Date: July 2019

Project No.: 9235
Checked By: DAJ

HOLDOWN & VERTICAL STRAP SCHEDULE

IBC 2018 / ASCE 7-16

HOLDOWN INTO CONCRETE							
Mark	Anchor	Wind or Seismic Capacity (LBS)	Rod Diameter	Min. Post Size	Minimum Embed Depth in Footing	Edge Distance	Post Grade
H-1	HTT4 w/ (18) 10dx1½ nails	3610	5/8"	3" x 3 1/2"	6 1/2"	10"	DF #2
H-2	HTT5 w/ (26) 10d nails	4670	5/8"	3" x 3 1/2"	6 1/2"	10"	DF #2
H-3	HDU5 - SDS2.5 (14)	5645	5/8"	4 1/2" x 3 1/2"	6 1/2"	10"	DF #2
H-4	HDU8 - SDS2.5 (20)	7870	7/8"	4 1/2" x 3 1/2"	9"	13 1/2"	DF #2
H-5	HDU11 - SDS2.5 (30)	9335	1"	5 1/2" x 3 1/2"	11"	16 1/2"	DF #2
H-6	HDU11 - SDS2.5 (30)	11175	1"	7 1/4" x 3 1/2"	11"	16 1/2"	DF #2
H-7	HDU14 - SDS2.5 (36)	14390	1"	5.5"sq or 9.25"	11"	16 1/2"	DF #2
H-8	HD12 (4) 1" Bolts	15435	1 1/8"	5.5"sq or 9.25"	12 1/2"	19"	DF #2
H-9	HD19 (1 1/8") & (5) 1" Bolts	16735	1 1/8"	5 1/2" x 5 1/2"	12 1/2"	19"	DF #1
H-10	HD19 (1 1/4") & (5) 1" Bolts	19070	1 1/4"	5 1/2" x 5 1/2"	14 1/2"	22"	DF #1

HOLDOWN INTO CONCRETE (Single Family Residential ONLY)								
		Wind Capacity (LBS) - Cracked			Seismic Capacity (LBS) - Cracked			
Mark	Anchor	Midwall	Corner	Endwall	Midwall	Corner	Endwall	Min. Post Size
H-11	LSTHD8	2675	2320	1915	2250	1950	1610	3" x 3 1/2"
H-12	STHD10	4195	3500	2585	3400	2940	2175	3" x 3 1/2"
H-13	STHD14	5345	5345	4210	3815	3815	3500	3" x 3 1/2"

FLOOR TO FLOOR TIES (STRAPS OR RODS)					
Mark	Anchor	Wind or Seismic Capacity (LBS)	Rod Diameter	Min. Post Size	Post Grade
	Strap Type				
T-1	CS16 - (20) - 11"	1705	NA	1 1/2" x 3 1/2"	DF #2
T-2	CS14 - (26) - 15"	2490	NA	3" x 3 1/2"	DF #2
T-3	CMSTC16 - (50) - 20"	4585	NA	3" x 3 1/2"	DF #2
T-4	CMST14 - (66) - 30"	6490	NA	4 1/2" x 3 1/2"	DF #2
T-5	CMST12 - (86) - 39"	9215	NA	5 1/2" x 3 1/2"	DF #2
	Rod Type				
T-6	HDU2-SDS2.5 (6)	3075	5/8"	3" x 3 1/2"	DF #2
T-7	HTT4 w/ (18) 10dx1½ nails	3610	5/8"	3" x 3 1/2"	DF #2
T-8	HTT5 w/ (26) 10d nails	4670	5/8"	3" x 3 1/2"	DF #2
T-9	HDU5 - SDS2.5 (14)	5645	5/8"	4 1/2" x 3 1/2"	DF #2
T-10	HDU8 - SDS2.5 (20)	7870	7/8"	4 1/2" x 3 1/2"	DF #2
T-11	HDU11 - SDS2.5 (30)	9335	1"	5 1/2" x 3 1/2"	DF #2
T-12	HDU11 - SDS2.5 (30)	11175	1"	7 1/4" x 3 1/2"	DF #2
T-13	HDU14 - SDS2.5 (36)	14390	1"	5.5"sq or 9.25"	DF #2
T-14	HD12 (4) 1" Bolts	15435	1 1/8"	5.5"sq or 9.25"	DF #2
T-15	HD19 (1 1/8") & (5) 1" Bolts	16735	1 1/8"	5 1/2" x 5 1/2"	DF #1
T-16	HD19 (1 1/4") & (5) 1" Bolts	19070	1 1/4"	5 1/2" x 5 1/2"	DF #1
T-17	(2) HDU4-SDS2.5 (20)	9130	5/8"	5 1/2" x 3 1/2"	DF #2

Notes:

All anchors are Simpson Strong-Tie. Install per manufacturer's specifications.

All capacities shown are ASD. All min. post sizes are based on 9 ft max nominal top plate heights. For 8ft use 7.25" for H-7&8, T-13&14 and 4x10 for H-9&10, T-15&16.

Use 4" end distance at foundation blockouts.

CS and CMST straps are specified with: strap type - total # of of 10d nails required - end length required onto the studs. CMSTC16 Strap uses 16d Sinker Nails.

Provide 1/2" X 1 3/4" X 1 3/4" plate washer for 5/8" dia. anchors, 1/2" X 2 1/2" X 2 1/2" plate washer for 7/8" dia. anchors, 5/8" X 3" X 2 3/4" plate washer for 1" dia. anchors, 5/8" X 3 1/2" X 3 1/4" plate washer for 1 1/8" dia. anchors, and 3/4" X 3 1/2" X 3 1/2" plate washer for 1 1/4" dia. anchors. Provide nut top & bot.

For stem wall applications use simspon SB 5/8" x 24" embed 18" min. in wall for HTT4, HTT5, HDU5 holdowns. HDU8 may use SB 7/8" x 24" at midwall.

Ensure that the Min. Edge distances are met for all anchors in concrete.

Min. anchor bolt strength is ASTM F-1554 GRADE 36 U.N.O.

LSTHD's and STHD's assume 8" stemwalls minimum.

ANCHOR BOLTS

2018 NDS Table 12E

1/2" Diameter Anchor Bolts		
Mark	Bolt Spacing	Capacifty (plf)
AB32	32"	384
AB24	24"	512
AB16	16"	768
AB12	12"	1024
AB8	8"	1536

5/8" Diameter Anchor Bolts		
Mark	Bolt Spacing	Capacifty (plf)
AB32	32"	552
AB24	24"	736
AB16	16"	1104
AB12	12"	1472
AB8	8"	2208

Notes:
7" minimum embedment depth on all anchor bolts.
3" x 3" x 0.229" plate washers on all anchor bolts. 1/2" away from sheathing.
(2) anchor bolts min. per shear wall.
Anchors are located a minimum of 1 3/4" away from the edge of concrete
Anchor bolts are to be located 15 anchor diameters away from a concrete edge that is perpendicular to the sill plate.
Sill plate is 2x or 3x minimum. (Capacities shown here are based on a 2x sill plate)

ROOF FRAMING

NDS 2018 EDITION *IBC 2018 / ASCE 7-16*

Roof Trusses:

Use pre-engineered trusses @ 24" o.c.
Provide truss blocking as shown on plans and per manufacturer's specifications.
All truss connection hardware to be designed by the truss manufacturer.
Provide full depth blocking at all bearing locations with (1) A35 clip to top plate per block U.N.O.
Nail through sheathing with 8d common @ 4" o.c. into blocking U.N.O.
Provide "H1" clips at both ends of every truss U.N.O.

Roof Stick Frame:

Use roof joists per span chart.
Provide full depth blocking at all bearing locations with (1) A35 clip to top plate per block UNO.
Nail through sheathing with 8d common @ 4" o.c. into blocking U.N.O.
Provide "H1" clips at both ends of every joist UNO.

Roof Overbuild:

Frame roof overbuild areas with 2x6 DF#2 @ 24" o.c.
Brace joists at 6' 0" o.c.
Use 2x8 DF#2 ridge board braced at 4' 0" o.c.
Use 2x8 DF#2 valley members laid flat and nailed to trusses with (2) 16d per truss.
Brace ridge and joists such that load is distributed uniformly to trusses below.
Sheath under all overbuild areas.
Provide access and ventilation to overbuild areas as necessary.

Roof Beams:

See attached beam calculations.

Roof Sheathing:

Provide 5/8" or thicker 24/16 APA rated panel.
Nail with 8d common at 6" o.c. at panel edge and 12" o.c. in the field.
Provide 'H' clips at all unsupported edges.
Provide 1/8" gap between panels at time of installation.

FLOOR FRAMING

NDS 2018 EDITION *IBC 2018 / ASCE 7-16*

Floor Joists:

TJI Engineered Floor Joist Span Tables: 20DL + 40LL + L/480					
Depth	Series	12" o.c.	16" o.c.	19.2" o.c.	24" o.c.
9 1/2"	*110*	16'-11"	15'-6"	14'-7"	13'-7"
9 1/2"	*210*	17-9"	16'-3"	15'-4"	14'-3"
11-7/8"	*110*	20'-2"	18'-5"	17'-4"	15'-9"**
11-7/8"	*210*	21'-1"	19'-3"	18'-2"	16'-11"
11-7/8"	*360*	22'-11"	20'-11"	19'-8"	18'-4"

LPI Engineered Floor Joist Span Tables: 15DL + 40LL + L/480					
Depth	Series	12" o.c.	16" o.c.	19.2" o.c.	24" o.c.
9 1/2"	*LPI 20Plus*	17'-9"	16'-2"	15'-3"	14'-3"
9 1/2"	*LPI32Plus*	18'-9"	17'-0"	16'-0"	14'-9"
11-7/8"	*LPI 20Plus*	21'-2"	19'-4"	18'-3"	17'-0"
11-7/8"	*LPI32Plus*	22'-3"	20'-2"	19'-0"	17'-7"

Roseberg Engineered Floor Joist Span Tables: 20DL + 40LL + L/480					
Depth	Series	12" o.c.	16" o.c.	19.2" o.c.	24" o.c.
9 1/2"	*RFPI 20*	16'-7"	15'-2"	14'-4"	12'-10"
9 1/2"	*RFPI 400*	18'-0"	16'-5"	15'-6"	14'-6"
11-7/8"	*RFPI 20*	19'-10"	17'-11"	16'-4"	13'-8"
11-7/8"	*RFPI 400*	21'-5"	19'-7"	18'-6"	16'-10"

1-1/4" Rimboard around perimeter of all floors.
Install per manufacturers specifications.
Equivalent engineered floor joists may be substituted based on published information.
**Web stiffener is required at intermediate support when bearing length is less than 5¼"

Floor Beams:

See attached beam calculations.

Floor Sheathing:

Provide 3/4" T&G APA rated Sturd-I-Floor sheathing.
Glue and nail with 10d common at 6" o.c. at panel edges and 12" o.c. in the field.

ENSIGN
THE STANDARD IN ENGINEERING

Project: Pioneer Cabin
By: Alex Hawkins, PE
Date: July 2019

Project No.: 9235
Checked By: DAJ

STUD COLUMN DESIGN

NDS 2018 EDITION *IBC 2018 / ASCE 7-16*

Species =	DFLN Stud	
Height =	8.0	ft
Fc =	900	psi
E =	1400	ksi
Kce =	0.3	psi
c =	0.8	psi

Size =	2x4	2x6	
d =	3.50	5.25	in
Fce =	558.27	1256.10	psi
Cp =	0.51	0.79	
F'c =	461.27	712.89	psi

Height	(2) 2x4	(3) 2x4	(4) 2x4	(5) 2x4	(6) 2x4	(7) 2x4	
8 ft	4.8	7.3	9.7	12.1	14.5	17.0	kips
9 ft	4.0	6.0	8.1	10.1	12.1	14.1	kips
10 ft	3.4	5.1	6.8	8.4	10.1	11.8	kips
12 ft	2.4	3.7	4.9	6.1	7.3	8.5	kips
18 ft	1.1	1.7	2.3	2.8	3.4	3.9	kips

Height	(2) 2x6	(3) 2x6	(4) 2x6	(5) 2x6	(6) 2x6	(7) 2x6	
8 ft	11.2	16.8	22.5	28.1	33.7	39.3	kips
9 ft	10.3	15.4	20.5	25.6	30.8	35.9	kips
10 ft	9.2	13.8	18.4	23.1	27.7	32.3	kips
12 ft	7.3	10.9	14.5	18.2	21.8	25.4	kips
18 ft	3.7	5.5	7.3	9.1	11.0	12.8	kips

SOLID POSTS

Species =	DFLN #1	
Height =	8.0	ft
Fc =	925	psi
E =	1600	ksi
Kce =	0.3	psi
c =	0.8	psi

Size =	4x4	4X6	6x6	
d =	3.5	3.5	5.5	in
Fce =	638.02	638.02	1575.52	psi
Cp =	0.553	0.553	0.838	
F'c =	511.49	511.49	774.96	psi

Height	4x4	4X6	6x6	
8 ft	6.3	9.8	23.4	kips
9 ft	5.6	8.8	21.9	kips
10 ft	4.7	7.3	20.1	kips
12 ft	3.3	5.2	16.5	kips
18 ft	1.5	2.4	8.6	kips

Project:	Pioneer Cabin	Project No.:	9235
By:	Alex Hawkins, PE	Checked By:	DAJ
Date:	July 2019		

STANDARD FOUNDATION WALLS

ACI 318-14 *IBC 2018 / ASCE 7-16*

Foundation Schedule			Horizontal Reinforcement		Vertical Reinforcement	
Mark	Wall Height	Thickness	Size	Spacing	Size	Spacing
Typ.	4'	8"	#4	18"	#4	24"
Typ.	8'	8"	#4	18"	#4	24"
Typ.	9'	8"	#4	18"	#4	16"
Typ.	10'	8"	#4	18"	#5	12"

Notes: Wall height refers to final grade difference through the wall. Total height of wall may be higher due to footing drop for frost protection or native soil bearing as long as wall is backfilled such that the grade difference does not exceed the wall height at any time during construction.
ALL REBAR TO BE GRADE 60.
Place vertical bars in the center of wall.
Extend vertical bars from the footing to within 3" of the top of wall.
Provide #4 dowel with standard hook in the footing to match the vertical rebar.
Extend vertical leg of dowel 24" min. into wall.
Place (1) #4 horizontally within 4" of top and bottom of wall.
Provide corner reinforcing so as to lap 24" min.
Provide (2) #4 above, (1) #4 each side, and (1) #4 below all openings.
Place steel within 2" of openings & extend 24" min. beyond edge of opening.
Vertical bars around openings may terminate 3" from top of wall.

