

REPRISE DE CHARPENTE

ZA PEGUILHAN
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SATOB
Construction Bois



arbonis®

LE 15/04/08

NOTE DE CALCUL: CHARPENTE FERMETTE

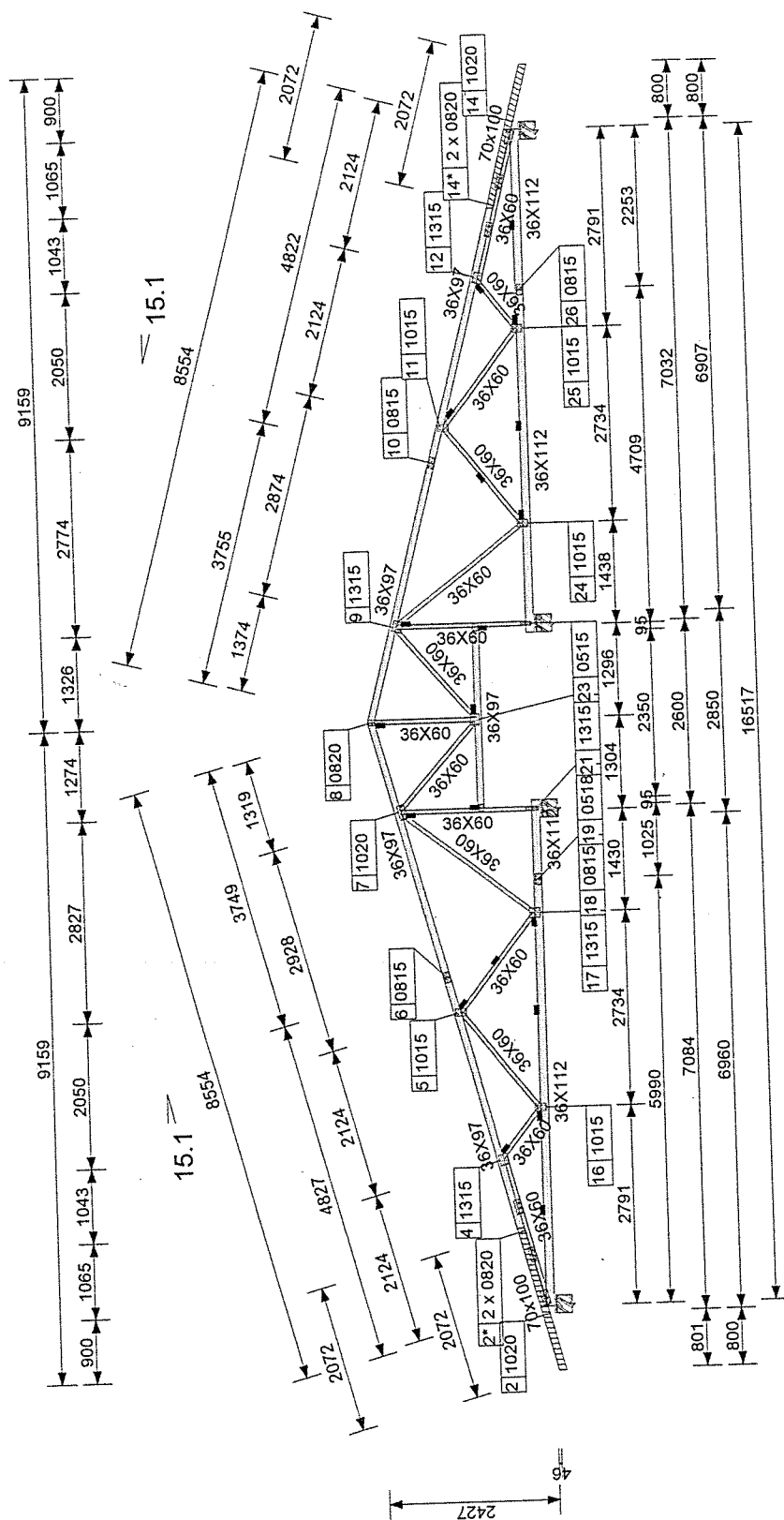
Ref: GROUPE SCOLAIRE AUZEVILLE TOLOSANE

1: Plans et détails pour la pose et le repérage sur chantier

-Vue en plan charpente avec dispositifs d'antiflambement et de contreventement et principe de pose.

2: Note de calcul

- Note de calcul de la ferme F2
- Note de calcul de la ferme F22 REPRISE DES CHEVETRES F2A-F2B
- Note de calcul de la ferme F222 REPRISE, CROCHET DE SECURITE
- Note de calcul de la poutre d'antiflambage AN2
- Note de calcul des poutres 90/240 pour support des fermettes
- Note de calcul de la ferme F1



Ce dessin doit être accompagné de la note de calcul.

☒ Lisse d'antiflambage.

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** NOTE DE CALCUL **

INFORMATIONS GENERALES

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Travaux faits par:

SATOB

ZI PEGUILHAN

Ville, Région HAUTE GARONNE, Pays

Tel : 05.61.88.78.51

Fax : 05.61.88.14.19

Adresse client:

Adresse chantier:

DIVERS

Les calculs ont pour base technique:

Les documents techniques unifiés DTU.

Règles N.V.65 et N 84 (carte de neige)

DTU 31.3, Norme P21.110 etc...

Méthode de calcul utilisées:

Calcul hyperstatique de structure plane à barres.

Unités utilisées:

mm, deg, MPa

Conventions:

Efforts : Négatif (-) = Compression, Positif (+) = Traction

Reactions: Négatif (-) = Soulèvement, Positive (+) = Descente

Caractéristiques des bois:

Catégorie de bois : C22 SE

Module d'élasticité axial : 9000.0

Coefficient de fluage : 1.5

Densité : 410.00 Kg/m³

Contraintes admissibles :

Flexion // : 10.00 MPa

Traction // : 6.00 MPa

Traction T : 0.20 MPa

Compression // : 9.00 MPa

Compression T : 2.20 MPa

Cisaillement // : 1.10 MPa

Catégorie de bois : C24 SE

Module d'élasticité axial : 10000.0

Coefficient de fluage : 1.5

Densité : 420.00 Kg/m³

Contraintes admissibles :

Flexion // : 11.00 MPa

Traction // : 6.50 MPa

Traction T : 0.20 MPa

Compression // : 9.50 MPa

Compression T : 2.30 MPa

Cisaillement // : 1.10 MPa

Caractéristiques des connecteurs:

Type de plaque : M20

Réf. PV Essai 01.370029v2

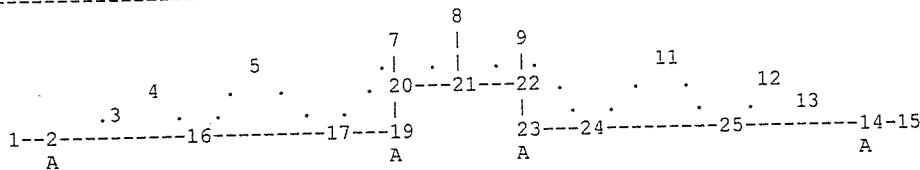
Lundi 14 Avril 2008

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2 ET MODELE DE LA STRUCTURE

Ma de la Structure



Dimensions du batiment:

Longueur (a)	: 15 m	Largeur (b)	: 8 m
Hauteur totale (H)	: 10 m	Hauteur au faitage (h)	: 10 m
Pente Gauche	: 15.11 deg	Pente Droite	: 15.11 deg
Portee	: 16517 mm	Entraxe des fermes	: 600 mm
Hauteur Hors-tout	: 2576 mm	Longueur Hors-tout	: 18317 mm
Prolonge Gauche Entrait	: 0 mm	Prolonge Droite Entrait	: 0 mm
Entraxe lattes Arba. (*)	: 600 mm	Entraxe lattes Entrait (*)	: 0 mm

(*) - Valeurs de saisie, voir les longueurs de flambement calculees en 'Caracteristiques des barres.'

Coordonnees des noeuds:

Noeud	Coordonnees		Liberte		
	X (mm)	Y (mm)	Horiz.	Vert.	Rot.
J2	-100	56	1	1	0 Appui
J8	8259	2377	0	0	0
J16	2791	56	0	0	0
J4	2061	703	0	0	0
J5	4145	1266	0	0	0
J17	5525	56	0	0	0
J21	8259	849	0	0	0
J11	12372	1266	0	0	0
J24	10993	56	0	0	0
J25	13726	56	0	0	0
J12	14456	703	0	0	0
J7	6985	2033	0	0	0
J19	6985	56	0	1	0 Appui
J9	9585	2019	0	0	0
J23	9585	56	0	1	0 Appui
J14	16617	56	0	1	0 Appui
J22	9585	849	0	0	0
J20	6985	849	0	0	0
J1	-900	-98	0	0	0
J3	1108	415	0	0	0
J13	15410	415	0	0	0
J15	17417	-98	0	0	0

0=Libre, 1=Fix

Caracteristiques des barres:

Barre	Debut-Fin	Section	Longueur (mm)	Project. X (mm)	Longueur Flambage (mm)	Pente (deg)	Conditions Extremities
T1 1-2	1	1.0 0x0 C22	815	800	540	10.88	Pin-Fix
T1 1-2	1	1.0 70x100 C22	1260	1207	540	16.55	Fix-Fix
T1 2-3	1	1.0 36x157 C24	996	954	540	16.84	Fix-Fix
T1 2-3	1	1.0 70x100 C22	2159	2084	540	15.11	Fix-Fix
T1 3-4	1	1.0 36x157 C24	524	506	540	15.11	Fix-Fix
T1 4-5	1	1.0 36x97 C24	2417	2333	540	15.11	Fix-Fix
T1 5-6	1	1.0 36x97 C24	1319	1274	540	15.11	Fix-Pin
T1 6-7	1	1.0 36x97 C24	1374	1326	540	-15.11	Pin-Fix
T1 7-8	1	1.0 36x97 C24	2368	2286	540	-15.11	Fix-Fix
T2 8-9	1	1.0 36x97 C24	519	501	540	-15.11	Fix-Fix
T2 9-10	1	1.0 36x97 C24	2159	2084	540	-15.11	Fix-Fix
T2 10-11	1	1.0 36x97 C24	996	954	540	-16.84	Fix-Fix
T2 11-12	1	1.0 36x157 C24	1260	1207	540	-16.55	Fix-Fix
T2 12-13	1	1.0 36x157 C24	815	800	540	-10.88	Fix-Pin
T2 13-14	1	1.0 70x100 C22	2891	2891	1446	0.00	Pin-Fix
T2 14-15	1	1.0 0x0 C22	2734	2734	1367	0.00	Fix-Fix
T2 14-15	1	1.0 70x100 C22	465	465	1460	0.00	Fix-Fix
B3 2-16	1	1.0 36x112 C24	995	995	1460	0.00	Fix-Pin
B3 16-17	1	1.0 36x112 C24	1274	1274	1274	0.00	Pin-Fix
B3 17-18	1	1.0 36x112 C24	1326	1326	1326	0.00	Fix-Pin
B3 18-19	1	1.0 36x112 C24	1408	1408	1408	0.00	Pin-Fix
B4 20-21	1	1.0 36x97 C24	2734	2734	1367	0.00	Fix-Fix
B4 21-22	1	1.0 36x97 C24	538	538	1446	0.00	Fix-Fix
B5 23-24	1	1.0 36x112 C24	2353	2353	1446	0.00	Fix-Pin
B5 24-25	1	1.0 36x112 C24	976	730	976	-41.56	Pin-Pin
B5 25-26	1	1.0 36x112 C24					
B5 26-14	1	1.0 36x112 C24					
W6 4-16	1	1.0 36x60 C24					

-----Section-----					Longueur	Project.	Longueur		Conditions
in	Pli	Coef	BxH	Cat	(mm)	X (mm)	Flambage (mm)	Pente (deg)	Extremities Debut-Fin
5	1	1.0	36x60	C24	1816	1354	1816	41.78	Pin-Pin
17	1	1.0	36x60	C24	1835	1380	918	-41.26	Pin-Pin
21-8	1	1.0	36x60	C24	1528	1528	1528	90.00	Pin-Pin
6 24-11	1	1.0	36x60	C24	1835	1380	918	41.26	Pin-Pin
17 11-25	1	1.0	36x60	C24	1816	1354	1816	-41.78	Pin-Pin
W18 25-12	1	1.0	36x60	C24	976	730	976	41.56	Pin-Pin
W10 19-20	1	1.0	36x60	C24	793	793	793	90.00	Pin-Fix
W10 20-7	1	1.0	36x60	C24	1184	1184	1184	90.00	Fix-Pin
W14 23-22	1	1.0	36x60	C24	793	793	793	90.00	Pin-Fix
W14 22-9	1	1.0	36x60	C24	1170	1170	1170	90.00	Fix-Pin
W9 17-7	1	1.0	36x60	C24	2458	1460	2458	53.55	Pin-Pin
W15 9-24	1	1.0	36x60	C24	2415	1408	2415	-54.35	Pin-Pin
W11 7-21	1	1.0	36x60	C24	1739	1274	1739	-42.92	Pin-Pin
W13 21-9	1	1.0	36x60	C24	1769	1326	1769	41.42	Pin-Pin

LES DE CHARGES ET SURCHARGES

Charges permanentes:					
Couverture	: 0.500	Plafond bas	: 0.440		
Surcharge de neige:					
Region de neige	: 1B	Altitude	: 200 m		
Normale	: 0.350	Normale majoree	: 0.350		
Extreme	: 0.600	Extreme majoree	: 0.800		
Accidentelle	: 0.800				
Permanente	: 0 %	Temporaire	: 100 %		
Barre	Pente	Coef multiplicateur du a la pente			
1-8	15.110	1.000			
8-15	-15.110	1.000			
Surcharge de vent:					
Region de vent	: II	Nature du Site	: Normal		
Pression de base	: 0.600	Permeabilite	: 5%		
Longueur (a)	: 15000 mm	Coef site	: 1.000		
Largeur (b)	: 8000 mm	Coef majoration	: 1.000		
Hauteur totale (H)	: 10000 mm	Coef hauteur	: 1.000		
Hauteur au faitage (h)	: 10000 mm	Valeur pression	: 0.600		
Flèche	: 2473 mm	Lambda a	: 0.667		
Coef delta	: 0.909	Lambda b	: 1.250		
f/h	: 0.247	Gamma 0 normal	: 1.000		
b/a	: 0.533	Gamma 0 Parallele	: 1.000		
Barre	Pente	-----Exterieur (Ce)-----	--Interieure (Ci)--		
		Au vent	Sous le vent	Parallele	Succion Pression
1-2	15.110	-0.633	-0.334	-0.502	0.000 0.000
14-15	-15.110	-0.633	-0.334	-0.502	0.000 0.000
2-8	15.110	-0.633	-0.334	-0.502	-0.300 0.300
8-14	-15.110	-0.633	-0.334	-0.502	-0.300 0.300

Combinaisons de charges vérifiées:

- Cas 1: Charges Permanentes + Neige Normale (Cas 1)
- Cas 3: Charges Permanentes + 1kN Arba (Cas 2)
- Cas 4: Charges Permanentes + Neige + 1kN Entrait (Cas 2bis)
- Cas 5: Vent Normal G->D Depression Interne (Cas 3)
- Cas 7: Vent Normal D->G Depression Interne (Cas 3)
- Cas 11: Charges Permanentes + Neige Extreme (Cas 4)
- Cas 13: Vent Extreme G->D Surpression Interne (Cas 5)
- Cas 15: Vent Extreme D->G Surpression Interne (Cas 5)
- Cas 16: Vent Extreme Parallele Surpression Interne (Cas 5bis)

Reactions d'appuis par Cas de Charges

Nom	Appui 2 Verti (kN)	Horiz (kN)	Appui 19 Verti (kN)	Horiz (kN)	Appui 23 Verti (kN)	Horiz (kN)	Appui 14 Verti (kN)	Horiz (kN)
TOTAL	3.375	0.000	4.072	0.000	4.041	0.000	3.354	0.000
DEAD	2.471	0.000	3.046	0.000	3.024	0.000	2.455	0.000
LIVE	0.904	0.000	1.026	0.000	1.017	0.000	0.899	0.000
TOTAL	2.425	0.000	3.092	0.000	3.068	0.000	2.410	0.000
4 TOTAL	3.375	0.000	4.072	0.000	4.041	0.000	3.354	0.000
5 TOTAL	2.005	0.323	3.023	0.000	2.977	0.000	2.365	0.000
5 DEAD	2.471	0.000	3.046	0.000	3.024	0.000	2.455	0.000
5 LIVE	-0.466	0.323	-0.023	0.000	-0.047	0.000	-0.090	0.000
7 TOTAL	2.291	-0.323	3.090	0.000	3.089	0.000	1.899	0.000
7 DEAD	2.471	0.000	3.046	0.000	3.024	0.000	2.455	0.000
7 LIVE	-0.180	-0.323	0.044	0.000	0.066	0.000	-0.556	0.000
11 TOTAL	4.764	0.000	5.672	0.000	5.627	0.000	4.736	0.000
13 TOTAL	-0.926	0.620	0.009	0.000	0.887	0.000	0.662	0.000
15 TOTAL	0.493	-0.620	1.068	0.000	0.168	0.000	-1.097	0.000
16 TOTAL	0.223	0.000	0.433	0.000	0.423	0.000	0.222	0.000

RESULTATS DE CALCUL

Cas de Charges 1: Coef =1.00 Charges Permanentes + Neige Normale (Cas 1)

Charges Uniformes

Barre	---Debut Barre--- Vert.	Horiz.	---Fin Barre--- Vert.	Horiz.
Arbalétrier				
T1 1-2	-0.544	0.000	-0.544	0.000
T1 2-3	-0.552	0.000	-0.552	0.000
T1 3-4	-0.553	0.000	-0.553	0.000
T1 4-5	-0.550	0.000	-0.550	0.000
T1 5-6	-0.550	0.000	-0.550	0.000
T1 6-7	-0.550	0.000	-0.550	0.000
T1 7-8	-0.550	0.000	-0.550	0.000
T2 8-9	-0.550	0.000	-0.550	0.000
T2 9-10	-0.550	0.000	-0.550	0.000
T2 10-11	-0.550	0.000	-0.550	0.000
T2 11-12	-0.550	0.000	-0.550	0.000
T2 12-13	-0.553	0.000	-0.553	0.000
T2 13-14	-0.552	0.000	-0.552	0.000
T2 14-15	-0.544	0.000	-0.544	0.000
Entrait				
B3 2-16	-0.285	0.000	-0.285	0.000
B3 16-17	-0.285	0.000	-0.285	0.000
B3 17-18	-0.285	0.000	-0.285	0.000
B3 18-19	-0.285	0.000	-0.285	0.000
B4 20-21	-0.285	0.000	-0.285	0.000
B4 21-22	-0.285	0.000	-0.285	0.000
B5 23-24	-0.285	0.000	-0.285	0.000
B5 24-25	-0.285	0.000	-0.285	0.000
B5 25-26	-0.285	0.000	-0.285	0.000
B5 26-14	-0.285	0.000	-0.285	0.000
Fiches				

Efforts/Moments aux Extremities

	----- Debut de Barre ----- Effort Tranch. (kN)	Effort Normal (kN)	Moment (kNm)	----- Fin de Barre ----- Effort Tranch. (kN)	Effort Normal (kN)	Moment (kNm)	Travee Moment Maxi. (kNm)
Arbalétrier							
T1 1-2	0.000	0.000	0.000	0.428	0.082	-0.174	0.000
T1 2-3	0.623	-7.048	0.174	0.017	-6.858	0.208	0.087
T1 3-4	-0.051	-6.858	-0.208	0.556	-6.705	-0.095	0.208
T1 4-5	0.448	-6.191	0.095	0.659	-5.893	-0.323	-0.193
T1 5-6	0.759	-2.157	0.323	-0.490	-2.084	0.004	-0.122
T1 6-7	0.490	-2.084	-0.004	0.749	-1.750	-0.309	0.239
T1 7-8	0.572	-0.437	0.309	0.104	-0.254	0.000	-0.238
T2 8-9	0.135	-0.246	0.000	0.570	-0.436	-0.299	-0.226
T2 9-10	0.735	-1.682	0.299	0.479	-2.010	0.005	0.228
T2 10-11	-0.479	-2.010	-0.005	0.745	-2.082	-0.313	-0.119
T2 11-12	0.652	-5.821	0.313	0.455	-6.120	-0.099	-0.184
T2 12-13	0.558	-6.640	0.099	-0.053	-6.793	0.205	0.205
T2 13-14	0.019	-6.793	-0.205	0.621	-6.983	-0.174	0.086
T2 14-15	0.428	0.082	0.174	0.000	0.000	0.000	0.000
Entrait							
B3 2-16	0.335	6.579	0.000	0.489	6.579	-0.222	0.197
B3 16-17	0.435	4.114	0.222	0.344	4.114	-0.097	-0.114
B3 17-18	0.274	-0.017	0.097	-0.142	-0.017	0.000	-0.059
B3 18-19	0.142	-0.017	-0.000	0.142	-0.017	0.000	0.035
B4 20-21	0.144	-0.028	0.000	0.218	-0.028	-0.047	0.037
B4 21-22	0.225	-0.028	0.047	0.154	-0.028	0.000	0.041

effort moyen dans
 arbal pour calcul
 poutre d'antiparlement
 AN2 page 35

	----- Debut de Barre -----			----- Fin de Barre -----			Travee
	Effort Tranch. (kN)	Effort Normal (kN)	Moment (kNm)	Effort Tranch. (kN)	Effort Normal (kN)	Moment (kNm)	Moment Maxi. (kNm)
B5 23-24	0.133	-0.016	0.000	0.268	-0.016	-0.095	-0.060
B5 24-25	0.343	4.032	0.095	0.436	4.032	-0.223	-0.114
B5 25-26	0.489	6.517	0.223	-0.336	6.517	-0.001	-0.093
B5 26-14	0.336	6.517	0.001	0.335	6.517	0.000	0.197
Fiches							
W6 4-16	0.000	-0.959	0.000	0.000	-0.959	0.000	0.000
W7 16-5	0.000	2.342	0.000	0.000	2.342	0.000	0.000
W8 5-17	0.000	-2.966	0.000	0.000	-2.966	0.000	0.000
W12 21-8	0.000	-0.100	0.000	0.000	-0.100	0.000	0.000
W16 24-11	0.000	-2.948	0.000	0.000	-2.948	0.000	0.000
W17 11-25	0.000	2.356	0.000	0.000	2.356	0.000	0.000
W18 25-12	0.000	-0.972	0.000	0.000	-0.972	0.000	0.000
W10 19-20	-0.017	-3.930	0.000	0.017	-3.930	-0.013	-0.012
W10 20-7	0.011	-3.786	0.013	-0.011	-3.786	0.000	-0.012
W14 23-22	0.016	-3.908	0.000	-0.016	-3.908	0.013	0.012
W14 22-9	-0.011	-3.754	-0.013	0.011	-3.754	0.000	0.012
W9 17-7	0.000	3.199	0.000	0.000	3.199	0.000	0.000
W15 9-24	0.000	3.144	0.000	0.000	3.144	0.000	0.000
W11 7-21	0.000	0.409	0.000	0.000	0.409	0.000	0.000
W13 21-9	0.000	0.400	0.000	0.000	0.400	0.000	0.000

Verification des Contraintes pour le cas de charge 1

Barres Externes:								
Barre	--Section-- BxH Cat.	--- Maximum ---		--Plan Ferme --		---Plan Perp---		Signal
		Effort (kN)	Moment (kNm)	K	Taux	K	Taux	ATF
T 2-4	36x157 C24	-6.858	0.208	0.965	0.276	0.826	0.298	
T 4-5	36x97 C24	-5.922	-0.193	0.710	0.562	0.826	0.526	
T 5-7	36x97 C24	-1.953	0.239	0.439	0.518	0.826	0.456	
T 7-8	36x97 C24	-0.418	-0.238	0.998	0.395	0.826	0.398	
T 8-9	36x97 C24	-0.417	-0.226	0.979	0.376	0.826	0.378	
T 9-11	36x97 C24	-1.882	0.228	0.456	0.492	0.826	0.436	
T11-12	36x97 C24	-5.851	-0.184	0.710	0.544	0.826	0.509	
T12-14	36x157 C24	-6.793	0.205	0.965	0.272	0.826	0.295	
B 2-16	36x112 C24	6.579	0.197		0.489			1
B16-17	36x112 C24	4.114	-0.114		0.294			1
B17-19	36x112 C24	-0.017	-0.059	1.000	0.072	0.156	0.075	
B20-21	36x97 C24	-0.028	0.037	1.000	0.060	0.206	0.063	
B21-22	36x97 C24	-0.028	0.041	0.995	0.067	0.190	0.071	
B23-24	36x112 C24	-0.016	-0.060	1.000	0.073	0.169	0.075	
B24-25	36x112 C24	4.032	-0.114		0.292			1
B25-14	36x112 C24	6.517	0.197		0.486			1
O 1-2	0x0 C22 +	0.000	0.000					
O 1-2	70x100 C22							
O14-15	0x0 C22 +	0.000	0.000					
O14-15	70x100 C22							

Barres Internes:								
Barre	--Section-- BxH Cat.	--- Maximum ---		--Plan Ferme --		---Plan Perp---		Signal
		Effort (kN)	Moment (kNm)	K	Taux	K	Taux	ATF
W 4-16	36x60 C24	-0.959	0.000	0.774	0.060	0.352	0.133	
W16-5	36x60 C24	2.342	0.000		0.167			
W 5-17	36x60 C24	-2.966	0.000	0.276	0.523	0.398	0.363	1
W21-8	36x60 C24	-0.100	0.000	0.398	0.012	0.138	0.035	
W24-11	36x60 C24	-2.948	0.000	0.276	0.520	0.398	0.361	1
W11-25	36x60 C24	2.356	0.000		0.168			
W25-12	36x60 C24	-0.972	0.000	0.774	0.061	0.352	0.135	
W19-20	36x60 C24	-3.930	-0.012	1.000	0.241	0.533	0.409	
W20-7	36x60 C24	-3.786	-0.012	0.794	0.282	0.239	0.822	
W23-22	36x60 C24	-3.908	0.012	1.000	0.240	0.533	0.406	
W22-9	36x60 C24	-3.754	0.012	0.801	0.277	0.245	0.797	
W17-7	36x60 C24	3.199	0.000		0.228			
W 9-24	36x60 C24	3.144	0.000		0.224			
W 7-21	36x60 C24	0.409	0.000		0.029			
W21-9	36x60 C24	0.400	0.000		0.028			

Noeuds:								
Noeud	--Section-- BxH Cat.	--- Maximum ---		--Plan Ferme --		---Plan Perp---		Signal
		Effort (kN)	Moment (kNm)	K	Taux	K	Taux	ATF
J2 T 2-4	36x157 C24 +	-4.552	-0.113	1.000	0.175	1.000	0.175	1
J2 T 2-4	70x100 C22							
J4 T 4-5	36x97 C24	-6.191	-0.095	1.000	0.339	1.000	0.339	1
J5 T 4-5	36x97 C24	-5.893	-0.323	1.000	0.698	1.000	0.698	1
J7 T 5-7	36x97 C24	-1.750	-0.309	1.000	0.550	1.000	0.550	1
J8 T 7-8	36x97 C24	-0.272	0.009	1.000	0.023	1.000	0.023	1
J8 T 8-9	36x97 C24	-0.265	0.014	1.000	0.030	1.000	0.030	1
J9 T 9-11	36x97 C24	-1.682	-0.299	1.000	0.532	1.000	0.532	1
J11 T11-12	36x97 C24	-5.821	-0.313	1.000	0.679	1.000	0.679	1

Noeud	--Section--				--- Maximum ---		--Plan Ferme --		---Plan Perp---		Signal
	BxH Cat.				Effort	Moment	K	Taux	K	Taux	
					(kN)	(kNm)					ATF
J12	T11-12	36x97	C24		-6.120	-0.099	1.000	0.344	1.000	0.344	1
J2	B 2-16	36x112	C24		6.579	0.085		0.354			1
J16	B 2-16	36x112	C24		6.579	-0.222		0.519			1
J17	B16-17	36x112	C24		4.114	-0.097		0.274			1
J19	B17-19	36x112	C24		-0.017	0.018	1.000	0.022	1.000	0.022	1
J20	B20-21	36x97	C24		-0.028	0.016	1.000	0.027	1.000	0.027	1
J21	B21-22	36x97	C24		-0.028	-0.047	1.000	0.077	1.000	0.077	1
J22	B21-22	36x97	C24		-0.028	0.018	1.000	0.030	1.000	0.030	1
J23	B23-24	36x112	C24		-0.016	0.016	1.000	0.020	1.000	0.020	1
J24	B24-25	36x112	C24		4.032	-0.095		0.268			1
J25	B25-14	36x112	C24		6.517	-0.223		0.518			1
J14	B25-14	36x112	C24		6.517	0.085		0.351			1
J19	W19-20	36x60	C24		-3.930	-0.001	1.000	0.197	1.000	0.197	1
J20	W19-20	36x60	C24		-3.930	-0.013	1.000	0.246	1.000	0.246	1
J7	W20-7	36x60	C24		-3.786	-0.001	1.000	0.190	1.000	0.190	1
J23	W23-22	36x60	C24		-3.908	0.001	1.000	0.196	1.000	0.196	1
J22	W23-22	36x60	C24		-3.908	0.013	1.000	0.245	1.000	0.245	1
J9	W22-9	36x60	C24		-3.754	0.001	1.000	0.188	1.000	0.188	1

Reactions d'appuis

Noeud	----- Reaction -----		----- Largeur -----		----- Hauteur -----		Signal
	Appui	Verti	Horiz	Réelle	Néc.	Réelle	
		(kN)	(kN)	(mm)	(mm)	(mm)	Taux
J2		3.375	0.000	250	41	112	0.11
J19		4.072	0.000	250	49	112	0.05
J23		4.041	0.000	250	49	112	0.04
J14		3.354	0.000	250	41	112	0.11

Verifications des Deformations pour le cas de charge 1

Fleche Locale

Barre	----- Panneau -----				----- Segment -----		Signal
	---Reelle---	---Admiss.---	---Reelle---	---Admiss.---	---Reelle---	---Admiss.---	
Debut-Fin	Fleche Ratio	Fleche Ratio	Fleche Ratio	Fleche Ratio	Fleche Ratio	Fleche Ratio	
T1 1-2	0.13 L/999	2.72 L/300	1.64 L/610	5.00 L/200			
T1 2-3	-0.93 L/999	7.52 L/300	-4.69 L/999	28.92 L/300			
T1 3-4	-0.93 L/999	7.52 L/300	-4.69 L/999	28.92 L/300			
T1 4-5	-1.08 L/999	7.20 L/300	-6.36 L/999	28.92 L/300			
T1 5-6	-7.24 L/406	9.80 L/300	-6.99 L/999	28.92 L/300			
T1 6-7	-7.24 L/406	9.80 L/300	-6.99 L/999	28.92 L/300			
T1 7-8	0.83 L/999	4.40 L/300	-0.72 L/999	28.92 L/300			
T2 8-9	0.76 L/999	4.58 L/300	-0.58 L/999	28.92 L/300			
T2 9-10	-6.66 L/433	9.62 L/300	-8.93 L/971	28.92 L/300			
T2 10-11	-6.66 L/433	9.62 L/300	-8.93 L/971	28.92 L/300			
T2 11-12	-1.14 L/999	7.20 L/300	-6.12 L/999	28.92 L/300			
T2 12-13	-0.91 L/999	7.52 L/300	-5.57 L/999	28.92 L/300			
T2 13-14	-0.91 L/999	7.52 L/300	-5.57 L/999	28.92 L/300			
T2 14-15	0.13 L/999	2.72 L/300	1.59 L/627	5.00 L/200			
B3 2-16	-5.19 L/557	7.23 L/400	-8.24 L/859	17.71 L/400			
B3 16-17	-1.91 L/999	6.83 L/400	-6.62 L/999	17.71 L/400			
B3 17-18	-0.11 L/999	3.65 L/400	-3.35 L/999	17.71 L/400			
B3 18-19	-0.11 L/999	3.65 L/400	-3.35 L/999	17.71 L/400			
B4 20-21	-0.27 L/999	3.18 L/400	-0.53 L/999	6.50 L/400			
B4 21-22	-0.34 L/999	3.32 L/400	-0.60 L/999	6.50 L/400			
B5 23-24	-0.07 L/999	3.52 L/400	-3.22 L/999	17.58 L/400			
B5 24-25	-1.93 L/999	6.83 L/400	-6.52 L/999	17.58 L/400			
B5 25-26	-5.18 L/558	7.23 L/400	-6.96 L/999	17.58 L/400			
B5 26-14	-5.18 L/558	7.23 L/400	-6.96 L/999	17.58 L/400			

Fleche Globale

Noeud	---- Deplacement ----			----- Admissible -----			Signal
	X	Y	Rotation	X	Y	Ratio	
J1	-0.316	1.637	0.000	10.000	5.000	L/200	
J2	0.000	0.000	0.000	10.000	17.712	L/400	
J4	1.395	-5.599	-0.003	10.000	17.712	L/400	
J5	0.700	-5.008	-0.001	10.000	17.712	L/400	
J7	-0.798	-0.641	-0.002	10.000	17.712	L/400	
J8	-0.798	-0.779	0.004	10.000	17.712	L/400	
J9	-0.796	-0.632	0.000	10.000	17.712	L/400	
J11	-2.063	-4.885	-0.004	10.000	17.712	L/400	
J12	-2.764	-5.519	0.001	10.000	17.712	L/400	
J14	-1.576	0.000	0.001	10.000	17.712	L/400	
J15	-1.319	1.593	0.002	10.000	5.000	L/200	
J16	0.864	-6.029	-0.003	10.000	17.712	L/400	
J17	1.247	-3.349	0.001	10.000	17.712	L/400	
J19	1.246	0.000	0.002	10.000	17.712	L/400	
J20	-0.793	-0.263	0.001	10.000	17.712	L/400	
J21	-0.794	-0.763	0.001	10.000	17.712	L/400	
J22	-0.796	-0.262	-0.000	10.000	17.712	L/400	

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Noeud	----- Deplacement -----			----- Admissible -----			Signal
	X	Y	Rotation	X	Y	Ratio	
J23	-2.620	0.000	0.000	10.000	17.712	L/400	
J24	-2.621	-3.219	0.000	10.000	17.712	L/400	
J25	-2.246	-5.932	-0.002	10.000	17.712	L/400	

RESUME DU CALCUL

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Contraintes

Barre	-Section-	Cas	Effort	Moment	Taux	Taux	ATF	Signal
	BxH Cat.		(kN)	(kNm)	Max.	Cis.		
T1 2-3	36x157 C24	+	3	-2.296	0.229	0.249	0.023	
T1 2-3	70x100 C22							
T1 3-4	36x157 C24		3	-5.205	0.472	0.313	0.119	
T1 4-5	36x97 C24		1	-5.922	-0.193	0.562	0.257	
T1 5-6	36x97 C24		3	-1.799	-0.259	0.386	0.190	
T1 6-7	36x97 C24		3	-1.698	0.533	0.697	0.157	
T1 7-8	36x97 C24		3	-0.310	-0.374	0.438	0.215	
T2 8-9	36x97 C24		3	-0.306	-0.362	0.424	0.213	
T2 9-10	36x97 C24		3	-1.641	0.518	0.673	0.155	
T2 10-11	36x97 C24		3	-1.739	-0.254	0.374	0.188	
T2 11-12	36x97 C24		1	-5.851	-0.184	0.544	0.255	
T2 12-13	36x157 C24		3	-5.159	0.469	0.310	0.119	
T2 13-14	36x157 C24	+	3	-2.277	0.228	0.248	0.022	
T2 13-14	70x100 C22							
B3 2-16	36x112 C24		1	6.579	0.197	0.489	0.165	1
B3 16-17	36x112 C24		1	4.114	-0.114	0.294	0.147	1
B3 17-18	36x112 C24		5	-0.013	-0.063	0.078	0.094	
B3 18-19	36x112 C24		1	-0.017	0.035	0.045	0.048	
B4 20-21	36x97 C24		1	-0.028	0.037	0.063	0.085	
B4 21-22	36x97 C24		1	-0.028	0.041	0.071	0.088	
B5 23-24	36x112 C24		7	-0.012	-0.064	0.079	0.092	
B5 24-25	36x112 C24		1	4.032	-0.114	0.292	0.148	1
B5 25-26	36x112 C24		1	6.517	-0.093	0.361	0.165	1
B5 26-14	36x112 C24		1	6.517	0.197	0.486	0.114	1
W6 4-16	36x60 C24		11	-1.527	0.000	0.141	0.000	
W7 16-5	36x60 C24		1	2.342	0.000	0.167	0.000	
W8 5-17	36x60 C24		1	-2.966	0.000	0.523	0.000	1
W12 21-8	36x60 C24		15	-0.458	0.000	0.107	0.000	
W16 24-11	36x60 C24		1	-2.948	0.000	0.520	0.000	1
W17 11-25	36x60 C24		1	2.356	0.000	0.168	0.000	
W18 25-12	36x60 C24		11	-1.546	0.000	0.143	0.000	
W10 19-20	36x60 C24		1	-3.930	-0.012	0.409	0.010	
W10 20-7	36x60 C24		1	-3.786	-0.012	0.822	0.007	
W14 23-22	36x60 C24		1	-3.908	0.012	0.406	0.010	
W14 22-9	36x60 C24		1	-3.754	0.012	0.797	0.007	
W9 17-7	36x60 C24		1	3.199	0.000	0.228	0.000	
W15 9-24	36x60 C24		1	3.144	0.000	0.224	0.000	
W11 7-21	36x60 C24		7	0.459	0.000	0.033	0.000	
W13 21-9	36x60 C24		7	0.449	0.000	0.032	0.000	

Noeuds:		--Section--		Cas	---- Maximum ----		---Plan (yy)---		---Plan (xx)---		Signal	
Noeud		BxH	Cat.		Effort	Moment	K	Taux	K	Taux	ATF	
					(kN)	(kNm)						
J2	T 2-4	36x157	C24	+	3	-3.624	-0.069	1.000	0.089	1.000	0.089	1
J2	T 2-4	70x100	C22									
J4	T 4-5	36x97	C24		3	-5.043	-0.304	1.000	0.458	1.000	0.458	1
J5	T 4-5	36x97	C24		3	-4.598	-0.525	1.000	0.703	1.000	0.703	1
J7	T 5-7	36x97	C24		3	-1.312	-0.514	1.000	0.619	1.000	0.619	1
J8	T 7-8	36x97	C24		3	0.041	0.037		0.044			1
J8	T 8-9	36x97	C24		3	0.049	0.043		0.051			1
J9	T 9-11	36x97	C24		3	-1.256	-0.505	1.000	0.608	1.000	0.608	1
J11	T11-12	36x97	C24		3	-4.544	-0.513	1.000	0.688	1.000	0.688	1
J12	T11-12	36x97	C24		3	-4.989	-0.309	1.000	0.462	1.000	0.462	1
J14	O12-14	36x157	C24		1	-4.510	-0.113	1.000	0.174	1.000	0.174	1
J2	B 2-16	36x112	C24		1	6.579	0.085		0.354			1
J16	B 2-16	36x112	C24		1	6.579	-0.222		0.519			1
J17	B16-17	36x112	C24		5	3.046	-0.101		0.238			1
J19	B17-19	36x112	C24		5	-0.013	0.017	1.000	0.021	1.000	0.021	1
J20	B20-21	36x97	C24		5	-0.021	0.016	1.000	0.026	1.000	0.026	1
J21	B20-21	36x97	C24		5	-0.021	-0.050	1.000	0.082	1.000	0.082	1
J22	B21-22	36x97	C24		5	-0.020	0.018	1.000	0.029	1.000	0.029	1
J23	B23-24	36x112	C24		7	-0.012	0.016	1.000	0.019	1.000	0.019	1
J24	B24-25	36x112	C24		1	4.032	-0.095		0.268			1
J25	B25-14	36x112	C24		1	6.517	-0.223		0.518			1
J14	B25-14	36x112	C24		1	6.517	0.085		0.351			1
J19	W19-20	36x60	C24		1	-3.930	-0.001	1.000	0.197	1.000	0.197	1
J20	W19-20	36x60	C24		1	-3.930	-0.013	1.000	0.246	1.000	0.246	1
J7	W20-7	36x60	C24		1	-3.786	-0.001	1.000	0.190	1.000	0.190	1
J23	W23-22	36x60	C24		1	-3.908	0.001	1.000	0.196	1.000	0.196	1
J22	W23-22	36x60	C24		1	-3.908	0.013	1.000	0.245	1.000	0.245	1
J9	W22-9	36x60	C24		1	-3.754	0.001	1.000	0.188	1.000	0.188	1

Reactions d'appuis

Noeud	-----Normale-----			-----Extreme-----			Permanente
	vert.	soul.	horz.	vert.	soul.	horz.	
J2	3.375(1)		-0.323(5)	4.764(6)	-0.926(7)	-0.620(8)	2.471
J19	4.072(1)		0.000(-1)	5.672(6)		0.000(-1)	3.046
J23	4.041(1)		0.000(-1)	5.627(6)		0.000(-1)	3.024
J14	3.354(1)		0.000(1)	4.736(6)	-1.097(8)	0.000(7)	2.455

Noeud	Largeur	Hauteur	Signal
	min. (mm)	min. (mm)	
J2	41	13	
J19	49	5	
J23	49	5	
J14	41	13	

Deformations

Barre	Panneau	Segment	--- Noeud Debut ---		--- Noeud Fin ---		Signal
			X	Y	X	Y	
T1 1-2	0.13(1)	3.09(5)	-0.60(5)	3.09(5)	0.00(1)	0.00(1)	
T1 2-3	-1.05(5)	-4.69(1)	0.00(1)	0.00(1)	1.40(1)	-5.60(1)	
T1 3-4	-1.05(5)	-4.69(1)	0.00(1)	0.00(1)	1.40(1)	-5.60(1)	
T1 4-5	-1.08(1)	-6.36(1)	1.40(1)	-5.60(1)	0.70(1)	-5.01(1)	
T1 5-6	-7.24(1)	-6.99(1)	0.70(1)	-5.01(1)	-0.80(1)	-0.64(1)	
T1 6-7	-7.24(1)	-6.99(1)	0.70(1)	-5.01(1)	-0.80(1)	-0.64(1)	
T1 7-8	0.83(1)	-0.72(1)	-0.80(1)	-0.64(1)	-0.80(1)	-0.78(1)	
T2 8-9	0.76(1)	-0.58(1)	-0.80(1)	-0.78(1)	-0.80(1)	-0.63(1)	
T2 9-10	-6.66(1)	-8.93(1)	-0.80(1)	-0.63(1)	-2.06(1)	-4.88(1)	
T2 10-11	-6.66(1)	-8.93(1)	-0.80(1)	-0.63(1)	-2.06(1)	-4.88(1)	
T2 11-12	-1.14(1)	-6.12(1)	-2.06(1)	-4.88(1)	-2.76(1)	-5.52(1)	
T2 12-13	-1.02(7)	-5.57(1)	-2.76(1)	-5.52(1)	-1.58(1)	0.00(1)	
T2 13-14	-1.02(7)	-5.57(1)	-2.76(1)	-5.52(1)	-1.58(1)	0.00(1)	
T2 14-15	0.13(1)	3.04(7)	-1.58(1)	0.00(1)	-1.32(1)	3.04(7)	
B3 2-16	-5.19(1)	-8.24(1)	0.00(1)	0.00(1)	0.86(1)	-6.03(1)	
B3 16-17	-1.91(1)	-6.62(1)	0.86(1)	-6.03(1)	1.25(1)	-3.35(1)	
B3 17-18	-0.11(1)	-3.35(1)	1.25(1)	-3.35(1)	1.25(1)	0.00(1)	
B3 18-19	-0.11(1)	-3.35(1)	1.25(1)	-3.35(1)	1.25(1)	0.00(1)	
B4 20-21	-0.27(1)	-0.53(1)	-0.79(1)	-0.26(1)	-0.79(1)	-0.76(1)	
B4 21-22	-0.34(1)	-0.60(1)	-0.79(1)	-0.76(1)	-0.80(1)	-0.26(1)	
B5 23-24	-0.07(1)	-3.22(1)	-2.62(1)	0.00(1)	-2.62(1)	-3.22(1)	
B5 24-25	-1.93(1)	-6.52(1)	-2.62(1)	-3.22(1)	-2.25(1)	-5.93(1)	
B5 25-26	-5.18(1)	-6.96(1)	-2.25(1)	-5.93(1)	-1.58(1)	0.00(1)	
B5 26-14	-5.18(1)	-6.96(1)	-2.25(1)	-5.93(1)	-1.58(1)	0.00(1)	
W6 4-16	-0.00(5)	-0.00(7)	1.40(1)	-5.60(1)	0.86(1)	-6.03(1)	
W7 16-5	0.00(1)	-0.00(5)	0.86(1)	-6.03(1)	0.70(1)	-5.01(1)	
W8 5-17	-0.00(1)	0.00(5)	0.70(1)	-5.01(1)	1.25(1)	-3.35(1)	
W12 21-8	0.00(1)	0.00(5)	-0.79(1)	-0.76(1)	-0.80(1)	-0.78(1)	
W16 24-11	-0.00(1)	0.00(5)	-2.62(1)	-3.22(1)	-2.06(1)	-4.88(1)	
W17 11-25	-0.00(1)	-0.00(5)	-2.06(1)	-4.88(1)	-2.25(1)	-5.93(1)	
W18 25-12	0.00(1)	-0.00(5)	-2.25(1)	-5.93(1)	-2.76(1)	-5.52(1)	
W10 19-20	0.14(1)	-0.00(5)	1.25(1)	0.00(1)	-0.79(1)	-0.26(1)	
W10 20-7	0.31(1)	-0.98(1)	-0.79(1)	-0.26(1)	-0.80(1)	-0.64(1)	
W14 23-22	-0.14(1)	-0.00(7)	-2.62(1)	0.00(1)	-0.80(1)	-0.26(1)	
W14 22-9	-0.30(1)	-1.14(1)	-0.80(1)	-0.26(1)	-0.80(1)	-0.63(1)	
W9 17-7	0.00(1)	-0.00(1)	1.25(1)	-3.35(1)	-0.80(1)	-0.64(1)	
W15 9-24	-0.00(1)	-0.00(1)	-0.80(1)	-0.63(1)	-2.62(1)	-3.22(1)	
W11 7-21	-0.00(1)	0.00(7)	-0.80(1)	-0.64(1)	-0.79(1)	-0.76(1)	
W13 21-9	-0.00(5)	-0.00(7)	-0.79(1)	-0.76(1)	-0.80(1)	-0.63(1)	

Notas importants:

1. Antiflambage:

Lisse d'Antiflambage necessaires aux barres:

W 5-17, W24-11

La fixation du dispositif d'antiflambage sera réalisé de manière à reprendre par ferme et par versant un effort perpendiculaire à l'arba $F = \text{Effort axial arba}/60 = 0.163\text{kN}$
Cette valeur est à multiplier par le nombre de fermes intéressées par le dispositif.

Remarques:

-
1. C'est la responsabilite du client de s'assurer que les donnees ci-dessus: dimensions, pentes, charges et autres caracteristiques sont celles demandees par le maitre d'ouvrage.
 2. Cette note de calcul propre a chaque element triangule ne dispense pas de l'execution d'un plan de pose et de contreventement adapte au batiment etudie.
 3. Poids de la Ferme 86.935 - 95.629 Kg

Informations Plaques

=====

Plaques utilisees: M20 01.370029v2

1. Les aboutages sont normalement places entre 10 et 25 % de la longueur du panneau.
2. Tolérance du positionnement = 10 (mm)

Noeud	Plaque		Position(x1)	(y1)	(x2)	(y2) (mm)
	Jauge	Code				
2	M20	1020	37	46		
2	M20	0820	102	38		
2	M20	0820	102	38		
4	M20	1315	0	0		
5	M20	1015	0	0		
6	M20	0815	0	0		
7	M20	1020	102	41		
8	M20	0820	38	85		
9	M20	1315	55	54		
10	M20	0815	0	0		
11	M20	1015	0	0		
12	M20	1315	0	0		
14	M20	1020	40	51		
14	M20	0820	102	38		
14	M20	0820	102	38		
16	M20	1015	0	0		
17	M20	1315	0	0		
18	M20	0815	0	0		
19	M20	0518	0	0		
20	M20	0810	0	0		
21	M20	1315	0	0		
22	M20	0810	0	0		
23	M20	0515	0	0		
24	M20	1015	0	0		
25	M20	1015	0	0		
26	M20	0815	0	0		

** N O T E D E C A L C U L **

INFORMATIONS GENERALES
=====

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DIVERS

Les calculs ont pour base technique:

Les documents techniques unifiés DTU.
Regles N.V.65 et N 84 (carte de neige)
DTU 31.3, Norme P21.110 etc...

Methode de calcul utilisees:

Calcul hyperstatique de structure plane a barres.

Unites utilisees:

mm, deg, MPa

Conventions:

Efforts : Negatif (-) = Compression, Positif (+) = Traction
Reactions: Negatif (-) = Soulevement, Positive (+) = Descente

Caracteristiques des bois:

Categorie de bois : C24 SE
Module d'elasticite axial : 10000.0
Coefficient de fluage : 1.5
Densite : 420.00 Kg/m^3
Contraintes admissibles :
Flexion // : 11.00 MPa
Traction // : 6.50 MPa
Traction T : 0.20 MPa
Compression // : 9.50 MPa
Compression T : 2.30 MPa
Cisaillement // : 1.10 MPa

Caracteristiques des connecteurs:

Type de plaque : M20

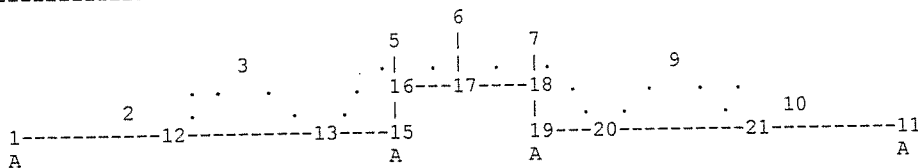
Réf. PV Essai 01.370029v2

Lundi 14 Avril 2008

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GEOMETRIE ET MODELE DE LA STRUCTURE

Schema de la Structure



Dimensions du batiment:

Longueur (a)	: 15 m	Largeur (b)	: 8 m
Hauteur totale (H)	: 10 m	Hauteur au faitage (h)	: 10 m
Pente Gauche	: 15.11 deg	Pente Droite	: 15.11 deg
Portee	: 16517 mm	Entraxe des fermes	: 600 mm
Hauteur Hors-tout	: 2427 mm	Longueur Hors-tout	: 16517 mm
Prolonge Gauche Entrait	: 0 mm	Prolonge Droite Entrait	: 0 mm
Entraxe lattes Arba. (*)	: 600 mm	Entraxe lattes Entrait (*)	: 0 mm

(*) - Valeurs de saisie, voir les longueurs de flambement calculees en 'Caracteristiques des barres.'

Coordonnees des noeuds:

Noeud	Coordonnees		Liberte			
	X (mm)	Y (mm)	Horiz.	Vert.	Rot.	
J1	-100	56	1	1	0	Appui
J6	8259	2377	0	0	0	
J12	2791	56	0	0	0	
J2	2061	703	0	0	0	
J3	4145	1266	0	0	0	
J13	5525	56	0	0	0	
J17	8259	849	0	0	0	
J9	12372	1266	0	0	0	
J20	10993	56	0	0	0	
J21	13726	56	0	0	0	
J10	14456	703	0	0	0	
J5	6985	2033	0	0	0	
J15	6985	56	0	1	0	Appui
J7	9585	2019	0	0	0	
J19	9585	56	0	1	0	Appui
J11	16617	56	0	1	0	Appui
J18	9585	849	0	0	0	
J16	6985	849	0	0	0	

0=Libre, 1=Fix

Caracteristiques des barres:

Barre	Section					Longueur	Project.	Longueur	Pente	Conditions
Debut-Fin	Pli	Coef	BxH	Cat		(mm)	X (mm)	Flambage (mm)	(deg)	Extremites
T1 1-2	1	1.0	36x157	C24		2256	2161	540	16.67	Pin-Fix
T1 2-3	1	1.0	36x97	C24		2159	2084	540	15.11	Fix-Fix
T1 3-4	1	1.0	36x97	C24		475	458	540	15.11	Fix-Fix
T1 4-5	1	1.0	36x97	C24		2467	2381	540	15.11	Fix-Fix
T1 5-6	1	1.0	36x97	C24		1319	1274	540	15.11	Fix-Pin
T2 6-7	1	1.0	36x97	C24		1374	1326	540	-15.11	Pin-Fix
T2 7-8	1	1.0	36x97	C24		2419	2335	540	-15.11	Fix-Fix
T2 8-9	1	1.0	36x97	C24		468	452	540	-15.11	Fix-Fix
T2 9-10	1	1.0	36x97	C24		2159	2084	540	-15.11	Fix-Fix
T2 10-11	1	1.0	36x157	C24		2256	2161	540	-16.67	Fix-Pin
B3 1-12	1	1.0	36x112	C24		2891	2891	1446	0.00	Pin-Fix
B3 12-13	1	1.0	36x112	C24		2734	2734	1367	0.00	Fix-Fix
B3 13-14	1	1.0	36x112	C24		465	465	1460	0.00	Fix-Fix
B3 14-15	1	1.0	36x112	C24		995	995	1460	0.00	Fix-Pin
B4 16-17	1	1.0	36x97	C24		1274	1274	1274	0.00	Pin-Fix
B4 17-18	1	1.0	36x97	C24		1326	1326	1326	0.00	Fix-Pin
B5 19-20	1	1.0	36x112	C24		1408	1408	1408	0.00	Pin-Fix
B5 20-21	1	1.0	36x112	C24		2734	2734	1367	0.00	Fix-Fix
B5 21-22	1	1.0	36x112	C24		513	513	1446	0.00	Fix-Fix
B5 22-11	1	1.0	36x112	C24		2378	2378	1446	0.00	Fix-Pin
W6 2-12	1	1.0	36x60	C24		976	730	976	-41.56	Pin-Pin
W7 12-3	1	1.0	36x60	C24		1816	1354	1816	41.78	Pin-Pin
W8 3-13	1	1.0	36x60	C24		1835	1380	918	-41.26	Pin-Pin
W12 17-6	1	1.0	36x60	C24		1528	1528	1528	90.00	Pin-Pin
W16 20-9	1	1.0	36x60	C24		1835	1380	918	41.26	Pin-Pin
W17 9-21	1	1.0	36x60	C24		1816	1354	1816	-41.78	Pin-Pin
W18 21-10	1	1.0	36x60	C24		976	730	976	41.56	Pin-Pin
W10 15-16	1	1.0	36x60	C24		793	793	793	90.00	Pin-Fix
W10 16-5	1	1.0	36x60	C24		1184	1184	1184	90.00	Fix-Pin
W14 19-18	1	1.0	36x60	C24		793	793	793	90.00	Pin-Fix
W14 18-7	1	1.0	36x60	C24		1170	1170	1170	90.00	Fix-Pin
W9 13-5	1	1.0	36x60	C24		2458	1460	2458	53.55	Pin-Pin
W15 7-20	1	1.0	36x60	C24		2415	1408	2415	-54.35	Pin-Pin

Barre	-----Section-----				Longueur	Project.	Longueur		Conditions
Debut-Fin	Pli	Coef	BxH	Cat	(mm)	X (mm)	Flambage (mm)	Pente (deg)	Extremities Debut-Fin
W11 5-17	1	1.0	36x60	C24	1739	1274	1739	-42.92	Pin-Pin
W13 17-7	1	1.0	36x60	C24	1769	1326	1769	41.42	Pin-Pin

HYPOTHESES DE CHARGES ET SURCHARGES =====

Charges permanentes:					
Couverture	:	0.500	Plafond bas	:	0.440
Surcharge de neige:					
Region de neige	:	1B	Altitude	:	200 m
Normale	:	0.350	Normale majoree	:	0.350
Extreme	:	0.600	Extreme majoree	:	0.800
Accidentelle	:	0.800		:	
Permanente	:	0 %	Temporaire	:	100 %
Barre	Pente	Coef multiplicateur du a la pente			
1-6	15.110	1.000			
6-11	-15.110	1.000			

Surcharge de vent:					
Région de vent	:	II	Nature du Site	:	Normal
Pression de base	:	0.600	Permeabilite	:	5%
Longueur (a)	:	15000 mm	Coef site	:	1.000
Largeur (b)	:	8000 mm	Coef majoration	:	1.000
Hauteur totale (H)	:	10000 mm	Coef hauteur	:	1.000
Hauteur au faitage (h)	:	10000 mm	Valeur pression	:	0.600
Flèche	:	2315 mm	Lambda a	:	0.667
Coef delta	:	0.913	Lambda b	:	1.250
f/h	:	0.231	Gamma 0 normal	:	1.000
b/a	:	0.533	Gamma 0 Parallèle	:	1.000

Barre	Pente	-----Exterieur (Ce)-----			--Interieure (Ci)--	
		Au vent	Sous le vent	Parallèle	Succion	Pression
1-6	15.110	-0.633	-0.334	-0.502	-0.300	0.300
6-11	-15.110	-0.633	-0.334	-0.502	-0.300	0.300

Combinaisons de charges vérifiées: -----

Cas 1: Charges Permanentes + Neige Normale (Cas 1)
Cas 3: Charges Permanentes + 1kN Arba (Cas 2)
Cas 4: Charges Permanentes + Neige + 1kN Entrait (Cas 2bis)
Cas 5: Vent Normal G->D Depression Interne (Cas 3)
Cas 7: Vent Normal D->G Depression Interne (Cas 3)
Cas 11: Charges Permanentes + Neige Extreme (Cas 4)
Cas 13: Vent Extreme G->D Surpression Interne (Cas 5)
Cas 15: Vent Extreme D->G Surpression Interne (Cas 5)
Cas 16: Vent Extreme Parallele Surpression Interne (Cas 5bis)

Reactions d'appuis par Cas de Charges -----

Cas	Nom	Appui 1	Appui 15	Appui 19	Appui 11
Charge		Verti (kN)	Horiz (kN)	Verti (kN)	Horiz (kN)
1	TOTAL	2.898	0.000	4.075	0.000
1	DEAD	2.172	0.000	3.039	0.000
1	LIVE	0.726	0.000	1.036	0.000
3	TOTAL	2.126	0.000	3.086	0.000
4	TOTAL	2.898	0.000	4.075	0.000
5	TOTAL	2.191	0.228	2.984	0.000
5	DEAD	2.172	0.000	3.039	0.000
5	LIVE	0.019	0.228	-0.056	0.000
7	TOTAL	2.067	-0.228	3.052	0.000
7	DEAD	2.172	0.000	3.039	0.000
7	LIVE	-0.105	-0.228	0.013	0.000
11	TOTAL	4.033	0.000	5.689	0.000
13	TOTAL	-0.102	0.438	-0.080	0.000
15	TOTAL	0.359	-0.438	0.993	0.000
16	TOTAL	0.083	0.000	0.400	0.000

RESULTATS DE CALCUL =====

Cas de Charges 1: Coef =1.00 Charges Permanentes + Neige Normale (Cas 1)

Charges Uniformes -----

Barre	---Debut Barre---	---Fin Barre---
	Vert.	Horiz.
Arbalétrier		
T1 1-2	-0.547	0.000
T1 2-3	-0.545	0.000
T1 3-4	-0.545	0.000

Barre	---Debut Barre---		----Fin Barre----	
	Vert.	Horiz.	Vert.	Horiz.
T1 4-5	-0.545	0.000	-0.545	0.000
T1 5-6	-0.545	0.000	-0.545	0.000
T2 6-7	-0.545	0.000	-0.545	0.000
T2 7-8	-0.545	0.000	-0.545	0.000
T2 8-9	-0.545	0.000	-0.545	0.000
T2 9-10	-0.545	0.000	-0.545	0.000
T2 10-11	-0.547	0.000	-0.547	0.000
Entrait				
B3 1-12	-0.286	0.000	-0.286	0.000
B3 12-13	-0.286	0.000	-0.286	0.000
B3 13-14	-0.286	0.000	-0.286	0.000
B3 14-15	-0.286	0.000	-0.286	0.000
B4 16-17	-0.286	0.000	-0.286	0.000
B4 17-18	-0.286	0.000	-0.286	0.000
B5 19-20	-0.286	0.000	-0.286	0.000
B5 20-21	-0.286	0.000	-0.286	0.000
B5 21-22	-0.286	0.000	-0.286	0.000
B5 22-11	-0.286	0.000	-0.286	0.000
Fiches				

Efforts/Moments aux Extremites

	----- Debut de Barre -----			----- Fin de Barre -----			Travée Moment Maxi. (kNm)
	Effort Tranch. (kN)	Effort Normal (kN)	Moment (kNm)	Effort Tranch. (kN)	Effort Normal (kN)	Moment (kNm)	
Arbalétrier							
T1 1-2	0.511	-7.213	0.000	0.621	-6.874	-0.124	0.261
T1 2-3	0.461	-6.301	0.124	0.635	-6.005	-0.312	-0.187
T1 3-4	0.747	-2.164	0.312	-0.506	-2.099	-0.015	-0.114
T1 4-5	0.506	-2.099	0.015	0.746	-1.760	-0.310	0.238
T1 5-6	0.570	-0.429	0.310	0.100	-0.249	0.000	-0.239
T2 6-7	0.130	-0.240	0.000	0.567	-0.429	-0.300	-0.227
T2 7-8	0.732	-1.693	0.300	0.496	-2.025	-0.014	0.228
T2 8-9	-0.496	-2.025	0.014	0.733	-2.089	-0.302	-0.111
T2 9-10	0.628	-5.933	0.302	0.467	-6.229	-0.128	-0.178
T2 10-11	0.623	-6.809	0.128	0.510	-7.148	0.000	0.259
Entrait							
B3 1-12	0.338	6.763	0.000	0.489	6.763	-0.218	0.200
B3 12-13	0.434	4.135	0.218	0.347	4.135	-0.099	0.112
B3 13-14	0.276	-0.019	0.099	-0.143	-0.019	-0.001	-0.061
B3 14-15	0.143	-0.019	0.001	0.141	-0.019	0.000	0.035
B4 16-17	0.145	-0.031	0.000	0.219	-0.031	-0.047	0.037
B4 17-18	0.225	-0.031	0.047	0.154	-0.031	0.000	0.041
B5 19-20	0.132	-0.019	0.000	0.270	-0.019	-0.097	-0.062
B5 20-21	0.346	4.054	0.097	0.435	4.054	-0.218	0.113
B5 21-22	0.489	6.701	0.218	-0.342	6.701	-0.005	-0.089
B5 22-11	0.342	6.701	0.005	0.338	6.701	0.000	0.200
Fiches							
W6 2-12	0.000	-1.070	0.000	0.000	-1.070	0.000	0.000
W7 12-3	0.000	2.451	0.000	0.000	2.451	0.000	0.000
W8 3-13	0.000	-2.981	0.000	0.000	-2.981	0.000	0.000
W12 17-6	0.000	-0.094	0.000	0.000	-0.094	0.000	0.000
W16 20-9	0.000	-2.964	0.000	0.000	-2.964	0.000	0.000
W17 9-21	0.000	2.464	0.000	0.000	2.464	0.000	0.000
W18 21-10	0.000	-1.082	0.000	0.000	-1.082	0.000	0.000
W10 15-16	-0.019	-3.934	0.000	0.019	-3.934	-0.015	-0.013
W10 16-5	0.013	-3.789	0.015	-0.013	-3.789	0.000	-0.013
W14 19-18	0.019	-3.912	0.000	-0.019	-3.912	0.015	0.013
W14 18-7	-0.013	-3.758	-0.015	0.013	-3.758	0.000	0.013
W9 13-5	0.000	3.219	0.000	0.000	3.219	0.000	0.000
W15 7-20	0.000	3.164	0.000	0.000	3.164	0.000	0.000
W11 5-17	0.000	0.406	0.000	0.000	0.406	0.000	0.000
W13 17-7	0.000	0.397	0.000	0.000	0.397	0.000	0.000

Verification des Contraintes pour le cas de charge 1

Barres Externes:								
Barre	--Section-- BxH Cat.	--- Maximum ---		--Plan Ferme --		---Plan Perp---		Signal ATF
		Effort (kN)	Moment (kNm)	K	Taux	K	Taux	
T 1-2	36x157 C24	-7.060	0.261	0.965	0.315	0.826	0.339	
T 2-3	36x97 C24	-6.034	-0.187	0.710	0.557	0.826	0.521	
T 3-5	36x97 C24	-1.962	0.238	0.439	0.518	0.826	0.455	
T 5-6	36x97 C24	-0.411	-0.239	0.998	0.398	0.826	0.400	
T 6-7	36x97 C24	-0.410	-0.227	0.979	0.378	0.826	0.381	
T 7-9	36x97 C24	-1.891	0.228	0.456	0.492	0.826	0.436	
T 9-10	36x97 C24	-5.962	-0.178	0.710	0.540	0.826	0.504	
T10-11	36x157 C24	-6.995	0.259	0.965	0.313	0.826	0.336	
B 1-12	36x112 C24	6.763	0.200		0.499			1
B12-13	36x112 C24	4.135	0.112		0.294			1
B13-15	36x112 C24	-0.019	-0.061	1.000	0.075	0.156	0.077	
B16-17	36x97 C24	-0.031	0.037	1.000	0.060	0.206	0.064	

Barre	--Section-- BxH Cat.	--- Maximum --- Effort Moment (kN) (kNm)	--Plan Ferme -- K Taux	---Plan Perp--- K Taux	Signal ATF
B17-18	36x97 C24	-0.031 0.041	0.995 0.068	0.190 0.072	
B19-20	36x112 C24	-0.019 -0.062	1.000 0.075	0.169 0.077	
B20-21	36x112 C24	4.054 0.113	0.291		1
B21-11	36x112 C24	6.701 0.200	0.497		1

Barres Internes:

Barre	--Section-- BxH Cat.	--- Maximum --- Effort Moment (kN) (kNm)	--Plan Ferme -- K Taux	---Plan Perp--- K Taux	Signal ATF
W 2-12	36x60 C24	-1.070 0.000	0.774 0.067	0.352 0.148	
W12-3	36x60 C24	2.451 0.000	0.175		
W 3-13	36x60 C24	-2.981 0.000	0.276 0.526	0.398 0.365	1
W17-6	36x60 C24	-0.094 0.000	0.398 0.012	0.138 0.033	
W20-9	36x60 C24	-2.964 0.000	0.276 0.523	0.398 0.363	1
W 9-21	36x60 C24	2.464 0.000	0.176		
W21-10	36x60 C24	-1.082 0.000	0.774 0.068	0.352 0.150	
W15-16	36x60 C24	-3.934 -0.013	1.000 0.248	0.533 0.416	
W16-5	36x60 C24	-3.789 -0.013	0.794 0.289	0.239 0.830	
W19-18	36x60 C24	-3.912 0.013	1.000 0.247	0.533 0.414	
W18-7	36x60 C24	-3.758 0.013	0.801 0.285	0.245 0.805	
W13-5	36x60 C24	3.219 0.000	0.229		
W 7-20	36x60 C24	3.164 0.000	0.225		
W 5-17	36x60 C24	0.406 0.000	0.029		
W17-7	36x60 C24	0.397 0.000	0.028		