Beam Id: Pioneer Cabin - RB /

Date 30-05-2019

Structural Engineer:

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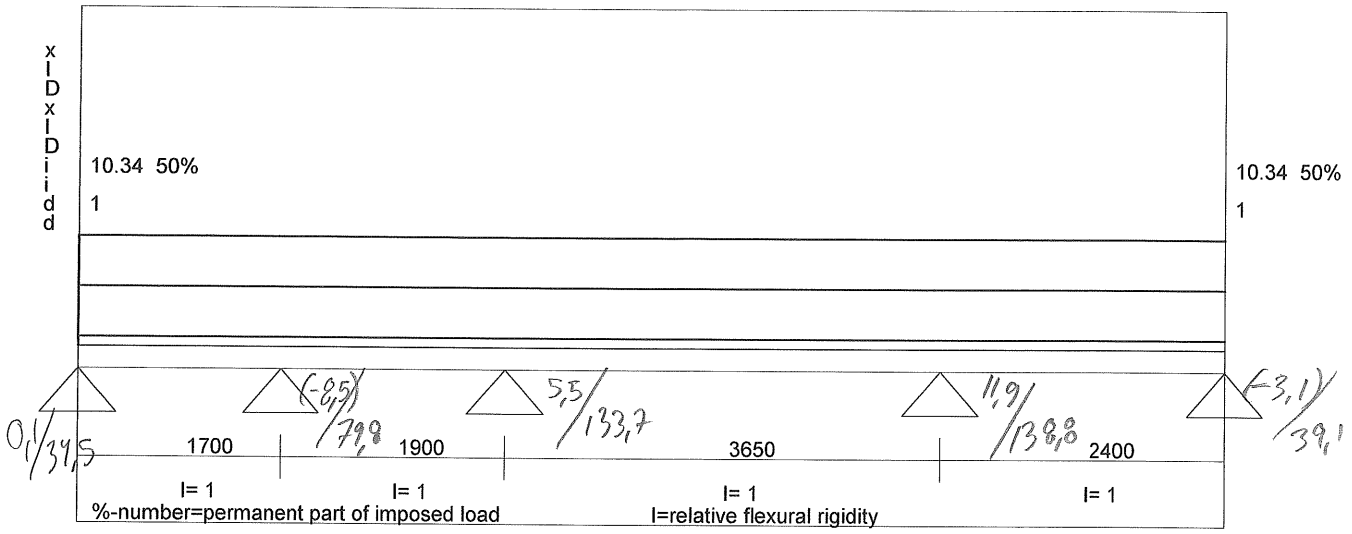

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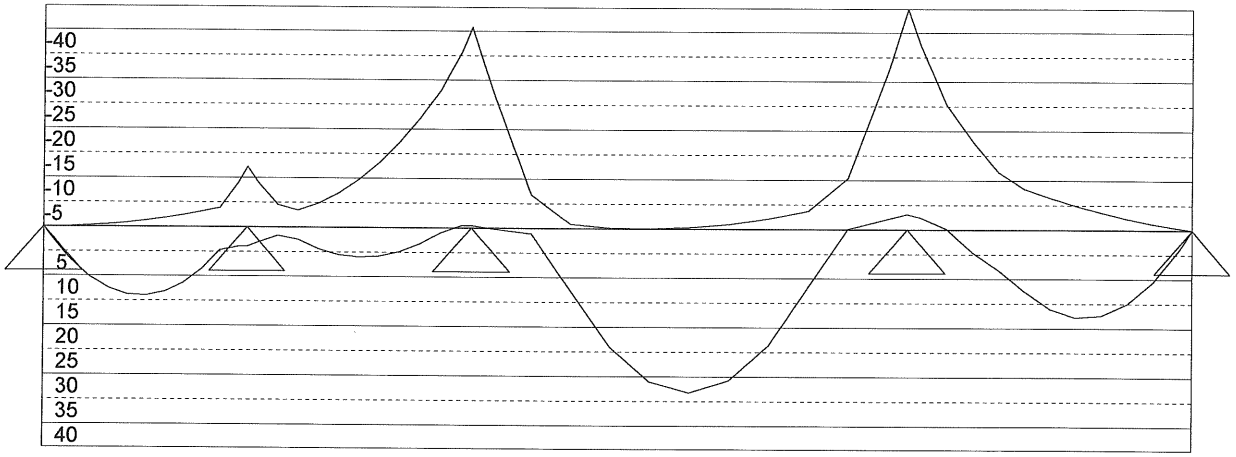

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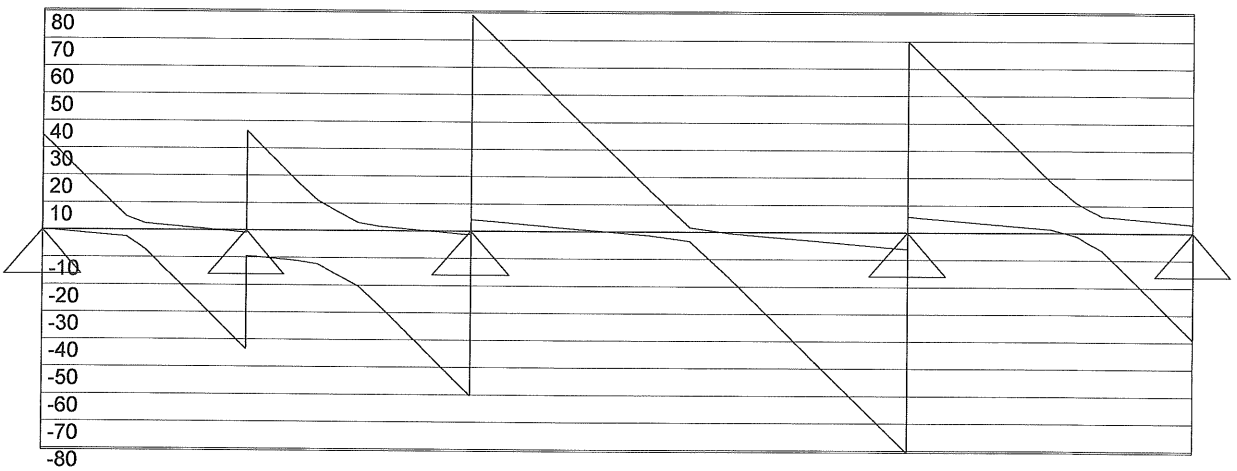


Load factor of dead load= 1 Load factor of imposed load= 1
Load width 3.775 (m) (by which the loads
has been multiplied during calculation)
Max/Min reactions of beam [kN]
34,613 79,856 139,276 150,722 39,120
0,142 -8,594 5,565 11,925 -3,171

1+1+1

T24 492 x 260 B 2 Cf=1,00 Design method: Allowable stress design
Increasing factor of the allowable stress 1,02
Factored Moment/Moment capacity [kNm] 44,773 54,414 82 %
Factored shear force/shear capacity [kN] 80,699 83,714 96 %

(3) PROPICES

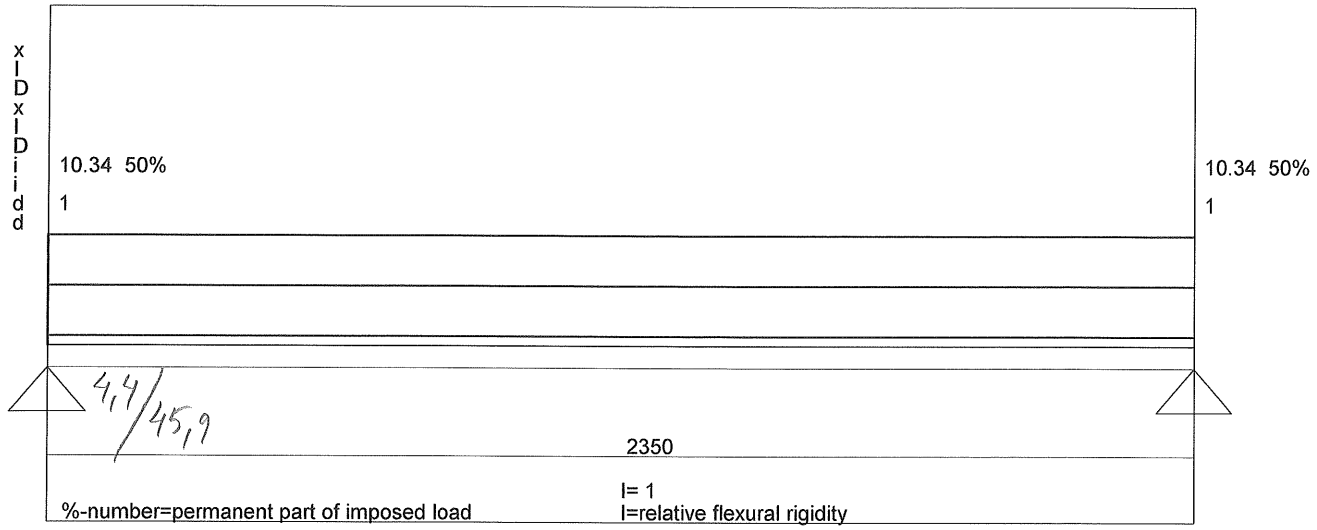
Deflection due to unfactored load (Deflection limit L/240)
0,9 mm (12 %) 0,4 mm (5 %) 7,7 mm (50 %) 1,7 mm (17 %)

Beam Id: Pioneer Cabin - RB 2

Date 29-05-2019

Structural Engineer:

Licensed to: FINNLAMELLI OY



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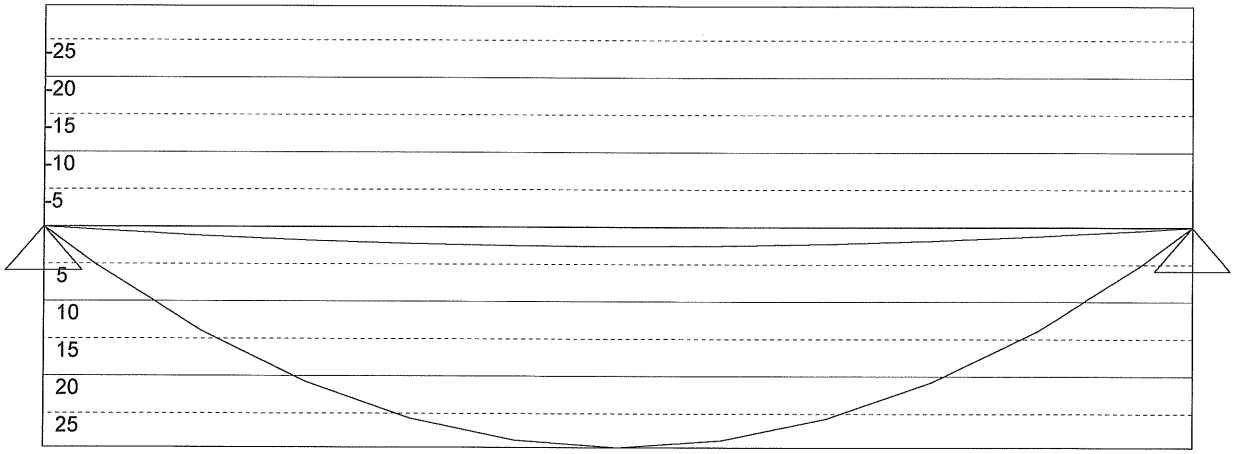

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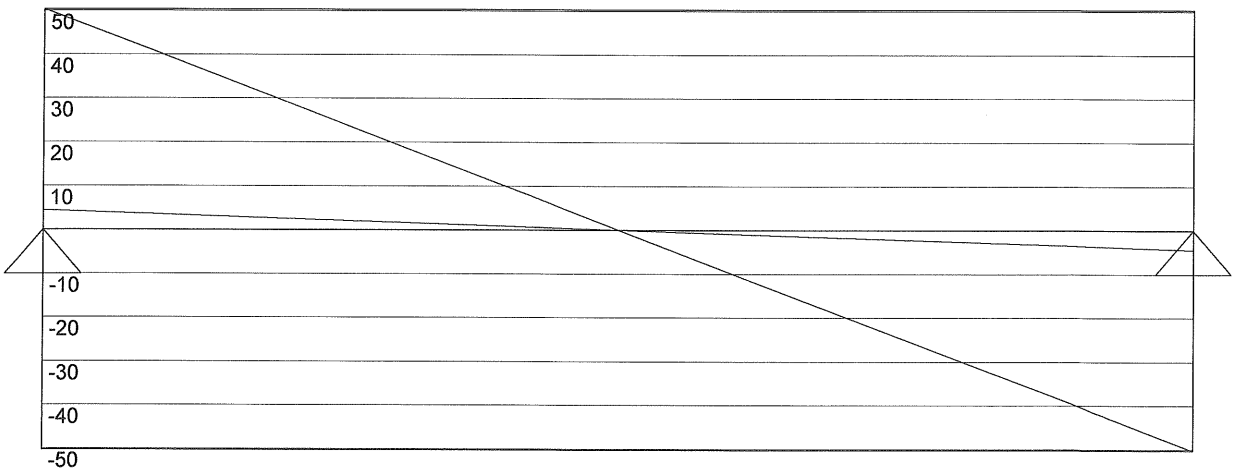


Load factor of dead load= 1 Load factor of imposed load= 1
Load width 3.775 (m) (by which the loads
has been multiplied during calculation)
Max/Min reactions of beam [kN]
50,290 50,300
4,435 4,436

T24 328 x 260 B 2 Cf=1,00 Design method: Allowable stress design
Increasing factor of the allowable stress 1,02
Factored Moment/Moment capacity [kNm] 29,551 36,276 81 %
Factored shear force/shear capacity [kN] 50,290 55,810 90 %

(2) PIECES

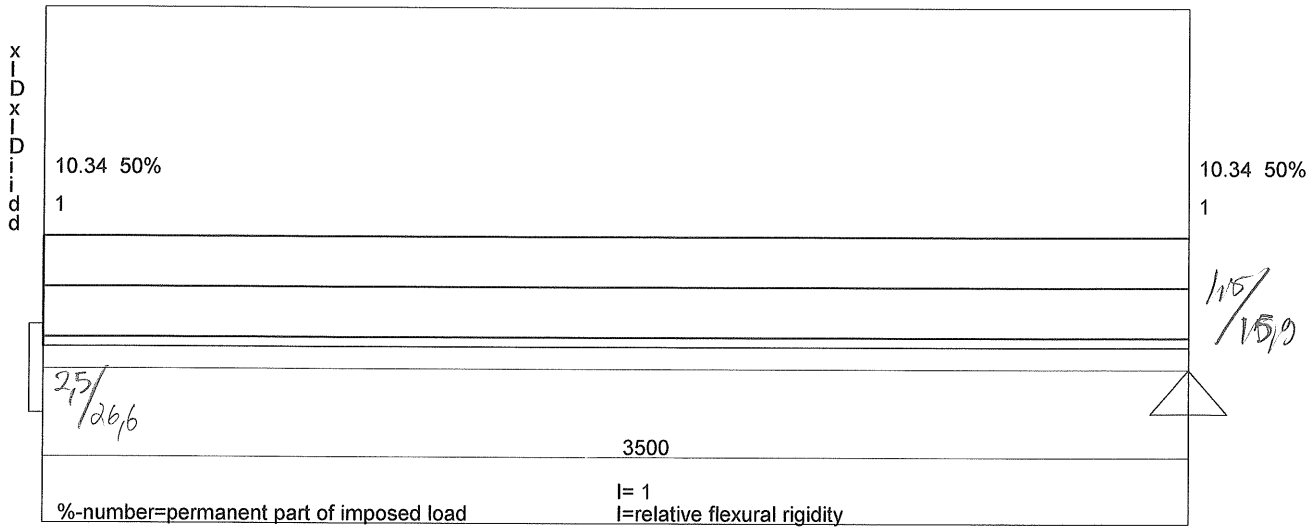
Deflection due to unfactored load (Deflection limit L/240)
5,5 mm (56 %)

Beam Id: Pioneer Cabin - RB 3

Date 29-05-2019

Structural Engineer:

Licensed to: FINNLAMELLI OY



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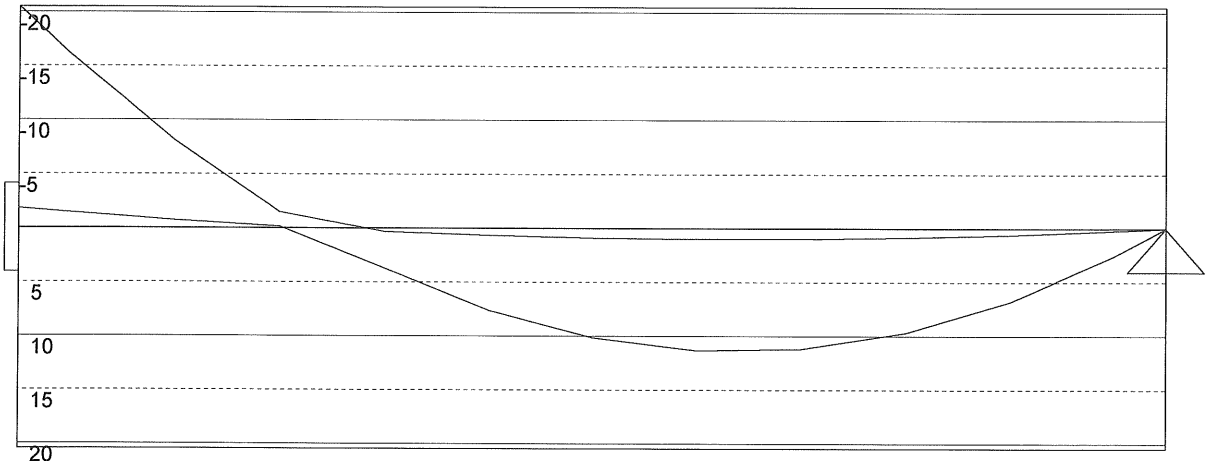