Noeuds:

Noeud	--Section-- BxH Cat.	--- Maximum --- Effort Moment (kN) (kNm)	--Plan Ferme -- K Taux	---Plan Perp--- K Taux	Signal ATF
J1 T 1-2	36x157 C24	-7.179 0.103	1.000 0.207	1.000 0.207	1
J2 T 2-3	36x97 C24	-6.301 -0.124	1.000 0.389	1.000 0.389	1
J3 T 2-3	36x97 C24	-6.005 -0.312	1.000 0.683	1.000 0.683	1
J5 T 3-5	36x97 C24	-1.760 -0.310	1.000 0.552	1.000 0.552	1
J6 T 5-6	36x97 C24	-0.267 0.009	1.000 0.022	1.000 0.022	1
J6 T 6-7	36x97 C24	-0.259 0.013	1.000 0.029	1.000 0.029	1
J7 T 7-9	36x97 C24	-1.693 -0.300	1.000 0.535	1.000 0.535	1
J9 T 9-10	36x97 C24	-5.933 -0.302	1.000 0.665	1.000 0.665	1
J10 T 9-10	36x97 C24	-6.229 -0.128	1.000 0.394	1.000 0.394	1
J11 T10-11	36x157 C24	-7.114 0.102	1.000 0.205	1.000 0.205	1
J1 B 1-12	36x112 C24	6.763 0.086	0.362		1
J12 B 1-12	36x112 C24	6.763 -0.218	0.521		1
J13 B12-13	36x112 C24	4.135 -0.099	0.277		1
J15 B13-15	36x112 C24	-0.019 0.018	1.000 0.022	1.000 0.022	1
J16 B16-17	36x97 C24	-0.031 0.016	1.000 0.027	1.000 0.027	1
J17 B17-18	36x97 C24	-0.031 -0.047	1.000 0.077	1.000 0.077	1
J18 B17-18	36x97 C24	-0.031 0.018	1.000 0.030	1.000 0.030	1
J19 B19-20	36x112 C24	-0.019 0.016	1.000 0.020	1.000 0.020	1
J20 B20-21	36x112 C24	4.054 -0.097	0.272		1
J21 B21-11	36x112 C24	6.701 -0.218	0.519		1
J11 B21-11	36x112 C24	6.701 0.086	0.359		1
J15 W15-16	36x60 C24	-3.934 -0.002	1.000 0.198	1.000 0.198	1
J16 W15-16	36x60 C24	-3.934 -0.015	1.000 0.254	1.000 0.254	1
J5 W16-5	36x60 C24	-3.789 -0.002	1.000 0.191	1.000 0.191	1
J19 W19-18	36x60 C24	-3.912 0.002	1.000 0.197	1.000 0.197	1
J18 W19-18	36x60 C24	-3.912 0.015	1.000 0.253	1.000 0.253	1
J7 W18-7	36x60 C24	-3.758 0.002	1.000 0.189	1.000 0.189	1

Reactions d'appuis

Noeud	----- Reaction -----	----- Largeur -----	----- Hauteur -----	Signal
Appui	Verti Horiz Réelle Néc. Réelle Néc. Taux	(kN) (kN) (mm) (mm) (mm) (mm) Cis.		
J1	2.898 0.000	250 35	112 13	0.11
J15	4.075 0.000	250 49	112 5	0.05
J19	4.045 0.000	250 49	112 5	0.04
J11	2.877 0.000	250 35	112 13	0.11

Verifications des Deformations pour le cas de charge 1

Fleche Locale

Barre	----- Panneau -----	----- Segment -----	Signal
Debut-Fin	---Reelle--- ---Admiss.--- ---Reelle--- ---Admiss.---	Fleche Ratio Fleche Ratio Fleche Ratio Fleche Ratio	
T1 1-2	-1.74 L/999 7.52 L/300	-4.88 L/999 28.92 L/300	
T1 2-3	-0.86 L/999 7.20 L/300	-6.72 L/999 28.92 L/300	
T1 3-4	-7.21 L/407 9.80 L/300	-7.12 L/999 28.92 L/300	
T1 4-5	-7.21 L/407 9.80 L/300	-7.12 L/999 28.92 L/300	
T1 5-6	0.84 L/999 4.40 L/300	-0.73 L/999 28.92 L/300	
T2 6-7	0.77 L/999 4.58 L/300	-0.58 L/999 28.92 L/300	
T2 7-8	-6.63 L/435 9.62 L/300	-9.08 L/955 28.92 L/300	
T2 8-9	-6.63 L/435 9.62 L/300	-9.08 L/955 28.92 L/300	

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Barre	----- Panneau -----		----- Segment -----		Signal
	---Reelle---	---Admiss.---	---Reelle---	---Admiss.---	
Debut-Fin	Fleche Ratio	Fleche Ratio	Fleche Ratio	Fleche Ratio	
T2 9-10	-0.93 L/999	7.20 L/300	-6.44 L/999	28.92 L/300	
T2 10-11	-1.72 L/999	7.52 L/300	-6.24 L/999	28.92 L/300	
B3 1-12	-5.26 L/550	7.23 L/400	-8.66 L/818	17.71 L/400	
B3 12-13	-1.95 L/999	6.83 L/400	-7.08 L/999	17.71 L/400	
B3 13-14	-0.11 L/999	3.65 L/400	-3.55 L/999	17.71 L/400	
B3 14-15	-0.11 L/999	3.65 L/400	-3.55 L/999	17.71 L/400	
B4 16-17	-0.27 L/999	3.18 L/400	-0.53 L/999	6.50 L/400	
B4 17-18	-0.34 L/999	3.32 L/400	-0.60 L/999	6.50 L/400	
B5 19-20	-0.07 L/999	3.52 L/400	-3.42 L/999	17.58 L/400	
B5 20-21	-1.96 L/999	6.83 L/400	-6.98 L/999	17.58 L/400	
B5 21-22	-5.24 L/551	7.23 L/400	-7.44 L/945	17.58 L/400	
B5 22-11	-5.24 L/551	7.23 L/400	-7.44 L/945	17.58 L/400	

Fleche Globale

Noeud	----- Deplacement -----			----- Admissible -----			Signal
	X	Y	Rotation	X	Y	Ratio	
J1	0.000	0.000	0.000	10.000	17.712	L/400	
J2	1.350	-6.300	0.000	10.000	17.712	L/400	
J3	0.563	-5.400	-0.000	10.000	17.712	L/400	
J5	-0.960	-0.641	-0.002	10.000	17.712	L/400	
J6	-0.948	-0.777	0.004	10.000	17.712	L/400	
J7	-0.935	-0.632	0.000	10.000	17.712	L/400	
J9	-2.412	-5.269	-0.004	10.000	17.712	L/400	
J10	-3.205	-6.212	0.001	10.000	17.712	L/400	
J11	-1.876	0.000	0.000	10.000	17.712	L/400	
J12	0.887	-6.635	0.000	10.000	17.712	L/400	
J13	1.271	-3.553	0.001	10.000	17.712	L/400	
J15	1.269	0.000	0.002	10.000	17.712	L/400	
J16	-0.942	-0.263	0.001	10.000	17.712	L/400	
J17	-0.945	-0.762	0.001	10.000	17.712	L/400	
J18	-0.947	-0.262	-0.000	10.000	17.712	L/400	
J19	-3.130	0.000	0.000	10.000	17.712	L/400	
J20	-3.131	-3.416	0.000	10.000	17.712	L/400	
J21	-2.754	-6.529	-0.002	10.000	17.712	L/400	

RESUME DU CALCUL

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Contraintes

Barre	-Section-		Cas	Effort (kN)	Moment (kNm)	Taux		ATF	Signal
	BxH	Cat.				Max.	Cis.		
T1 1-2	36x157	C24	3	-5.625	0.565	0.364	0.041		
T1 2-3	36x97	C24	1	-6.034	-0.187	0.557	0.248		
T1 3-4	36x97	C24	3	-1.797	-0.249	0.374	0.187		
T1 4-5	36x97	C24	3	-1.698	0.534	0.697	0.158		
T1 5-6	36x97	C24	3	-0.304	-0.376	0.440	0.215		
T2 6-7	36x97	C24	3	-0.300	-0.363	0.426	0.212		
T2 7-8	36x97	C24	3	-1.640	0.518	0.674	0.156		
T2 8-9	36x97	C24	3	-1.737	-0.244	0.363	0.185		
T2 9-10	36x97	C24	1	-5.962	-0.178	0.540	0.245		
T2 10-11	36x157	C24	3	-5.578	0.563	0.362	0.041		
B3 1-12	36x112	C24	1	6.763	0.200	0.499	0.165	1	
B3 12-13	36x112	C24	1	4.135	0.112	0.294	0.147	1	
B3 13-14	36x112	C24	5	-0.014	-0.064	0.080	0.094		
B3 14-15	36x112	C24	1	-0.019	0.035	0.045	0.048		
B4 16-17	36x97	C24	1	-0.031	0.037	0.064	0.086		
B4 17-18	36x97	C24	1	-0.031	0.041	0.072	0.088		
B5 19-20	36x112	C24	5	-0.014	-0.065	0.080	0.092		
B5 20-21	36x112	C24	1	4.054	0.113	0.291	0.147	1	
B5 21-22	36x112	C24	1	6.701	-0.089	0.363	0.165	1	
B5 22-11	36x112	C24	1	6.701	0.200	0.497	0.116	1	
W6 2-12	36x60	C24	11	-1.706	0.000	0.158	0.000		
W7 12-3	36x60	C24	1	2.451	0.000	0.175	0.000		
W8 3-13	36x60	C24	1	-2.981	0.000	0.526	0.000	1	
W12 17-6	36x60	C24	15	-0.376	0.000	0.088	0.000		
W16 20-9	36x60	C24	1	-2.964	0.000	0.523	0.000	1	
W17 9-21	36x60	C24	1	2.464	0.000	0.176	0.000		
W18 21-10	36x60	C24	11	-1.724	0.000	0.159	0.000		
W10 15-16	36x60	C24	1	-3.934	-0.013	0.416	0.012		
W10 16-5	36x60	C24	1	-3.789	-0.013	0.830	0.008		
W14 19-18	36x60	C24	1	-3.912	0.013	0.414	0.012		
W14 18-7	36x60	C24	1	-3.758	0.013	0.805	0.008		
W9 13-5	36x60	C24	1	3.219	0.000	0.229	0.000		
W15 7-20	36x60	C24	1	3.164	0.000	0.225	0.000		
W11 5-17	36x60	C24	7	0.426	0.000	0.030	0.000		
W13 17-7	36x60	C24	7	0.416	0.000	0.030	0.000		

Noeuds:											Signal
Noeud		--Section--	Cas	Maximum	Plan (yy)	Plan (xx)					
		BxH Cat.		Effort	K	Taux	K	Taux	ATF		
				(kN)							
				Moment							
				(kNm)							
J1	T 1-2	36x157 C24	3	-5.709	0.144	1.000	0.147	1.000	0.147	1	
J2	T 2-3	36x97 C24	3	-5.116	-0.344	1.000	0.506	1.000	0.506	1	
J3	T 2-3	36x97 C24	3	-4.673	-0.512	1.000	0.689	1.000	0.689	1	
J5	T 3-5	36x97 C24	3	-1.313	-0.515	1.000	0.621	1.000	0.621	1	
J6	T 5-6	36x97 C24	3	0.045	0.037		0.044			1	
J6	T 6-7	36x97 C24	3	0.053	0.042		0.050			1	
J7	T 7-9	36x97 C24	3	-1.257	-0.507	1.000	0.610	1.000	0.610	1	
J9	T 9-10	36x97 C24	3	-4.619	-0.500	1.000	0.674	1.000	0.674	1	
J10	T 9-10	36x97 C24	3	-5.061	-0.349	1.000	0.510	1.000	0.510	1	
J11	T10-11	36x157 C24	3	-5.661	0.144	1.000	0.147	1.000	0.147	1	
J1	B 1-12	36x112 C24	1	6.763	0.086		0.362			1	
J12	B 1-12	36x112 C24	1	6.763	-0.218		0.521			1	
J13	B12-13	36x112 C24	7	3.002	-0.102		0.238			1	
J15	B13-15	36x112 C24	7	-0.013	0.017	1.000	0.021	1.000	0.021	1	
J16	B16-17	36x97 C24	5	-0.024	0.016	1.000	0.026	1.000	0.026	1	
J17	B16-17	36x97 C24	5	-0.024	-0.051	1.000	0.082	1.000	0.082	1	
J18	B17-18	36x97 C24	5	-0.023	0.018	1.000	0.029	1.000	0.029	1	
J19	B19-20	36x112 C24	7	-0.013	0.016	1.000	0.019	1.000	0.019	1	
J20	B20-21	36x112 C24	1	4.054	-0.097		0.272			1	
J21	B21-11	36x112 C24	1	6.701	-0.218		0.519			1	
J11	B21-11	36x112 C24	1	6.701	0.086		0.359			1	
J15	W15-16	36x60 C24	1	-3.934	-0.002	1.000	0.198	1.000	0.198	1	
J16	W15-16	36x60 C24	1	-3.934	-0.015	1.000	0.254	1.000	0.254	1	
J5	W16-5	36x60 C24	1	-3.789	-0.002	1.000	0.191	1.000	0.191	1	
J19	W19-18	36x60 C24	1	-3.912	0.002	1.000	0.197	1.000	0.197	1	
J18	W19-18	36x60 C24	1	-3.912	0.015	1.000	0.253	1.000	0.253	1	
J7	W18-7	36x60 C24	1	-3.758	0.002	1.000	0.189	1.000	0.189	1	

Reactions d'appuis

Noeud		Normale		Extrem		Permanente
		vert.	horz.	vert.	horz.	vert.
		soul.		soul.		
J1	2.898(1)		0.228(4)	4.033(6)	-0.102(7)	0.438(7)
J15	4.075(1)		0.000(-1)	5.689(6)	-0.080(7)	0.000(-1)
J19	4.045(1)		0.000(-1)	5.645(6)		0.000(-1)
J11	2.877(1)		0.000(1)	4.004(6)	-0.223(8)	0.000(6)

Noeud	Largeur	Hauteur	Signal
	min. (mm)	min. (mm)	
J1	35	13	
J15	49	5	
J19	49	5	
J11	35	13	

Deformations

Barre	Panneau	Segment	Noeud Debut	Noeud Fin	Signal
	Max.	Max.	X Y	X Y	
T1 1-2	-1.74(1)	-4.88(1)	0.00(1) 0.00(1)	1.35(1) -6.30(1)	
T1 2-3	-0.86(1)	-6.72(1)	1.35(1) -6.30(1)	0.56(1) -5.40(1)	
T1 3-4	-7.21(1)	-7.12(1)	0.56(1) -5.40(1)	-0.96(1) -0.64(1)	
T1 4-5	-7.21(1)	-7.12(1)	0.56(1) -5.40(1)	-0.96(1) -0.64(1)	
T1 5-6	0.84(1)	-0.73(1)	-0.96(1) -0.64(1)	-0.95(1) -0.78(1)	
T2 6-7	0.77(1)	-0.58(1)	-0.95(1) -0.78(1)	-0.94(1) -0.63(1)	
T2 7-8	-6.63(1)	-9.08(1)	-0.94(1) -0.63(1)	-2.41(1) -5.27(1)	
T2 8-9	-6.63(1)	-9.08(1)	-0.94(1) -0.63(1)	-2.41(1) -5.27(1)	
T2 9-10	-0.93(1)	-6.44(1)	-2.41(1) -5.27(1)	-3.20(1) -6.21(1)	
T2 10-11	-1.72(1)	-6.24(1)	-3.20(1) -6.21(1)	-1.88(1) 0.00(1)	
B3 1-12	-5.26(1)	-8.66(1)	0.00(1) 0.00(1)	0.89(1) -6.64(1)	
B3 12-13	-1.95(1)	-7.08(1)	0.89(1) -6.64(1)	1.27(1) -3.55(1)	
B3 13-14	-0.11(1)	-3.55(1)	1.27(1) -3.55(1)	1.27(1) 0.00(1)	
B3 14-15	-0.11(1)	-3.55(1)	1.27(1) -3.55(1)	1.27(1) 0.00(1)	
B4 16-17	-0.27(1)	-0.53(1)	-0.94(1) -0.26(1)	-0.94(1) -0.76(1)	
B4 17-18	-0.34(1)	-0.60(1)	-0.94(1) -0.76(1)	-0.95(1) -0.26(1)	
B5 19-20	-0.07(1)	-3.42(1)	-3.13(1) 0.00(1)	-3.13(1) -3.42(1)	
B5 20-21	-1.96(1)	-6.98(1)	-3.13(1) -3.42(1)	-2.75(1) -6.53(1)	
B5 21-22	-5.24(1)	-7.44(1)	-2.75(1) -6.53(1)	-1.88(1) 0.00(1)	
B5 22-11	-5.24(1)	-7.44(1)	-2.75(1) -6.53(1)	-1.88(1) 0.00(1)	
W6 2-12	-0.00(1)	-0.00(1)	1.35(1) -6.30(1)	0.89(1) -6.64(1)	
W7 12-3	0.00(1)	-0.00(7)	0.89(1) -6.64(1)	0.56(1) -5.40(1)	
W8 3-13	-0.00(1)	0.00(1)	0.56(1) -5.40(1)	1.27(1) -3.55(1)	
W12 17-6	0.00(1)	0.00(1)	-0.94(1) -0.76(1)	-0.95(1) -0.78(1)	
W16 20-9	-0.00(1)	0.00(1)	-3.13(1) -3.42(1)	-2.41(1) -5.27(1)	
W17 9-21	0.00(7)	-0.00(7)	-2.41(1) -5.27(1)	-2.75(1) -6.53(1)	
W18 21-10	0.00(1)	-0.00(7)	-2.75(1) -6.53(1)	-3.20(1) -6.21(1)	
W10 15-16	0.15(1)	-0.00(7)	1.27(1) 0.00(1)	-0.94(1) -0.26(1)	
W10 16-5	0.34(1)	-1.09(1)	-0.94(1) -0.26(1)	-0.96(1) -0.64(1)	
W14 19-18	-0.15(1)	-0.00(1)	-3.13(1) 0.00(1)	-0.95(1) -0.26(1)	
W14 18-7	-0.33(1)	-1.30(1)	-0.95(1) -0.26(1)	-0.94(1) -0.63(1)	
W9 13-5	0.00(1)	-0.00(1)	1.27(1) -3.55(1)	-0.96(1) -0.64(1)	
W15 7-20	0.00(1)	-0.00(1)	-0.94(1) -0.63(1)	-3.13(1) -3.42(1)	

Barre	Panneau Max.	Segment Max.	--- Noeud Debut ---		--- Noeud Fin ---		Signal
			X	Y	X	Y	
W11 5-17	0.00(1)	-0.00(1)	-0.96(1)	-0.64(1)	-0.94(1)	-0.76(1)	
W13 17-7	0.00(1)	-0.00(7)	-0.94(1)	-0.76(1)	-0.94(1)	-0.63(1)	

Notas importants:

- Antiflambage:
Lisse d'Antiflambage necessaires aux barres:
W 3-13, W20-9
La fixation du dispositif d'antiflambage sera réalisé de manière à reprendre par ferme et par versant un effort perpendiculaire à l'arba $F = \text{Effort axial arba}/60 = 0.167\text{kN}$
Cette valeur est à multiplier par le nombre de fermes intéressées par le dispositif.

Remarques:

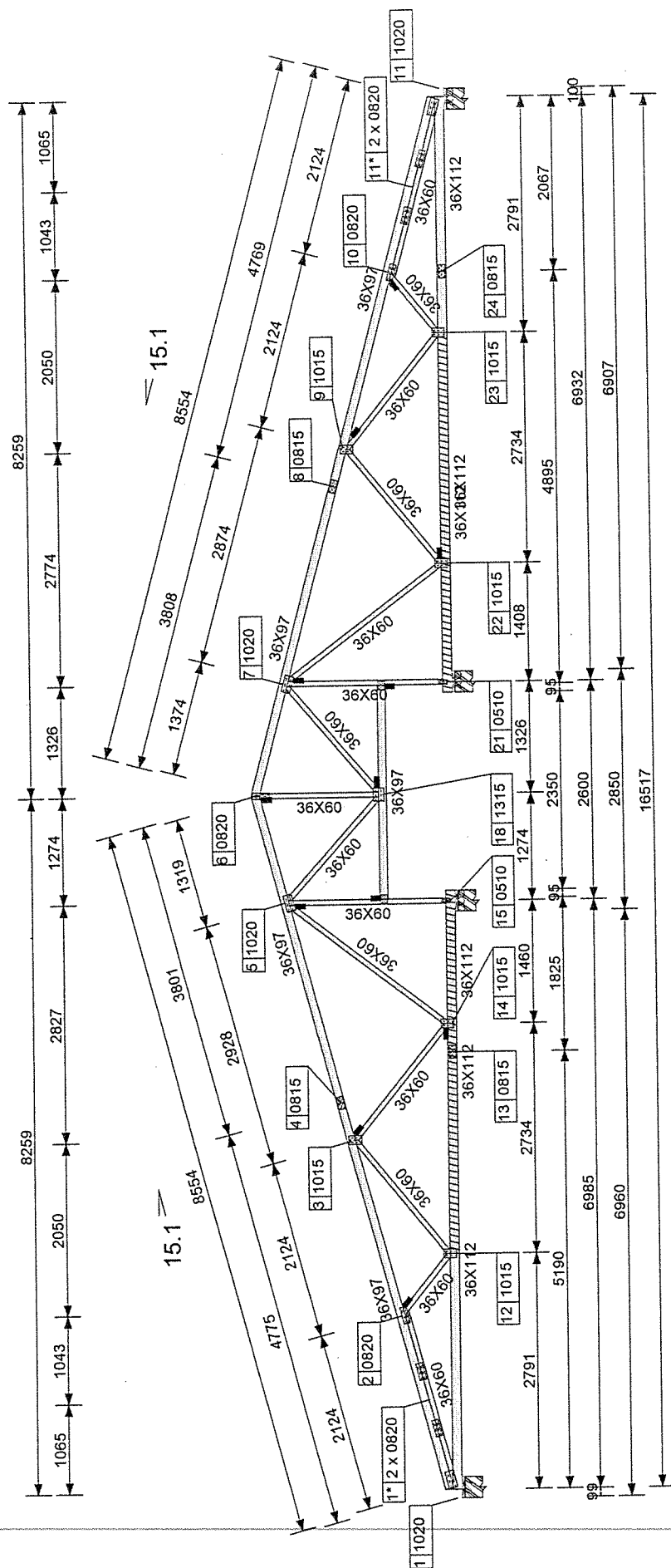
- C'est la responsabilite du client de s'assurer que les donnees ci-dessus: dimensions, pentes, charges et autres caracteristiques sont celles demandees par le maitre d'ouvrage.
- Cette note de calcul propre a chaque element triangule ne dispense pas de l'execution d'un plan de pose et de contreventement adapte au batiment etudie.
- Poids de la Ferme 75.130 - 82.643 Kg

Informations Plaques

Plaques utilisées: M20 01.370029v2

- Les aboutages sont normalement placés entre 10 et 25 % de la longueur du panneau.
- Tolérance du positionnement = 10 (mm)

Noeud	Plaque		Position(x1)	(y1)	(x2)	(y2) (mm)
	Jauge	Code				
1	M20	1030	40	51		
1	M20	0820	102	38		
1	M20	0820	102	38		
2	M20	1315	0	0		
3	M20	1015	0	0		
4	M20	0815	0	0		
5	M20	1020	102	41		
6	M20	1015	0	0		
7	M20	1315	55	48		
8	M20	0815	0	0		
9	M20	1015	0	0		
10	M20	1315	0	0		
11	M20	1030	40	51		
11	M20	0820	102	38		
11	M20	0820	102	38		
12	M20	1015	0	0		
13	M20	1315	0	0		
14	M20	0815	0	0		
15	M20	0518	0	0		
16	M20	0810	0	0		
17	M20	1315	0	0		
18	M20	0810	0	0		
19	M20	0515	0	0		
20	M20	1315	0	0		
21	M20	1015	0	0		
22	M20	0815	0	0		



Echelle 1:75

Ce dessin doit être accompagné de la note de calcul.

☒ Lisse d'antiflambage.

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[illegible]

** N O T E D E C A L C U L **

INFORMATIONS GENERALES

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Etude faite par:

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Adresse chantier:

DIVERS

Les calculs ont pour base technique:

Les documents techniques unifiés DTU.
Regles N.V.65 et N 84 (carte de neige)
DTU 31.3, Norme P21.110 etc...

Methode de calcul utilisees:

Calcul hyperstatique de structure plane a barres.

Unites utilisees:

mm, deg, MPa

Conventions:

Efforts : Negatif (-) = Compression, Positif (+) = Traction
Reactions: Negatif (-) = Soulevement, Positive (+) = Descente

Caracteristiques des bois:

Categorie de bois : C24 SE
Module d'elasticite axial : 10000.0
Coefficient de fluage : 1.5
Densite : 420.00 Kg/m^3
Contraintes admissibles :
Flexion // : 11.00 MPa
Traction // : 6.50 MPa
Traction T : 0.20 MPa
Compression // : 9.50 MPa
Compression T : 2.30 MPa
Cisaillement // : 1.10 MPa

Caracteristiques des connecteurs:

Type de plaque : M20

Réf. PV Essai 01.370029v2

Lundi 14 Avril 2008

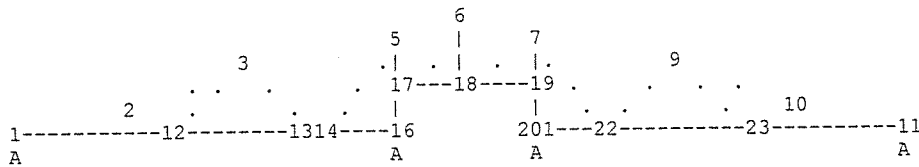
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Permettre reprise charnière de F2A-F2B.

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GEOMETRIE ET MODELE DE LA STRUCTURE

Schema de la Structure



Dimensions du batiment:

Longueur (a)	: 15 m	Largeur (b)	: 8 m
Hauteur totale (H)	: 10 m	Hauteur au faitage (h)	: 10 m
Pente Gauche	: 15.11 deg	Pente Droite	: 15.11 deg
Portee	: 16517 mm	Entraxe des fermes	: 600 mm
Hauteur Hors-tout	: 2427 mm	Longueur Hors-tout	: 16517 mm
Prolonge Gauche Entrait	: 0 mm	Prolonge Droite Entrait	: 0 mm
Entraxe lattes Arba. (*)	: 600 mm	Entraxe lattes Entrait (*)	: 0 mm

(*) - Valeurs de saisie, voir les longueurs de flambement calculees en 'Caracteristiques des barres.'

Coordonnees des noeuds:

Noeud	Coordonnees		Liberte		
	X (mm)	Y (mm)	Horiz.	Vert.	Rot.
J1	-100	56	1	1	0 Appui
J13	5190	56	0	0	0
J6	8259	2377	0	0	0
J12	2791	56	0	0	0
J2	2061	703	0	0	0
J3	4145	1266	0	0	0
J14	5525	56	0	0	0
J18	8259	849	0	0	0
J9	12372	1266	0	0	0
J22	10993	56	0	0	0
J23	13726	56	0	0	0
J10	14456	703	0	0	0
J5	6985	2033	0	0	0
J15	6985	56	0	1	0 Appui
J7	9585	2019	0	0	0
J21	9585	56	0	1	0 Appui
J11	16617	56	0	1	0 Appui
J19	9585	849	0	0	0
J17	6985	849	0	0	0
J20	9460	56	0	0	0
J16	7110	56	0	0	0

0=Libre, 1=Fix

Caracteristiques des barres:

Barre	Section				Longueur	Project.	Longueur	Pente	Conditions
Debut-Fin	Pli	Coef	BxH	Cat	(mm)	X (mm)	Flambage (mm)	(deg)	Extremites
T1 1-2	2	2.0	72x157	C24	2256	2161	540	16.67	Pin-Fix
T1 2-3	2	2.0	72x97	C24	2159	2084	540	15.11	Fix-Fix
T1 3-4	2	2.0	72x97	C24	472	456	540	15.11	Fix-Fix
T1 4-5	2	2.0	72x97	C24	2469	2384	540	15.11	Fix-Fix
T1 5-6	2	2.0	72x97	C24	1319	1274	540	15.11	Fix-Pin
T2 6-7	2	2.0	72x97	C24	1374	1326	540	-15.11	Pin-Fix
T2 7-8	2	2.0	72x97	C24	2421	2337	540	-15.11	Fix-Fix
T2 8-9	2	2.0	72x97	C24	466	450	540	-15.11	Fix-Fix
T2 9-10	2	2.0	72x97	C24	2159	2084	540	-15.11	Fix-Fix
T2 10-11	2	2.0	72x157	C24	2256	2161	540	-16.67	Fix-Pin
B3 1-12	2	2.0	72x112	C24	2891	2891	2891	0.00	Pin-Fix
B3 12-13	2	2.0	72x112	C24	2399	2399	2734	0.00	Fix-Fix
B3 12-13	2	2.0	36x112	C24	335	335	2734	0.00	Fix-Fix
B3 13-14	2	2.0	72x112	C24	1460	1460	1460	0.00	Fix-Fix
B3 13-14	2	2.0	36x112	C24	125	125	125	0.00	Fix-Pin
B3 14-15	2	2.0	72x112	C24	1274	1274	1274	0.00	Pin-Fix
B3 14-15	2	2.0	36x112	C24	1326	1326	1326	0.00	Fix-Pin
B5 20-21	2	2.0	72x112	C24	125	125	125	0.00	Pin-Fix
B5 20-21	2	2.0	36x112	C24	1408	1408	1408	0.00	Fix-Fix
B5 21-22	2	2.0	72x112	C24	2734	2734	2734	0.00	Fix-Fix
B5 21-22	2	2.0	36x112	C24	724	724	2891	0.00	Fix-Fix
B5 22-23	2	2.0	72x112	C24	2167	2167	2891	0.00	Fix-Pin
B5 22-23	2	2.0	36x112	C24	976	730	976	-41.56	Pin-Pin
B5 23-24	2	2.0	72x112	C24					
B5 24-11	2	2.0	72x112	C24					
W6 2-12	2	2.0	72x60	C24					

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Barre	-----Section-----				Longueur	Project.	Longueur		Conditions
Debut-Fin	Pli	Coef	BxH	Cat	(mm)	X (mm)	Flambage (mm)	Pente (deg)	Extremities Debut-Fin
W7 12-3	2	2.0	72x60	C24	1816	1354	1816	41.78	Pin-Pin
W8 3-14	2	2.0	72x60	C24	1835	1380	1835	-41.26	Pin-Pin
W12 18-6	2	2.0	72x60	C24	1528	1528	1528	90.00	Pin-Pin
W16 22-9	2	2.0	72x60	C24	1835	1380	1835	41.26	Pin-Pin
W17 9-23	2	2.0	72x60	C24	1816	1354	1816	-41.78	Pin-Pin
W18 23-10	2	2.0	72x60	C24	976	730	976	41.56	Pin-Pin
W10 15-17	2	2.0	72x60	C24	793	793	793	90.00	Pin-Fix
W10 17-5	2	2.0	72x60	C24	1184	1184	1184	90.00	Fix-Pin
W14 21-19	2	2.0	72x60	C24	793	793	793	90.00	Pin-Fix
W14 19-7	2	2.0	72x60	C24	1170	1170	1170	90.00	Fix-Pin
W9 14-5	2	2.0	72x60	C24	2458	1460	2458	53.55	Pin-Pin
W15 7-22	2	2.0	72x60	C24	2415	1408	2415	-54.35	Pin-Pin
W11 5-18	2	2.0	72x60	C24	1739	1274	1739	-42.92	Pin-Pin
W13 18-7	2	2.0	72x60	C24	1769	1326	1769	41.42	Pin-Pin

HYPOTHESES DE CHARGES ET SURCHARGES =====

Charges permanentes:			
Couverture	: 0.500	Plafond bas	: 0.440
Surcharge de neige:			
Region de neige	: 1B	Altitude	: 200 m
Normale	: 0.350	Normale majoree	: 0.350
Extreme	: 0.600	Extreme majoree	: 0.800
Accidentelle	: 0.800		
Permanente	: 0 %	Temporaire	: 100 %
Barre Pente Coef multiplicateur du a la pente			
1-6 15.110	1.000		
6-11 -15.110	1.000		
Surcharge de vent:			
Région de vent	: II	Nature du Site	: Normal
Pression de base	: 0.600	Permeabilite	: 5%
Longueur (a)	: 15000 mm	Coef site	: 1.000
Largeur (b)	: 8000 mm	Coef majoration	: 1.000
Hauteur totale (H)	: 10000 mm	Coef hauteur	: 1.000
Hauteur au faitage (h)	: 10000 mm	Valeur pression	: 0.600
Flèche	: 2315 mm	Lambda a	: 0.667
Coef delta	: 0.913	Lambda b	: 1.250
f/h	: 0.231	Gamma 0 normal	: 1.000
b/a	: 0.533	Gamma 0 Parallèle	: 1.000
Barre Pente -----Exterieur (Ce)----- --Interieure (Ci)-			
	Au vent	Sous le vent	Parallèle
1-6 15.110	-0.633	-0.334	-0.502
6-11 -15.110	-0.633	-0.334	-0.502
			Succion Pression
			-0.300 0.300
			-0.300 0.300