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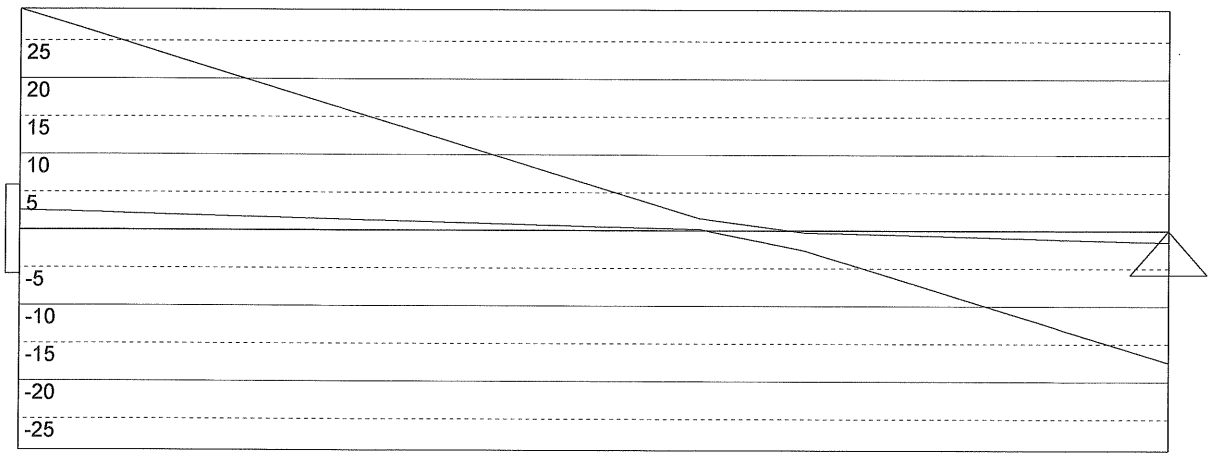


Load factor of dead load= 1 Load factor of imposed load= 1
Load width 1.175 (m) (by which the loads
has been multiplied during calculation)
Max/Min reactions of beam [kN]
29,165 17,466
2,572 1,540

T24 328 x 260 B 2 Cf=1,00 Design method: Allowable stress design
Increasing factor of the allowable stress 1,02
Factored Moment/Moment capacity [kNm] 20,471 36,276 56 %
Factored shear force/shear capacity [kN] 29,165 55,810 52 %

(2) PROFILES

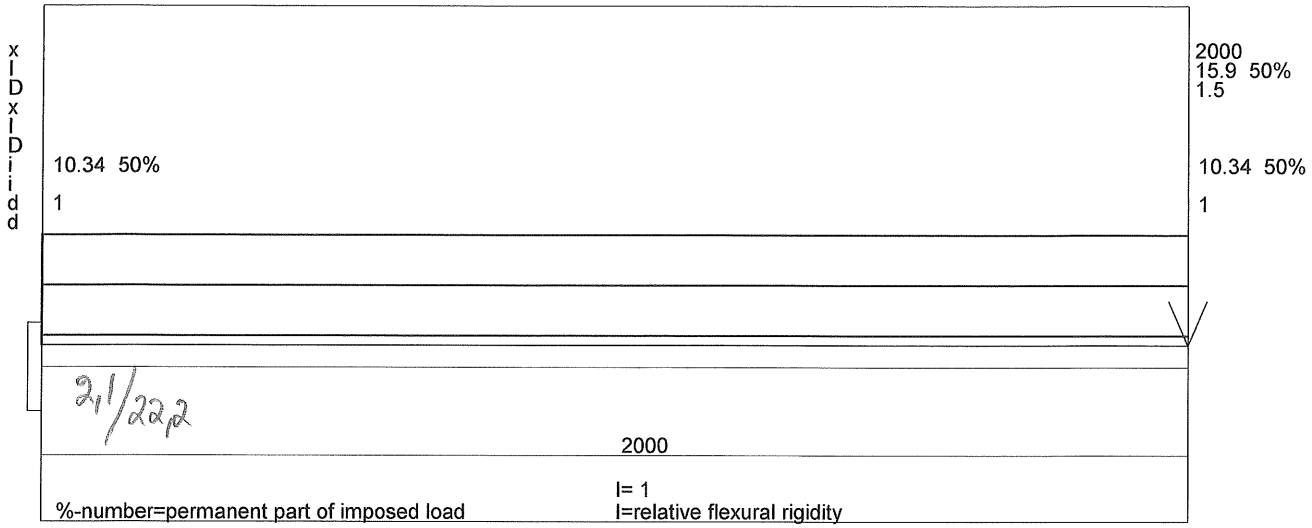
Deflection due to unfactored load (Deflection limit L/240)
3,3 mm (23 %)

Beam Id: Pioneer Cabin - RB 4

Date 29-05-2019

Structural Engineer:

Licensed to: FINNLAMELLI OY



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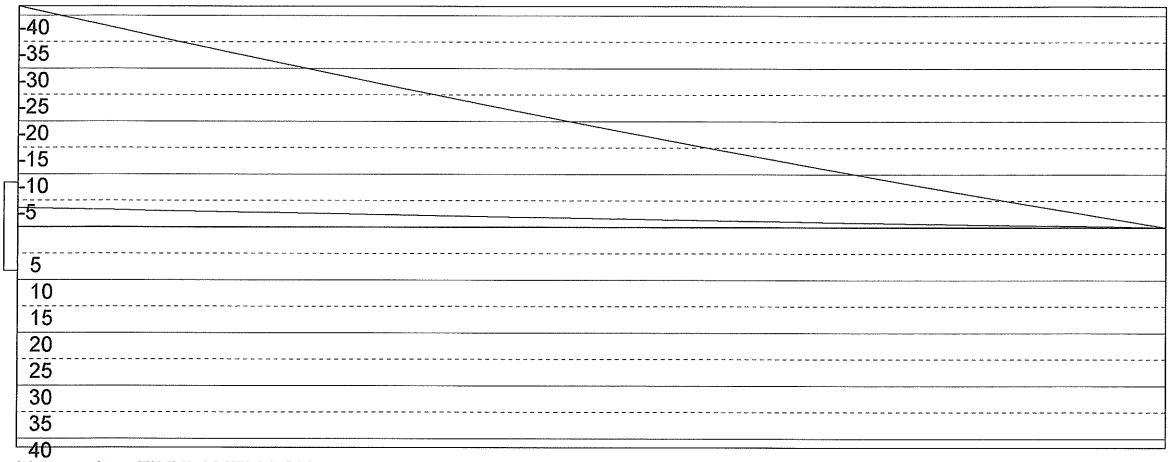

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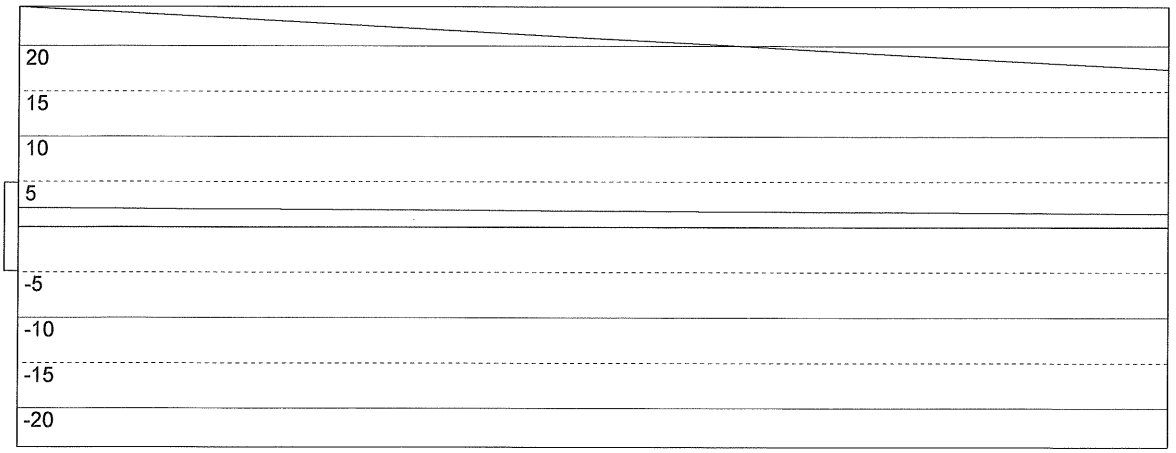

Load factor of dead load= 1 Load factor of imposed load= 1
Load width .305 (m) (by which the loads
has been multiplied during calculation)
Max/Min reactions of beam [kN]
24,316
2,110

T24 492 x 260 B 2 Cf=1,00 Design method: Allowable stress design
Increasing factor of the allowable stress 1,02
Factored Moment/Moment capacity [kNm] 41,711 54,391 77 %
Factored shear force/shear capacity [kN] 24,316 83,679 29 %

(3) PROFILES

Deflection due to unfactored load (Deflection limit L/240)/L/120)!
11,4 mm (68 %)

Beam Id: Pioneer Cabin - RB 5

Date 30-05-2019

Structural Engineer:

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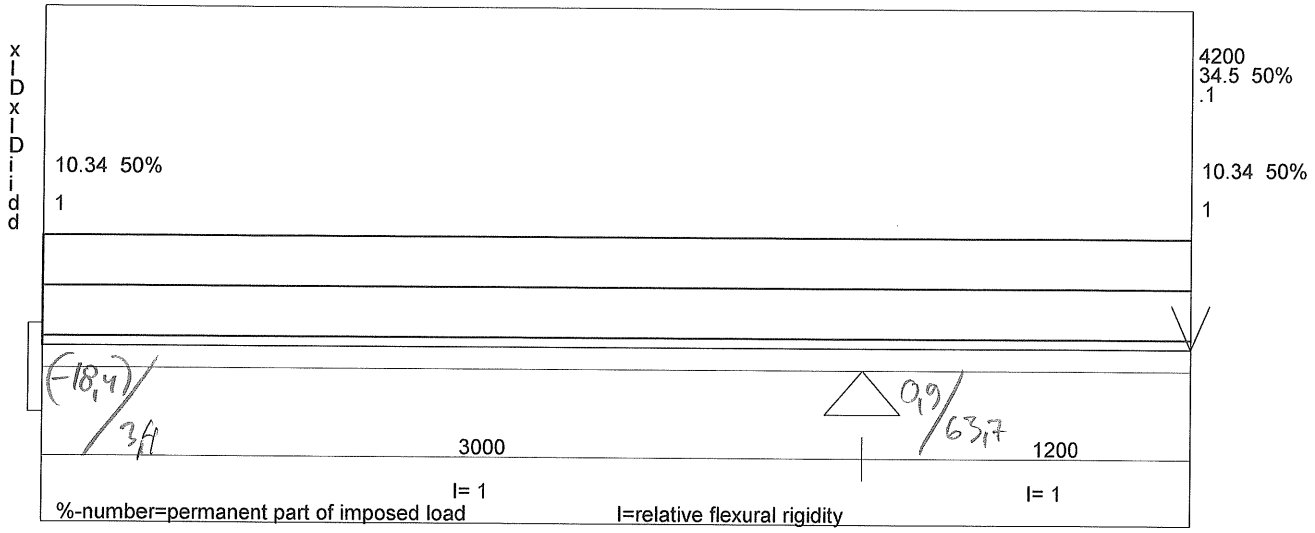

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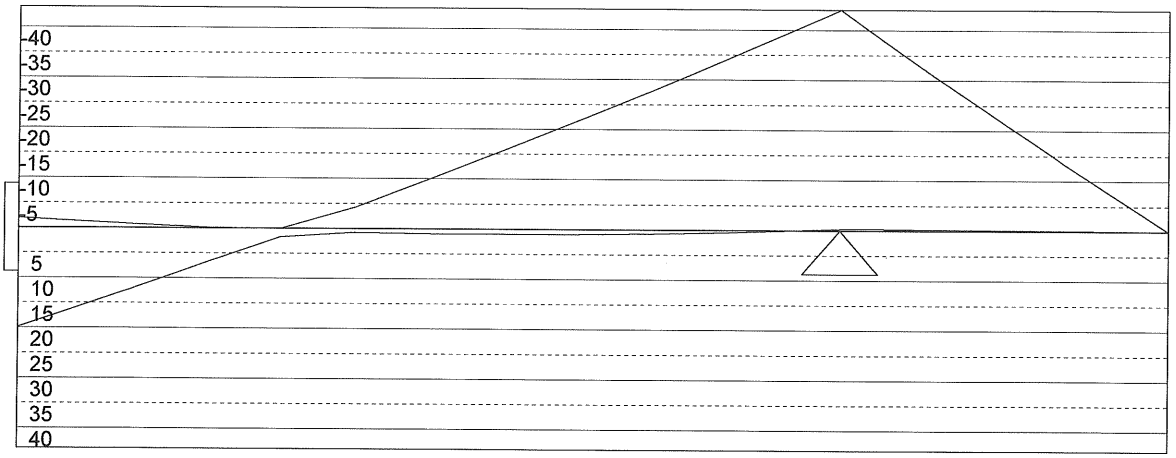

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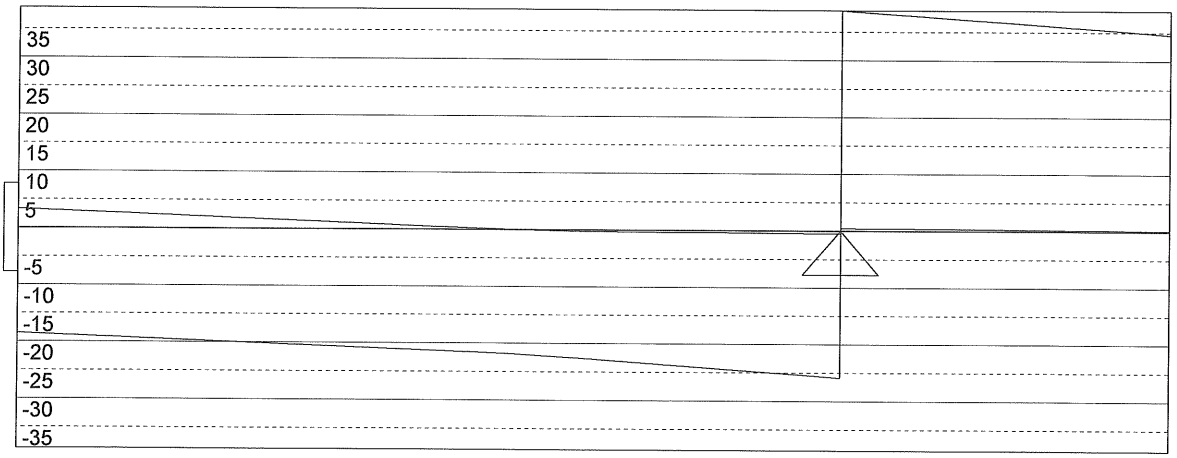

Load factor of dead load= 1 Load factor of imposed load= 1
Load width .305 (m) (by which the loads
has been multiplied during calculation)
Max/Min reactions of beam [kN]
3,361 64,640
-18,474 0,978

636

T24 636 x 260 B 2 Cf=1,00 Design method: Allowable stress design
Increasing factor of the allowable stress 1,00
Factored Moment/Moment capacity [kNm] 44,005 68,923 64 %
Factored shear force/shear capacity [kN] 38,750 106,035 37 %