Combinaisons de charges vérifiées:

- Cas 1: Charges Permanentes + Neige Normale (Cas 1)
- Cas 3: Charges Permanentes + 1kN Arba (Cas 2)
- Cas 4: Charges Permanentes + Neige + 1kN Entrait (Cas 2bis)
- Cas 5: Vent Normal G->D Depression Interne (Cas 3)
- Cas 7: Vent Normal D->G Depression Interne (Cas 3)
- Cas 11: Charges Permanentes + Neige Extreme (Cas 4)
- Cas 13: Vent Extreme G->D Surpression Interne (Cas 5)
- Cas 15: Vent Extreme D->G Surpression Interne (Cas 5)
- Cas 16: Vent Extreme Parallele Surpression Interne (Cas 5bis)

Reactions d'appuis par Cas de Charges

Cas	Nom	Appui 1	Appui 15	Appui 21	Appui 11
Charge		Verti Horiz (kN)	Verti Horiz (kN)	Verti Horiz (kN)	Verti Horiz (kN)
1	TOTAL	3.406 0.000	5.178 0.000	5.155 0.000	3.373 0.000
1	DEAD	2.599 0.000	3.943 0.000	3.927 0.000	2.574 0.000
1	LIVE	0.807 0.000	1.235 0.000	1.228 0.000	0.799 0.000
3	TOTAL	2.553 0.000	3.990 0.000	3.972 0.000	2.528 0.000
4	TOTAL	3.406 0.000	5.178 0.000	5.155 0.000	3.373 0.000
5	TOTAL	2.699 0.228	4.086 0.000	4.077 0.000	2.611 0.000
5	DEAD	2.599 0.000	3.943 0.000	3.927 0.000	2.574 0.000
5	LIVE	0.100 0.228	0.143 0.000	0.150 0.000	0.037 0.000
7	TOTAL	2.575 -0.228	4.155 0.000	4.135 0.000	2.608 0.000
7	DEAD	2.599 0.000	3.943 0.000	3.927 0.000	2.574 0.000
7	LIVE	-0.024 -0.228	0.212 0.000	0.208 0.000	0.034 0.000
11	TOTAL	4.541 0.000	6.795 0.000	6.759 0.000	4.500 0.000
13	TOTAL	0.325 0.438	0.821 0.000	1.770 0.000	0.894 0.000
15	TOTAL	0.786 -0.438	1.894 0.000	0.936 0.000	0.195 0.000
16	TOTAL	0.510 0.000	1.301 0.000	1.297 0.000	0.500 0.000

RESULTATS DE CALCUL

Cas de Charges 1: Coef =1.00 Charges Permanentes + Neige Normale (Cas 1)

Charges Uniformes

Barre	---Debut Barre---	---Fin Barre---
	Vert. Horiz.	Vert. Horiz.
Arbalétrier		
T1 1-2	-0.565 0.000	-0.565 0.000
T1 2-3	-0.562 0.000	-0.562 0.000
T1 3-4	-0.562 0.000	-0.562 0.000

Barre	---Debut Barre---		---Fin Barre---	
	Vert.	Horiz.	Vert.	Horiz.
T1 4-5	-0.562	0.000	-0.562	0.000
T1 5-6	-0.562	0.000	-0.562	0.000
T2 6-7	-0.562	0.000	-0.562	0.000
T2 7-8	-0.562	0.000	-0.562	0.000
T2 8-9	-0.562	0.000	-0.562	0.000
T2 9-10	-0.562	0.000	-0.562	0.000
T2 10-11	-0.565	0.000	-0.565	0.000
Entraît				
B3 1-12	-0.322	0.000	-0.322	0.000
B3 12-13	-0.322	0.000	-0.322	0.000
B3 13-14	-0.322	0.000	-0.322	0.000
B3 14-15	-0.322	0.000	-0.322	0.000
B3 15-16	-0.322	0.000	-0.322	0.000
B4 17-18	-0.322	0.000	-0.322	0.000
B4 18-19	-0.322	0.000	-0.322	0.000
B5 20-21	-0.322	0.000	-0.322	0.000
B5 21-22	-0.322	0.000	-0.322	0.000
B5 22-23	-0.322	0.000	-0.322	0.000
B5 23-24	-0.322	0.000	-0.322	0.000
B5 24-11	-0.322	0.000	-0.322	0.000
Fiches				

Charges Ponctuelles

Noeud	X (mm)	Y (mm)	Vert. (kN)	Horiz. (kN)	Moment (kNm)	Fermes Portées
J25	4814	56	-1.002	0.000	0.000	} chape.
J26	6186	56	-0.115	0.000	0.000	
J35	10367	56	-0.115	0.000	0.000	
J36	11667	56	-1.002	0.000	0.000	

Efforts/Moments aux Extrémités

	----- Debut de Barre -----			----- Fin de Barre -----		-----	Travee
	Effort Tranch. (kN)	Effort Normal (kN)	Moment (kNm)	Effort Tranch. (kN)	Effort Normal (kN)	Moment (kNm)	Moment Maxi. (kNm)
Arbalétrier							
T1 1-2	0.533	-8.843	0.000	0.636	-8.492	-0.116	0.274
T1 2-3	0.471	-7.931	0.116	0.660	-7.625	-0.320	-0.190
T1 3-4	0.769	-3.193	0.320	-0.521	-3.126	-0.015	-0.116
T1 4-5	0.521	-3.126	0.015	0.773	-2.776	-0.325	0.244
T1 5-6	0.592	-0.454	0.325	0.099	-0.268	0.000	-0.252
T2 6-7	0.131	-0.259	0.000	0.589	-0.453	-0.315	-0.239
T2 7-8	0.758	-2.687	0.315	0.510	-3.029	-0.015	0.234
T2 8-9	-0.510	-3.029	0.015	0.754	-3.095	-0.309	-0.113
T2 9-10	0.653	-7.506	0.309	0.478	-7.812	-0.121	-0.181
T2 10-11	0.638	-8.381	0.121	0.531	-8.731	0.000	0.272
Entraît							
B3 1-12	0.358	8.318	0.000	0.574	8.318	-0.313	0.199
B3 12-13	0.677	5.356	0.313	1.098	5.356	0.006	0.176
B3 13-14	-1.098	5.356	-0.006	1.206	5.356	-0.379	-0.027
B3 14-15	0.556	-0.023	0.379	0.029	-0.023	-0.003	-0.134
B3 15-16	0.040	0.000	0.003	0.000	0.000	0.000	-0.001
B4 17-18	0.165	-0.038	0.000	0.246	-0.038	-0.052	0.042
B4 18-19	0.253	-0.037	0.052	0.175	-0.037	0.000	0.047
B5 20-21	0.000	0.000	0.000	0.040	0.000	-0.003	-0.001
B5 21-22	0.014	-0.022	0.003	0.554	-0.022	-0.374	-0.133
B5 22-23	1.219	5.244	0.374	0.664	5.244	-0.309	0.167
B5 23-24	0.573	8.212	0.309	-0.340	8.212	0.021	-0.157
B5 24-11	0.340	8.212	-0.021	0.359	8.212	0.000	0.200
Fiches							
W6 2-12	0.000	-1.048	0.000	0.000	-1.048	0.000	0.000
W7 12-3	0.000	2.921	0.000	0.000	2.921	0.000	0.000
W8 3-14	0.000	-3.291	0.000	0.000	-3.291	0.000	0.000
W12 18-6	0.000	-0.085	0.000	0.000	-0.085	0.000	0.000
W16 22-9	0.000	-3.262	0.000	0.000	-3.262	0.000	0.000
W17 9-23	0.000	2.914	0.000	0.000	2.914	0.000	0.000
W18 23-10	0.000	-1.063	0.000	0.000	-1.063	0.000	0.000
W10 15-17	-0.023	-5.108	0.000	0.023	-5.108	-0.018	-0.016
W10 17-5	0.015	-4.944	0.018	-0.015	-4.944	0.000	-0.016
W14 21-19	0.022	-5.101	0.000	-0.022	-5.101	0.018	0.016
W14 19-7	-0.015	-4.926	-0.018	0.015	-4.926	0.000	0.016
W9 14-5	0.000	4.888	0.000	0.000	4.888	0.000	0.000
W15 7-22	0.000	4.828	0.000	0.000	4.828	0.000	0.000
W11 5-18	0.000	0.440	0.000	0.000	0.440	0.000	0.000
W13 18-7	0.000	0.429	0.000	0.000	0.429	0.000	0.000

Verification des Contraintes pour le cas de charge 1

Barres Externes:

Barre	--Section-- BxH Cat.	--- Maximum --- Effort (kN)	Moment (kNm)	--Plan Ferme -- K	Taux	---Plan Perp--- K	Taux	Signal ATF
T 1-2	72x157 C24	-8.683	0.274	0.959	0.189	1.000	0.185	
T 2-3	72x97 C24	-7.656	-0.190	0.710	0.315	1.000	0.268	
T 3-5	72x97 C24	-2.985	0.244	0.439	0.299	1.000	0.242	
T 5-6	72x97 C24	-0.436	-0.252	0.998	0.209	1.000	0.209	
T 6-7	72x97 C24	-0.434	-0.239	0.979	0.199	1.000	0.199	
T 7-9	72x97 C24	-2.892	0.234	0.456	0.284	1.000	0.232	
T 9-10	72x97 C24	-7.537	-0.181	0.710	0.305	1.000	0.259	
T10-11	72x157 C24	-8.572	0.272	0.959	0.187	1.000	0.183	
B 1-12	72x112 C24	8.318	0.199		0.279			
B12-14	72x112 C24 +	3.570	0.264		0.228			
B12-14	36x112 C24							
B14-15	72x112 C24 +	-0.015	-0.142	1.000	0.086	0.888	0.086	
B14-15	36x112 C24							
B17-18	72x97 C24	-0.038	0.042	1.000	0.034	0.715	0.035	
B18-19	72x97 C24	-0.037	0.047	0.995	0.039	0.684	0.039	
B21-22	72x112 C24 +	-0.015	-0.144	1.000	0.087	0.908	0.087	
B21-22	36x112 C24							
B22-23	72x112 C24 +	3.496	0.250		0.218			
B22-23	36x112 C24							
B23-11	72x112 C24	8.212	0.200		0.277			
O15-16	72x112 C24 +	0.000	-0.001		0.001			
O15-16	36x112 C24							
O20-21	72x112 C24 +	0.000	-0.001		0.001			
O20-21	36x112 C24							

Barres Internes:

Barre	--Section-- BxH Cat.	--- Maximum --- Effort (kN)	Moment (kNm)	--Plan Ferme -- K	Taux	---Plan Perp--- K	Taux	Signal ATF
W 2-12	72x60 C24	-1.048	0.000	0.774	0.033	0.887	0.029	
W12-3	72x60 C24	2.921	0.000		0.104			
W 3-14	72x60 C24	-3.291	0.000	0.276	0.290	0.398	0.202	
W18-6	72x60 C24	-0.085	0.000	0.398	0.005	0.568	0.004	
W22-9	72x60 C24	-3.262	0.000	0.276	0.288	0.398	0.200	
W 9-23	72x60 C24	2.914	0.000		0.104			
W23-10	72x60 C24	-1.063	0.000	0.774	0.033	0.887	0.029	
W15-17	72x60 C24	-5.108	-0.016	1.000	0.158	0.992	0.159	
W17-5	72x60 C24	-4.944	-0.016	0.794	0.186	0.766	0.191	
W21-19	72x60 C24	-5.101	0.016	1.000	0.158	0.992	0.159	
W19-7	72x60 C24	-4.926	0.016	0.801	0.183	0.774	0.189	
W14-5	72x60 C24	4.888	0.000		0.174			
W 7-22	72x60 C24	4.828	0.000		0.172			
W 5-18	72x60 C24	0.440	0.000		0.016			
W18-7	72x60 C24	0.429	0.000		0.015			

Noeuds:

Noeud	--Section-- BxH Cat.	--- Maximum --- Effort (kN)	Moment (kNm)	--Plan Ferme -- K	Taux	---Plan Perp--- K	Taux	Signal ATF
J1	T 1-2 72x157 C24	-8.808	0.107	1.000	0.126	1.000	0.126	1
J2	T 2-3 72x97 C24	-7.931	-0.116	1.000	0.213	1.000	0.213	1
J3	T 2-3 72x97 C24	-7.625	-0.320	1.000	0.372	1.000	0.372	1
J5	T 3-5 72x97 C24	-2.776	-0.325	1.000	0.304	1.000	0.304	1
J6	T 5-6 72x97 C24	-0.286	0.009	1.000	0.011	1.000	0.011	1
J6	T 6-7 72x97 C24	-0.279	0.013	1.000	0.015	1.000	0.015	1
J7	T 7-9 72x97 C24	-2.687	-0.315	1.000	0.294	1.000	0.294	1
J9	T 9-10 72x97 C24	-7.506	-0.309	1.000	0.362	1.000	0.362	1
J10	T 9-10 72x97 C24	-7.812	-0.121	1.000	0.215	1.000	0.215	1
J11	T10-11 72x157 C24	-8.696	0.107	1.000	0.124	1.000	0.124	1
J1	B 1-12 72x112 C24	8.318	0.090		0.213			1
J12	B 1-12 72x112 C24	8.318	-0.313		0.348			1
J14	B12-14 72x112 C24 +	3.570	-0.253		0.221			1
J14	B12-14 36x112 C24							
J15	X14-15 72x112 C24 +	-0.015	-0.002	1.000	0.001	1.000	0.001	1
J15	X14-15 36x112 C24							
J16	X15-16 72x112 C24 +	0.000	0.000					1
J16	X15-16 36x112 C24							
J17	B17-18 72x97 C24	-0.038	0.018	1.000	0.015	1.000	0.015	1
J18	B17-18 72x97 C24	-0.038	-0.052	1.000	0.042	1.000	0.042	1
J19	B18-19 72x97 C24	-0.037	0.020	1.000	0.017	1.000	0.017	1
J20	X20-21 72x112 C24 +	0.000	0.000					1
J20	X20-21 36x112 C24							
J21	B21-22 72x112 C24 +	-0.015	-0.002	1.000	0.001	1.000	0.001	1
J21	B21-22 36x112 C24							
J22	B22-23 72x112 C24 +	3.496	-0.249		0.217			1
J22	B22-23 36x112 C24							
J23	B23-11 72x112 C24	8.212	-0.309		0.343			1
J11	B23-11 72x112 C24	8.212	0.090		0.211			1
J15	W15-17 72x60 C24	-5.108	-0.002	1.000	0.128	1.000	0.128	1

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Noeud	--Section--			--- Maximum ---		--Plan Ferme --		---Plan Perp---		Signal
	BxH	Cat.		Effort	Moment	K	Taux	K	Taux	ATF
				(kN)	(kNm)					
J17	W15-17	72x60	C24	-5.108	-0.018	1.000	0.162	1.000	0.162	1
J5	W17-5	72x60	C24	-4.944	-0.002	1.000	0.124	1.000	0.124	1
J21	W21-19	72x60	C24	-5.101	0.002	1.000	0.128	1.000	0.128	1
J19	W21-19	72x60	C24	-5.101	0.018	1.000	0.162	1.000	0.162	1
J7	W19-7	72x60	C24	-4.926	0.002	1.000	0.124	1.000	0.124	1

Reactions d'appuis

Noeud	----- Reaction -----		----- Largeur -----		----- Hauteur -----		Signal
Appui	Verti	Horiz	Réelle	Néc.	Réelle	Néc.	Taux
	(kN)	(kN)	(mm)	(mm)	(mm)	(mm)	Cis.
J1	3.406	0.000	250	21	112	7	0.06
J15	5.178	0.000	250	21	112	0	0.00
J21	5.155	0.000	250	21	112	0	0.00
J11	3.373	0.000	250	20	112	7	0.06

Verifications des Deformations pour le cas de charge 1

Fleche Locale

-----		----- Panneau -----		----- Segment -----		Signal
Barre	---Reelle---	---Admiss---	---Reelle---	---Admiss---		
Debut-Fin	Fleche Ratio	Fleche Ratio	Fleche Ratio	Fleche Ratio		
T1 1-2	-0.92 L/999	7.52 L/300	-2.96 L/999	28.92 L/300		
T1 2-3	-0.53 L/999	7.20 L/300	-4.16 L/999	28.92 L/300		
T1 3-4	-3.70 L/794	9.80 L/300	-4.09 L/999	28.92 L/300		
T1 4-5	-3.70 L/794	9.80 L/300	-4.09 L/999	28.92 L/300		
T1 5-6	0.44 L/999	4.40 L/300	-0.39 L/999	28.92 L/300		
T2 6-7	0.41 L/999	4.58 L/300	-0.31 L/999	28.92 L/300		
T2 7-8	-3.40 L/848	9.62 L/300	-4.93 L/999	28.92 L/300		
T2 8-9	-3.40 L/848	9.62 L/300	-4.93 L/999	28.92 L/300		
T2 9-10	-0.56 L/999	7.20 L/300	-3.97 L/999	28.92 L/300		
T2 10-11	-0.91 L/999	7.52 L/300	-3.84 L/999	28.92 L/300		
B3 1-12	-2.30 L/999	7.23 L/400	-4.38 L/999	17.71 L/400		
B3 12-13	-2.71 L/999	6.83 L/400	-5.90 L/999	17.71 L/400		
B3 13-14	-2.71 L/999	6.83 L/400	-5.90 L/999	17.71 L/400		
B3 14-15	0.38 L/999	3.65 L/400	-2.37 L/999	17.71 L/400		
B3 15-16	0.00 L/999	1.00 L/400	0.00 L/999	1.00 L/400		
B4 17-18	-0.16 L/999	3.18 L/400	-0.33 L/999	6.50 L/400		
B4 18-19	-0.20 L/999	3.32 L/400	-0.36 L/999	6.50 L/400		
B5 20-21	0.00 L/999	1.00 L/400	0.00 L/999	1.00 L/400		
B5 21-22	0.36 L/999	3.52 L/400	-2.63 L/999	17.58 L/400		
B5 22-23	-2.60 L/999	6.83 L/400	-4.70 L/999	17.58 L/400		
B5 23-24	-2.34 L/999	7.23 L/400	-4.17 L/999	17.58 L/400		
B5 24-11	-2.34 L/999	7.23 L/400	-4.17 L/999	17.58 L/400		

Fleche Globale

Noeud	----- Deplacement -----			----- Admissible -----			Signal
	X	Y	Rotation	X	Y	Ratio	
J1	0.000	0.000	0.000	10.000	17.712	L/400	
J2	0.832	-3.887	0.000	10.000	17.712	L/400	
J3	0.347	-3.370	-0.000	10.000	17.712	L/400	
J5	-0.630	-0.420	-0.001	10.000	17.712	L/400	
J6	-0.624	-0.492	0.002	10.000	17.712	L/400	
J7	-0.617	-0.416	0.000	10.000	17.712	L/400	
J9	-1.563	-3.282	-0.002	10.000	17.712	L/400	
J10	-2.048	-3.820	0.001	10.000	17.712	L/400	
J11	-1.232	0.000	0.000	10.000	17.712	L/400	
J12	0.548	-4.116	0.000	10.000	17.712	L/400	
J14	0.715	-2.374	-0.001	10.000	17.712	L/400	
J15	0.714	0.000	0.002	10.000	17.712	L/400	
J16	0.714	0.145	0.001	10.000	17.712	L/400	
J17	-0.621	-0.172	0.001	10.000	17.712	L/400	
J18	-0.622	-0.486	0.001	10.000	17.712	L/400	
J19	-0.624	-0.172	-0.000	10.000	17.712	L/400	
J20	-1.936	0.143	0.000	10.000	17.712	L/400	
J21	-1.936	0.000	0.000	10.000	17.712	L/400	
J22	-1.936	-2.285	-0.001	10.000	17.712	L/400	
J23	-1.773	-4.037	-0.002	10.000	17.712	L/400	

RESUME DU CALCUL

Contraintes

Barre	-Section-		Cas	Effort	Moment	Taux	Taux	ATF	Signal
	BxH	Cat.		(kN)	(kNm)	Max.	Cis.		
T1 1-2	72x157	C24	3	-6.952	0.578	0.201	0.021		
T1 2-3	72x97	C24	1	-7.656	-0.190	0.315	0.129		
T1 3-4	72x97	C24	3	-2.602	-0.251	0.208	0.096		
T1 4-5	72x97	C24	3	-2.498	0.540	0.372	0.080		

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Barre	-Section-	Cas	Effort	Moment	Taux	Taux	ATF	Signal
	BxH Cat.		(kN)	(kNm)	Max.	Cis.		
T1 5-6	72x97 C24	3	-0.330	-0.387	0.226	0.110		
T2 6-7	72x97 C24	3	-0.326	-0.375	0.219	0.108		
T2 7-8	72x97 C24	3	-2.422	0.524	0.359	0.080		
T2 8-9	72x97 C24	3	-2.524	-0.247	0.201	0.095		
T2 9-10	72x97 C24	1	-7.537	-0.181	0.305	0.127		
T2 10-11	72x157 C24	3	-6.869	0.576	0.200	0.021		
B3 1-12	72x112 C24	1	8.318	0.199	0.279	0.097		
B3 12-13	72x112 C24	+ 1	2.380	0.176	0.228	0.076		
B3 12-13	36x112 C24							
B3 13-14	72x112 C24	+ 1	2.380	-0.027	0.071	0.136		
B3 13-14	36x112 C24							
B3 14-15	72x112 C24	+ 7	-0.008	-0.136	0.088	0.063		
B3 14-15	36x112 C24							
B3 15-16	72x112 C24	+ 1	0.000	-0.001	0.001	0.000		
B3 15-16	36x112 C24							
B4 17-18	72x97 C24	1	-0.038	0.042	0.035	0.048		
B4 18-19	72x97 C24	1	-0.037	0.047	0.039	0.049		
B5 20-21	72x112 C24	+ 1	0.000	-0.001	0.001	0.000		
B5 20-21	36x112 C24							
B5 21-22	72x112 C24	+ 7	-0.008	-0.135	0.089	0.063		
B5 21-22	36x112 C24							
B5 22-23	72x112 C24	+ 1	2.330	0.167	0.218	0.137		
B5 22-23	36x112 C24							
B5 23-24	72x112 C24	1	8.212	-0.157	0.251	0.097		
B5 24-11	72x112 C24	1	8.212	0.200	0.277	0.061		
W6 2-12	72x60 C24	11	-1.684	0.000	0.035	0.000		
W7 12-3	72x60 C24	1	2.921	0.000	0.104	0.000		
W8 3-14	72x60 C24	1	-3.291	0.000	0.290	0.000		
W12 18-6	72x60 C24	15	-0.366	0.000	0.015	0.000		
W16 22-9	72x60 C24	1	-3.262	0.000	0.288	0.000		
W17 9-23	72x60 C24	1	2.914	0.000	0.104	0.000		
W18 23-10	72x60 C24	11	-1.704	0.000	0.036	0.000		
W10 15-17	72x60 C24	1	-5.108	-0.016	0.159	0.007		
W10 17-5	72x60 C24	1	-4.944	-0.016	0.191	0.005		
W14 21-19	72x60 C24	1	-5.101	0.016	0.159	0.007		
W14 19-7	72x60 C24	1	-4.926	0.016	0.189	0.005		
W9 14-5	72x60 C24	1	4.888	0.000	0.174	0.000		
W15 7-22	72x60 C24	1	4.828	0.000	0.172	0.000		
W11 5-18	72x60 C24	7	0.459	0.000	0.016	0.000		
W13 18-7	72x60 C24	7	0.448	0.000	0.016	0.000		

Noeuds:										
Noeud	--Section--	Cas	Maximum	Plan (yy)	Plan (xx)	Signal				
	BxH Cat.		Effort	Moment	K	Taux	K	Taux	ATF	
			(kN)	(kNm)						
J1	T 1-2	72x157 C24	3	-7.040	0.149	1.000	0.088	1.000	0.088	1
J2	T 2-3	72x97 C24	1	-7.931	-0.116	1.000	0.213	1.000	0.213	1
J3	T 2-3	72x97 C24	3	-5.990	-0.520	1.000	0.364	1.000	0.364	1
J5	T 3-5	72x97 C24	3	-2.107	-0.529	1.000	0.327	1.000	0.327	1
J6	T 5-6	72x97 C24	3	0.024	0.036		0.021			1
J6	T 6-7	72x97 C24	3	0.032	0.042		0.025			1
J7	T 7-9	72x97 C24	3	-2.033	-0.521	1.000	0.321	1.000	0.321	1
J9	T 9-10	72x97 C24	1	-7.506	-0.309	1.000	0.362	1.000	0.362	1
J10	T 9-10	72x97 C24	3	-6.352	-0.344	1.000	0.266	1.000	0.266	1
J11	T10-11	72x157 C24	3	-6.957	0.148	1.000	0.087	1.000	0.087	1
J1	B 1-12	72x112 C24	1	8.318	0.090		0.213			1
J12	B 1-12	72x112 C24	1	8.318	-0.313		0.348			1
J14	B12-14	72x112 C24	+ 7	2.815	-0.256		0.208			1
J14	B12-14	36x112 C24								
J15	X14-15	72x112 C24	+ 1	-0.015	-0.002	1.000	0.001	1.000	0.001	1
J15	X14-15	36x112 C24								
J16	X15-16	72x112 C24	+ 1	0.000	0.000					1
J16	X15-16	36x112 C24								
J17	B17-18	72x97 C24	5	-0.030	0.018	1.000	0.015	1.000	0.015	1
J18	B17-18	72x97 C24	5	-0.030	-0.055	1.000	0.045	1.000	0.045	1
J19	B18-19	72x97 C24	5	-0.030	0.020	1.000	0.017	1.000	0.017	1
J20	X20-21	72x112 C24	+ 1	0.000	0.000					1
J20	X20-21	36x112 C24								
J21	B21-22	72x112 C24	+ 7	-0.011	-0.002	1.000	0.001	1.000	0.001	1
J21	B21-22	36x112 C24								
J22	B22-23	72x112 C24	+ 1	3.496	-0.249		0.217			1
J22	B22-23	36x112 C24								
J23	B23-11	72x112 C24	1	8.212	-0.309		0.343			1
J11	B23-11	72x112 C24	1	8.212	0.090		0.211			1
J15	W15-17	72x60 C24	1	-5.108	-0.002	1.000	0.128	1.000	0.128	1
J17	W15-17	72x60 C24	1	-5.108	-0.018	1.000	0.162	1.000	0.162	1
J5	W17-5	72x60 C24	1	-4.944	-0.002	1.000	0.124	1.000	0.124	1
J21	W21-19	72x60 C24	1	-5.101	0.002	1.000	0.128	1.000	0.128	1
J19	W21-19	72x60 C24	1	-5.101	0.018	1.000	0.162	1.000	0.162	1
J7	W19-7	72x60 C24	1	-4.926	0.002	1.000	0.124	1.000	0.124	1

Reactions d'appuis

Noeud	-----Normale-----			-----Extreme-----			Permanente
	vert.	soul.	horz.	vert.	soul.	horz.	
J1	3.406(1)		-0.228(5)	4.541(6)		0.438(7)	2.599
J15	5.178(1)		0.000(-1)	6.795(6)		0.000(-1)	3.943
J21	5.155(1)		0.000(-1)	6.759(6)		0.000(-1)	3.927
J11	3.373(1)		0.000(1)	4.500(6)		0.000(6)	2.574

Noeud	Largeur min. (mm)	Hauteur min. (mm)	Signal
J1	21	7	
J15	21	0	
J21	21	0	
J11	20	7	

Deformations

Barre	Panneau Max.	Segment Max.	--- Noeud Debut ---		--- Noeud Fin ---		Signal
			X	Y	X	Y	
T1 1-2	-0.92(1)	-2.96(1)	0.00(1)	0.00(1)	0.83(1)	-3.89(1)	
T1 2-3	-0.53(1)	-4.16(1)	0.83(1)	-3.89(1)	0.35(1)	-3.37(1)	
T1 3-4	-3.70(1)	-4.09(1)	0.35(1)	-3.37(1)	-0.63(1)	-0.42(1)	
T1 4-5	-3.70(1)	-4.09(1)	0.35(1)	-3.37(1)	-0.63(1)	-0.42(1)	
T1 5-6	0.44(1)	-0.39(1)	-0.63(1)	-0.42(1)	-0.62(1)	-0.49(1)	
T2 6-7	0.41(1)	-0.31(1)	-0.62(1)	-0.49(1)	-0.62(1)	-0.42(1)	
T2 7-8	-3.40(1)	-4.93(1)	-0.62(1)	-0.42(1)	-1.56(1)	-3.28(1)	
T2 8-9	-3.40(1)	-4.93(1)	-0.62(1)	-0.42(1)	-1.56(1)	-3.28(1)	
T2 9-10	-0.56(1)	-3.97(1)	-1.56(1)	-3.28(1)	-2.05(1)	-3.82(1)	
T2 10-11	-0.91(1)	-3.84(1)	-2.05(1)	-3.82(1)	-1.23(1)	0.00(1)	
B3 1-12	-2.30(1)	-4.38(1)	0.00(1)	0.00(1)	0.55(1)	-4.12(1)	
B3 12-13	-2.71(1)	-5.90(1)	0.55(1)	-4.12(1)	0.71(1)	-2.37(1)	
B3 13-14	-2.71(1)	-5.90(1)	0.55(1)	-4.12(1)	0.71(1)	-2.37(1)	
B3 14-15	0.38(7)	-2.37(1)	0.71(1)	-2.37(1)	0.71(1)	0.00(1)	
B3 15-16	0.00(1)	0.00(1)	0.71(1)	0.00(1)	0.71(1)	0.15(1)	
B4 17-18	-0.16(1)	-0.33(1)	-0.62(1)	-0.17(1)	-0.62(1)	-0.49(1)	
B4 18-19	-0.20(1)	-0.36(1)	-0.62(1)	-0.49(1)	-0.62(1)	-0.17(1)	
B5 20-21	0.00(1)	0.00(1)	-1.94(1)	0.14(1)	-1.94(1)	0.00(1)	
B5 21-22	0.36(7)	-2.63(1)	-1.94(1)	0.00(1)	-1.94(1)	-2.28(1)	
B5 22-23	-2.60(1)	-4.70(1)	-1.94(1)	-2.28(1)	-1.77(1)	-4.04(1)	
B5 23-24	-2.34(1)	-4.17(1)	-1.77(1)	-4.04(1)	-1.23(1)	0.00(1)	
B5 24-11	-2.34(1)	-4.17(1)	-1.77(1)	-4.04(1)	-1.23(1)	0.00(1)	
W6 2-12	-0.00(1)	-0.00(1)	0.83(1)	-3.89(1)	0.55(1)	-4.12(1)	
W7 12-3	0.00(1)	-0.00(5)	0.55(1)	-4.12(1)	0.35(1)	-3.37(1)	
W8 3-14	0.00(1)	0.00(7)	0.35(1)	-3.37(1)	0.71(1)	-2.37(1)	
W12 18-6	0.00(1)	0.00(7)	-0.62(1)	-0.49(1)	-0.62(1)	-0.49(1)	
W16 22-9	-0.00(1)	-0.00(1)	-1.94(1)	-2.28(1)	-1.56(1)	-3.28(1)	
W17 9-23	-0.00(1)	-0.00(7)	-1.56(1)	-3.28(1)	-1.77(1)	-4.04(1)	
W18 23-10	0.00(1)	0.00(1)	-1.77(1)	-4.04(1)	-2.05(1)	-3.82(1)	
W10 15-17	0.09(1)	-0.00(5)	0.71(1)	0.00(1)	-0.62(1)	-0.17(1)	
W10 17-5	0.20(1)	-0.66(1)	-0.62(1)	-0.17(1)	-0.63(1)	-0.42(1)	
W14 21-19	-0.09(1)	-0.00(5)	-1.94(1)	0.00(1)	-0.62(1)	-0.17(1)	
W14 19-7	-0.20(1)	-0.78(1)	-0.62(1)	-0.17(1)	-0.62(1)	-0.42(1)	
W9 14-5	0.00(1)	-0.00(5)	0.71(1)	-2.37(1)	-0.63(1)	-0.42(1)	
W15 7-22	-0.00(1)	0.00(5)	-0.62(1)	-0.42(1)	-1.94(1)	-2.28(1)	
W11 5-18	-0.00(1)	0.00(7)	-0.63(1)	-0.42(1)	-0.62(1)	-0.49(1)	
W13 18-7	-0.00(5)	0.00(5)	-0.62(1)	-0.49(1)	-0.62(1)	-0.42(1)	

Notas importants:

La fixation du dispositif d'antiflambage sera réalisé de manière à reprendre par ferme et par versant un effort perpendiculaire à l'arba $F = \text{Effort axial arba}/60 = 0.194\text{kN}$
Cette valeur est à multiplier par le nombre de fermes intéressées par le dispositif.

Remarques:

- C'est la responsabilite du client de s'assurer que les donnees ci-dessus: dimensions, pentes, charges et autres caracteristiques sont celles demandees par le maitre d'ouvrage.
- Cette note de calcul propre a chaque element triangule ne dispense pas de l'execution d'un plan de pose et de contreventement adapte au batiment etudie.
- Poids de la Ferme 164.508 - 180.959 Kg

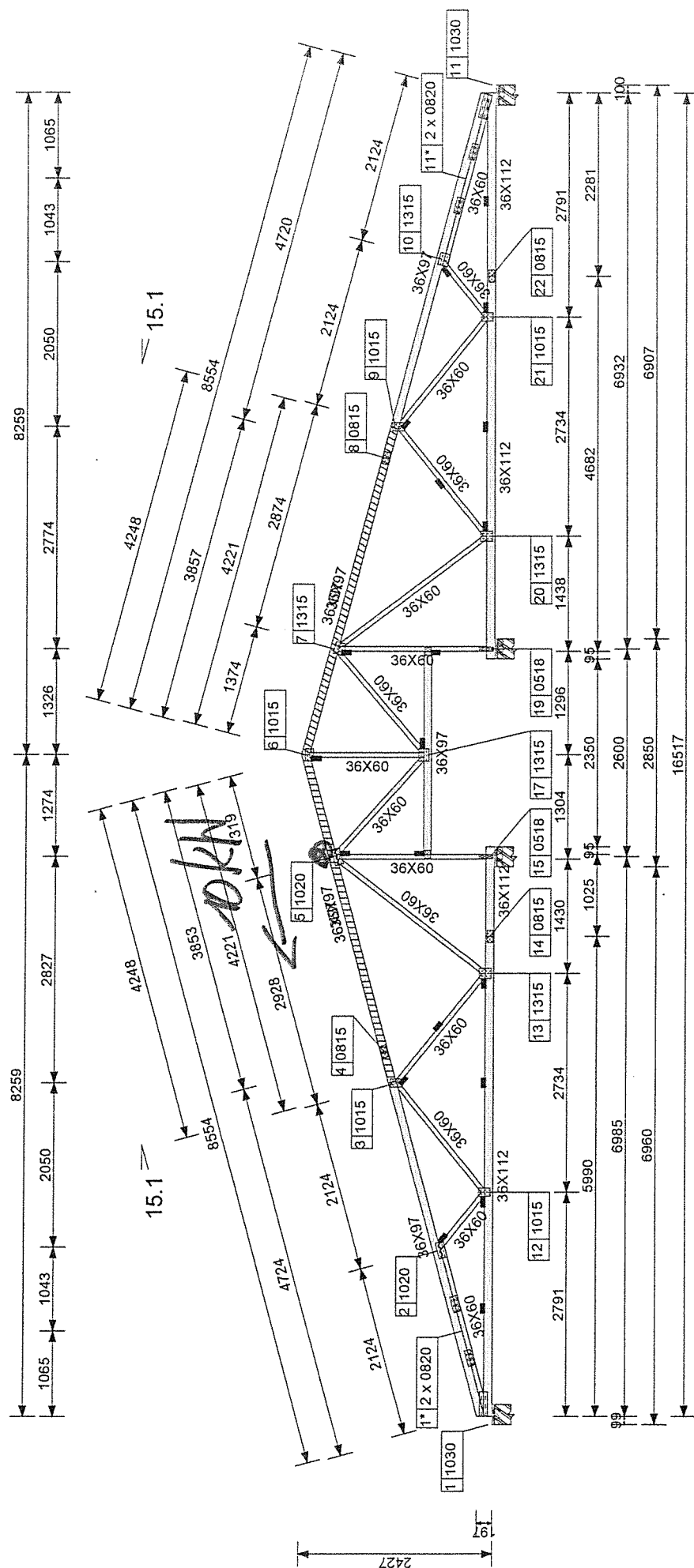
Informations Plaques

Plaques utilisées: M20 01.370029v2

- Les aboutages sont normalement placés entre 10 et 25 % de la longueur du panneau.
- Tolérance du positionnement = 10 (mm)

Informations Plaques

Noeud	Plaque		Position(x1)	(y1)	(x2)	(y2) (mm)
	Jauge	Code				
1	M20	1020	37	51		
1	M20	0820	102	38		
1	M20	0820	102	38		
2	M20	0820	0	0		
3	M20	1015	0	0		
4	M20	0815	0	0		
5	M20	1020	0	0		
6	M20	0820	38	85		
7	M20	1020	0	0		
8	M20	0815	0	0		
9	M20	1015	0	0		
10	M20	0820	0	0		
11	M20	1020	37	51		
11	M20	0820	102	38		
11	M20	0820	102	38		
12	M20	1015	0	0		
13	M20	0815	0	0		
14	M20	1015	0	0		
15	M20	0510	0	0		
17	M20	0810	0	0		
18	M20	1315	0	0		
19	M20	0810	0	0		
21	M20	0510	0	0		
22	M20	1015	0	0		
23	M20	1015	0	0		
24	M20	0815	0	0		



Echelle 1:75

Ce dessin doit être accompagné de la note de calcul.

☒ Lisse d'antiflambage.

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[illegible]

** NOTE DE CALCUL **

INFORMATIONS GENERALES

Etude faite par:

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Tel : 05.61.88.78.51
Fax : 05.61.88.14.19

Adresse client:

Adresse chantier:

DIVERS

Les calculs ont pour base technique:

Les documents techniques unifiés DTU.
Regles N.V.65 et N 84 (carte de neige)
DTU 31.3, Norme P21.110 etc...

Methode de calcul utilisees:

Calcul hyperstatique de structure plane a barres.

Unites utilisees:

mm, deg, MPa

Conventions:

Efforts : Negatif (-) = Compression, Positif (+) = Traction
Reactions: Negatif (-) = Soulevement, Positive (+) = Descente

Caracteristiques des bois:

Categorie de bois : C24 SE
Module d'elasticite axial : 10000.0
Coefficient de fluage : 1.5
Densite : 420.00 Kg/m³
Contraintes admissibles :
Contraintes admissibles :
Flexion // : 11.00 MPa
Traction // : 6.50 MPa
Traction T : 0.20 MPa
Compression // : 9.50 MPa
Compression T : 2.30 MPa
Cisaillement // : 1.10 MPa

Caracteristiques des connecteurs:

Type de plaque : M20

Réf. PV Essai 01.370029v2

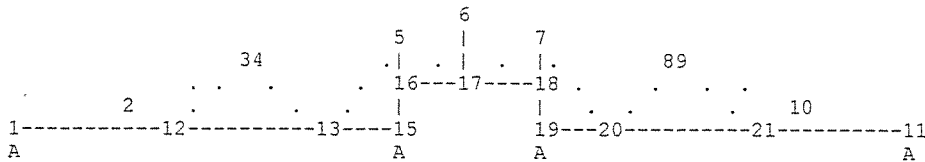
Lundi 14 Avril 2008

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Reprise crochet de sécurité.
Le calcul est fait avec la ferme F2 + un renfort asab.
En fait sur le chantier les fermes supportant le crochet de
sécurité correspondent aussi aux recoupements feu. La ferme
de reprise du crochet sera donc doublée. Le nom de l'étude est
F222 juste pour ne pas compliquer la fabrication et le nom de pose.

GEOMETRIE ET MODELE DE LA STRUCTURE
=====

Schema de la Structure



Dimensions du batiment:

Longueur (a)	: 15 m	Largeur (b)	: 8 m
Hauteur totale (H)	: 10 m	Hauteur au faitage (h)	: 10 m
Pente Gauche	: 15.11 deg	Pente Droite	: 15.11 deg
Portee	: 16517 mm	Entraxe des fermes	: 600 mm
Hauteur Hors-tout	: 2427 mm	Longueur Hors-tout	: 16517 mm
Prolonge Gauche Entrait	: 0 mm	Prolonge Droite Entrait	: 0 mm
Entraxe lattes Arba. (*)	: 600 mm	Entraxe lattes Entrait (*)	: 0 mm

(*) - Valeurs de saisie, voir les longueurs de flambement calculees en 'Caracteristiques des barres.'

Coordonnees des noeuds:

Noeud	Coordonnees		Liberte		
	X	Y	Horiz.	Vert.	Rot.
	(mm)	(mm)			
J1	-100	56	1	1	0 Appui
J4	4552	1376	0	0	0
J6	8259	2377	0	0	0
J8	11970	1375	0	0	0
J12	2791	56	0	0	0
J2	2061	703	0	0	0
J3	4145	1266	0	0	0
J13	5525	56	0	0	0
J17	8259	849	0	0	0
J9	12372	1266	0	0	0
J20	10993	56	0	0	0
J21	13726	56	0	0	0
J10	14456	703	0	0	0
J5	6985	2033	0	0	0
J15	6985	56	0	1	0 Appui
J7	9585	2019	0	0	0
J19	9585	56	0	1	0 Appui
J11	16617	56	0	1	0 Appui
J18	9585	849	0	0	0
J16	6985	849	0	0	0

0=Libre, 1=Fix

Caracteristiques des barres:

Barre	Section				Longueur	Project.	Longueur	Pente	Conditions
Debut-Fin	Pli	Coef	BxH	Cat	(mm)	X (mm)	Flambage (mm)	(deg)	Extremities
T1 1-2	1	1.0	36x157	C24	2256	2161	540	16.67	Pin-Fix
T1 2-3	1	1.0	36x97	C24	2159	2084	540	15.11	Fix-Fix
T1 3-4	1	1.0	36x97	C24	421	406	540	15.11	Fix-Fix
T1 3-4			36x97	C24					
T1 4-5	1	1.0	36x97	C24	2520	2433	540	15.11	Fix-Fix
T1 4-5			36x97	C24					
T1 5-6	1	1.0	36x97	C24	1319	1274	540	15.11	Fix-Pin
T1 5-6			36x97	C24					
T2 6-7	1	1.0	36x97	C24	1374	1326	540	-15.11	Pin-Fix
T2 6-7			36x97	C24					
T2 7-8	1	1.0	36x97	C24	2470	2385	540	-15.11	Fix-Fix
T2 7-8			36x97	C24					
T2 8-9	1	1.0	36x97	C24	417	402	540	-15.11	Fix-Fix
T2 8-9			36x97	C24					
T2 9-10	1	1.0	36x97	C24	2159	2084	540	-15.11	Fix-Fix
T2 10-11	1	1.0	36x157	C24	2256	2161	540	-16.67	Fix-Pin
B3 1-12	1	1.0	36x112	C24	2891	2891	1446	0.00	Pin-Fix
B3 12-13	1	1.0	36x112	C24	2734	2734	1367	0.00	Fix-Fix
B3 13-14	1	1.0	36x112	C24	465	465	1460	0.00	Fix-Fix
B3 14-15	1	1.0	36x112	C24	995	995	1460	0.00	Fix-Pin
B4 16-17	1	1.0	36x97	C24	1274	1274	1274	0.00	Pin-Fix
B4 17-18	1	1.0	36x97	C24	1326	1326	1326	0.00	Fix-Pin
B5 19-20	1	1.0	36x112	C24	1408	1408	1408	0.00	Pin-Fix
B5 20-21	1	1.0	36x112	C24	2734	2734	1367	0.00	Fix-Fix
B5 21-22	1	1.0	36x112	C24	510	510	1446	0.00	Fix-Fix
B5 22-11	1	1.0	36x112	C24	2381	2381	1446	0.00	Fix-Pin
W6 2-12	1	1.0	36x60	C24	976	730	976	-41.56	Pin-Pin
W7 12-3	1	1.0	36x60	C24	1816	1354	1816	41.78	Pin-Pin
W8 3-13	1	1.0	36x60	C24	1835	1380	918	-41.26	Pin-Pin
W12 17-6	1	1.0	36x60	C24	1528	1528	1528	90.00	Pin-Pin
W16 20-9	1	1.0	36x60	C24	1835	1380	918	41.26	Pin-Pin

Barre	-----Section-----				Longueur	Project.	Longueur		Conditions
Debut-Fin	Pli	Coef	BxH	Cat	(mm)	X (mm)	Flambage (mm)	Pente (deg)	Extremities Debut-Fin
W17 9-21	1	1.0	36x60	C24	1816	1354	1816	-41.78	Pin-Pin
W18 21-10	1	1.0	36x60	C24	976	730	976	41.56	Pin-Pin
W10 15-16	1	1.0	36x60	C24	793	793	793	90.00	Pin-Fix
W10 16-5	1	1.0	36x60	C24	1184	1184	1184	90.00	Fix-Pin
W14 19-18	1	1.0	36x60	C24	793	793	793	90.00	Pin-Fix
W14 18-7	1	1.0	36x60	C24	1170	1170	1170	90.00	Fix-Pin
W9 13-5	1	1.0	36x60	C24	2458	1460	2458	53.55	Pin-Pin
W15 7-20	1	1.0	36x60	C24	2415	1408	2415	-54.35	Pin-Pin
W11 5-17	1	1.0	36x60	C24	1739	1274	1739	-42.92	Pin-Pin
W13 17-7	1	1.0	36x60	C24	1769	1326	1769	41.42	Pin-Pin

HYPOTHESES DE CHARGES ET SURCHARGES

Charges permanentes:

Couverture : 0.500 Plafond bas : 0.440

Surcharge de neige:

Region de neige : 1B Altitude : 200 m
Normale : 0.350 Normale majoree : 0.350
Extrême : 0.600 Extrême majoree : 0.800
Accidentelle : 0.800
Permanente : 0 % Temporaire : 100 %

Barre Pente Coef multiplicateur du a la pente

1-6 15.110 1.000

6-11 -15.110 1.000

Surcharge de vent:

Région de vent : II Nature du Site : Normal
Pression de base : 0.600 Permeabilite : 5%

Longueur (a) : 15000 mm Coef site : 1.000
Largeur (b) : 8000 mm Coef majoration : 1.000
Hauteur totale (H) : 10000 mm Coef hauteur : 1.000
Hauteur au faitage (h) : 10000 mm Valeur pression : 0.600

Flèche : 2315 mm Lambda a : 0.667
Coef delta : 0.913 Lambda b : 1.250
f/h : 0.231 Gamma 0 normal : 1.000
b/a : 0.533 Gamma 0 Parallèle : 1.000

Barre	Pente	-----Exterieur (Ce)-----			--Interieure (Ci)--	
		Au vent	Sous le vent	Parallèle	Succion	Pression
1-6	15.110	-0.633	-0.334	-0.502	-0.300	0.300
6-11	-15.110	-0.633	-0.334	-0.502	-0.300	0.300

Combinaisons de charges vérifiées:

Cas 1: Charges Permanentes + Neige Normale (Cas 1)
Cas 3: Charges Permanentes + 1kN Arba (Cas 2)
Cas 4: Charges Permanentes + Neige + 1kN Entrait (Cas 2bis)
Cas 5: Vent Normal G->D Depression Interne (Cas 3)
Cas 7: Vent Normal D->G Depression Interne (Cas 3)
Cas 11: Charges Permanentes + Neige Extrême (Cas 4)
Cas 13: Vent Extrême G->D Surpression Interne (Cas 5)
Cas 15: Vent Extrême D->G Surpression Interne (Cas 5)
Cas 16: Vent Extrême Parallèle Surpression Interne (Cas 5bis)
Cas 17: Charges Permanentes + 10KN

Reactions d'appuis par Cas de Charges

Cas	Nom	Appui 1	Appui 15	Appui 19	Appui 11
Charge		Verti Horiz (kN)	Verti Horiz (kN)	Verti Horiz (kN)	Verti Horiz (kN)
1	TOTAL	2.921 0.000	4.117 0.000	4.085 0.000	2.900 0.000
1	DEAD	2.196 0.000	3.079 0.000	3.057 0.000	2.180 0.000
1	LIVE	0.725 0.000	1.037 0.000	1.028 0.000	0.720 0.000
3	TOTAL	2.149 0.000	3.127 0.000	3.102 0.000	2.134 0.000
4	TOTAL	2.921 0.000	4.117 0.000	4.085 0.000	2.900 0.000
5	TOTAL	2.215 0.228	3.024 0.000	3.005 0.000	2.139 0.000
5	DEAD	2.196 0.000	3.079 0.000	3.057 0.000	2.180 0.000
5	LIVE	0.019 0.228	-0.056 0.000	-0.052 0.000	-0.041 0.000
7	TOTAL	2.091 -0.228	3.092 0.000	3.064 0.000	2.136 0.000
7	DEAD	2.196 0.000	3.079 0.000	3.057 0.000	2.180 0.000
7	LIVE	-0.105 -0.228	0.013 0.000	0.007 0.000	-0.044 0.000
11	TOTAL	4.054 0.000	5.732 0.000	5.686 0.000	4.026 0.000
13	TOTAL	-0.075 0.438	-0.045 0.000	0.904 0.000	0.503 0.000
15	TOTAL	0.385 -0.438	1.033 0.000	0.064 0.000	-0.196 0.000
16	TOTAL	0.110 0.000	0.438 0.000	0.428 0.000	0.109 0.000
17	TOTAL	5.083 9.654	3.301 0.000	3.317 0.000	2.380 0.000

RESULTATS DE CALCUL

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Cas de Charges 1: Coef =1.00 Charges Permanentes + Neige Normale (Cas 1)

Charges Uniformes

Barre	---Debut Barre---	---Fin Barre---
	Vert. Horiz.	Vert. Horiz.
Arbalétrier		
T1 1-2	-0.556 0.000	-0.556 0.000
T1 2-3	-0.553 0.000	-0.553 0.000
T1 3-4	-0.553 0.000	-0.553 0.000
T1 4-5	-0.553 0.000	-0.553 0.000
T1 5-6	-0.553 0.000	-0.553 0.000
T2 6-7	-0.553 0.000	-0.553 0.000
T2 7-8	-0.553 0.000	-0.553 0.000
T2 8-9	-0.553 0.000	-0.553 0.000
T2 9-10	-0.553 0.000	-0.553 0.000
T2 10-11	-0.556 0.000	-0.556 0.000
Entrait		
B3 1-12	-0.285 0.000	-0.285 0.000
B3 12-13	-0.285 0.000	-0.285 0.000
B3 13-14	-0.285 0.000	-0.285 0.000
B3 14-15	-0.285 0.000	-0.285 0.000
B4 16-17	-0.285 0.000	-0.285 0.000
B4 17-18	-0.285 0.000	-0.285 0.000
B5 19-20	-0.285 0.000	-0.285 0.000
B5 20-21	-0.285 0.000	-0.285 0.000
B5 21-22	-0.285 0.000	-0.285 0.000
B5 22-11	-0.285 0.000	-0.285 0.000
Fiches		

Efforts/Moments aux Extremities

	----- Debut de Barre -----	----- Fin de Barre -----	-----
	Effort Tranch. (kN)	Effort Normal (kN)	Moment (kNm)
Arbalétrier			
T1 1-2	0.514	-7.288	0.000
T1 2-3	0.489	-6.343	0.138
T1 3-4	0.739	-2.163	0.284
T1 4-5	0.522	-2.104	0.018
T1 5-6	0.598	-0.423	0.340
T2 6-7	0.115	-0.231	0.000
T2 7-8	0.762	-1.687	0.329
T2 8-9	-0.511	-2.030	0.018
T2 9-10	0.619	-5.970	0.276
T2 10-11	0.638	-6.876	0.141
Entrait			
B3 1-12	0.337	6.834	0.000
B3 12-13	0.432	4.137	0.216
B3 13-14	0.276	-0.018	0.100
B3 14-15	0.144	-0.018	0.002
B4 16-17	0.144	-0.030	0.000
B4 17-18	0.225	-0.030	0.047
B5 19-20	0.131	-0.018	0.000
B5 20-21	0.346	4.057	0.098
B5 21-22	0.487	6.770	0.217
B5 22-11	0.341	6.770	0.005
Fiches			
V6 2-12	0.000	-1.120	0.000
V7 12-3	0.000	2.493	0.000

27

	----- Debut de Barre -----			----- Fin de Barre -----			Travée
	Effort	Effort	Moment	Effort	Effort	Moment	Moment
	Tranch.	Normal		Tranch.	Normal		Maxi.
	(kN)	(kN)	(kNm)	(kN)	(kN)	(kNm)	(kNm)
3-13	0.000	-2.982	0.000	0.000	-2.982	0.000	0.000
2 17-6	0.000	-0.068	0.000	0.000	-0.068	0.000	0.000
5 20-9	0.000	-2.966	0.000	0.000	-2.966	0.000	0.000
7 9-21	0.000	2.505	0.000	0.000	2.505	0.000	0.000
3 21-10	0.000	-1.130	0.000	0.000	-1.130	0.000	0.000
3 15-16	-0.018	-3.977	0.000	0.018	-3.977	-0.014	-0.013
3 16-5	0.012	-3.833	0.014	-0.012	-3.833	0.000	-0.013
4 19-18	0.018	-3.954	0.000	-0.018	-3.954	0.014	0.013
4 18-7	-0.012	-3.801	-0.014	0.012	-3.801	0.000	0.013
13-5	0.000	3.220	0.000	0.000	3.220	0.000	0.000
5 7-20	0.000	3.165	0.000	0.000	3.165	0.000	0.000
1 5-17	0.000	0.386	0.000	0.000	0.386	0.000	0.000
3 17-7	0.000	0.377	0.000	0.000	0.377	0.000	0.000

rification des Contraintes pour le cas de charge 1

rres Externes:								
rre	--Section--	--- Maximum ---		--Plan Ferme --		---Plan Perp---		Signal
	BxH Cat.	Effort	Moment	K	Taux	K	Taux	ATF
		(kN)	(kNm)					
1-2	36x157 C24	-7.134	0.259	0.965	0.316	0.826	0.339	
2-3	36x97 C24	-6.072	-0.161	0.710	0.517	0.826	0.481	
3-5	36x97 C24 +	-0.979	0.123	0.439	0.265	1.000	0.227	
3-5	36x97 C24							
5-6	36x97 C24 +	-0.189	-0.085	0.998	0.143	1.000	0.143	
5-6	36x97 C24							
6-7	36x97 C24 +	-0.187	-0.078	0.979	0.131	1.000	0.131	
6-7	36x97 C24							
7-9	36x97 C24 +	-0.944	0.117	0.456	0.251	1.000	0.218	
7-9	36x97 C24							
9-10	36x97 C24	-6.000	-0.154	0.710	0.503	0.826	0.467	
0-11	36x157 C24	-7.067	0.258	0.965	0.313	0.826	0.337	
1-12	36x112 C24	6.834	0.200		0.502			1
2-13	36x112 C24	4.137	0.112		0.293			1
3-15	36x112 C24	-0.018	-0.063	1.000	0.076	0.156	0.079	
6-17	36x97 C24	-0.030	0.036	1.000	0.060	0.206	0.063	
7-18	36x97 C24	-0.030	0.041	0.995	0.067	0.190	0.071	
9-20	36x112 C24	-0.018	-0.063	1.000	0.076	0.169	0.079	
0-21	36x112 C24	4.057	0.112		0.290			1
1-11	36x112 C24	6.770	0.199		0.499			1

rres Internes:								
rre	--Section--	--- Maximum ---		--Plan Ferme --		---Plan Perp---		Signal
	BxH Cat.	Effort	Moment	K	Taux	K	Taux	ATF
		(kN)	(kNm)					
2-12	36x60 C24	-1.120	0.000	0.774	0.070	0.352	0.155	
2-3	36x60 C24	2.493	0.000		0.178			
3-13	36x60 C24	-2.982	0.000	0.276	0.526	0.398	0.365	1
7-6	36x60 C24	-0.068	0.000	0.398	0.008	0.138	0.024	
0-9	36x60 C24	-2.966	0.000	0.276	0.523	0.398	0.363	1
9-21	36x60 C24	2.505	0.000		0.178			
1-10	36x60 C24	-1.130	0.000	0.774	0.071	0.352	0.157	
5-16	36x60 C24	-3.977	-0.013	1.000	0.247	0.533	0.417	
6-5	36x60 C24	-3.833	-0.013	0.794	0.289	0.239	0.836	
9-18	36x60 C24	-3.954	0.013	1.000	0.246	0.533	0.415	
8-7	36x60 C24	-3.801	0.013	0.801	0.284	0.245	0.811	
3-5	36x60 C24	3.220	0.000		0.229			
7-20	36x60 C24	3.165	0.000		0.225			
5-17	36x60 C24	0.386	0.000		0.027			
7-7	36x60 C24	0.377	0.000		0.027			

euds:								
eud	--Section--	--- Maximum ---		--Plan Ferme --		---Plan Perp---		Signal
	BxH Cat.	Effort	Moment	K	Taux	K	Taux	ATF
		(kN)	(kNm)					
T 1-2	36x157 C24	-7.253	0.103	1.000	0.208	1.000	0.208	1
T 2-3	36x97 C24	-6.343	-0.138	1.000	0.413	1.000	0.413	1
T 2-3	36x97 C24	-6.042	-0.284	1.000	0.639	1.000	0.639	1
T 3-5	36x97 C24 +	-0.877	-0.170	1.000	0.300	1.000	0.300	1
T 3-5	36x97 C24							
T 5-6	36x97 C24 +	-0.125	0.002	1.000	0.008	1.000	0.008	1
T 5-6	36x97 C24							
T 6-7	36x97 C24 +	-0.121	0.004	1.000	0.009	1.000	0.009	1
T 6-7	36x97 C24							
T 7-9	36x97 C24 +	-0.843	-0.164	1.000	0.290	1.000	0.290	1
T 7-9	36x97 C24							
T 9-10	36x97 C24	-5.970	-0.276	1.000	0.624	1.000	0.624	1
0 T 9-10	36x97 C24	-6.270	-0.141	1.000	0.416	1.000	0.416	1
1 T10-11	36x157 C24	-7.186	0.103	1.000	0.207	1.000	0.207	1
B 1-12	36x112 C24	6.834	0.086		0.364			1
2 B 1-12	36x112 C24	6.834	-0.216		0.521			1

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Noeud	--Section--			--- Maximum ---		--Plan Ferme --		---Plan Perp---		Signal
	BxH	Cat.		Effort (kN)	Moment (kNm)	K	Taux	K	Taux	ATF
J13	B12-13	36x112	C24	4.137	-0.100		0.279			1
J15	B13-15	36x112	C24	-0.018	0.017	1.000	0.021	1.000	0.021	1
J16	B16-17	36x97	C24	-0.030	0.016	1.000	0.027	1.000	0.027	1
J17	B17-18	36x97	C24	-0.030	-0.047	1.000	0.077	1.000	0.077	1
J18	B17-18	36x97	C24	-0.030	0.018	1.000	0.030	1.000	0.030	1
J19	B19-20	36x112	C24	-0.018	0.016	1.000	0.019	1.000	0.019	1
J20	B20-21	36x112	C24	4.057	-0.098		0.273			1
J21	B21-11	36x112	C24	6.770	-0.217		0.520			1
J11	B21-11	36x112	C24	6.770	0.086		0.362			1
J15	W15-16	36x60	C24	-3.977	-0.001	1.000	0.200	1.000	0.200	1
J16	W15-16	36x60	C24	-3.977	-0.014	1.000	0.253	1.000	0.253	1
J5	W16-5	36x60	C24	-3.833	-0.001	1.000	0.193	1.000	0.193	1
J19	W19-18	36x60	C24	-3.954	0.001	1.000	0.199	1.000	0.199	1
J18	W19-18	36x60	C24	-3.954	0.014	1.000	0.252	1.000	0.252	1
J7	W18-7	36x60	C24	-3.801	0.001	1.000	0.191	1.000	0.191	1

Reactions d'appuis

Noeud Appui	----- Reaction -----		----- Largeur -----		----- Hauteur -----		Signal
	Verti (kN)	Horiz (kN)	Réelle (mm)	Néc. (mm)	Réelle (mm)	Néc. (mm)	Taux Cis.
J1	2.921	0.000	250	35	112	13	0.11
J15	4.117	0.000	250	50	112	5	0.05
J19	4.085	0.000	250	49	112	5	0.04
J11	2.900	0.000	250	35	112	13	0.11

Verifications des Deformations pour le cas de charge 1

Fleche Locale

Barre Debut-Fin	----- Panneau -----		----- Segment -----		Signal
	---Reelle---	---Admiss.---	---Reelle---	---Admiss.---	
T1 1-2	-1.72 L/999	7.52 L/300	-4.88 L/999	28.92 L/300	
T1 2-3	-1.10 L/999	7.20 L/300	-6.92 L/999	28.92 L/300	
T1 3-4	-4.50 L/653	9.80 L/300	-5.95 L/999	28.92 L/300	
T1 4-5	-4.50 L/653	9.80 L/300	-5.95 L/999	28.92 L/300	
T1 5-6	0.58 L/999	4.40 L/300	-0.51 L/999	28.92 L/300	
T2 6-7	0.54 L/999	4.58 L/300	-0.41 L/999	28.92 L/300	
T2 7-8	-4.13 L/699	9.62 L/300	-6.56 L/999	28.92 L/300	
T2 8-9	-4.13 L/699	9.62 L/300	-6.56 L/999	28.92 L/300	
T2 9-10	-1.16 L/999	7.20 L/300	-6.69 L/999	28.92 L/300	
T2 10-11	-1.70 L/999	7.52 L/300	-6.26 L/999	28.92 L/300	
B3 1-12	-5.25 L/550	7.23 L/400	-8.67 L/817	17.71 L/400	
B3 12-13	-1.93 L/999	6.83 L/400	-7.05 L/999	17.71 L/400	
B3 13-14	-0.10 L/999	3.65 L/400	-3.49 L/999	17.71 L/400	
B3 14-15	-0.10 L/999	3.65 L/400	-3.49 L/999	17.71 L/400	
B4 16-17	-0.27 L/999	3.18 L/400	-0.52 L/999	6.50 L/400	
B4 17-18	-0.34 L/999	3.32 L/400	-0.59 L/999	6.50 L/400	
B5 19-20	0.07 L/999	3.52 L/400	-3.36 L/999	17.58 L/400	
B5 20-21	-1.94 L/999	6.83 L/400	-6.95 L/999	17.58 L/400	
B5 21-22	-5.24 L/551	7.23 L/400	-7.45 L/944	17.58 L/400	
B5 22-11	-5.24 L/551	7.23 L/400	-7.45 L/944	17.58 L/400	

Fleche Globale

Noeud	----- Deplacement -----			----- Admissible -----			Signal
	X	Y	Rotation	X	Y	Ratio	
J1	0.000	0.000	0.000	10.000	17.712	L/400	
J2	1.354	-6.331	0.000	10.000	17.712	L/400	
J3	0.545	-5.368	-0.000	10.000	17.712	L/400	
J5	-0.848	-0.649	-0.001	10.000	17.712	L/400	
J6	-0.829	-0.764	0.003	10.000	17.712	L/400	
J7	-0.808	-0.640	0.000	10.000	17.712	L/400	
J9	-2.163	-5.243	-0.003	10.000	17.712	L/400	
J10	-2.975	-6.244	0.001	10.000	17.712	L/400	
J11	-1.643	0.000	0.000	10.000	17.712	L/400	
J12	0.897	-6.649	0.000	10.000	17.712	L/400	
J13	1.281	-3.488	0.001	10.000	17.712	L/400	
J15	1.280	0.000	0.002	10.000	17.712	L/400	
J16	-0.822	-0.267	0.001	10.000	17.712	L/400	
J17	-0.824	-0.755	0.001	10.000	17.712	L/400	
J18	-0.827	-0.265	-0.000	10.000	17.712	L/400	
J19	-2.907	0.000	0.000	10.000	17.712	L/400	
J20	-2.908	-3.357	0.000	10.000	17.712	L/400	
J21	-2.531	-6.546	-0.002	10.000	17.712	L/400	

Cas de Charges 17: Coef =1.40 Charges Permanentes + 10KN

arges Uniformes

re	---Debut Barre---		---Fin Barre---	
	Vert.	Horiz.	Vert.	Horiz.
balétrier				
1-2	-0.377	0.000	-0.377	0.000
2-3	-0.374	0.000	-0.374	0.000
3-4	-0.374	0.000	-0.374	0.000
4-5	-0.374	0.000	-0.374	0.000
5-6	-0.374	0.000	-0.374	0.000
6-7	-0.374	0.000	-0.374	0.000
7-8	-0.374	0.000	-0.374	0.000
8-9	-0.374	0.000	-0.374	0.000
9-10	-0.374	0.000	-0.374	0.000
10-11	-0.377	0.000	-0.377	0.000
trait				
1-12	-0.311	0.000	-0.311	0.000
12-13	-0.311	0.000	-0.311	0.000
13-14	-0.311	0.000	-0.311	0.000
14-15	-0.311	0.000	-0.311	0.000
16-17	-0.311	0.000	-0.311	0.000
17-18	-0.311	0.000	-0.311	0.000
19-20	-0.311	0.000	-0.311	0.000
20-21	-0.311	0.000	-0.311	0.000
21-22	-0.311	0.000	-0.311	0.000
22-11	-0.311	0.000	-0.311	0.000
ches				

arges Ponctuelles

eud	X	Y	Vert.	Horiz.	Moment	Fermes Portées
	(mm)	(mm)	(kN)	(kN)	(kNm)	
	6985	2033	-2.607	-9.654	0.000	