(4) PROFILES

Deflection due to unfactored load (Deflection limit L/240)/L/120)!
0,1 mm (1 %) 9,8 mm (98 %)

Beam Id: Pioneer Cabin - MB /

Date 30-05-2019

Structural Engineer:

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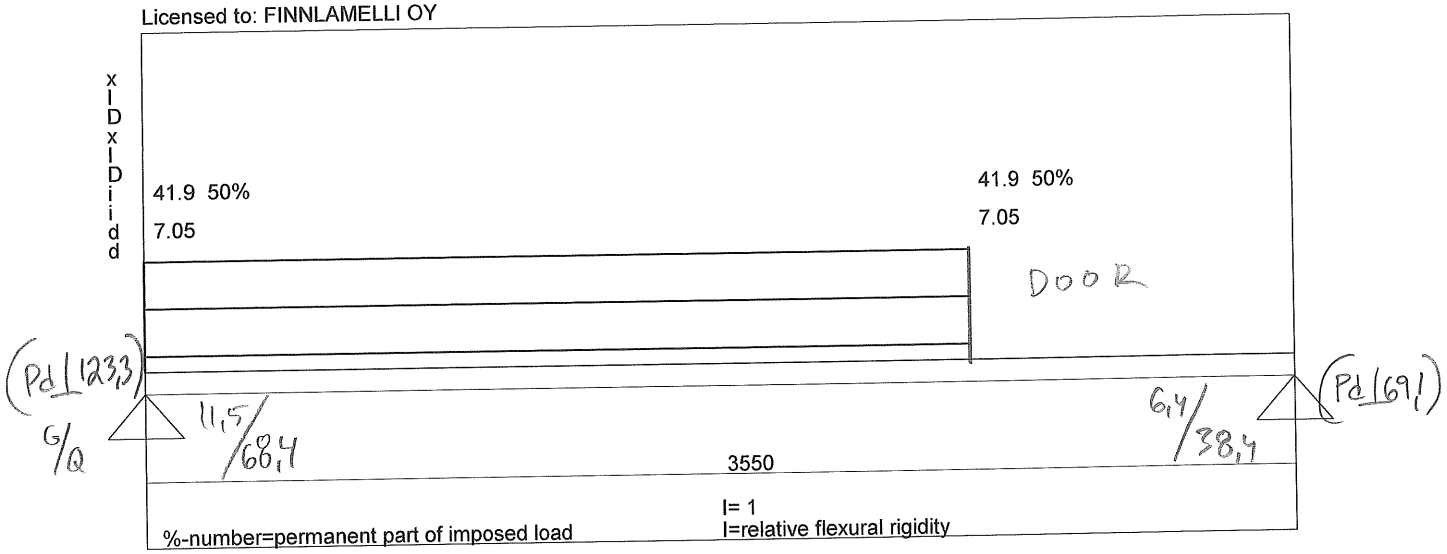

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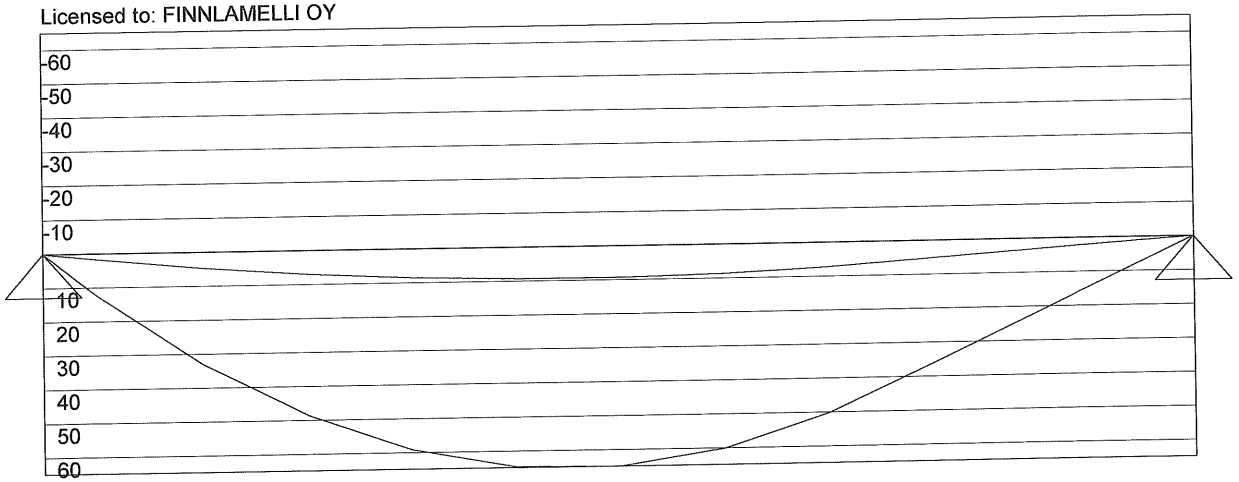

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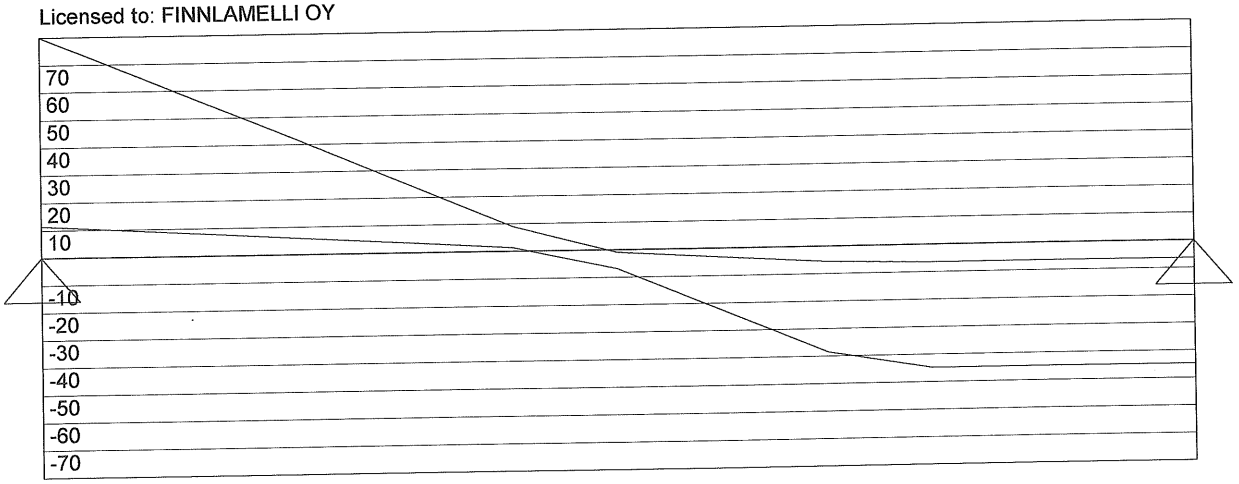

Load factor of dead load= 1 Load factor of imposed load= 1
Load width 1 (m) (by which the loads
has been multiplied during calculation)
Max/Min reactions of beam [kN]
79,975 44,831
11,518 6,457

L40 380 x 345 B 1 Cf=0,98 Design method: Allowable stress design
Increasing factor of the allowable stress 1,04
Factored Moment/Moment capacity [kNm] 64,874 114,720 57 %
Factored shear force/shear capacity [kN] 79,975 104,264 77 %

GL (2) $7\frac{1}{2} \times 13\frac{5}{8}$

Deflection due to unfactored load (Deflection limit L/360)
7,5 mm (76 %)

Beam Id: Pioneer Cabin MB 2

Date 03-06-2019

Structural Engineer:

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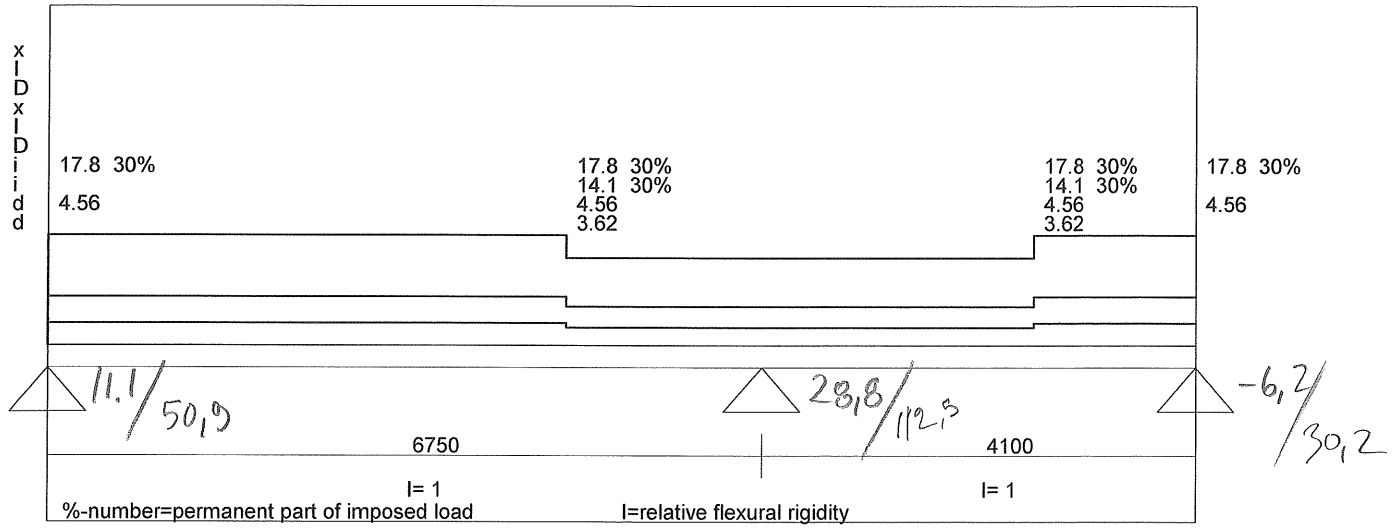

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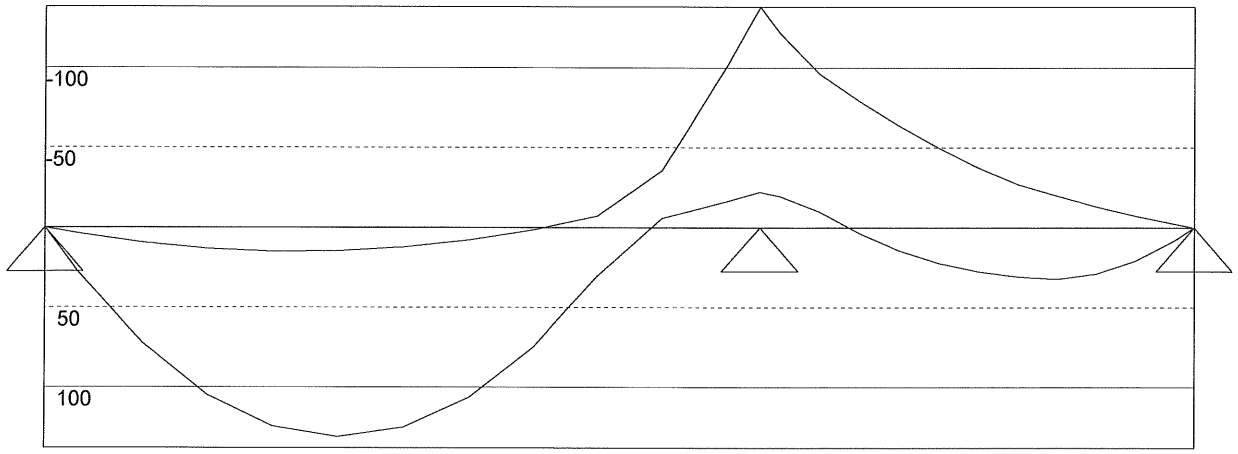

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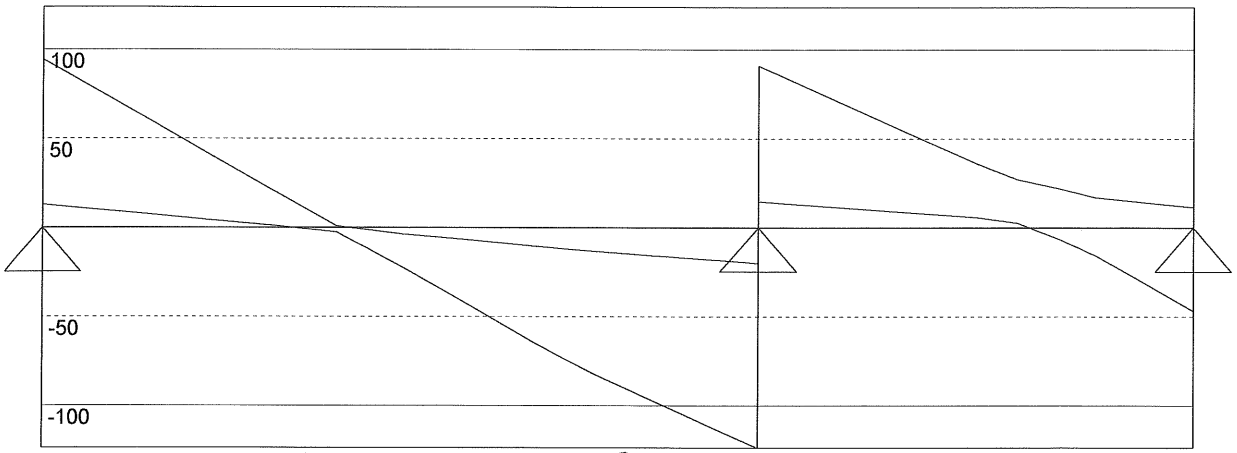


Load factor of dead load= 1.2 Load factor of imposed load= 1.6
Load width 1 (m) (by which the loads
has been multiplied during calculation)
Max/Min reactions of beam [kN]
94,319 214,653 46,826
12,886 34,626 -11,594

HEB 240 (Class of section=1/1) G= 83,2 I(cm4)=11259 W(cm3)=938 fy=235
Factored Moment/Moment capacity [kNm] 138,026 247,690 56 %
Factored shear force/shear capacity [kN] 123,772 314,430 39 %

W8x67

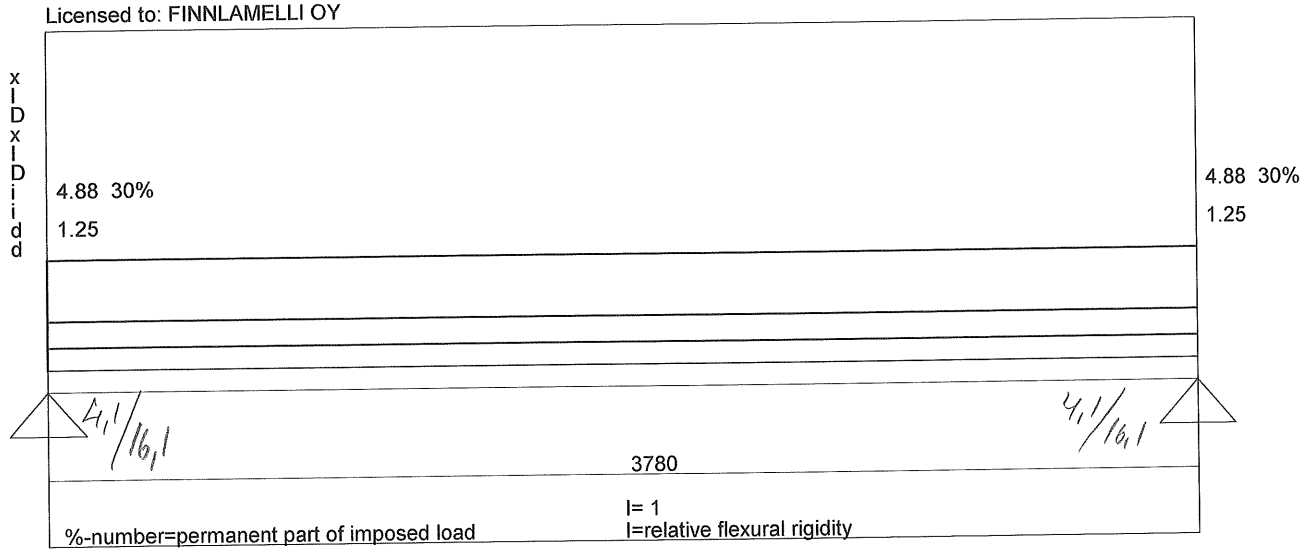
Deflection due to unfactored load (Deflection limit L/360)
14,8 mm (79 %) 1,1 mm (9 %)
Attention! Ultimate limit design! Remember the load factors!!