Jauchet

forts/Moments aux Extremities

	----- Debut de Barre -----			----- Fin de Barre -----			Travee Moment Maxi. (kNm)
	Effort Tranch. (kN)	Effort Normal (kN)	Moment (kNm)	Effort Tranch. (kN)	Effort Normal (kN)	Moment (kNm)	
balétrier							
1-2	0.365	-15.199	0.000	0.415	-14.965	-0.056	0.193
2-3	0.316	-14.759	0.056	0.437	-14.556	-0.187	-0.101
3-4	0.490	-11.699	0.187	-0.343	-11.659	-0.012	-0.015
4-5	0.343	-11.659	0.012	0.536	-11.422	-0.254	0.039
5-6	0.423	-0.350	0.254	0.037	-0.225	0.000	-0.050
6-7	0.074	-0.216	0.000	0.406	-0.345	-0.228	-0.044
7-8	0.518	-1.472	0.228	0.344	-1.705	-0.012	0.039
8-9	-0.344	-1.705	0.012	0.489	-1.744	-0.186	-0.015
9-10	0.423	-5.022	0.186	0.330	-5.226	-0.086	-0.103
10-11	0.429	-5.614	0.086	0.352	-5.848	0.000	0.179
trait							
1-12	0.372	4.801	0.000	0.528	4.801	-0.226	0.222
12-13	0.468	3.111	0.226	0.384	3.111	-0.111	0.125
13-14	0.303	-0.031	0.111	-0.159	-0.031	-0.004	-0.070
14-15	0.159	-0.031	0.004	0.151	-0.031	0.000	0.037
16-17	0.155	-0.052	0.000	0.242	-0.052	-0.055	0.039
17-18	0.248	-0.025	0.055	0.165	-0.025	0.000	0.044
19-20	0.141	-0.015	0.000	0.297	-0.015	-0.110	-0.071
20-21	0.375	3.288	0.110	0.476	3.288	-0.249	-0.130
21-22	0.536	5.501	0.249	-0.377	5.501	-0.016	-0.107
22-11	0.377	5.501	0.016	0.364	5.501	0.000	0.213
ches							
2-12	0.000	-0.386	0.000	0.000	-0.386	0.000	0.000
12-3	0.000	1.879	0.000	0.000	1.879	0.000	0.000
3-13	0.000	-2.127	0.000	0.000	-2.127	0.000	0.000
2 17-6	0.000	0.008	0.000	0.000	0.008	0.000	0.000
6 20-9	0.000	-2.303	0.000	0.000	-2.303	0.000	0.000
7 9-21	0.000	2.241	0.000	0.000	2.241	0.000	0.000
8 21-10	0.000	-0.725	0.000	0.000	-0.725	0.000	0.000
0 15-16	-0.031	-3.150	0.000	0.031	-3.150	-0.025	-0.022
0 16-5	0.021	-2.995	0.025	-0.021	-2.995	0.000	-0.022
4 19-18	0.015	-3.176	0.000	-0.015	-3.176	0.012	0.010
4 18-7	-0.010	-3.011	-0.012	0.010	-3.011	0.000	0.010
13-5	0.000	2.598	0.000	0.000	2.598	0.000	0.000
5 7-20	0.000	2.696	0.000	0.000	2.696	0.000	0.000
1 5-17	0.000	0.381	0.000	0.000	0.381	0.000	0.000
3 17-7	0.000	0.336	0.000	0.000	0.336	0.000	0.000

Verification des Contraintes pour le cas de charge 17

Barres Externes:

Barre	--Section-- BxH Cat.	---	Maximum Effort (kN)	---	Moment (kNm)	--Plan Ferme -- K Taux	---	Plan Perp--- K Taux	---	Signal ATF
T 1-2	36x157 C24		-15.090		0.193	0.965	0.307	0.826	0.343	
T 2-3	36x97 C24		-14.576		-0.101	0.710	0.558	0.826	0.496	
T 3-5	36x97 C24 +		-5.780		0.078	0.439	0.374	1.000	0.214	
T 3-5	36x97 C24									
T 5-6	36x97 C24 +		-0.159		-0.067	0.998	0.080	1.000	0.080	
T 5-6	36x97 C24									
T 6-7	36x97 C24 +		-0.156		-0.055	0.979	0.066	1.000	0.066	
T 6-7	36x97 C24									
T 7-9	36x97 C24 +		-0.804		0.078	0.456	0.128	1.000	0.107	
T 7-9	36x97 C24									
T 9-10	36x97 C24		-5.043		-0.103	0.710	0.271	0.826	0.249	
T10-11	36x157 C24		-5.743		0.179	0.965	0.167	0.826	0.181	
B 1-12	36x112 C24		4.801		0.222		0.322			1
B12-13	36x112 C24		3.111		0.125		0.193			1
B13-15	36x112 C24		-0.031		-0.070	1.000	0.061	0.156	0.064	
B16-17	36x97 C24		-0.052		0.039	1.000	0.045	0.206	0.050	
B17-18	36x97 C24		-0.025		0.044	0.995	0.051	0.190	0.053	
B19-20	36x112 C24		-0.015		-0.071	1.000	0.062	0.169	0.063	
B20-21	36x112 C24		3.288		-0.130		0.202			1
B21-11	36x112 C24		5.501		0.213		0.334			1

Barres Internes:

Barre	--Section-- BxH Cat.	---	Maximum Effort (kN)	---	Moment (kNm)	--Plan Ferme -- K Taux	---	Plan Perp--- K Taux	---	Signal ATF
W 2-12	36x60 C24		-0.386		0.000	0.774	0.017	0.352	0.038	
W12-3	36x60 C24		1.879		0.000		0.096			
W 3-13	36x60 C24		-2.127		0.000	0.276	0.268	0.398	0.186	1
W17-6	36x60 C24		0.008		0.000		0.000			
W20-9	36x60 C24		-2.303		0.000	0.276	0.290	0.398	0.202	1
W 9-21	36x60 C24		2.241		0.000		0.114			
W21-10	36x60 C24		-0.725		0.000	0.774	0.033	0.352	0.072	
W15-16	36x60 C24		-3.150		-0.022	1.000	0.176	0.533	0.272	
W16-5	36x60 C24		-2.995		-0.022	0.794	0.198	0.239	0.503	
W19-18	36x60 C24		-3.176		0.010	1.000	0.142	0.533	0.239	
W18-7	36x60 C24		-3.011		0.010	0.801	0.162	0.245	0.460	
W13-5	36x60 C24		2.598		0.000		0.132			
W 7-20	36x60 C24		2.696		0.000		0.137			
W 5-17	36x60 C24		0.381		0.000		0.019			
W17-7	36x60 C24		0.336		0.000		0.017			

Noeuds:

Noeud	--Section-- BxH Cat.	---	Maximum Effort (kN)	---	Moment (kNm)	--Plan Ferme -- K Taux	---	Plan Perp--- K Taux	---	Signal ATF
J1	T 1-2 36x157 C24		-15.176		0.074	1.000	0.243	1.000	0.243	1
J2	T 2-3 36x97 C24		-14.759		-0.056	1.000	0.382	1.000	0.382	1
J3	T 2-3 36x97 C24		-14.556		-0.187	1.000	0.529	1.000	0.529	1
J5	T 3-5 36x97 C24 +		-5.711		-0.127	1.000	0.269	1.000	0.269	1
J5	T 3-5 36x97 C24									
J6	T 5-6 36x97 C24 +		-0.116		0.001	1.000	0.004	1.000	0.004	1
J6	T 5-6 36x97 C24									
J6	T 6-7 36x97 C24 +		-0.111		0.002	1.000	0.005	1.000	0.005	1
J6	T 6-7 36x97 C24									
J7	T 7-9 36x97 C24 +		-0.736		-0.114	1.000	0.147	1.000	0.147	1
J7	T 7-9 36x97 C24									
J9	T 9-10 36x97 C24		-5.022		-0.186	1.000	0.322	1.000	0.322	1
J10	T 9-10 36x97 C24		-5.226		-0.086	1.000	0.212	1.000	0.212	1
J11	T10-11 36x157 C24		-5.825		0.071	1.000	0.114	1.000	0.114	1
J1	B 1-12 36x112 C24		4.801		0.095		0.212			1
J12	B 1-12 36x112 C24		4.801		-0.226		0.326			1
J13	B12-13 36x112 C24		3.111		-0.111		0.181			1
J15	B13-15 36x112 C24		-0.031		0.019	1.000	0.017	1.000	0.017	1
J16	B16-17 36x97 C24		-0.052		0.017	1.000	0.021	1.000	0.021	1
J17	B16-17 36x97 C24		-0.052		-0.055	1.000	0.065	1.000	0.065	1
J18	B17-18 36x97 C24		-0.025		0.019	1.000	0.023	1.000	0.023	1
J19	B19-20 36x112 C24		-0.015		0.017	1.000	0.015	1.000	0.015	1
J20	B20-21 36x112 C24		3.288		-0.110		0.185			1
J21	B21-11 36x112 C24		5.501		-0.249		0.364			1
J11	B21-11 36x112 C24		5.501		0.092		0.230			1
J15	W15-16 36x60 C24		-3.150		-0.003	1.000	0.117	1.000	0.117	1
J16	W15-16 36x60 C24		-3.150		-0.025	1.000	0.184	1.000	0.184	1
J5	W16-5 36x60 C24		-2.995		-0.003	1.000	0.112	1.000	0.112	1
J19	W19-18 36x60 C24		-3.176		0.001	1.000	0.114	1.000	0.114	1
J18	W19-18 36x60 C24		-3.176		0.012	1.000	0.145	1.000	0.145	1
J7	W18-7 36x60 C24		-3.011		0.001	1.000	0.108	1.000	0.108	1

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Sud	--Section-- BxH Cat.	--- Maximum ---		--Plan Ferme --		---Plan Perp---		Signal
		Effort (kN)	Moment (kNm)	K	Taux	K	Taux ATF	

actions d'appuis

Sud Sui	Reaction		Largeur		Hauteur		Signal
	Verti (kN)	Horiz (kN)	Réelle (mm)	Néc. (mm)	Réelle (mm)	Néc. (mm)	
	5.083	9.654	250	44	112	7	0.06
	3.301	0.000	250	28	112	3	0.03
	3.317	0.000	250	29	112	3	0.02
	2.380	0.000	250	21	112	7	0.06

SUME DU CALCUL

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contraintes

Sere	-Section-		Cas	Effort (kN)	Moment (kNm)	Taux		ATF	Signal
	BxH	Cat.				Max.	Cis.		
1-2	36x157	C24	3	-5.701	0.562	0.364	0.040		
2-3	36x97	C24	17	-14.576	-0.101	0.558	0.087		
3-4	36x97	C24	+ 17	-2.918	-0.015	0.293	0.049		
3-4	36x97	C24							
4-5	36x97	C24	+ 17	-2.892	0.039	0.374	0.034		
4-5	36x97	C24							
5-6	36x97	C24	+ 11	-0.135	-0.101	0.144	0.080		
5-6	36x97	C24							
6-7	36x97	C24	+ 11	-0.135	-0.096	0.131	0.079		
6-7	36x97	C24							
7-8	36x97	C24	+ 3	-0.408	0.132	0.343	0.079		
7-8	36x97	C24							
8-9	36x97	C24	+ 3	-0.434	-0.054	0.105	0.092		
8-9	36x97	C24							
9-10	36x97	C24	1	-6.000	-0.154	0.503	0.242		
10-11	36x157	C24	3	-5.652	0.560	0.362	0.040		
1-12	36x112	C24	1	6.834	0.200	0.502	0.165	1	
12-13	36x112	C24	1	4.137	0.112	0.293	0.146	1	
13-14	36x112	C24	5	-0.013	-0.065	0.081	0.094		
14-15	36x112	C24	1	-0.018	0.034	0.044	0.049		
16-17	36x97	C24	1	-0.030	0.036	0.063	0.085		
17-18	36x97	C24	1	-0.030	0.041	0.071	0.088		
19-20	36x112	C24	5	-0.013	-0.065	0.081	0.092		
20-21	36x112	C24	1	4.057	0.112	0.290	0.146	1	
21-22	36x112	C24	1	6.770	-0.088	0.364	0.165	1	
22-11	36x112	C24	1	6.770	0.199	0.499	0.115	1	
2-12	36x60	C24	11	-1.772	0.000	0.164	0.000		
12-3	36x60	C24	1	2.493	0.000	0.178	0.000		
3-13	36x60	C24	1	-2.982	0.000	0.526	0.000	1	
2 17-6	36x60	C24	15	-0.383	0.000	0.090	0.000		
6 20-9	36x60	C24	1	-2.966	0.000	0.523	0.000	1	
7 9-21	36x60	C24	1	2.505	0.000	0.178	0.000		
8 21-10	36x60	C24	11	-1.788	0.000	0.165	0.000		
0 15-16	36x60	C24	1	-3.977	-0.013	0.417	0.011		
0 16-5	36x60	C24	1	-3.833	-0.013	0.836	0.008		
4 19-18	36x60	C24	1	-3.954	0.013	0.415	0.011		
4 18-7	36x60	C24	1	-3.801	0.013	0.811	0.008		
13-5	36x60	C24	1	3.220	0.000	0.229	0.000		
5 7-20	36x60	C24	1	3.165	0.000	0.225	0.000		
1 5-17	36x60	C24	7	0.412	0.000	0.029	0.000		
3 17-7	36x60	C24	7	0.403	0.000	0.029	0.000		

deuds:

Sud Sud	--Section--		Cas	--- Maximum ---		---Plan (yy)---		---Plan (xx)---		Signal
	BxH	Cat.		Effort (kN)	Moment (kNm)	K	Taux	K	Taux ATF	
	T 1-2	36x157 C24	3	-5.786	0.145	1.000	0.149	1.000	0.149	1
	T 2-3	36x97 C24	3	-5.159	-0.360	1.000	0.525	1.000	0.525	1
	T 2-3	36x97 C24	3	-4.712	-0.478	1.000	0.651	1.000	0.651	1
	T 3-5	36x97 C24	+ 3	-0.652	-0.271	1.000	0.326	1.000	0.326	1
	T 3-5	36x97 C24								
	T 5-6	36x97 C24	+ 3	0.029	0.010		0.012			1
	T 5-6	36x97 C24								
	T 6-7	36x97 C24	+ 3	0.034	0.012		0.014			1
	T 6-7	36x97 C24								
	T 7-9	36x97 C24	+ 3	-0.624	-0.267	1.000	0.320	1.000	0.320	1
	T 7-9	36x97 C24								
	T 9-10	36x97 C24	3	-4.657	-0.468	1.000	0.639	1.000	0.639	1
	T 9-10	36x97 C24	3	-5.104	-0.364	1.000	0.528	1.000	0.528	1
	T10-11	36x157 C24	3	-5.738	0.144	1.000	0.148	1.000	0.148	1
	B 1-12	36x112 C24	1	6.834	0.086		0.364			1
	B 1-12	36x112 C24	1	6.834	-0.216		0.521			1
	B12-13	36x112 C24	5	3.005	-0.103		0.239			1

Noeud	--Section-- BxH Cat.			Cas	---- Maximum ---- Effort Moment (kN) (kNm)		---Plan (yy)--- K Taux		---Plan (xx)--- K Taux		Signal ATF
J15	B13-15	36x112	C24	5	-0.013	0.017	1.000	0.021	1.000	0.021	1
J16	B16-17	36x97	C24	5	-0.022	0.016	1.000	0.026	1.000	0.026	1
J17	B16-17	36x97	C24	5	-0.022	-0.051	1.000	0.082	1.000	0.082	1
J18	B17-18	36x97	C24	5	-0.022	0.018	1.000	0.029	1.000	0.029	1
J19	B19-20	36x112	C24	5	-0.013	0.015	1.000	0.019	1.000	0.019	1
J20	B20-21	36x112	C24	1	4.057	-0.098		0.273			1
J21	B21-11	36x112	C24	1	6.770	-0.217		0.520			1
J11	B21-11	36x112	C24	1	6.770	0.086		0.362			1
J15	W15-16	36x60	C24	1	-3.977	-0.001	1.000	0.200	1.000	0.200	1
J16	W15-16	36x60	C24	1	-3.977	-0.014	1.000	0.253	1.000	0.253	1
J5	W16-5	36x60	C24	1	-3.833	-0.001	1.000	0.193	1.000	0.193	1
J19	W19-18	36x60	C24	1	-3.954	0.001	1.000	0.199	1.000	0.199	1
J18	W19-18	36x60	C24	1	-3.954	0.014	1.000	0.252	1.000	0.252	1
J7	W18-7	36x60	C24	1	-3.801	0.001	1.000	0.191	1.000	0.191	1

Reactions d'appuis

Noeud	-----Normale-----			-----Extreme-----			Permanente
	vert.	soul.	horz.	vert.	soul.	horz.	
J1	2.921(1)		-0.228(5)	4.054(6)	-0.075(7)	0.438(7)	2.196
J15	4.117(1)		0.000(-1)	5.732(6)	-0.045(7)	0.000(-1)	3.079
J19	4.085(1)		0.000(-1)	5.686(6)		0.000(-1)	3.057
J11	2.900(1)		0.000(1)	4.026(6)	-0.196(8)	0.000(6)	2.180

Noeud	Largeur min. (mm)	Hauteur min. (mm)	Signal
J1	44	13	
J15	50	5	
J19	49	5	
J11	35	13	

Deformations

Barre	Panneau		Segment	--- Noeud Debut ---		--- Noeud Fin ---		Signal
	Max.	Max.		X	Y	X	Y	
T1 1-2	-1.72(1)	-4.88(1)		0.00(1)	0.00(1)	1.35(1)	-6.33(1)	
T1 2-3	-1.10(1)	-6.92(1)		1.35(1)	-6.33(1)	0.55(1)	-5.37(1)	
T1 3-4	-4.50(1)	-5.95(1)		0.55(1)	-5.37(1)	-0.85(1)	-0.65(1)	
T1 4-5	-4.50(1)	-5.95(1)		0.55(1)	-5.37(1)	-0.85(1)	-0.65(1)	
T1 5-6	0.58(1)	-0.51(1)		-0.85(1)	-0.65(1)	-0.83(1)	-0.76(1)	
T2 6-7	0.54(1)	-0.41(1)		-0.83(1)	-0.76(1)	-0.81(1)	-0.64(1)	
T2 7-8	-4.13(1)	-6.56(1)		-0.81(1)	-0.64(1)	-2.16(1)	-5.24(1)	
T2 8-9	-4.13(1)	-6.56(1)		-0.81(1)	-0.64(1)	-2.16(1)	-5.24(1)	
T2 9-10	-1.16(1)	-6.69(1)		-2.16(1)	-5.24(1)	-2.98(1)	-6.24(1)	
T2 10-11	-1.70(1)	-6.26(1)		-2.98(1)	-6.24(1)	-1.64(1)	0.00(1)	
B3 1-12	-5.25(1)	-8.67(1)		0.00(1)	0.00(1)	0.90(1)	-6.65(1)	
B3 12-13	-1.93(1)	-7.05(1)		0.90(1)	-6.65(1)	1.28(1)	-3.49(1)	
B3 13-14	-0.10(1)	-3.49(1)		1.28(1)	-3.49(1)	1.28(1)	0.00(1)	
B3 14-15	-0.10(1)	-3.49(1)		1.28(1)	-3.49(1)	1.28(1)	0.00(1)	
B4 16-17	-0.27(1)	-0.52(1)		-0.82(1)	-0.75(1)	-0.82(1)	-0.75(1)	
B4 17-18	-0.34(1)	-0.59(1)		-0.82(1)	-0.75(1)	-0.83(1)	-0.76(1)	
B5 19-20	0.07(5)	-3.36(1)		-2.91(1)	0.00(1)	-2.91(1)	-3.36(1)	
B5 20-21	-1.94(1)	-6.95(1)		-2.91(1)	-3.36(1)	-2.53(1)	-6.55(1)	
B5 21-22	-5.24(1)	-7.45(1)		-2.53(1)	-6.55(1)	-1.64(1)	0.00(1)	
B5 22-11	-5.24(1)	-7.45(1)		-2.53(1)	-6.55(1)	-1.64(1)	0.00(1)	
W6 2-12	-0.00(1)	-0.00(1)		1.35(1)	-6.33(1)	0.90(1)	-6.65(1)	
W7 12-3	0.00(1)	-0.00(1)		0.90(1)	-6.65(1)	0.55(1)	-5.37(1)	
W8 3-13	-0.00(1)	0.00(1)		0.55(1)	-5.37(1)	1.28(1)	-3.49(1)	
W12 17-6	0.00(1)	-0.00(5)		-0.82(1)	-0.75(1)	-0.83(1)	-0.76(1)	
W16 20-9	-0.00(1)	0.00(7)		-2.91(1)	-3.36(1)	-2.16(1)	-5.24(1)	
W17 9-21	-0.00(1)	-0.00(7)		-2.16(1)	-5.24(1)	-2.53(1)	-6.55(1)	
W18 21-10	0.00(1)	-0.00(1)		-2.53(1)	-6.55(1)	-2.98(1)	-6.24(1)	
W10 15-16	0.14(1)	-0.00(7)		1.28(1)	0.00(1)	-0.82(1)	-0.27(1)	
W10 16-5	0.32(1)	-1.03(1)		-0.82(1)	-0.27(1)	-0.85(1)	-0.65(1)	
W14 19-18	-0.14(1)	-0.00(5)		-2.91(1)	0.00(1)	-0.83(1)	-0.27(1)	
W14 18-7	-0.31(1)	-1.23(1)		-0.83(1)	-0.27(1)	-0.81(1)	-0.64(1)	
W9 13-5	0.00(1)	-0.00(1)		1.28(1)	-3.49(1)	-0.85(1)	-0.65(1)	
W15 7-20	-0.00(1)	-0.00(5)		-0.81(1)	-0.64(1)	-2.91(1)	-3.36(1)	
W11 5-17	0.00(1)	-0.00(5)		-0.85(1)	-0.65(1)	-0.82(1)	-0.75(1)	
W13 17-7	-0.00(1)	0.00(5)		-0.82(1)	-0.75(1)	-0.81(1)	-0.64(1)	

Notas importants:

- Antiflambage:
Lisse d'Antiflambage necessaires aux barres:
W 3-13, W20-9
La fixation du dispositif d'antiflambage sera réalisé de manière à reprendre par ferme
et par versant un effort perpendiculaire à l'arba $F = \text{Effort axial arba}/60 = 0.251\text{kN}$
Cette valeur est à multiplier par le nombre de fermes intéressées par le dispositif.

arques:

C'est la responsabilite du client de s'assurer que les donnees
ci-dessus: dimensions, pentes, charges et autres
caracteristiques sont celles demandees par le maitre d'ouvrage.
Cette note de calcul propre a chaque element triangule ne
dispense pas de l'execution d'un plan de pose et de
contreventement adapte au batiment etudie.
Poids de la Ferme 87.340 - 96.074 Kg

Formations Plaques
=====

Plaques utilisees: M20 01.370029v2

Les aboutages sont normalement places entre 10 et 25 % de la longueur du panneau.
Tolerance du positionnement = 10 (mm)

aud	Plaque		Position(x1)	(y1)	(x2)	(y2) (mm)
	Jauge	Code				
1	M20	1030	52	51		
1	M20	0820	102	38		
1	M20	0820	102	38		
2	M20	1020	102	41		
3	M20	1015	0	0		
4	M20	0815	0	0		
5	M20	1020	102	41		
6	M20	1015	0	0		
7	M20	1315	55	48		
8	M20	0815	0	0		
9	M20	1015	0	0		
0	M20	1315	0	0		
1	M20	1030	40	51		
1	M20	0820	102	38		
1	M20	0820	102	38		
2	M20	1015	0	0		
3	M20	1315	0	0		
4	M20	0815	0	0		
5	M20	0518	0	0		
6	M20	0810	0	0		
7	M20	1315	0	0		
8	M20	0810	0	0		
9	M20	0518	0	0		
0	M20	1315	0	0		
1	M20	1015	0	0		
2	M20	0815	0	0		

SATOB
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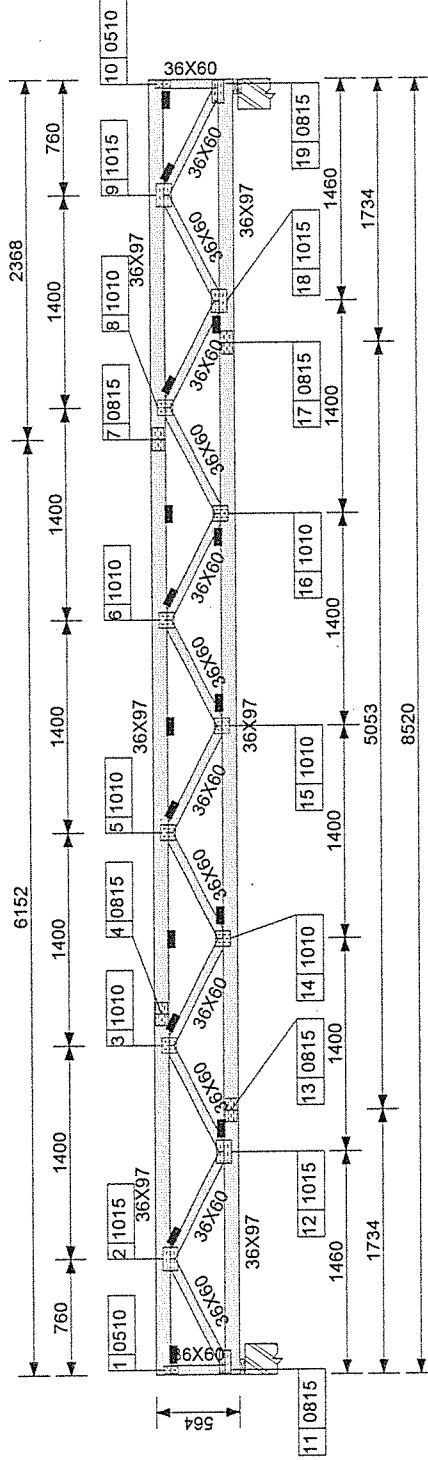
Date: 14 Apr 2008 15:28:05
Utilis.: Administrateur
Vers.: 5.10.6

Job: 704846
Desc.: Auzeville Tolosane
Client: DIVERS

Ferme: **AN2**

Qté Fab: **1**

SATOB
Construction Bois



Echelle 1:50

Ce dessin doit être accompagné de la note de calcul.

☒ Lisse d'antiflambage.

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Charges (kN/m2)		Sections		Plaques		Réaction Appui Maxi (kN)			
Entraxe Ferme:	100 mm	Arbalétrier	Arbalétrier	36X97 C24 SE	Surf. total (dm2):	M20	42.84	Nd	Ver(N) C
Entraxe Lattes:	1400 mm	Couverture:	0.150	Arbalétrier	36X60 C24 SE			Hor(E) C	Sou(E) C
Altitude:	200 m	Neige:	0.350	Entrait	36X97 C24 SE			11	1.759 11 0.000 1
Quantité Fermes:	1	Vent:	0.600	Fiches	36X60 C24 SE			19	1.759 11 0.000 1
Poids Ferme:	34 kg				Cube Net (m3):		0.082		
					Cube Brut (m3):		0.169		

** NOTE DE CALCUL **

FORMATIONS GENERALES
=====

de faite par:
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ZI PEGUILHAN
Ville, Région HAUTE GARONNE, Pays
Tel : 05.61.88.78.51
Fax : 05.61.88.14.19

resse client: Adresse chantier:

DIVERS

s calculs ont pour base technique:
Les documents techniques unifiés DTU.
Regles N.V.65 et N 84 (carte de neige)
DTU 31.3, Norme P21.110 etc...

thode de calcul utilises:
Calcul hyperstatique de structure plane a barres.

ites utilisees:
mm, deg, MPa

nyventions:
Efforts : Negatif (-) = Compression, Positif (+) = Traction
Reactions: Negatif (-) = Soulevement, Positive (+) = Descente

racteristiques des bois:
Categorie de bois : C24 SE
Module d'elasticite axial : 10000.0
Coefficient de fluage : 1.5
Densite : 420.00 Kg/m^3
Contraintes admissibles :
Flexion // : 11.00 MPa
Traction // : 6.50 MPa
Traction T : 0.20 MPa
Compression // : 9.50 MPa
Compression T : 2.30 MPa
Cisaillement // : 1.10 MPa

racteristiques des connecteurs:
Type de plaque : M20 Réf. PV Essai 01.370029v2

ndi 14 Avril 2008

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$$q = \frac{n \cdot N}{30 \text{ hp}}$$

n : 20 Permettes reprise par la poutre.

U : effort normal dans arba de f2 voir page 5

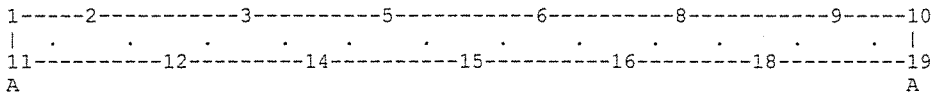
yp: 852

$$q = \frac{20 \cdot 487 \text{ daN}}{30 \cdot 8,52 \text{ m}} = 38 \text{ daN/m} \Rightarrow 19 \text{ daN/m sur arba.}$$

19 daN/m sur entrait

GEOMETRIE ET MODELE DE LA STRUCTURE
=====

Schema de la Structure



Dimensions du batiment:

Longueur (a)	: 15 m	Largeur (b)	: 8 m
Hauteur totale (H)	: 10 m	Hauteur au faitage (h)	: 10 m
Pente Gauche	: 0.00 deg	Pente Droite	: 0.00 deg
Portee	: 8520 mm	Entraxe des fermes	: 100 mm
Hauteur Hors-tout	: 564 mm	Longueur Hors-tout	: 8520 mm
Prolonge Gauche Entrait	: 0 mm	Prolonge Droite Entrait	: 0 mm
Entraxe lattes Arba.(*)	: 100 mm	Entraxe lattes Entrait(*)	: 0 mm

(*) - Valeurs de saisie, voir les longueurs de flambement calculees en 'Caracteristiques des barres.'