Beam Id: Pioneer Cabin - MB 3

Date 30-05-2019

Structural Engineer:

Licensed to: FINNLAMELLI OY



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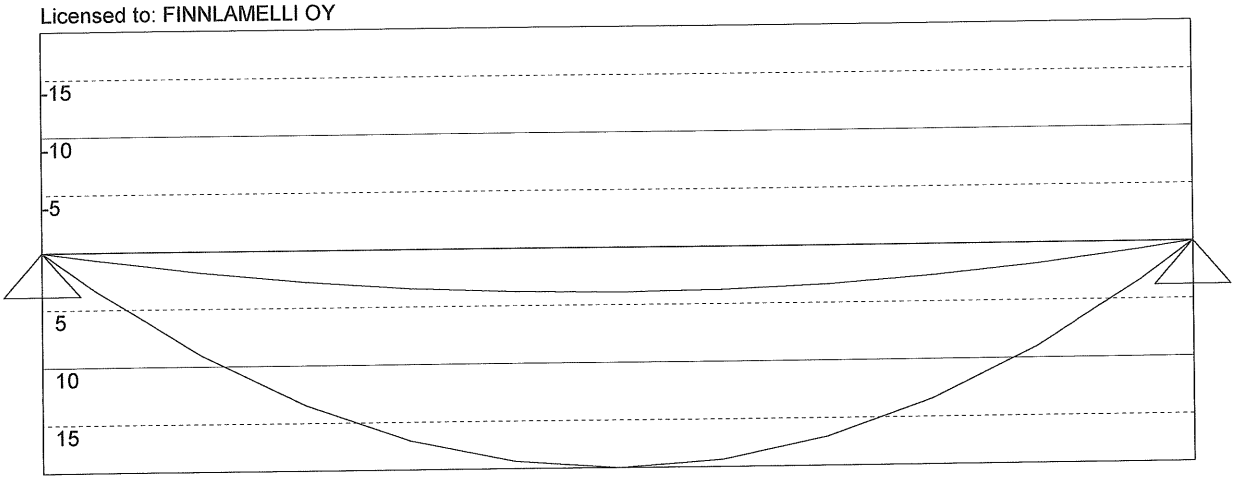

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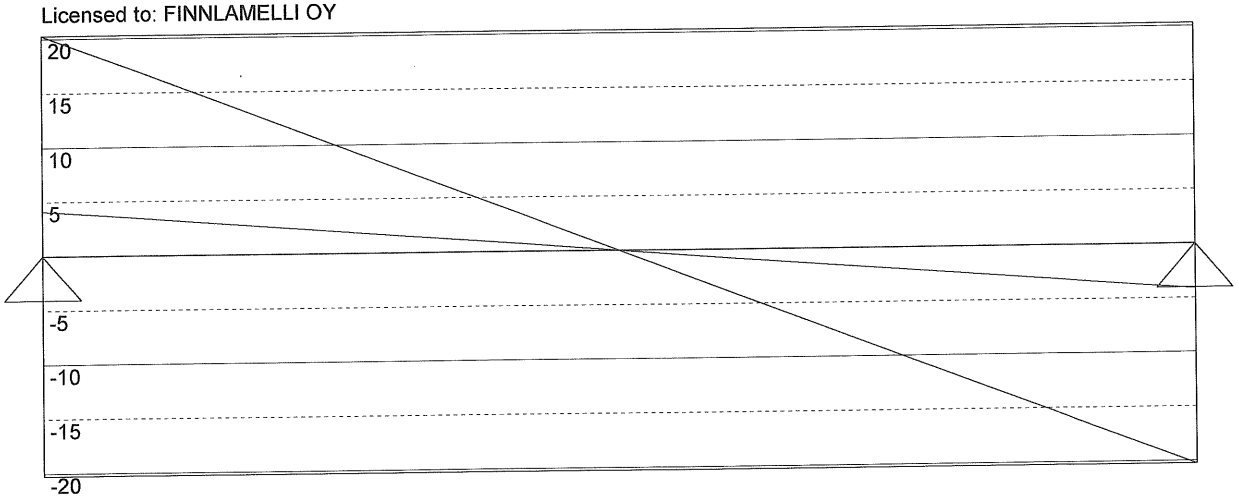

Load factor of dead load= 1 Load factor of imposed load= 1
Load width 1.75 (m) (by which the loads
has been multiplied during calculation)
Max/Min reactions of beam [kN]
20,271 20,275
4,134 4,134

T24 328 x 260 B 2 Cf=1,00 Design method: Allowable stress design
Increasing factor of the allowable stress 1,05
Factored Moment/Moment capacity [kNm] 19,160 37,382 51 %
Factored shear force/shear capacity [kN] 20,271 57,511 35 %

(2) PROFILES

Deflection due to unfactored load (Deflection limit L/360)
9,2 mm (87 %)

Beam Id: PIONEER CABIN - MB4

Date 17-07-2019

Structural Engineer:

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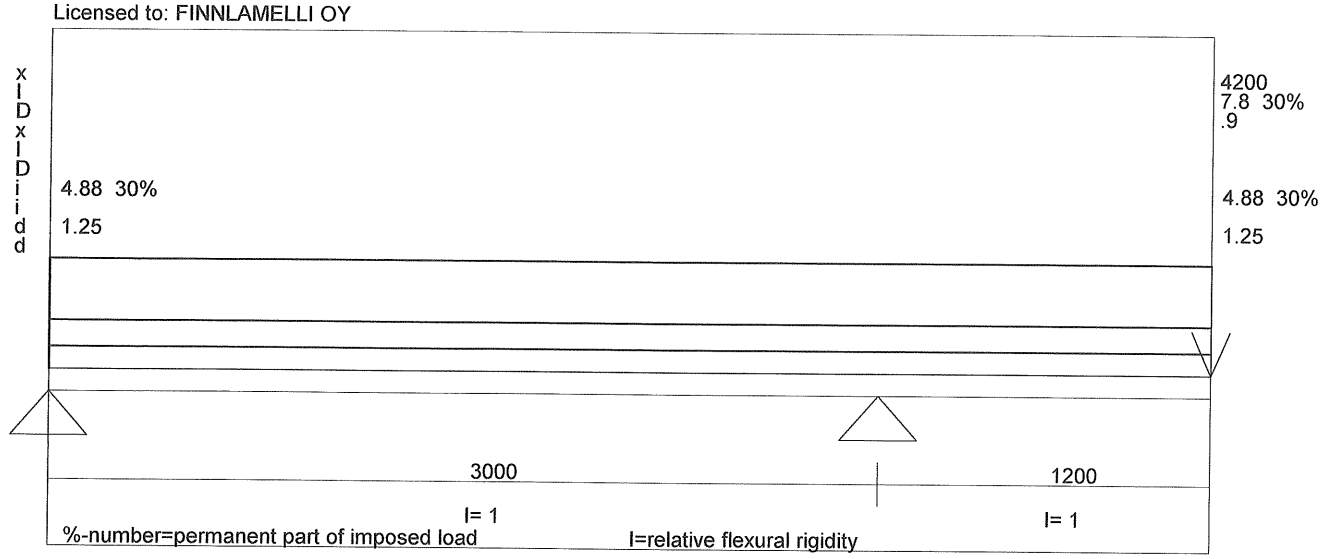

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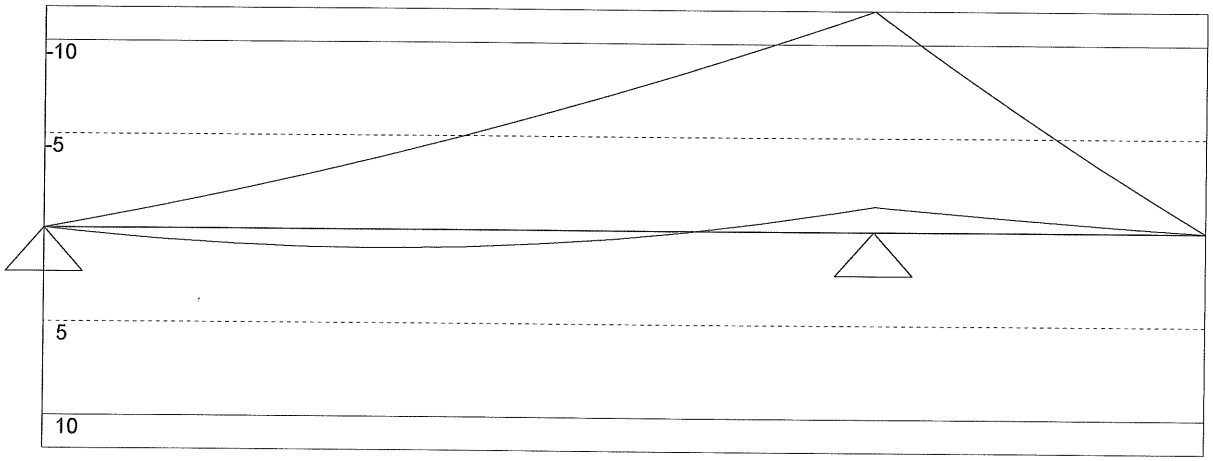

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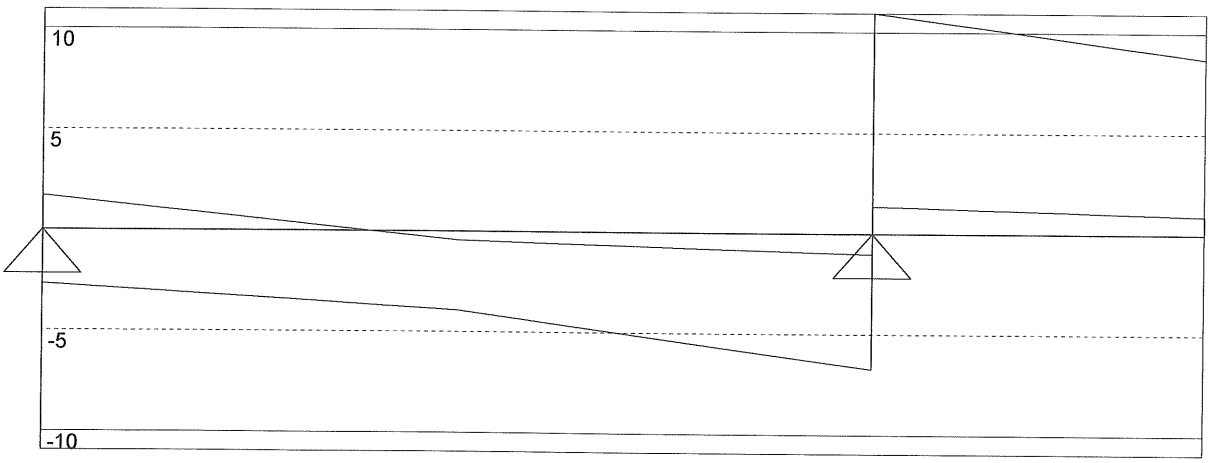


Load factor of dead load= 1 Load factor of imposed load= 1
Load width .305 (m) (by which the loads
has been multiplied during calculation)
Max/Min reactions of beam [kN]
1,683 17,676
-2,687 2,381

T24 328 x 260 B 2 Cf=1,00 Design method: Allowable stress design
Increasing factor of the allowable stress 1,03
Factored Moment/Moment capacity [kNm] 11,785 36,526 32 %
Factored shear force/shear capacity [kN] 10,943 56,194 19 %

(2) PROFILES

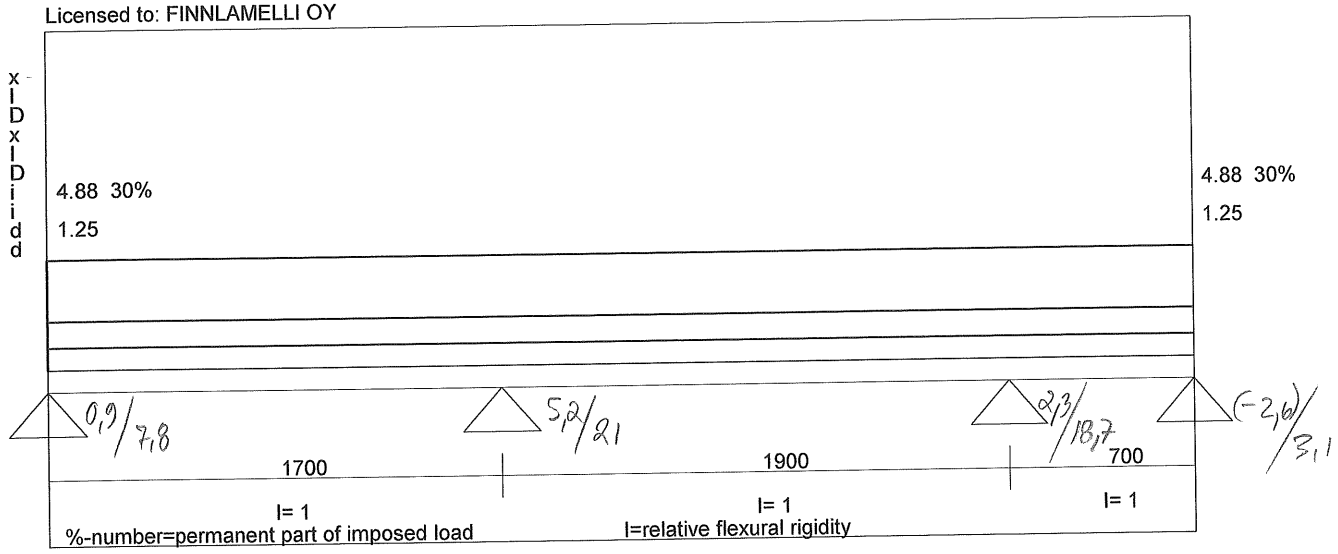
Deflection due to unfactored load (Deflection limit L/360)/L/180)!
0,2 mm (3 %) 5,9 mm (89 %)

Beam Id: Pioneer Cabin - MB 5

Date 30-05-2019

Structural Engineer:

Licensed to: FINNLAMELLI OY



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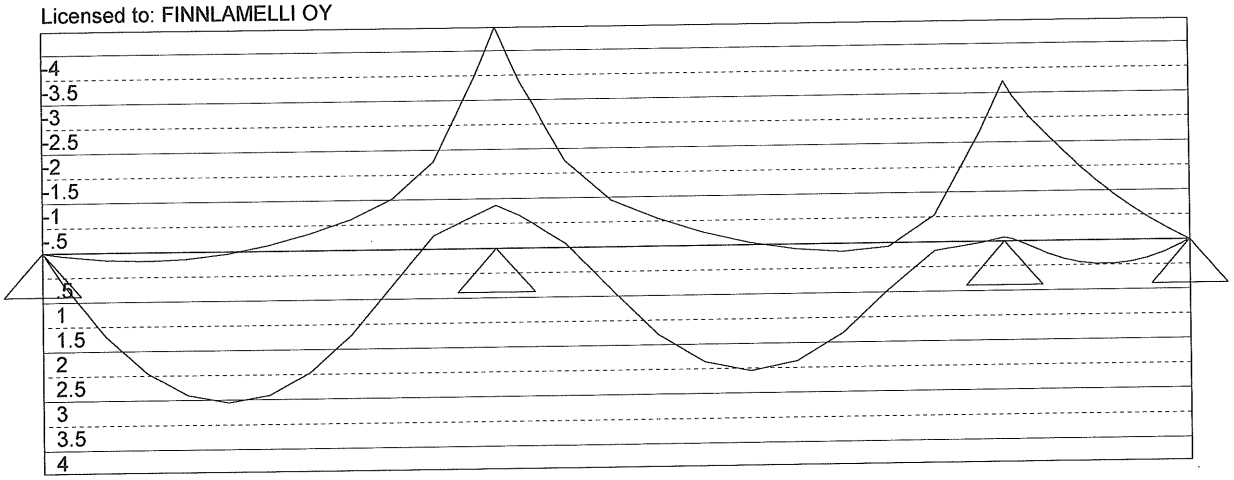
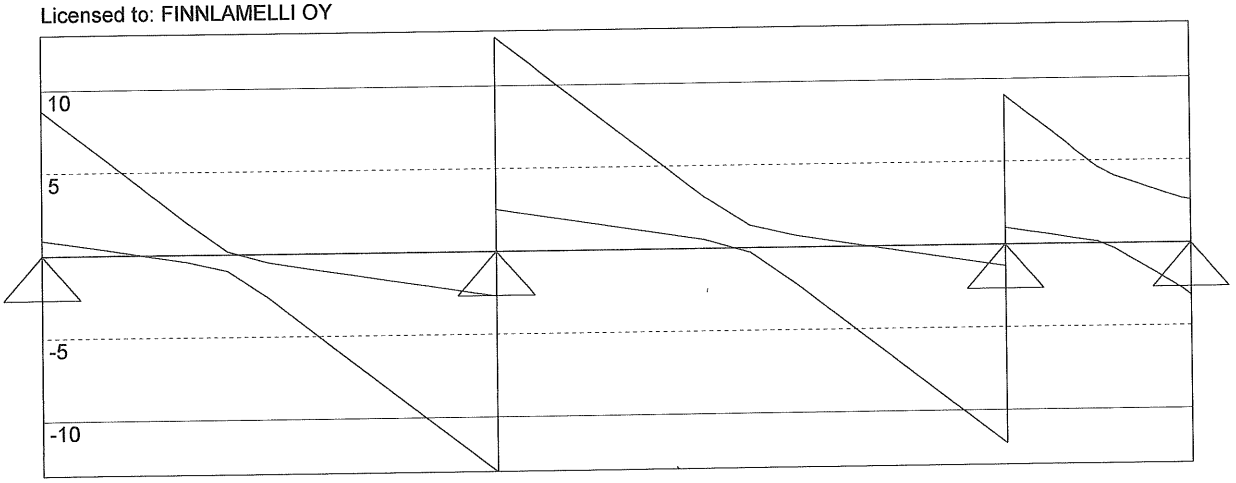


Licensed to: FINNLAMELLI OY



Load factor of dead load= 1 Load factor of imposed load= 1
Load width 2.05 (m) (by which the loads
has been multiplied during calculation)
Max/Min reactions of beam [kN]
8,765 26,213 21,021 3,169
0,954 5,218 2,304 -2,601

T24 164 x 260 B 1 Cf=1,00 Design method: Allowable stress design
Increasing factor of the allowable stress 1,05
Factored Moment/Moment capacity [kNm] 4,463 18,691 24 %
Factored shear force/shear capacity [kN] 13,306 28,755 46 %

(1) PROFILE

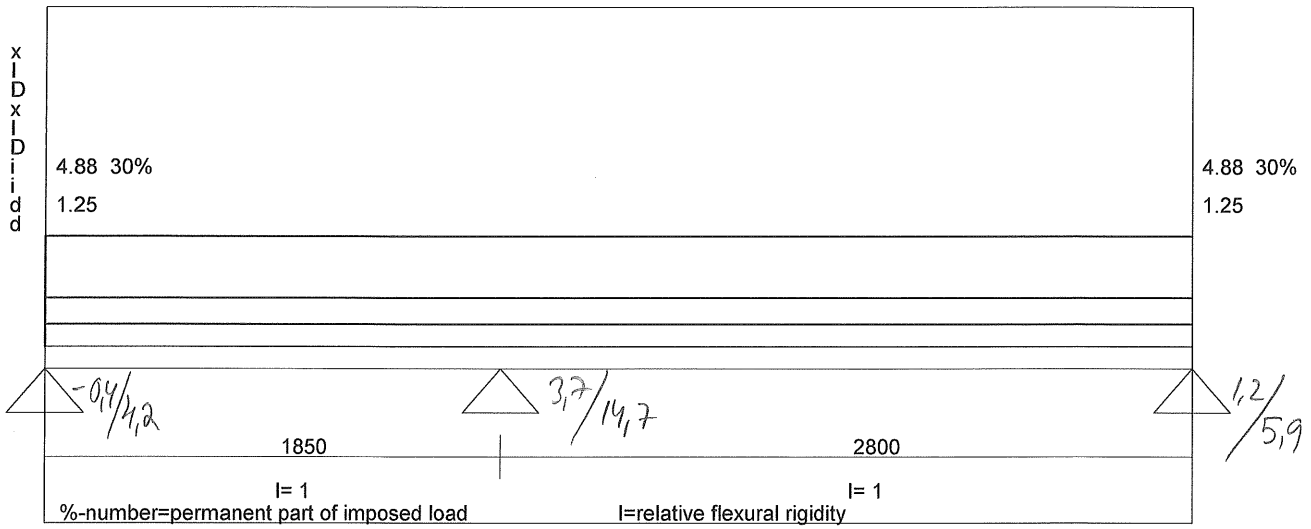
Deflection due to unfactored load (Deflection limit L/360)
0,5 mm (11 %) 0,5 mm (9 %) 0,0 mm (1 %)

Beam Id: Pioneer Cabin - MB 6

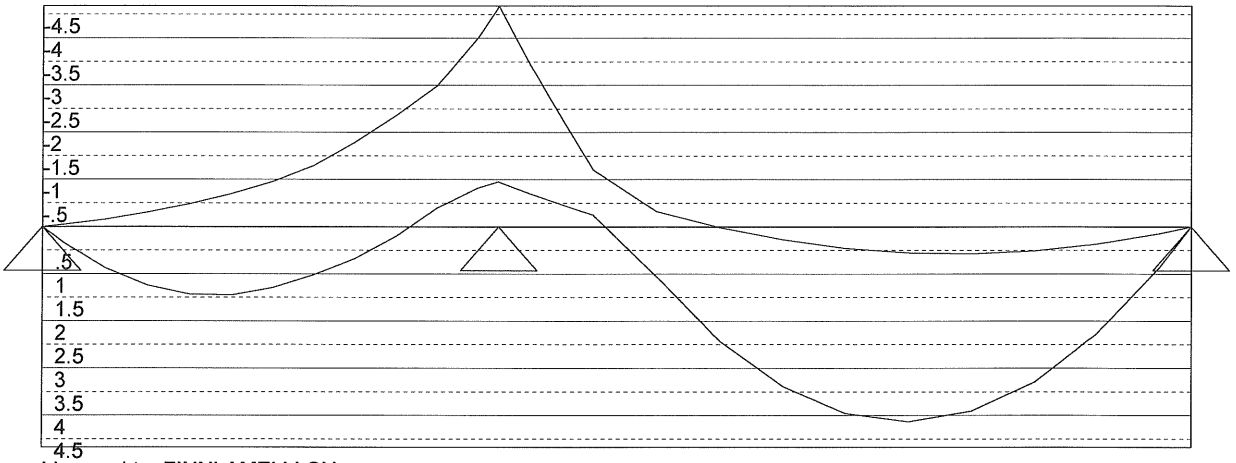
Date 30-05-2019

Structural Engineer:

Licensed to: FINNLAMELLI OY



Licensed to: FINNLAMELLI OY



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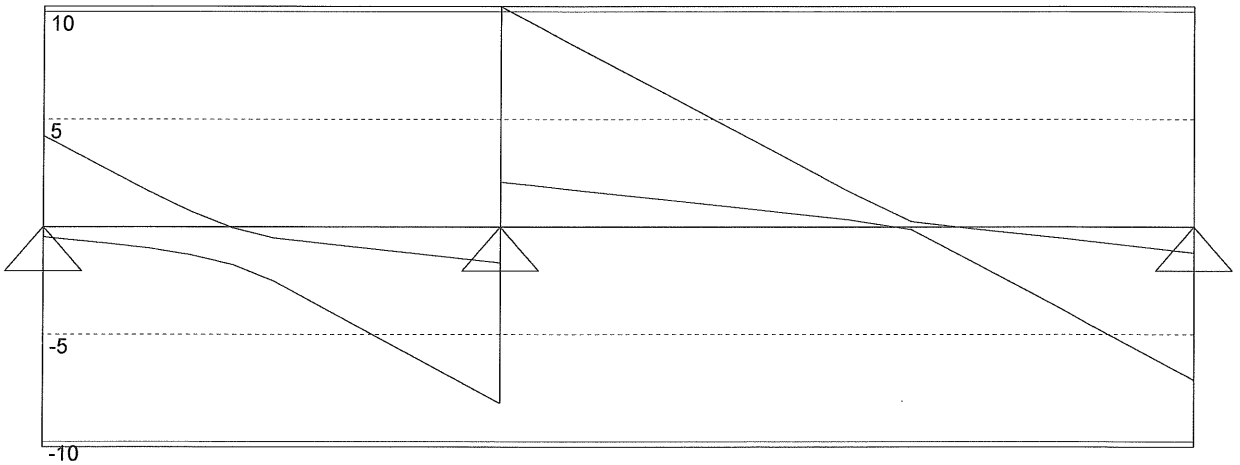


Load factor of dead load= 1 Load factor of imposed load= 1
Load width 1 (m) (by which the loads
has been multiplied during calculation)
Max/Min reactions of beam [kN]
4,234 18,449 7,120
-0,454 3,762 1,201

KER 38 x 300 B 2 Cf=1,00 Design method: Allowable stress design
Increasing factor of the allowable stress 1,05
Factored Moment/Moment capacity [kNm] 4,677 10,811 43 %
Factored shear force/shear capacity [kN] 10,251 13,614 75 %

LVL (1) 1 1/2 x 11 7/8

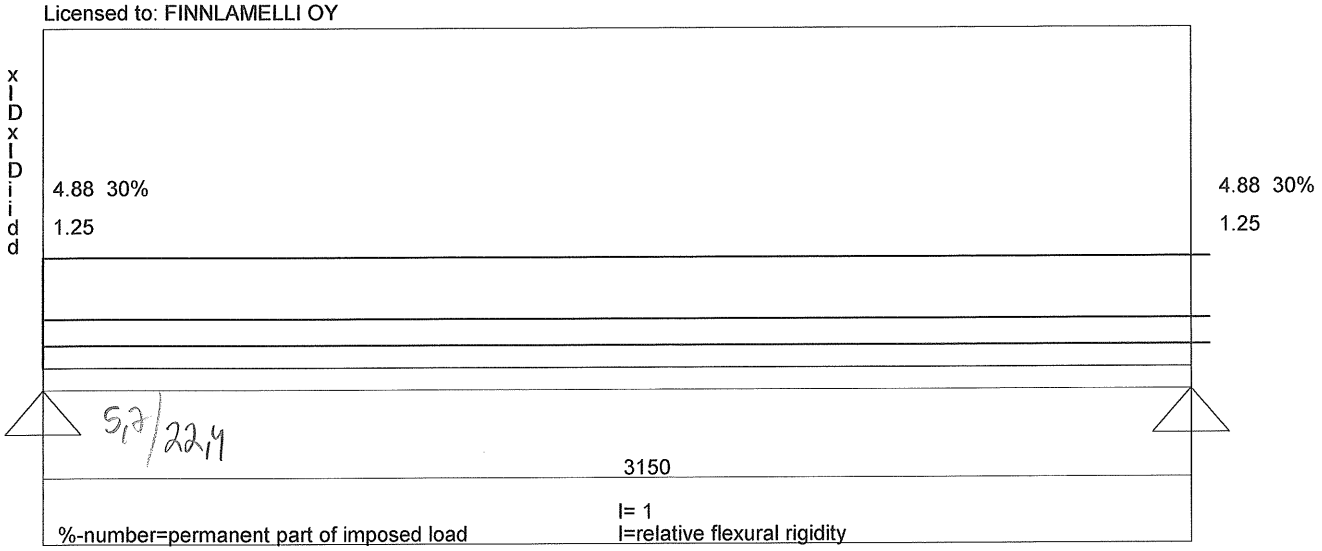
Deflection due to unfactored load (Deflection limit L/360)
0,4 mm (8 %) 3,3 mm (42 %)

Beam Id: Pioneer Cabin - MB II

Date 31-05-2019

Structural Engineer:

Licensed to: FINNLAMELLI OY



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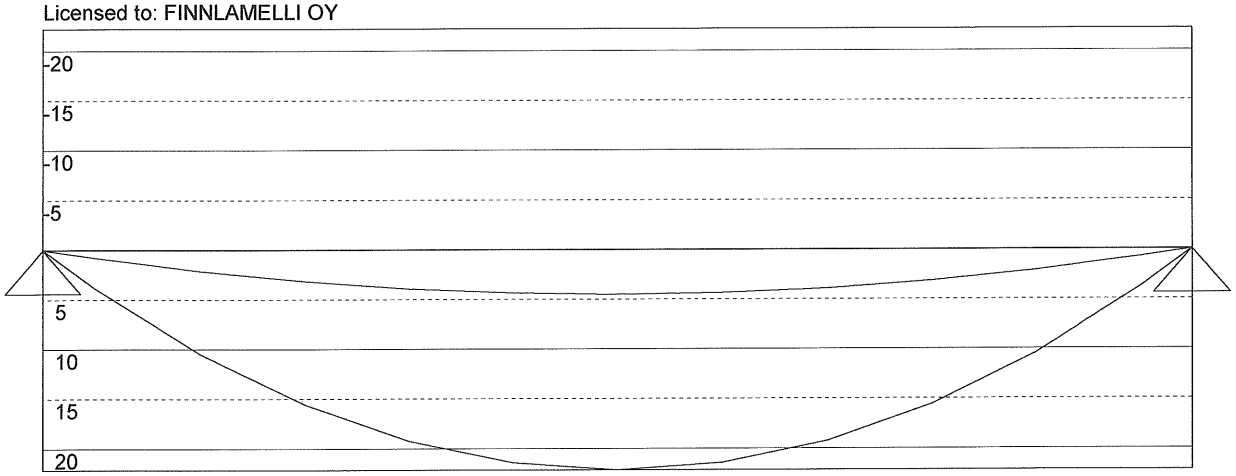

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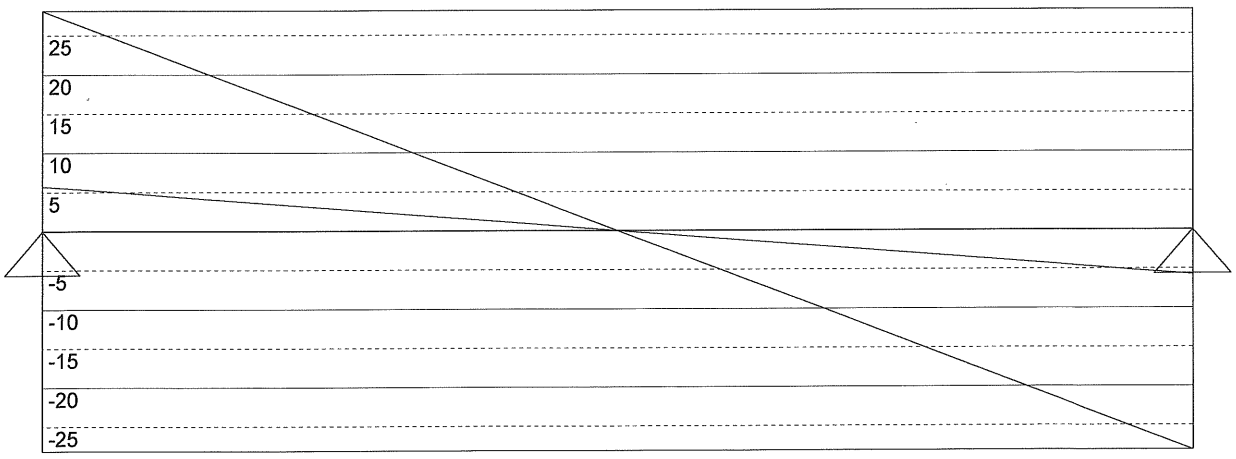

Load factor of dead load= 1 Load factor of imposed load= 1
Load width 2.915 (m) (by which the loads
has been multiplied during calculation)
Max/Min reactions of beam [kN]
28,138 28,144
5,738 5,739

KER 114 x 300 B 1 Cf=1,00 Design method: Allowable stress design
Increasing factor of the allowable stress 1,05
Factored Moment/Moment capacity [kNm] 22,163 32,433 68 %
Factored shear force/shear capacity [kN] 28,138 40,842 69 %

LVL (3) 1 1/2 x 11 7/8

Deflection due to unfactored load (Deflection limit L/360)
8,6 mm (98 %)

Beam Id: Pioneer cabin - MB 12 Date 11-07-2019

Structural Engineer:

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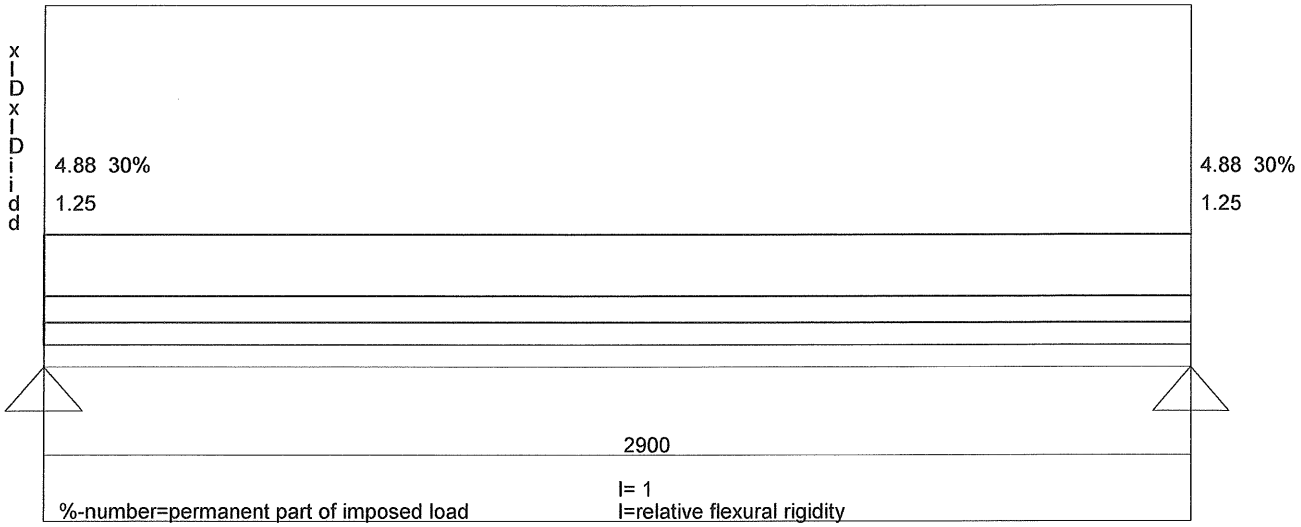

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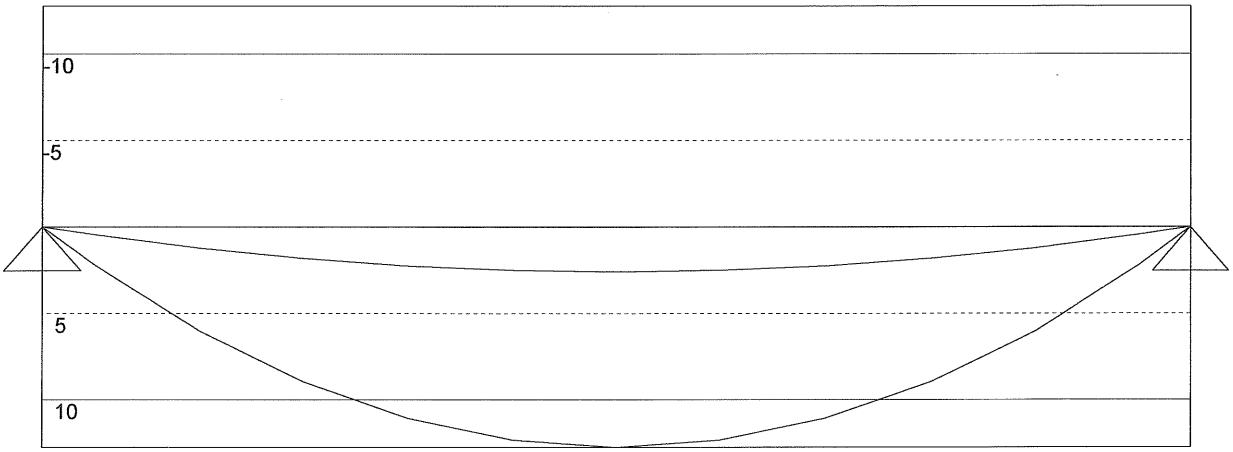

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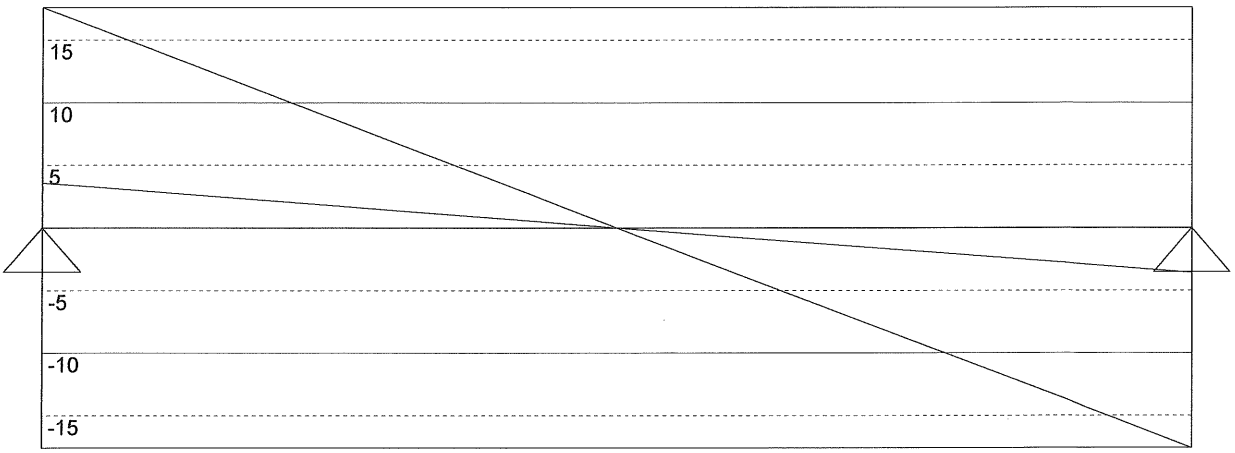

Load factor of dead load= 1 Load factor of imposed load= 1
Load width 1.98 (m) (by which the loads
has been multiplied during calculation)
Max/Min reactions of beam [kN]
17,596 17,599
3,588 3,589

KER 76 x 300 B 1 Cf=1,00 Design method: Allowable stress design
Increasing factor of the allowable stress 1,05
Factored Moment/Moment capacity [kNm] 12,759 21,622 59 %
Factored shear force/shear capacity [kN] 17,596 27,228 65 %

(2) LVL 1 1/2 x 11 7/8

Deflection due to unfactored load (Deflection limit L/360)
6,3 mm (78 %)

Beam Id: Pioneer Cabin MB 13

Date 03-06-2019

Structural Engineer:

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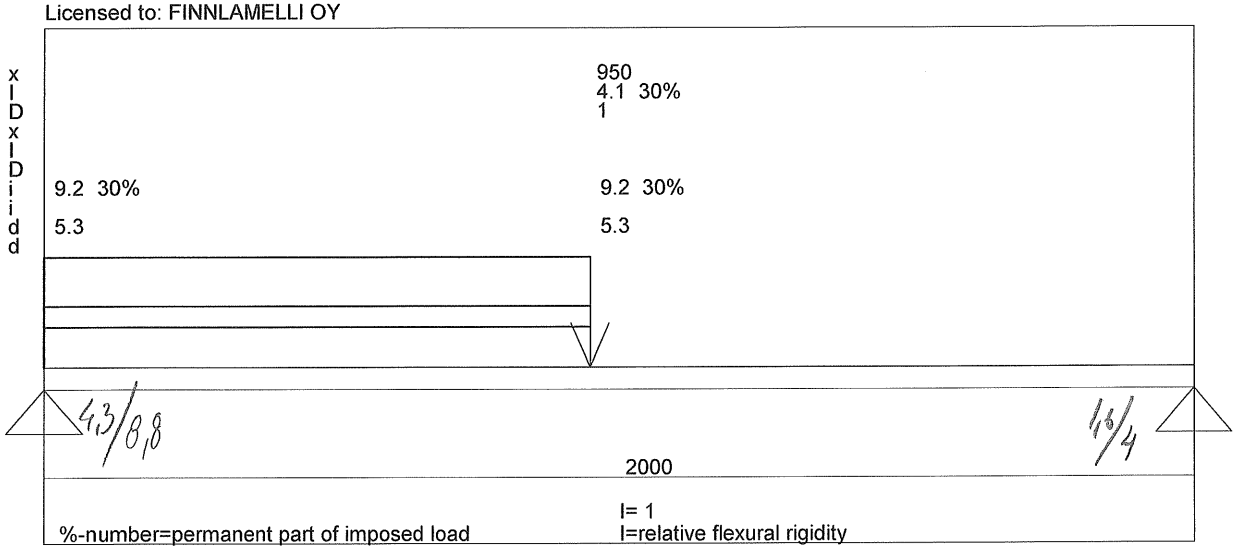

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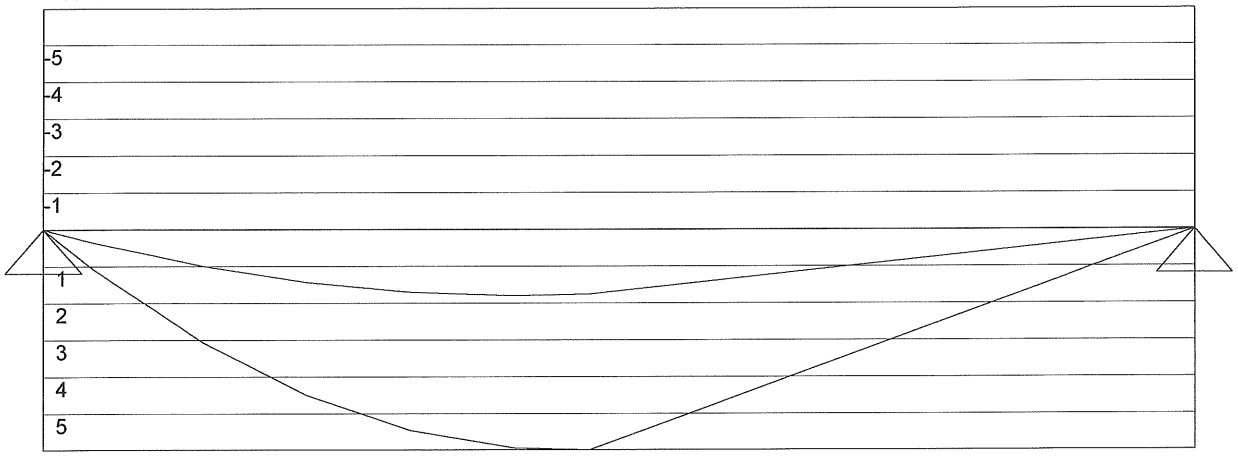

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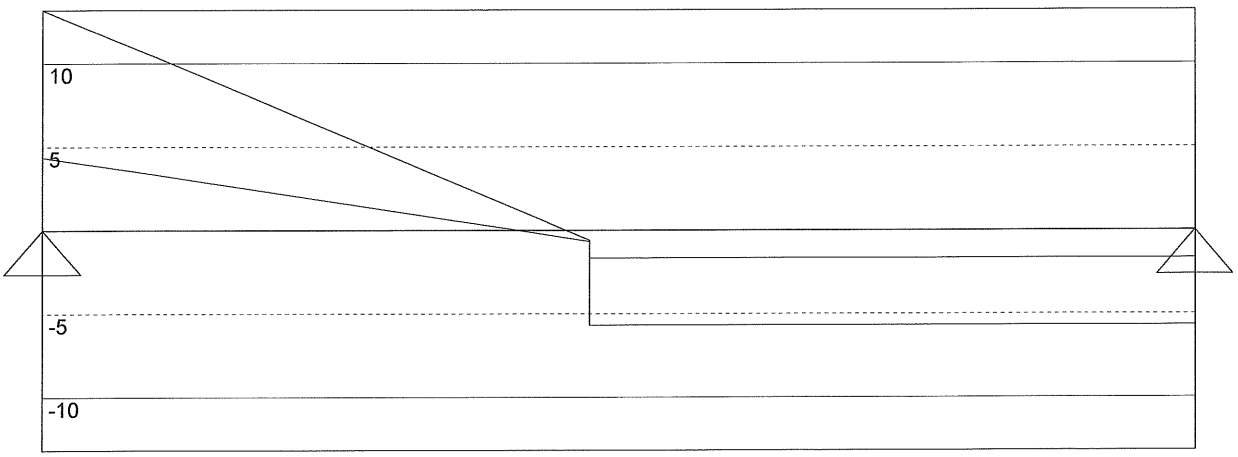