Coordonnees des noeuds:					
Noeud	Coordonnees		Liberte		
	X	Y	Horiz.	Vert.	Rot.
	(mm)	(mm)			
J11	30	49	1	1	0 Appui
J1	30	516	0	0	0
J19	8490	49	0	1	0 Appui
J10	8490	516	0	0	0
J2	760	516	0	0	0
J12	1460	49	0	0	0
J3	2160	516	0	0	0
J14	2860	49	0	0	0
J5	3560	516	0	0	0
J15	4260	49	0	0	0
J6	4960	516	0	0	0
J16	5660	49	0	0	0
J8	6360	516	0	0	0
J18	7060	49	0	0	0
J9	7760	516	0	0	0

0=Libre, 1=Fix

Caracteristiques des barres:

Barre	Section				Longueur	Project.	Longueur	Pente	Conditions
Debut-Fin	Pli	Coef	BxH	Cat	(mm)	X (mm)	Flambage (mm)	(deg)	Extremites
T1 11-1	1	1.0	36x60	C24	467	467	467	90.00	Pin-Pin
T2 1-2	1	1.0	36x97	C24	730	730	730	0.00	Pin-Fix
T2 2-3	1	1.0	36x97	C24	1400	1400	1400	0.00	Fix-Fix
T2 3-4	1	1.0	36x97	C24	208	208	700	0.00	Fix-Fix
T2 4-5	1	1.0	36x97	C24	1192	1192	700	0.00	Fix-Fix
T2 5-6	1	1.0	36x97	C24	1400	1400	700	0.00	Fix-Fix
T2 6-7	1	1.0	36x97	C24	1192	1192	700	0.00	Fix-Fix
T2 7-8	1	1.0	36x97	C24	208	208	700	0.00	Fix-Fix
T2 8-9	1	1.0	36x97	C24	1400	1400	1400	0.00	Fix-Fix
T2 9-10	1	1.0	36x97	C24	730	730	730	0.00	Fix-Pin
T3 19-10	1	1.0	36x60	C24	467	467	467	90.00	Pin-Pin
B4 11-12	1	1.0	36x97	C24	1430	1430	1430	0.00	Pin-Fix
B4 12-13	1	1.0	36x97	C24	274	274	1400	0.00	Fix-Fix
B4 13-14	1	1.0	36x97	C24	1126	1126	1400	0.00	Fix-Fix
B4 14-15	1	1.0	36x97	C24	1400	1400	1400	0.00	Fix-Fix
B4 15-16	1	1.0	36x97	C24	1400	1400	1400	0.00	Fix-Fix
B4 16-17	1	1.0	36x97	C24	1126	1126	1400	0.00	Fix-Fix
B4 17-18	1	1.0	36x97	C24	274	274	1400	0.00	Fix-Fix
B4 18-19	1	1.0	36x97	C24	1430	1430	1430	0.00	Fix-Pin
W5 11-2	1	1.0	36x60	C24	867	730	867	32.61	Pin-Pin
W6 2-12	1	1.0	36x60	C24	841	700	841	-33.71	Pin-Pin
W7 12-3	1	1.0	36x60	C24	841	700	841	33.71	Pin-Pin
W8 3-14	1	1.0	36x60	C24	841	700	841	-33.71	Pin-Pin
W9 14-5	1	1.0	36x60	C24	841	700	841	33.71	Pin-Pin
W10 5-15	1	1.0	36x60	C24	841	700	841	-33.71	Pin-Pin
W11 15-6	1	1.0	36x60	C24	841	700	841	33.71	Pin-Pin
W12 6-16	1	1.0	36x60	C24	841	700	841	-33.71	Pin-Pin
W13 16-8	1	1.0	36x60	C24	841	700	841	33.71	Pin-Pin
W14 8-18	1	1.0	36x60	C24	841	700	841	-33.71	Pin-Pin
W15 18-9	1	1.0	36x60	C24	841	700	841	33.71	Pin-Pin
W16 9-19	1	1.0	36x60	C24	867	730	867	-32.61	Pin-Pin

NOTHESES DE CHARGES ET SURCHARGES

arges permanentes:			
Couverture	: 0.450	Plafond bas	: 0.150
charge de neige:			
Region de neige	: 1B	Altitude	: 200 m
Normale	: 0.350	Normale majoree	: 0.350
Extreme	: 0.600	Extreme majoree	: 0.800
Accidentelle	: 0.800		
Permanente	: 0 %	Temporaire	: 100 %
charge de vent:			
Région de vent	: II	Nature du Site	: Normal
Pression de base	: 0.600	Permeabilite	: 5%
Longueur (a)	: 15000 mm	Coef site	: 1.000
Largeur (b)	: 8000 mm	Coef majoration	: 1.000
Hauteur totale (H)	: 10000 mm	Coef hauteur	: 1.000
Hauteur au faitage (h)	: 10000 mm	Valeur pression	: 0.600
Flèche	: 0 mm	Lambda a	: 0.667
Coef delta	: 1.000	Lambda b	: 1.250
f/h	: 0.000	Gamma 0 normal	: 1.000
b/a	: 0.533	Gamma 0 Parallèle	: 1.000

mbinaisons de charges vérifiées:

- s 1: Charges Permanentes + Neige Normale (Cas 1)
- s 3: Charges Permanentes + 1kN Arba (Cas 2)
- s 4: Charges Permanentes + Neige + 1kN Entrait (Cas 2bis)
- s 11: Charges Permanentes + Neige Extreme (Cas 4)
- s 13: Vent Extreme G->D Surpression Interne (Cas 5)

actions d'appuis par Cas de Charges

Cas	Nom	Appui	11	Appui	19
arge		Verti	Horiz	Verti	Horiz
		(kN)	(kN)	(kN)	(kN)
	TOTAL	1.753	0.000	1.753	0.000
	DEAD	1.753	0.000	1.753	0.000
	LIVE	0.000	0.000	0.000	0.000
	TOTAL	1.753	0.000	1.753	0.000
	DEAD	1.753	0.000	1.753	0.000
	LIVE	0.000	0.000	0.000	0.000
	TOTAL	1.753	0.000	1.753	0.000
	TOTAL	1.759	0.000	1.759	0.000
	DEAD	1.759	0.000	1.759	0.000
	LIVE	0.000	0.000	0.000	0.000
	TOTAL	1.746	0.000	1.746	0.000
	DEAD	1.746	0.000	1.746	0.000
	LIVE	0.000	0.000	0.000	0.000

RESULTATS DE CALCUL

is de Charges 1: Coef =1.00 Charges Permanentes + Neige Normale (Cas 1)

arges Uniformes

Barre	---Debut Barre---		----Fin Barre----	
	Vert.	Horiz.	Vert.	Horiz.
balétrier				
1-2	-0.190	0.000	-0.190	0.000
2-3	-0.190	0.000	-0.190	0.000
3-4	-0.190	0.000	-0.190	0.000
4-5	-0.190	0.000	-0.190	0.000
5-6	-0.190	0.000	-0.190	0.000
6-7	-0.190	0.000	-0.190	0.000
7-8	-0.190	0.000	-0.190	0.000
8-9	-0.190	0.000	-0.190	0.000
9-10	-0.190	0.000	-0.190	0.000
entrait				
11-12	-0.224	0.000	-0.224	0.000
12-13	-0.224	0.000	-0.224	0.000
13-14	-0.224	0.000	-0.224	0.000
14-15	-0.224	0.000	-0.224	0.000
15-16	-0.224	0.000	-0.224	0.000
16-17	-0.224	0.000	-0.224	0.000

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	---Debut Barre---		----Fin Barre----	
Barre	Vert.	Horiz.	Vert.	Horiz.
B4 17-18	-0.224	0.000	-0.224	0.000
B4 18-19	-0.224	0.000	-0.224	0.000
Fiches				

Efforts/Moments aux Extremities

	----- Debut de Barre -----			----- Fin de Barre -----			Travee
	Effort	Effort	Moment	Effort	Effort	Moment	Moment
	Tranch.	Normal		Tranch.	Normal		Maxi.
	(kN)	(kN)	(kNm)	(kN)	(kN)	(kNm)	(kNm)
Arbalétrier							
T1 11-1	0.000	-0.059	0.000	0.000	-0.059	0.000	0.000
T2 1-2	0.059	0.000	0.000	0.080	0.000	-0.008	0.009
T2 2-3	0.132	-4.442	0.008	0.134	-4.442	-0.009	0.038
T2 3-4	0.139	-6.989	0.009	-0.100	-6.989	0.016	0.016
T2 4-5	0.100	-6.989	-0.016	0.127	-6.989	-0.000	0.042
T2 5-6	0.133	-7.854	0.000	0.133	-7.854	-0.000	0.046
T2 6-7	0.127	-6.989	0.000	0.100	-6.989	0.016	0.042
T2 7-8	-0.100	-6.989	-0.016	0.139	-6.989	-0.009	0.016
T2 8-9	0.134	-4.442	0.009	0.132	-4.442	-0.008	0.038
T2 9-10	0.080	0.000	0.008	0.059	0.000	0.000	0.009
T3 19-10	0.000	-0.059	0.000	0.000	-0.059	0.000	0.000
Entrait							
B4 11-12	0.139	2.430	0.000	0.181	2.430	-0.030	0.043
B4 12-13	0.175	5.920	0.030	-0.114	5.920	0.009	0.009
B4 13-14	0.114	5.920	-0.009	0.139	5.920	-0.005	0.038
B4 14-15	0.155	7.617	0.005	0.159	7.617	-0.007	0.049
B4 15-16	0.159	7.617	0.007	0.155	7.617	-0.005	0.049
B4 16-17	0.139	5.920	0.005	0.114	5.920	0.009	0.038
B4 17-18	-0.114	5.920	-0.009	0.175	5.920	-0.030	0.009
B4 18-19	0.181	2.430	0.030	0.139	2.430	0.000	0.043
Fiches							
W5 11-2	0.000	-2.885	0.000	0.000	-2.885	0.000	0.000
W6 2-12	0.000	2.419	0.000	0.000	2.419	0.000	0.000
W7 12-3	0.000	-1.776	0.000	0.000	-1.776	0.000	0.000
W8 3-14	0.000	1.285	0.000	0.000	1.285	0.000	0.000
W9 14-5	0.000	-0.754	0.000	0.000	-0.754	0.000	0.000
W10 5-15	0.000	0.286	0.000	0.000	0.286	0.000	0.000
W11 15-6	0.000	0.286	0.000	0.000	0.286	0.000	0.000
W12 6-16	0.000	-0.754	0.000	0.000	-0.754	0.000	0.000
W13 16-8	0.000	1.285	0.000	0.000	1.285	0.000	0.000
W14 8-18	0.000	-1.776	0.000	0.000	-1.776	0.000	0.000
W15 18-9	0.000	2.419	0.000	0.000	2.419	0.000	0.000
W16 9-19	0.000	-2.885	0.000	0.000	-2.885	0.000	0.000

Verification des Contraintes pour le cas de charge 1

Barres Externes:									
Barre	--Section--		--- Maximum ---		--Plan Ferme --		---Plan Perp---		Signal
	BxH	Cat.	Effort	Moment	K	Taux	K	Taux	ATF
			(kN)	(kNm)					
V11-1	36x60	C24	-0.059	0.000	1.000	0.003	0.911	0.003	
V19-10	36x60	C24	-0.059	0.000	1.000	0.003	0.911	0.003	
B11-12	36x97	C24	2.430	0.043		0.177			
B12-14	36x97	C24	5.920	0.038		0.322			
B14-15	36x97	C24	7.617	0.049		0.414			
B15-16	36x97	C24	7.617	0.049		0.414			
B16-18	36x97	C24	5.920	0.038		0.322			
B18-19	36x97	C24	2.430	0.043		0.177			

Barres Internes:									
Barre	--Section--		--- Maximum ---		--Plan Ferme --		---Plan Perp---		Signal
	BxH	Cat.	Effort	Moment	K	Taux	K	Taux	ATF
			(kN)	(kNm)					
W 1-2	36x97	C24	0.000	0.009		0.015			
W 2-3	36x97	C24	-4.442	0.038	0.970	0.200	0.171	0.846	
W 3-5	36x97	C24	-6.989	0.042	0.970	0.285	0.642	0.396	1
W 5-6	36x97	C24	-7.854	0.046	0.970	0.318	0.642	0.443	1
W 6-8	36x97	C24	-6.989	0.042	0.970	0.285	0.642	0.396	1
W 8-9	36x97	C24	-4.442	0.038	0.970	0.200	0.171	0.846	
W 9-10	36x97	C24	0.000	0.009		0.015			
W11-2	36x60	C24	-2.885	0.000	0.850	0.165	0.446	0.315	
W 2-12	36x60	C24	2.419	0.000		0.172			
W12-3	36x60	C24	-1.776	0.000	0.867	0.100	0.473	0.183	
W 3-14	36x60	C24	1.285	0.000		0.092			
W14-5	36x60	C24	-0.754	0.000	0.867	0.042	0.473	0.078	
W 5-15	36x60	C24	0.286	0.000		0.020			
W15-6	36x60	C24	0.286	0.000		0.020			
W 6-16	36x60	C24	-0.754	0.000	0.867	0.042	0.473	0.078	
W16-8	36x60	C24	1.285	0.000		0.092			
W 8-18	36x60	C24	-1.776	0.000	0.867	0.100	0.473	0.183	
W18-9	36x60	C24	2.419	0.000		0.172			
W 9-19	36x60	C24	-2.885	0.000	0.850	0.165	0.446	0.315	

Suds: Sud	--Section--		--- Maximum ---		--Plan Ferme --		---Plan Perp---		Signal
	BxH	Cat.	Effort (kN)	Moment (kNm)	K	Taux	K	Taux ATF	
B11-12	36x97	C24	2.430	0.018		0.135			1
B12-14	36x97	C24	5.920	-0.030		0.309			1
B14-15	36x97	C24	7.617	0.015		0.359			1
B15-16	36x97	C24	7.617	0.013		0.356			1
B15-16	36x97	C24	7.617	0.015		0.359			1
B16-18	36x97	C24	5.920	-0.030		0.309			1
B18-19	36x97	C24	2.430	0.018		0.135			1
W 1-2	36x97	C24	0.000	0.004		0.006			1
W 2-3	36x97	C24	-4.442	0.009	1.000	0.148	1.000	0.148	1
W 3-5	36x97	C24	-6.989	-0.009	1.000	0.225	1.000	0.225	1
W 5-6	36x97	C24	-7.854	0.016	1.000	0.263	1.000	0.263	1
W 5-6	36x97	C24	-7.854	0.016	1.000	0.263	1.000	0.263	1
W 6-8	36x97	C24	-6.989	-0.009	1.000	0.225	1.000	0.225	1
W 8-9	36x97	C24	-4.442	0.009	1.000	0.148	1.000	0.148	1
W 9-10	36x97	C24	0.000	0.004		0.006			1

actions d'appuis

Sud Sui	Reaction		Largeur		Hauteur		Signal
	Verti (kN)	Horiz (kN)	Réelle (mm)	Néc. (mm)	Réelle (mm)	Néc. (mm)	
1	1.753	0.000	100	21	97	5	0.05
9	1.753	0.000	100	21	97	5	0.05

ifications des Deformations pour le cas de charge 1

leche Locale

Barre	Panneau		Segment		Signal
	Reelle	Admiss.	Reelle	Admiss.	
but-Fin	Fleche Ratio	Fleche Ratio	Fleche Ratio	Fleche Ratio	
1-2	-0.02 L/999	3.65 L/200	-4.65 L/999	21.15 L/400	
2-3	-0.46 L/999	7.00 L/200	-11.86 L/713	21.15 L/400	
3-4	-0.55 L/999	7.00 L/200	-15.60 L/542	21.15 L/400	
4-5	-0.55 L/999	7.00 L/200	-15.60 L/542	21.15 L/400	
5-6	-0.62 L/999	7.00 L/200	-16.45 L/514	21.15 L/400	
6-7	-0.55 L/999	7.00 L/200	-15.84 L/534	21.15 L/400	
7-8	-0.55 L/999	7.00 L/200	-15.84 L/534	21.15 L/400	
8-9	-0.46 L/999	7.00 L/200	-11.86 L/713	21.15 L/400	
9-10	-0.02 L/999	3.65 L/200	-4.65 L/999	21.15 L/400	
11-12	-0.59 L/999	3.58 L/400	-8.60 L/984	21.15 L/400	
12-13	-0.47 L/999	3.50 L/400	-14.09 L/600	21.15 L/400	
13-14	-0.47 L/999	3.50 L/400	-14.09 L/600	21.15 L/400	
14-15	-0.64 L/999	3.50 L/400	-16.37 L/516	21.15 L/400	
15-16	-0.64 L/999	3.50 L/400	-16.37 L/516	21.15 L/400	
16-17	-0.47 L/999	3.50 L/400	-14.32 L/590	21.15 L/400	
17-18	-0.47 L/999	3.50 L/400	-14.32 L/590	21.15 L/400	
18-19	-0.59 L/999	3.58 L/400	-8.60 L/984	21.15 L/400	

leche Globale

Sud	Déplacement			Admissible			Signal
	X	Y	Rotation	X	Y	Ratio	
1	2.453	-0.005	0.000	10.000	21.150	L/400	
2	2.453	-4.651	0.000	10.000	21.150	L/400	
3	2.115	-11.861	-0.003	10.000	21.150	L/400	
5	1.582	-15.839	-0.002	10.000	21.150	L/400	
6	0.984	-15.839	-0.001	10.000	21.150	L/400	
8	0.452	-11.861	0.001	10.000	21.150	L/400	
9	0.113	-4.651	0.002	10.000	21.150	L/400	
10	0.113	-0.005	0.003	10.000	21.150	L/400	
11	0.000	0.000	0.000	10.000	21.150	L/400	
12	0.252	-8.595	0.000	10.000	21.150	L/400	
14	0.703	-14.320	-0.003	10.000	21.150	L/400	
15	1.283	-16.364	-0.002	10.000	21.150	L/400	
16	1.863	-14.320	-0.000	10.000	21.150	L/400	
18	2.314	-8.595	0.002	10.000	21.150	L/400	
19	2.567	0.000	0.003	10.000	21.150	L/400	

ESUME DU CALCUL

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ontraintes

Barre	-Section-		Cas	Effort (kN)	Moment (kNm)	Taux Max.	Taux Cis.	ATF	Signal
	BxH	Cat.							
1 11-1	36x60	C24	11	-0.059	0.000	0.003	0.000		
2 1-2	36x97	C24	11	0.000	0.009	0.015	0.031		
2 2-3	36x97	C24	11	-4.459	0.038	0.849	0.052		
2 3-4	36x97	C24	11	-7.015	0.016	0.355	0.054	1	

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Barre	-Section- BxH Cat.	Cas	Effort (kN)	Moment (kNm)	Taux Max.	Taux Cis.	ATF	Signal
T2 4-5	36x97 C24	11	-7.015	0.042	0.397	0.050	1	
T2 5-6	36x97 C24	11	-7.883	0.046	0.445	0.052	1	
T2 6-7	36x97 C24	11	-7.015	0.042	0.397	0.050	1	
T2 7-8	36x97 C24	11	-7.015	0.016	0.355	0.054	1	
T2 8-9	36x97 C24	11	-4.459	0.038	0.849	0.052		
T2 9-10	36x97 C24	11	0.000	0.009	0.015	0.031		
T3 19-10	36x60 C24	11	-0.059	0.000	0.003	0.000		
B4 11-12	36x97 C24	11	2.439	0.043	0.178	0.071		
B4 12-13	36x97 C24	11	5.941	0.009	0.277	0.069		
B4 13-14	36x97 C24	11	5.941	0.038	0.323	0.055		
B4 14-15	36x97 C24	11	7.644	0.049	0.416	0.062		
B4 15-16	36x97 C24	11	7.644	0.049	0.416	0.062		
B4 16-17	36x97 C24	11	5.941	0.038	0.323	0.055		
B4 17-18	36x97 C24	11	5.941	0.009	0.277	0.069		
B4 18-19	36x97 C24	11	2.439	0.043	0.178	0.071		
W5 11-2	36x60 C24	11	-2.895	0.000	0.316	0.000		
W6 2-12	36x60 C24	11	2.428	0.000	0.173	0.000		
W7 12-3	36x60 C24	11	-1.782	0.000	0.184	0.000		
W8 3-14	36x60 C24	11	1.290	0.000	0.092	0.000		
W9 14-5	36x60 C24	11	-0.756	0.000	0.078	0.000		
W10 5-15	36x60 C24	11	0.288	0.000	0.021	0.000		
W11 15-6	36x60 C24	11	0.288	0.000	0.021	0.000		
W12 6-16	36x60 C24	11	-0.756	0.000	0.078	0.000		
W13 16-8	36x60 C24	11	1.290	0.000	0.092	0.000		
W14 8-18	36x60 C24	11	-1.782	0.000	0.184	0.000		
W15 18-9	36x60 C24	11	2.428	0.000	0.173	0.000		
W16 9-19	36x60 C24	11	-2.895	0.000	0.316	0.000		

Noeuds:	--Section--		Cas	---- Maximum ----		---Plan (yy)---		---Plan (xx)---		Signal
Noeud	BxH	Cat.		Effort (kN)	Moment (kNm)	K	Taux	K	Taux	ATF
J11	B11-12	36x97 C24	11	2.439	0.018		0.136			1
J12	B12-14	36x97 C24	11	5.941	-0.030		0.311			1
J14	B14-15	36x97 C24	11	7.644	0.015		0.360			1
J15	B15-16	36x97 C24	11	7.644	0.013		0.357			1
J16	B15-16	36x97 C24	11	7.644	0.015		0.360			1
J18	B16-18	36x97 C24	11	5.941	-0.030		0.311			1
J19	B18-19	36x97 C24	11	2.439	0.018		0.136			1
J1	W 1-2	36x97 C24	13	0.000	0.004		0.006			1
J2	W 2-3	36x97 C24	11	-4.459	0.009	1.000	0.149	1.000	0.149	1
J3	W 3-5	36x97 C24	11	-7.015	0.009	1.000	0.226	1.000	0.226	1
J5	W 5-6	36x97 C24	11	-7.883	0.017	1.000	0.264	1.000	0.264	1
J6	W 5-6	36x97 C24	11	-7.883	0.017	1.000	0.264	1.000	0.264	1
J8	W 6-8	36x97 C24	11	-7.015	0.009	1.000	0.226	1.000	0.226	1
J9	W 8-9	36x97 C24	13	-4.426	0.009	1.000	0.147	1.000	0.147	1
J10	W 9-10	36x97 C24	13	0.000	0.004		0.006			1

Reactions d'appuis

	-----Normale-----			-----Extreme-----			Permanente
Noeud	vert.	soul.	horz.	vert.	soul.	horz.	vert.
J11	1.759(6)		0.000(1)			0.000(-1)	1.759
J19	1.759(6)		0.000(1)			0.000(-1)	1.759

Noeud	Largeur min. (mm)	Hauteur min. (mm)	Signal
J11	21	5	
J19	21	5	

Deformations

Barre	Panneau Max.	Segment Max.	--- Noeud Debut ---		--- Noeud Fin ---		Signal
			X	Y	X	Y	
T1 11-1	0.00(1)	0.00(1)	0.00(1)	0.00(1)	2.45(1)	-0.00(1)	
T2 1-2	-0.02(1)	-4.65(1)	2.45(1)	-0.00(1)	2.45(1)	-4.65(1)	
T2 2-3	-0.46(1)	-11.86(1)	2.45(1)	-4.65(1)	2.11(1)	-11.86(1)	
T2 3-4	-0.55(1)	-15.60(1)	2.11(1)	-11.86(1)	1.58(1)	-15.84(1)	
T2 4-5	-0.55(1)	-15.60(1)	2.11(1)	-11.86(1)	1.58(1)	-15.84(1)	
T2 5-6	-0.62(1)	-16.45(1)	1.58(1)	-15.84(1)	0.98(1)	-15.84(1)	
T2 6-7	-0.55(1)	-15.84(1)	0.98(1)	-15.84(1)	0.45(1)	-11.86(1)	
T2 7-8	-0.55(1)	-15.84(1)	0.98(1)	-15.84(1)	0.45(1)	-11.86(1)	
T2 8-9	-0.46(1)	-11.86(1)	0.45(1)	-11.86(1)	0.11(1)	-4.65(1)	
T2 9-10	-0.02(1)	-4.65(1)	0.11(1)	-4.65(1)	0.11(1)	-0.00(1)	
T3 19-10	0.00(1)	0.00(1)	2.57(1)	0.00(1)	0.11(1)	-0.00(1)	
B4 11-12	-0.59(1)	-8.60(1)	0.00(1)	0.00(1)	0.25(1)	-8.60(1)	
B4 12-13	-0.47(1)	-14.09(1)	0.25(1)	-8.60(1)	0.70(1)	-14.32(1)	
B4 13-14	-0.47(1)	-14.09(1)	0.25(1)	-8.60(1)	0.70(1)	-14.32(1)	
B4 14-15	-0.64(1)	-16.37(1)	0.70(1)	-14.32(1)	1.28(1)	-16.36(1)	
B4 15-16	-0.64(1)	-16.37(1)	1.28(1)	-16.36(1)	1.86(1)	-14.32(1)	
B4 16-17	-0.47(1)	-14.32(1)	1.86(1)	-14.32(1)	2.31(1)	-8.60(1)	
B4 17-18	-0.47(1)	-14.32(1)	1.86(1)	-14.32(1)	2.31(1)	-8.60(1)	
B4 18-19	-0.59(1)	-8.60(1)	2.31(1)	-8.60(1)	2.57(1)	0.00(1)	

re	Panneau Max.	Segment Max.	--- Noeud Debut --- X Y	--- Noeud Fin --- X Y	Signal
11-2	-0.00(1)	0.00(1)	0.00(1) 0.00(1)	2.45(1) -4.65(1)	
2-12	-0.00(1)	-0.00(1)	2.45(1) -4.65(1)	0.25(1) -8.60(1)	
12-3	-0.00(1)	0.00(1)	0.25(1) -8.60(1)	2.11(1) -11.86(1)	
3-14	0.00(1)	-0.00(1)	2.11(1) -11.86(1)	0.70(1) -14.32(1)	
14-5	0.00(1)	0.00(1)	0.70(1) -14.32(1)	1.58(1) -15.84(1)	
5-15	-0.00(1)	-0.00(1)	1.58(1) -15.84(1)	1.28(1) -16.36(1)	
15-6	0.00(1)	-0.00(1)	1.28(1) -16.36(1)	0.98(1) -15.84(1)	
6-16	0.00(1)	0.00(1)	0.98(1) -15.84(1)	1.86(1) -14.32(1)	
16-8	0.00(1)	-0.00(1)	1.86(1) -14.32(1)	0.45(1) -11.86(1)	
8-18	0.00(1)	0.00(1)	0.45(1) -11.86(1)	2.31(1) -8.60(1)	
18-9	0.00(1)	-0.00(1)	2.31(1) -8.60(1)	0.11(1) -4.65(1)	
9-19	0.00(1)	0.00(1)	0.11(1) -4.65(1)	2.57(1) 0.00(1)	

as importants:

Antiflambage:

Lisse d'Antiflambage necessaires aux barres:

W 3-5 , W 5-6 , W 6-8

La fixation du dispositif d'antiflambage sera réalisé de manière à reprendre par ferme
 et par versant un effort perpendiculaire à l'arba $F = \text{Effort axial arba}/60 = 0.131\text{kN}$
 Cette valeur est à multiplier par le nombre de fermes intéressées par le dispositif.

arques:

C'est la responsabilite du client de s'assurer que les donnees
 ci-dessus: dimensions, pentes, charges et autres
 caracteristiques sont celles demandees par le maitre d'ouvrage.
 Cette note de calcul propre a chaque element triangulé ne
 dispense pas de l'execution d'un plan de pose et de
 contreventement adapte au batiment etudie.
 Poids de la Ferme 33.597 - 36.956 Kg

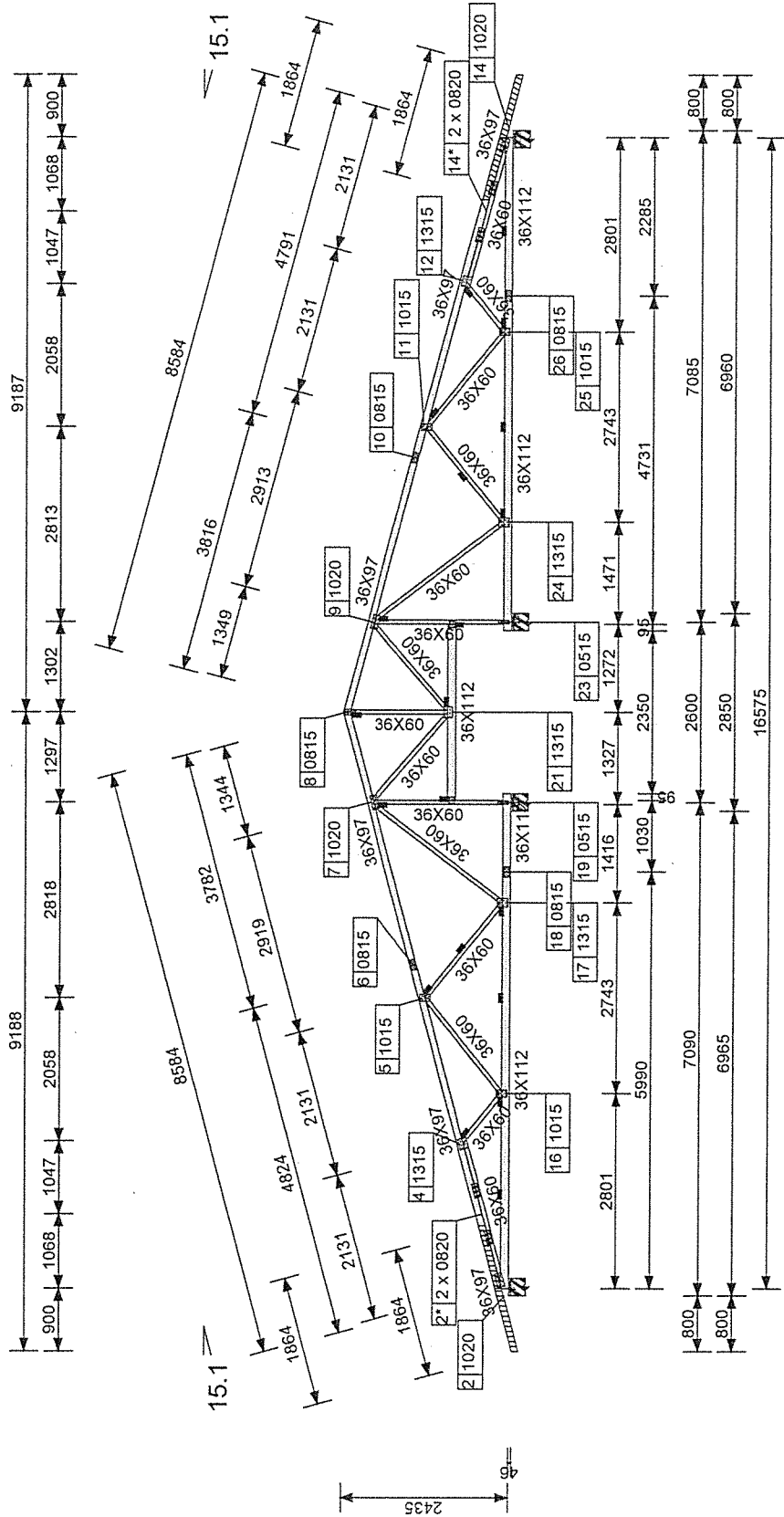
formations Plaques

Plaques utilisées: M20 01.370029v2

Les aboutages sont normalement placés entre 10 et 25 % de la longueur du panneau.
 Tolérance du positionnement = 10 (mm)

eud	Plaque Jauge Code	Position(x1)	(y1)	(x2)	(y2) (mm)
1	M20 0510	0	0		
2	M20 1015	0	0		
3	M20 1010	0	0		
4	M20 0815	0	0		
5	M20 1010	0	0		
6	M20 1010	0	0		
7	M20 0815	0	0		
8	M20 1010	0	0		
9	M20 1015	0	0		
0	M20 0510	0	0		
1	M20 0815	55	38		
2	M20 1015	0	0		
3	M20 0815	0	0		
4	M20 1010	0	0		
5	M20 1010	0	0		
6	M20 1010	0	0		
7	M20 0815	0	0		
8	M20 1015	0	0		
9	M20 0815	55	38		

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chelle 1:100

Ce dessin doit être accompagné de la note de calcul.

☐ Lisse d'antiflambage

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		<u>Charges (kN/m2)</u>		<u>Sections</u>	
		Arbalétrier	Entrait	Arbalétrier	
traxe Ferme:	600 mm	Couverture: 0.500	Plafond: 0.440	Entrait	
traxe Lattes:	540 mm	Neige: 0.350		Fiches	
itude:	200 m	Vent: 0.600		Autres barr	
itude Ferme:	1				
ids Ferme:	83 kg				

	Plaques	Réaction Appui Maxi (kN)										
		Surf. total (dm2):		M20	78.45	Nd	Ver(N)	C	Hor(E)	C	Sou(E)	C
36X97 C24 SE						2	3.363	1	-0.619	13	-0.940	13
36X112 C24 SE						19	4.054	1	0.000	1	-0.012	13
36X60 C24 SE	Bois						0.184	23	4.051	1	0.000	1
36X60 C24 SE	Cube Net (m3):						0.236	14	3.361	1	0.000	11
36X60 C24 SE	Cube Brut (m3):										-1.112	15

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** NOTE DE CALCUL **

INFORMATIONS GENERALES

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de faite par:

SATOB

ZI PEGUILHAN

Ville, Région HAUTE GARONNE, Pays

Tel : 05.61.88.78.51

Fax : 05.61.88.14.19

resse client:

Adresse chantier:

DIVERS

s calculs ont pour base technique:

Les documents techniques unifiés DTU.

Regles N.V.65 et N 84 (carte de neige)

DTU 31.3, Norme P21.110 etc...

thode de calcul utilises:

Calcul hyperstatique de structure plane a barres.

ites utilisees:

mm, deg, MPa

nventions:

Efforts : Negatif (-) = Compression, Positif (+) = Traction

Reactions: Negatif (-) = Soulevement, Positive (+) = Descente

racteristiques des bois:

Categorie de bois : C24 SE

Module d'elasticite axial : 10000.0

Coefficient de fluage : 1.5

Densite : 420.00 Kg/m³

Contraintes admissibles :

Flexion // : 11.00 MPa

Traction // : 6.50 MPa

Traction T : 0.20 MPa

Compression // : 9.50 MPa

Compression T : 2.30 MPa

Cisaillement // : 1.10 MPa

racteristiques des connecteurs:

Type de plaque : M20

Réf. PV Essai 01.370029v2

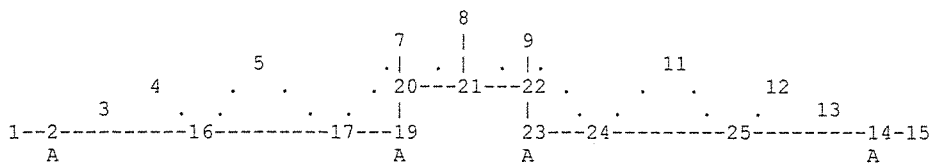
rdi 15 Avril 2008

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GEOMETRIE ET MODELE DE LA STRUCTURE

Schema de la Structure



Dimensions du batiment:

Longueur (a)	: 15 m	Largeur (b)	: 8 m
Hauteur totale (H)	: 10 m	Hauteur au faitage (h)	: 10 m
Pente Gauche	: 15.11 deg	Pente Droite	: 15.11 deg
Portee	: 16575 mm	Entraxe des fermes	: 600 mm
Hauteur Hors-tout	: 2581 mm	Longueur Hors-tout	: 18375 mm
Prolonge Gauche Entrait	: 0 mm	Prolonge Droite Entrait	: 0 mm
Entraxe lattes Arba.(*)	: 600 mm	Entraxe lattes Entrait(*)	: 0 mm

(*) - Valeurs de saisie, voir les longueurs de flambement calculees en 'Caracteristiques des barres.'