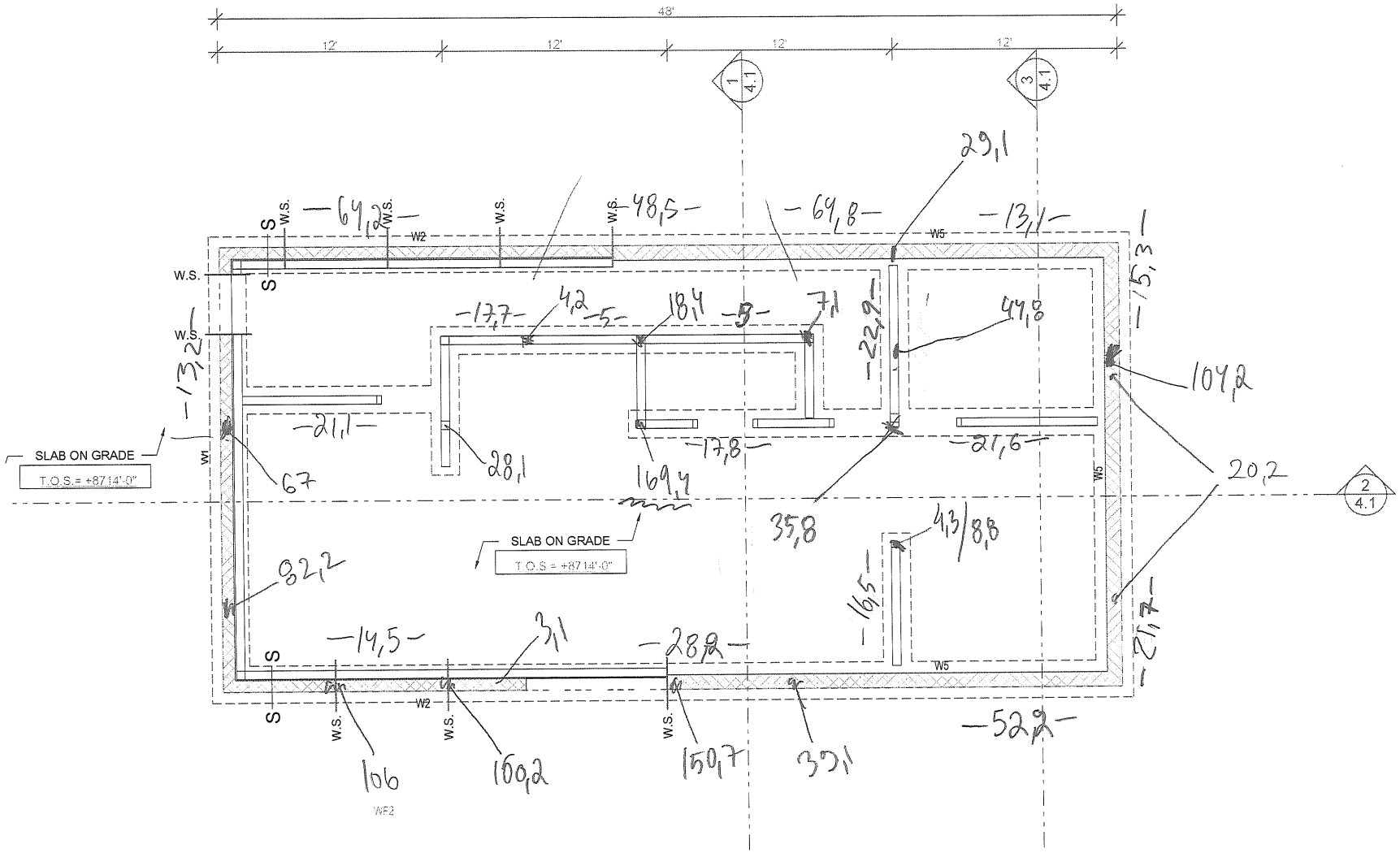
Load factor of dead load= 1 Load factor of imposed load= 1
Load width 1 (m) (by which the loads
has been multiplied during calculation)
Max/Min reactions of beam [kN]
13,177 5,693
4,363 1,670

KER 76 x 240 B 2 Cf=1,00 Design method: Allowable stress design
Increasing factor of the allowable stress 1,08
Factored Moment/Moment capacity [kNm] 5,978 14,172 42 %
Factored shear force/shear capacity [kN] 13,177 22,308 59 %

LVL (1) 3 x 9 1/2

Deflection due to unfactored load (Deflection limit L/360)
2,5 mm (44 %)

PIONEER CABIN FOUNDATION LOADS



+ 10 kN/m

+ 25 kN/m

1/S1 FOOTING AND FOUNDATION PLAN

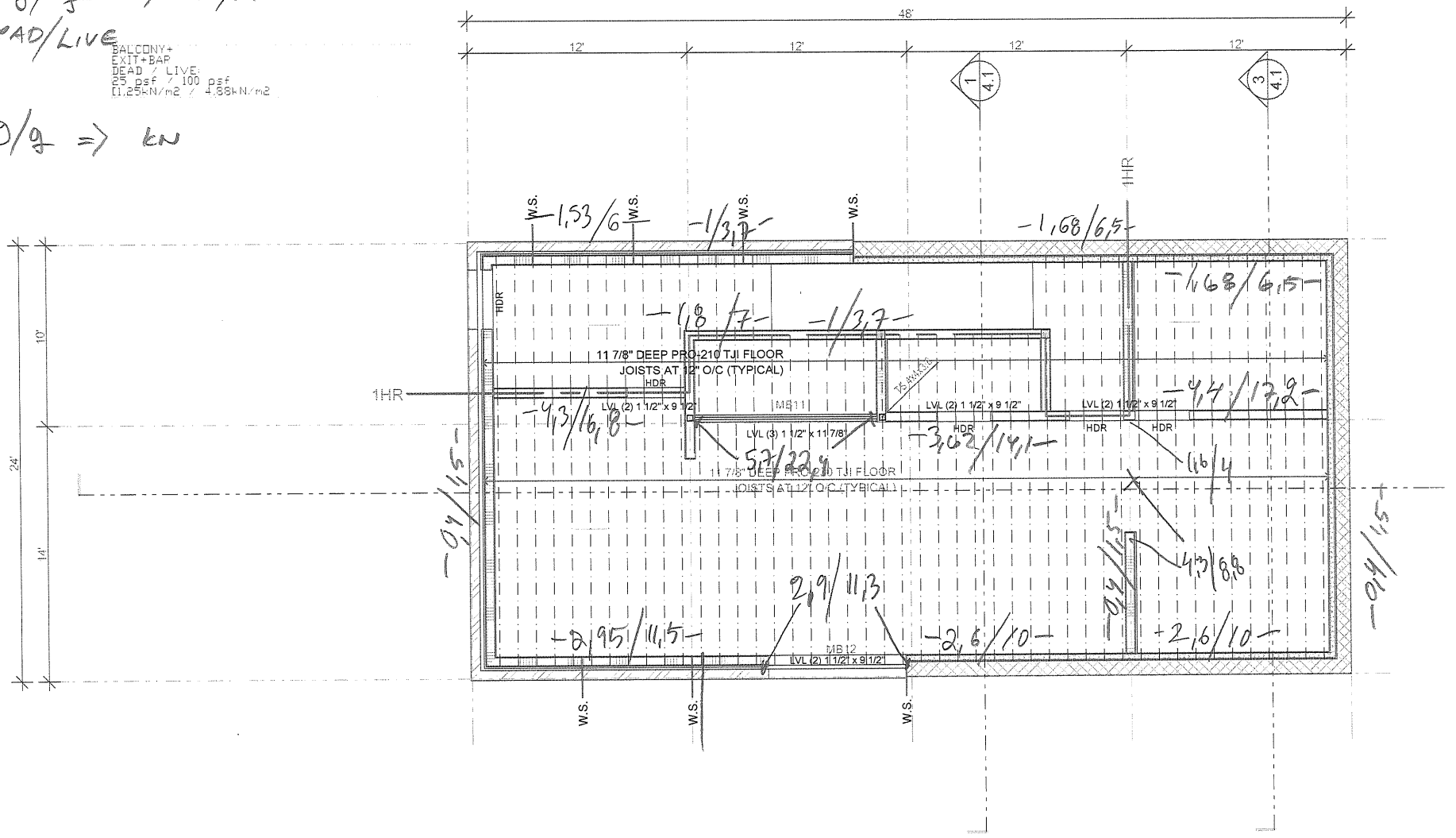
PIONEER CABIN . FLOOR LOADS (LOWER)

- g/q - ⇒ kN/m

DEAD/LIVE

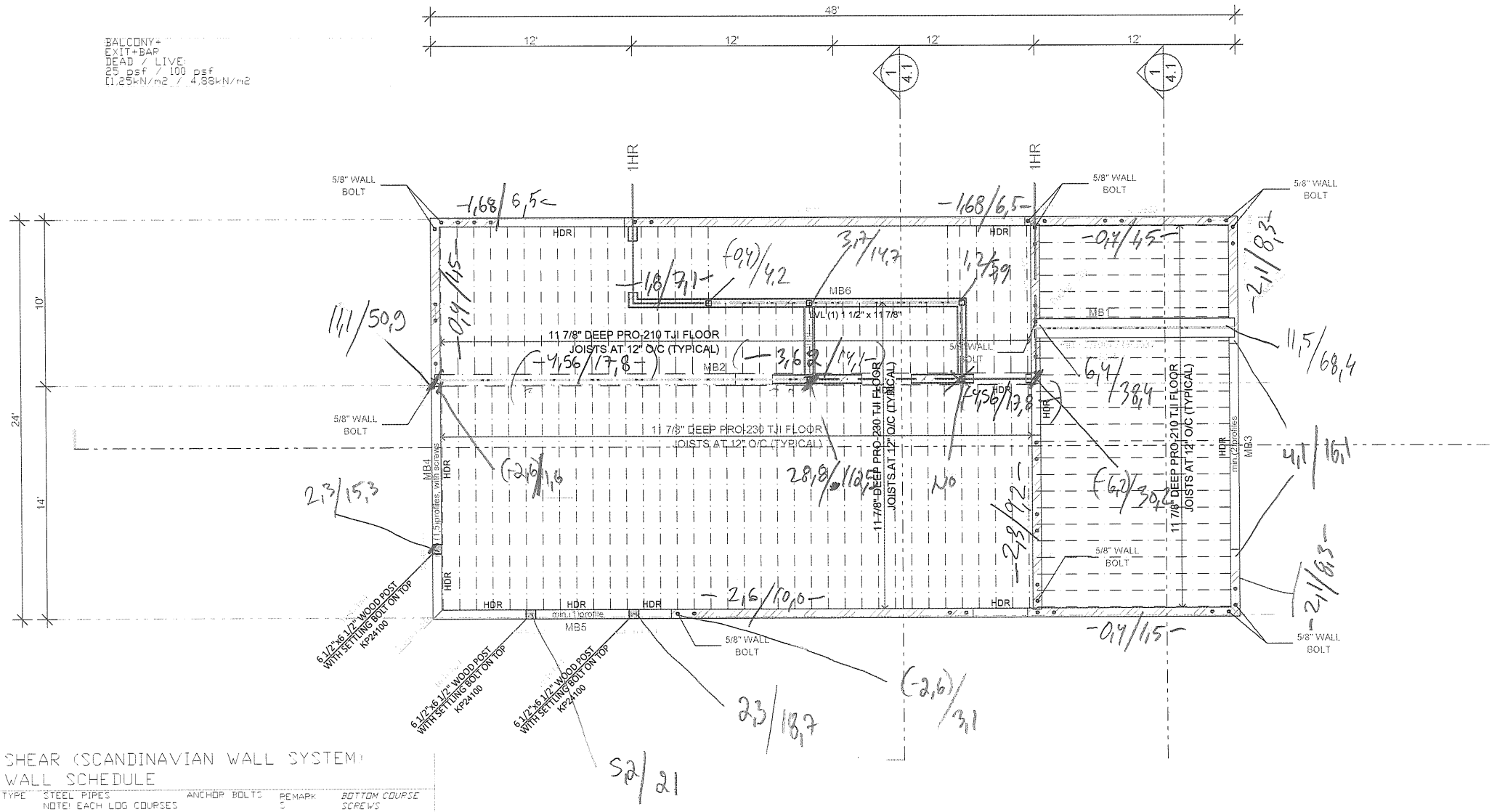
BALCONY+
EXIT+BAP
DEAD / LIVE:
25 psf / 100 psf
[1.25kN/m2 / 4.88kN/m2

g/q ⇒ kN



2 S1 LOWER LEVEL FRAMING PLAN

PIONEER CABIN FLOOR LOADS (UPPER)



SHEAR (SCANDINAVIAN WALL SYSTEM)
WALL SCHEDULE

TYPE	STEEL PIPES NOTE! EACH LOG COURSES	ANCHOR BOLTS	PEMAPK	BOTTOM COURSE SCREWS	
1	LOCATION OF THE WALL DRAWINGS	5/8" AT 24"	C.D	(2) 13" x 1.2" SCREWS AT 24"	=340 plf
2	LOCATION OF THE WALL DRAWINGS	5/8" AT 16"	C.D	(2) 13" x 1.2" SCREWS AT 12"	=680 plf
3	LOCATION OF THE WALL DRAWINGS	5/8" AT	C.D.E	(2) 13" x 1.2" SCREWS AT 8"	=1020 plf

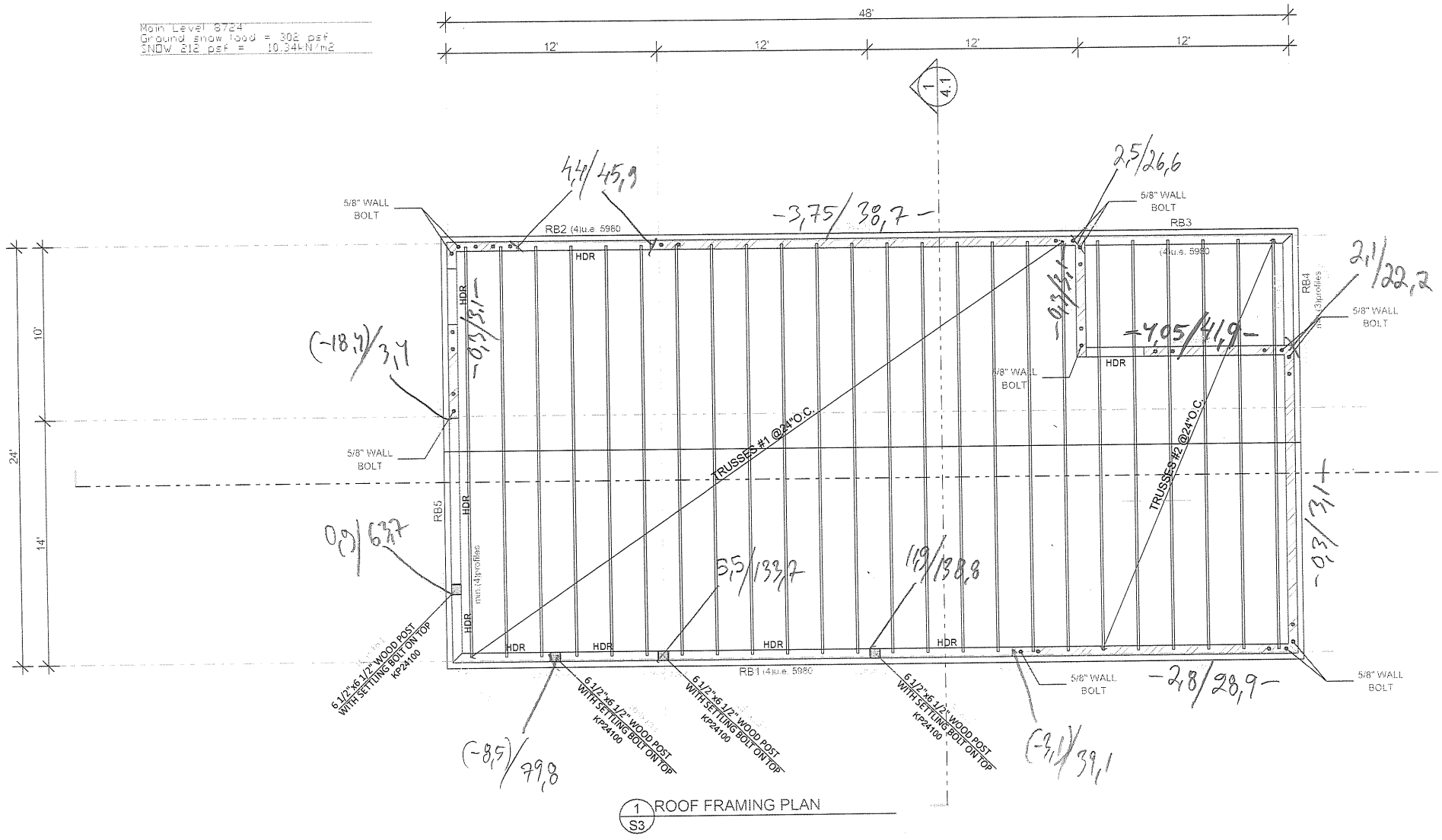
Note! MIN. 3"x3"x0.229" PLATE WASHERS ON ANCHOR BOLTS

1 1/8" STEEL DOWELS — 1 1/8" STEEL DOWEL LOCATION, TYPICAL AS SHOWN ON PLANS. SEE DETAIL S304 FOR INSTALLATION OF DOWELS

5/8" WALL BOLT — 5/8" WALL CORNER BOLT LOCATION, TYPICAL AS SHOWN ON PLANS. SEE DETAIL S304 FOR INSTALLATION OF STEEL BOLTS

1/S2 MAIN LEVEL FRAMING PLAN (SECOND FLOOR)

PIONEER CABIN ROOF LOADS



1 S3 ROOF FRAMING PLAN