Coordonnees des noeuds:

Noeud	Coordonnees		Liberte		
	X (mm)	Y (mm)	Horiz.	Vert.	Rot.
J2	-100	56	1	1	0 Appui
J8	8288	2384	0	0	0
J16	2801	56	0	0	0
J4	2068	705	0	0	0
J5	4160	1270	0	0	0
J17	5544	56	0	0	0
J21	8288	856	0	0	0
J11	12415	1270	0	0	0
J24	11031	56	0	0	0
J25	13774	56	0	0	0
J12	14507	705	0	0	0
J7	6990	2034	0	0	0
J19	6990	56	0	1	0 Appui
J9	9590	2033	0	0	0
J23	9590	56	0	1	0 Appui
J14	16675	56	0	1	0 Appui
J22	9590	856	0	0	0
J20	6990	856	0	0	0
J1	-900	-96	0	0	0
J3	908	361	0	0	0
J13	15667	361	0	0	0
J15	17475	-96	0	0	0

0=Libre, 1=Fix

Caracteristiques des barres:

Barre	Section				Longueur	Project.	Longueur	Pente	Conditions
Debut-Fin	Pli	Coef	BxH	Cat	(mm)	X (mm)	Flambage (mm)	(deg)	Extremities Debut-Fin
T1 1-2	1	1.0	0x0	C24	814	800	540	10.78	Pin-Fix
T1 1-2			36x97	C24					
T1 2-3	1	1.0	36x157	C24	1053	1008	540	16.83	Fix-Fix
T1 2-3			36x97	C24					
T1 3-4	1	1.0	36x157	C24	1211	1161	540	16.53	Fix-Fix
T1 4-5	1	1.0	36x97	C24	2166	2091	540	15.11	Fix-Fix
T1 5-6	1	1.0	36x97	C24	506	489	540	15.11	Fix-Fix
T1 6-7	1	1.0	36x97	C24	2425	2341	540	15.11	Fix-Fix
T1 7-8	1	1.0	36x97	C24	1344	1297	540	15.11	Fix-Pin
T2 8-9	1	1.0	36x97	C24	1349	1302	540	-15.11	Pin-Fix
T2 9-10	1	1.0	36x97	C24	2453	2368	540	-15.11	Fix-Fix
T2 10-11	1	1.0	36x97	C24	473	457	540	-15.11	Fix-Fix
T2 11-12	1	1.0	36x97	C24	2166	2091	540	-15.11	Fix-Fix
T2 12-13	1	1.0	36x157	C24	1210	1160	540	-16.53	Fix-Fix
T2 13-14	1	1.0	36x157	C24	1053	1008	540	-16.83	Fix-Fix
T2 13-14			36x97	C24					
T2 14-15	1	1.0	0x0	C24	814	800	540	-10.77	Fix-Pin
T2 14-15			36x97	C24					
B3 2-16	1	1.0	36x112	C24	2901	2901	1450	0.00	Pin-Fix
B3 16-17	1	1.0	36x112	C24	2743	2743	1372	0.00	Fix-Fix
B3 17-18	1	1.0	36x112	C24	446	446	1446	0.00	Fix-Fix
B3 18-19	1	1.0	36x112	C24	1000	1000	1446	0.00	Fix-Pin
B4 20-21	1	1.0	36x112	C24	1297	1297	1297	0.00	Pin-Fix
B4 21-22	1	1.0	36x112	C24	1302	1302	1302	0.00	Fix-Pin
B5 23-24	1	1.0	36x112	C24	1441	1441	1441	0.00	Pin-Fix
B5 24-25	1	1.0	36x112	C24	2743	2743	1372	0.00	Fix-Fix
B5 25-26	1	1.0	36x112	C24	516	516	1450	0.00	Fix-Fix
B5 26-14	1	1.0	36x112	C24	2384	2384	1450	0.00	Fix-Pin
W6 4-16	1	1.0	36x60	C24	979	732	979	-41.56	Pin-Pin

Barre	-----Section-----				Longueur	Project.	Longueur		Conditions
out-Fin	Pli	Coef	BxH	Cat	(mm)	X (mm)	Flambage (mm)	Pente (deg)	Extremities Debut-Fin
16-5	1	1.0	36x60	C24	1822	1359	1822	41.77	Pin-Pin
5-17	1	1.0	36x60	C24	1841	1384	921	-41.25	Pin-Pin
21-8	1	1.0	36x60	C24	1528	1528	1528	90.00	Pin-Pin
24-11	1	1.0	36x60	C24	1841	1384	921	41.25	Pin-Pin
11-25	1	1.0	36x60	C24	1822	1359	1822	-41.77	Pin-Pin
25-12	1	1.0	36x60	C24	979	732	979	41.56	Pin-Pin
19-20	1	1.0	36x60	C24	800	800	800	90.00	Pin-Fix
20-7	1	1.0	36x60	C24	1178	1178	1178	90.00	Fix-Pin
23-22	1	1.0	36x60	C24	800	800	800	90.00	Pin-Fix
22-9	1	1.0	36x60	C24	1177	1177	1177	90.00	Fix-Pin
17-7	1	1.0	36x60	C24	2450	1446	2450	53.83	Pin-Pin
9-24	1	1.0	36x60	C24	2446	1441	2446	-53.91	Pin-Pin
7-21	1	1.0	36x60	C24	1753	1297	1753	-42.24	Pin-Pin
21-9	1	1.0	36x60	C24	1755	1302	1755	42.10	Pin-Pin

HYPOTHESES DE CHARGES ET SURCHARGES
=====

Charges permanentes:

Couverture	: 0.500	Plafond bas	: 0.440
------------	---------	-------------	---------

Surcharge de neige:

Region de neige	: 1B	Altitude	: 200 m
Normale	: 0.350	Normale majoree	: 0.350
Extreme	: 0.600	Extreme majoree	: 0.800
Accidentelle	: 0.800		:
Permanente	: 0 %	Temporaire	: 100 %

Barre Pente Coef multiplicateur du a la pente

1-8	15.110	1.000
8-15	-15.110	1.000

Surcharge de vent:

Région de vent	: II	Nature du Site	: Normal
Pression de base	: 0.600	Permeabilite	: 5%

Longueur (a) : 15000 mm Coef site : 1.000

Largeur (b) : 8000 mm Coef majoration : 1.000

Hauteur totale (H) : 10000 mm Coef hauteur : 1.000

Hauteur au faitage (h) : 10000 mm Valeur pression : 0.600

Flèche : 2481 mm Lambda a : 0.667

Coef delta : 0.909 Lambda b : 1.250

f/h : 0.248 Gamma 0 normal : 1.000

b/a : 0.533 Gamma 0 Parallèle : 1.000

Barre	Pente	-----Exterieur (Ce)-----			--Interieure (Ci)--	
		Au vent	Sous le vent	Parallèle	Succion	Pression
1-2	15.110	-0.633	-0.334	-0.502	0.000	0.000
14-15	-15.110	-0.633	-0.334	-0.502	0.000	0.000
2-8	15.110	-0.633	-0.334	-0.502	-0.300	0.300
8-14	-15.110	-0.633	-0.334	-0.502	-0.300	0.300

Combinaisons de charges vérifiées:

-
- Cas 1: Charges Permanentes + Neige Normale (Cas 1)
 - Cas 3: Charges Permanentes + 1kN Arba (Cas 2)
 - Cas 4: Charges Permanentes + Neige + 1kN Entrait (Cas 2bis)
 - Cas 5: Vent Normal G->D Depression Interne (Cas 3)
 - Cas 7: Vent Normal D->G Depression Interne (Cas 3)
 - Cas 11: Charges Permanentes + Neige Extreme (Cas 4)
 - Cas 13: Vent Extreme G->D Surpression Interne (Cas 5)
 - Cas 15: Vent Extreme D->G Surpression Interne (Cas 5)
 - Cas 16: Vent Extreme Parallele Surpression Interne (Cas 5bis)

Reactions d'appuis par Cas de Charges

Cas	Nom	Appui	2	Appui	19	Appui	23	Appui	14
arge		Verti	Horiz	Verti	Horiz	Verti	Horiz	Verti	Horiz
		(kN)	(kN)	(kN)	(kN)	(kN)	(kN)	(kN)	(kN)
	TOTAL	3.363	0.000	4.055	0.000	4.051	0.000	3.361	0.000
	DEAD	2.458	0.000	3.029	0.000	3.027	0.000	2.456	0.000
	LIVE	0.905	0.000	1.025	0.000	1.025	0.000	0.904	0.000
	TOTAL	2.423	0.000	3.064	0.000	3.062	0.000	2.422	0.000
	TOTAL	3.363	0.000	4.055	0.000	4.051	0.000	3.361	0.000
	TOTAL	1.992	0.323	3.006	0.000	2.980	0.000	2.366	0.000
	DEAD	2.458	0.000	3.029	0.000	3.027	0.000	2.456	0.000
	LIVE	-0.466	0.323	-0.023	0.000	-0.047	0.000	-0.090	0.000
	TOTAL	2.278	-0.323	3.072	0.000	3.094	0.000	1.901	0.000
	DEAD	2.458	0.000	3.029	0.000	3.027	0.000	2.456	0.000
	LIVE	-0.179	-0.323	0.042	0.000	0.067	0.000	-0.555	0.000
	TOTAL	4.753	0.000	5.653	0.000	5.648	0.000	4.750	0.000
	TOTAL	-0.940	0.619	-0.012	0.000	0.877	0.000	0.651	0.000
	TOTAL	0.479	-0.619	1.050	0.000	0.159	0.000	-1.112	0.000
	TOTAL	0.209	0.000	0.414	0.000	0.413	0.000	0.209	0.000

SULTATS DE CALCUL

=====

s de Charges 1: Coef =1.00 Charges Permanentes + Neige Normale (Cas 1)

arges Uniformes

	---Debut Barre---		---Fin Barre---	
rre	Vert.	Horiz.	Vert.	Horiz.
balétrier				
1-2	-0.540	0.000	-0.540	0.000
2-3	-0.549	0.000	-0.549	0.000
3-4	-0.548	0.000	-0.548	0.000
4-5	-0.546	0.000	-0.546	0.000
5-6	-0.546	0.000	-0.546	0.000
6-7	-0.546	0.000	-0.546	0.000
7-8	-0.546	0.000	-0.546	0.000
8-9	-0.546	0.000	-0.546	0.000
9-10	-0.546	0.000	-0.546	0.000
10-11	-0.546	0.000	-0.546	0.000
11-12	-0.546	0.000	-0.546	0.000
12-13	-0.548	0.000	-0.548	0.000
13-14	-0.549	0.000	-0.549	0.000
14-15	-0.540	0.000	-0.540	0.000
trait				
2-16	-0.286	0.000	-0.286	0.000
16-17	-0.286	0.000	-0.286	0.000
17-18	-0.286	0.000	-0.286	0.000
18-19	-0.286	0.000	-0.286	0.000
20-21	-0.286	0.000	-0.286	0.000
21-22	-0.286	0.000	-0.286	0.000
23-24	-0.286	0.000	-0.286	0.000
24-25	-0.286	0.000	-0.286	0.000
25-26	-0.286	0.000	-0.286	0.000
26-14	-0.286	0.000	-0.286	0.000
ches				

forts/Moments aux Extremites

	----- Debut de Barre -----	----- Fin de Barre -----	----- Travee -----
	Effort	Effort	Moment
	Tranch.	Normal	Maxi.
	(kN)	(kN)	(kNm)
balétrier			
1-2	0.000	0.000	0.000
2-3	0.586	-7.021	0.173
3-4	0.092	-6.860	-0.165
4-5	0.446	-6.165	0.093
5-6	0.751	-2.131	0.320
6-7	0.493	-2.061	0.005
7-8	0.569	-0.429	0.305
8-9	0.118	-0.243	0.000
9-10	0.740	-1.721	0.304
10-11	-0.509	-2.059	0.021
11-12	0.655	-5.860	0.319
12-13	0.518	-6.673	0.093
13-14	-0.056	-6.854	-0.165
14-15	0.424	0.081	0.173
trait			
2-16	0.337	6.551	0.000
16-17	0.438	4.084	0.224
17-18	0.274	-0.016	0.097
18-19	0.146	-0.016	0.004
20-21	0.154	-0.028	0.000
21-22	0.217	-0.028	0.040

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	----- Debut de Barre -----			----- Fin de Barre -----			Travee
	Effort	Effort	Moment	Effort	Effort	Moment	
	Tranch. (kN)	Normal (kN)	(kNm)	Tranch. (kN)	Normal (kN)	(kNm)	
B5 23-24	0.139	-0.016	0.000	0.273	-0.016	-0.097	-0.061
B5 24-25	0.346	4.076	0.097	0.439	4.076	-0.225	-0.115
B5 25-26	0.492	6.545	0.225	-0.344	6.545	-0.009	-0.094
B5 26-14	0.344	6.545	0.009	0.337	6.545	0.000	0.199
Fiches							
W6 4-16	0.000	-0.956	0.000	0.000	-0.956	0.000	0.000
W7 16-5	0.000	2.349	0.000	0.000	2.349	0.000	0.000
W8 5-17	0.000	-2.956	0.000	0.000	-2.956	0.000	0.000
W12 21-8	0.000	-0.098	0.000	0.000	-0.098	0.000	0.000
W16 24-11	0.000	-2.954	0.000	0.000	-2.954	0.000	0.000
W17 11-25	0.000	2.350	0.000	0.000	2.350	0.000	0.000
W18 25-12	0.000	-0.957	0.000	0.000	-0.957	0.000	0.000
W10 19-20	-0.016	-3.915	0.000	0.016	-3.915	-0.013	-0.012
W10 20-7	0.011	-3.761	0.013	-0.011	-3.761	0.000	-0.012
W14 23-22	0.016	-3.913	0.000	-0.016	-3.913	0.013	0.012
W14 22-9	-0.011	-3.758	-0.013	0.011	-3.758	0.000	0.012
W9 17-7	0.000	3.182	0.000	0.000	3.182	0.000	0.000
W15 9-24	0.000	3.176	0.000	0.000	3.176	0.000	0.000
W11 7-21	0.000	0.396	0.000	0.000	0.396	0.000	0.000
W13 21-9	0.000	0.395	0.000	0.000	0.395	0.000	0.000

Verification des Contraintes pour le cas de charge 1

Barres Externes:									
Barre	--Section--		--- Maximum ---		--Plan Ferme --		---Plan Perp---		Signal
	BxH	Cat.	Effort	Moment	K	Taux	K	Taux	ATF
			(kN)	(kNm)					
T 2-4	36x157	C24	-6.833	0.174	0.964	0.252	0.826	0.275	
T 4-5	36x97	C24	-5.897	-0.190	0.707	0.557	0.826	0.520	
T 5-7	36x97	C24	-1.929	0.234	0.442	0.509	0.826	0.448	
T 7-8	36x97	C24	-0.410	-0.233	0.989	0.388	0.826	0.390	
T 8-9	36x97	C24	-0.410	-0.232	0.987	0.386	0.826	0.388	
T 9-11	36x97	C24	-1.922	0.233	0.443	0.507	0.826	0.446	
T11-12	36x97	C24	-5.890	-0.189	0.707	0.555	0.826	0.519	
T12-14	36x157	C24	-6.827	0.173	0.964	0.252	0.826	0.275	
B 2-16	36x112	C24	6.551	0.199		0.490			1
B16-17	36x112	C24	4.084	-0.115		0.295			1
B17-19	36x112	C24	-0.016	-0.061	1.000	0.074	0.159	0.076	
B20-21	36x112	C24	-0.028	0.042	1.000	0.051	0.199	0.054	
B21-22	36x112	C24	-0.028	0.042	1.000	0.052	0.197	0.055	
B23-24	36x112	C24	-0.016	-0.061	1.000	0.074	0.160	0.076	
B24-25	36x112	C24	4.076	-0.115		0.294			1
B25-14	36x112	C24	6.545	0.199		0.490			1
C 1-2	0x0	C24 +	0.000	0.000					
C 1-2	36x97	C24							
C14-15	0x0	C24 +	0.000	0.000					
C14-15	36x97	C24							

Barres Internes:									
Barre	--Section--		--- Maximum ---		--Plan Ferme --		---Plan Perp---		Signal
	BxH	Cat.	Effort	Moment	K	Taux	K	Taux	ATF
			(kN)	(kNm)					
N 4-16	36x60	C24	-0.956	0.000	0.772	0.060	0.350	0.133	
N16-5	36x60	C24	2.349	0.000		0.167			
N 5-17	36x60	C24	-2.956	0.000	0.274	0.525	0.395	0.365	1
N21-8	36x60	C24	-0.098	0.000	0.398	0.012	0.138	0.035	
N24-11	36x60	C24	-2.954	0.000	0.274	0.525	0.395	0.364	1
N11-25	36x60	C24	2.350	0.000		0.167			
N25-12	36x60	C24	-0.957	0.000	0.772	0.060	0.350	0.133	
N19-20	36x60	C24	-3.915	-0.012	1.000	0.241	0.523	0.414	
N20-7	36x60	C24	-3.761	-0.012	0.797	0.280	0.241	0.810	
N23-22	36x60	C24	-3.913	0.012	1.000	0.240	0.523	0.414	
N22-9	36x60	C24	-3.758	0.012	0.798	0.279	0.242	0.807	
N17-7	36x60	C24	3.182	0.000		0.227			
N 9-24	36x60	C24	3.176	0.000		0.226			
N 7-21	36x60	C24	0.396	0.000		0.028			
N21-9	36x60	C24	0.395	0.000		0.028			

Noeuds:												
Noeud		--Section--				--- Maximum ---		--Plan Ferme --		---Plan Perp---		Signal
		BxH Cat.			Effort	Moment	K	Taux	K	Taux	ATF	
					(kN)	(kNm)						
J2	T 2-4	36x157	C24	+	-5.584	-0.138	1.000	0.199	1.000	0.199	1	
J2	T 2-4	36x97	C24									
J4	T 4-5	36x97	C24		-6.165	-0.093	1.000	0.335	1.000	0.335	1	
J5	T 4-5	36x97	C24		-5.867	-0.320	1.000	0.692	1.000	0.692	1	
J7	T 5-7	36x97	C24		-1.728	-0.305	1.000	0.543	1.000	0.543	1	
J8	T 7-8	36x97	C24		-0.263	0.011	1.000	0.025	1.000	0.025	1	
J8	T 8-9	36x97	C24		-0.262	0.011	1.000	0.026	1.000	0.026	1	
J9	T 9-11	36x97	C24		-1.721	-0.304	1.000	0.541	1.000	0.541	1	
J11	T11-12	36x97	C24		-5.860	-0.319	1.000	0.690	1.000	0.690	1	

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aud	--Section--			--- Maximum ---		--Plan Ferme --		---Plan Perp---		Signal
	BxH	Cat.		Effort	Moment	K	Taux	K	Taux	ATF
				(kN)	(kNm)					
2	T11-12	36x97	C24	-6.158	-0.093	1.000	0.336	1.000	0.336	1
	B 2-16	36x112	C24	6.551	0.086		0.354			1
5	B 2-16	36x112	C24	6.551	-0.224		0.521			1
7	B16-17	36x112	C24	4.084	-0.097		0.273			1
3	B17-19	36x112	C24	-0.016	0.017	1.000	0.021	1.000	0.021	1
0	B20-21	36x112	C24	-0.028	0.018	1.000	0.022	1.000	0.022	1
1	B20-21	36x112	C24	-0.028	-0.040	1.000	0.049	1.000	0.049	1
2	B21-22	36x112	C24	-0.028	0.018	1.000	0.022	1.000	0.022	1
3	B23-24	36x112	C24	-0.016	0.017	1.000	0.021	1.000	0.021	1
4	B24-25	36x112	C24	4.076	-0.097		0.273			1
5	B25-14	36x112	C24	6.545	-0.225		0.521			1
4	B25-14	36x112	C24	6.545	0.086		0.353			1
9	W19-20	36x60	C24	-3.915	-0.001	1.000	0.196	1.000	0.196	1
0	W19-20	36x60	C24	-3.915	-0.013	1.000	0.246	1.000	0.246	1
	W20-7	36x60	C24	-3.761	-0.001	1.000	0.189	1.000	0.189	1
3	W23-22	36x60	C24	-3.913	0.001	1.000	0.196	1.000	0.196	1
2	W23-22	36x60	C24	-3.913	0.013	1.000	0.246	1.000	0.246	1
	W22-9	36x60	C24	-3.758	0.001	1.000	0.189	1.000	0.189	1

actions d'appuis

eud pui	Reaction		Largeur		Hauteur		Signal
	Verti	Horiz	Réelle	Néc.	Réelle	Néc.	
	(kN)	(kN)	(mm)	(mm)	(mm)	(mm)	Taux Cis.
	3.363	0.000	250	41	112	13	0.11
9	4.055	0.000	250	49	112	5	0.05
3	4.051	0.000	250	49	112	5	0.05
4	3.361	0.000	250	41	112	13	0.11

rifications des Deformations pour le cas de charge 1

eche Locale

Barre but-Fin	Panneau		Segment		Signal
	---Reelle---	---Admiss.---	---Reelle---	---Admiss.---	
	Fleche Ratio	Fleche Ratio	Fleche Ratio	Fleche Ratio	
1-2	0.26 L/999	2.71 L/300	0.58 L/999	5.00 L/200	
2-3	-0.90 L/999	7.54 L/300	-4.81 L/999	29.02 L/300	
3-4	-0.90 L/999	7.54 L/300	-4.81 L/999	29.02 L/300	
4-5	-1.16 L/999	7.22 L/300	-6.48 L/999	29.02 L/300	
5-6	-7.04 L/416	9.77 L/300	-6.82 L/999	29.02 L/300	
6-7	-7.04 L/416	9.77 L/300	-6.82 L/999	29.02 L/300	
7-8	0.81 L/999	4.48 L/300	-0.69 L/999	29.02 L/300	
8-9	0.81 L/999	4.50 L/300	-0.63 L/999	29.02 L/300	
9-10	-6.99 L/418	9.75 L/300	-9.32 L/933	29.02 L/300	
10-11	-6.99 L/418	9.75 L/300	-9.32 L/933	29.02 L/300	
11-12	-1.16 L/999	7.22 L/300	-6.27 L/999	29.02 L/300	
12-13	-0.90 L/999	7.54 L/300	-5.70 L/999	29.02 L/300	
13-14	-0.90 L/999	7.54 L/300	-5.70 L/999	29.02 L/300	
14-15	0.26 L/999	2.71 L/300	0.58 L/999	5.00 L/200	
2-16	-5.27 L/550	7.25 L/400	-8.35 L/848	17.73 L/400	
16-17	-1.95 L/999	6.86 L/400	-6.67 L/999	17.73 L/400	
17-18	-0.10 L/999	3.61 L/400	-3.34 L/999	17.73 L/400	
18-19	-0.10 L/999	3.61 L/400	-3.34 L/999	17.73 L/400	
20-21	-0.22 L/999	3.24 L/400	-0.50 L/999	6.50 L/400	
21-22	-0.22 L/999	3.26 L/400	-0.50 L/999	6.50 L/400	
23-24	-0.09 L/999	3.60 L/400	-3.32 L/999	17.71 L/400	
24-25	-1.95 L/999	6.86 L/400	-6.66 L/999	17.71 L/400	
25-26	-5.27 L/550	7.25 L/400	-7.06 L/999	17.71 L/400	
26-14	-5.27 L/550	7.25 L/400	-7.06 L/999	17.71 L/400	

eche Globale

eud	----- Deplacement -----			----- Admissible -----			Signal
	X	Y	Rotation	X	Y	Ratio	
	-0.113	0.585	0.000	10.000	5.000	L/200	
	0.000	0.000	0.000	10.000	17.725	L/400	
	1.380	-5.668	-0.002	10.000	17.725	L/400	
	0.671	-5.025	-0.001	10.000	17.725	L/400	
	-0.829	-0.638	-0.002	10.000	17.725	L/400	
	-0.828	-0.776	0.004	10.000	17.725	L/400	
	-0.827	-0.637	0.000	10.000	17.725	L/400	
.1	-2.136	-5.013	-0.004	10.000	17.725	L/400	
.2	-2.845	-5.660	0.001	10.000	17.725	L/400	
.4	-1.654	0.000	0.001	10.000	17.725	L/400	
.5	-1.546	0.580	0.002	10.000	5.000	L/200	
.6	0.863	-6.083	-0.002	10.000	17.725	L/400	
.7	1.244	-3.336	0.001	10.000	17.725	L/400	
.9	1.243	0.000	0.002	10.000	17.725	L/400	
.20	-0.826	-0.265	0.001	10.000	17.725	L/400	
.21	-0.828	-0.761	0.001	10.000	17.725	L/400	
.22	-0.829	-0.265	-0.000	10.000	17.725	L/400	

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Noeud	----- Deplacement -----			----- Admissible -----			Signal
	X	Y	Rotation	X	Y	Ratio	
J23	-2.709	0.000	0.000	10.000	17.725	L/400	
J24	-2.710	-3.323	0.000	10.000	17.725	L/400	
J25	-2.330	-6.073	-0.002	10.000	17.725	L/400	

RESUME DU CALCUL
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Contraintes

Barre	-Section-		Cas	Effort (kN)	Moment (kNm)	Taux Max.	Taux Cis.	ATF	Signal
	BxH	Cat.							
F1 2-3	36x157	C24	+	3	-3.429	0.330	0.270	0.034	
F1 2-3	36x97	C24							
F1 3-4	36x157	C24		3	-5.133	0.522	0.335	0.111	
F1 4-5	36x97	C24		1	-5.897	-0.190	0.557	0.256	
F1 5-6	36x97	C24		3	-1.766	-0.257	0.381	0.188	
F1 6-7	36x97	C24		3	-1.667	0.528	0.689	0.157	
F1 7-8	36x97	C24		3	-0.303	-0.369	0.433	0.214	
F2 8-9	36x97	C24		3	-0.303	-0.368	0.431	0.214	
F2 9-10	36x97	C24		3	-1.662	0.527	0.687	0.159	
F2 10-11	36x97	C24		3	-1.761	-0.256	0.380	0.188	
F2 11-12	36x97	C24		1	-5.890	-0.189	0.555	0.256	
F2 12-13	36x157	C24		3	-5.129	0.522	0.335	0.111	
F2 13-14	36x157	C24	+	3	-3.426	0.330	0.270	0.033	
F2 13-14	36x97	C24							
B3 2-16	36x112	C24		1	6.551	0.199	0.490	0.166	1
B3 16-17	36x112	C24		1	4.084	-0.115	0.295	0.148	1
B3 17-18	36x112	C24		5	-0.013	-0.064	0.080	0.094	
B3 18-19	36x112	C24		1	-0.016	0.034	0.044	0.050	
B4 20-21	36x112	C24		1	-0.028	0.042	0.054	0.073	
B4 21-22	36x112	C24		1	-0.028	0.042	0.055	0.073	
B5 23-24	36x112	C24		7	-0.012	-0.064	0.080	0.093	
B5 24-25	36x112	C24		1	4.076	-0.115	0.294	0.148	1
B5 25-26	36x112	C24		1	6.545	-0.094	0.363	0.166	1
B5 26-14	36x112	C24		1	6.545	0.199	0.490	0.116	1
W6 4-16	36x60	C24		11	-1.528	0.000	0.142	0.000	
W7 16-5	36x60	C24		1	2.349	0.000	0.167	0.000	
W8 5-17	36x60	C24		1	-2.956	0.000	0.525	0.000	1
W12 21-8	36x60	C24		15	-0.463	0.000	0.109	0.000	
W16 24-11	36x60	C24		1	-2.954	0.000	0.525	0.000	1
W17 11-25	36x60	C24		1	2.350	0.000	0.167	0.000	
W18 25-12	36x60	C24		11	-1.529	0.000	0.142	0.000	
W10 19-20	36x60	C24		1	-3.915	-0.012	0.414	0.010	
W10 20-7	36x60	C24		1	-3.761	-0.012	0.810	0.007	
W14 23-22	36x60	C24		1	-3.913	0.012	0.414	0.010	
W14 22-9	36x60	C24		1	-3.758	0.012	0.807	0.007	
W9 17-7	36x60	C24		1	3.182	0.000	0.227	0.000	
W15 9-24	36x60	C24		1	3.176	0.000	0.226	0.000	
W11 7-21	36x60	C24		7	0.447	0.000	0.032	0.000	
W13 21-9	36x60	C24		7	0.448	0.000	0.032	0.000	

Noeuds:		--Section--		Cas	----- Maximum -----		---Plan (yy)---		---Plan (xx)---		Signal	
Noeud		BxH	Cat.		Effort (kN)	Moment (kNm)	K	Taux	K	Taux	ATF	
J2	T 2-4	36x157	C24	+	3	-4.390	-0.084	1.000	0.100	1.000	0.100	1
J2	T 2-4	36x97	C24									
J4	T 4-5	36x97	C24		3	-4.968	-0.308	1.000	0.462	1.000	0.462	1
J5	T 4-5	36x97	C24		3	-4.525	-0.520	1.000	0.696	1.000	0.696	1
J7	T 5-7	36x97	C24		3	-1.282	-0.511	1.000	0.615	1.000	0.615	1
J8	T 7-8	36x97	C24		3	0.048	0.039		0.047			1
J8	T 8-9	36x97	C24		3	0.049	0.040		0.047			1
J9	T 9-11	36x97	C24		3	-1.277	-0.510	1.000	0.614	1.000	0.614	1
J11	T11-12	36x97	C24		3	-4.519	-0.519	1.000	0.694	1.000	0.694	1
J12	T11-12	36x97	C24		3	-4.963	-0.309	1.000	0.462	1.000	0.462	1
J14	O12-14	36x157	C24		1	-5.579	-0.138	1.000	0.199	1.000	0.199	1
J2	B 2-16	36x112	C24		1	6.551	0.086		0.354			1
J16	B 2-16	36x112	C24		1	6.551	-0.224		0.521			1
J17	B16-17	36x112	C24		5	3.019	-0.101		0.237			1
J19	B17-19	36x112	C24		5	-0.013	0.017	1.000	0.021	1.000	0.021	1
J20	B20-21	36x112	C24		5	-0.021	0.017	1.000	0.021	1.000	0.021	1
J21	B20-21	36x112	C24		5	-0.021	-0.045	1.000	0.055	1.000	0.055	1
J22	B21-22	36x112	C24		5	-0.021	0.017	1.000	0.021	1.000	0.021	1
J23	B23-24	36x112	C24		7	-0.012	0.017	1.000	0.020	1.000	0.020	1
J24	B24-25	36x112	C24		1	4.076	-0.097		0.273			1
J25	B25-14	36x112	C24		1	6.545	-0.225		0.521			1
J14	B25-14	36x112	C24		1	6.545	0.086		0.353			1
J19	W19-20	36x60	C24		1	-3.915	-0.001	1.000	0.196	1.000	0.196	1
J20	W19-20	36x60	C24		1	-3.915	-0.013	1.000	0.246	1.000	0.246	1
J7	W20-7	36x60	C24		1	-3.761	-0.001	1.000	0.189	1.000	0.189	1
J23	W23-22	36x60	C24		1	-3.913	0.001	1.000	0.196	1.000	0.196	1
J22	W23-22	36x60	C24		1	-3.913	0.013	1.000	0.246	1.000	0.246	1
J9	W22-9	36x60	C24		1	-3.758	0.001	1.000	0.189	1.000	0.189	1

actions d'appuis

sud	-----Normale-----			-----Extreme-----			Permanente
	vert.	soul.	horz.	vert.	soul.	horz.	vert.
	3.363(1)		0.323(4)	4.753(6)	-0.940(7)	0.619(7)	2.458
9	4.055(1)		0.000(-1)	5.653(6)	-0.012(7)	0.000(-1)	3.029
3	4.051(1)		0.000(-1)	5.648(6)		0.000(-1)	3.027
4	3.361(1)		0.000(4)	4.750(6)	-1.112(8)	0.000(6)	2.456

sud	Largeur min. (mm)	Hauteur min. (mm)	Signal
	41	13	
9	49	5	
3	49	5	
4	41	13	

formations

rre	Panneau		Segment		--- Noeud Debut ---		--- Noeud Fin ---		Signal
	Max.	Max.	Max.	Max.	X	Y	X	Y	
1-2	0.26(1)	3.32(5)	-0.63(5)	3.32(5)	0.00(1)	0.00(1)	0.00(1)	0.00(1)	
2-3	-1.08(5)	-4.81(1)	0.00(1)	0.00(1)	1.38(1)	-5.67(1)	1.38(1)	-5.67(1)	
3-4	-1.08(5)	-4.81(1)	0.00(1)	0.00(1)	1.38(1)	-5.67(1)	1.38(1)	-5.67(1)	
4-5	-1.16(1)	-6.48(1)	1.38(1)	-5.67(1)	0.67(1)	-5.02(1)	-0.83(1)	-0.64(1)	
5-6	-7.04(1)	-6.82(1)	0.67(1)	-5.02(1)	-0.83(1)	-0.64(1)	-0.83(1)	-0.64(1)	
6-7	-7.04(1)	-6.82(1)	0.67(1)	-5.02(1)	-0.83(1)	-0.64(1)	-0.83(1)	-0.64(1)	
7-8	0.81(1)	-0.69(1)	-0.83(1)	-0.64(1)	-0.83(1)	-0.78(1)	-0.83(1)	-0.78(1)	
8-9	0.81(1)	-0.63(1)	-0.83(1)	-0.78(1)	-0.83(1)	-0.64(1)	-0.83(1)	-0.64(1)	
9-10	-6.99(1)	-9.32(1)	-0.83(1)	-0.64(1)	-2.14(1)	-5.01(1)	-2.14(1)	-5.01(1)	
10-11	-6.99(1)	-9.32(1)	-0.83(1)	-0.64(1)	-2.14(1)	-5.01(1)	-2.14(1)	-5.01(1)	
11-12	-1.16(1)	-6.27(1)	-2.14(1)	-5.01(1)	-2.85(1)	-5.66(1)	-1.65(1)	0.00(1)	
12-13	-1.08(7)	-5.70(1)	-2.85(1)	-5.66(1)	-1.65(1)	0.00(1)	-1.65(1)	0.00(1)	
13-14	-1.08(7)	-5.70(1)	-2.85(1)	-5.66(1)	-1.65(1)	0.00(1)	-1.65(1)	0.00(1)	
14-15	0.26(1)	3.30(7)	-1.65(1)	0.00(1)	0.00(1)	3.30(7)	-1.55(1)	3.30(7)	
2-16	-5.27(1)	-8.35(1)	0.00(1)	0.00(1)	0.86(1)	-6.08(1)	1.24(1)	-3.34(1)	
16-17	-1.95(1)	-6.67(1)	0.86(1)	-6.08(1)	1.24(1)	0.00(1)	1.24(1)	0.00(1)	
17-18	-0.10(1)	-3.34(1)	1.24(1)	-3.34(1)	1.24(1)	0.00(1)	1.24(1)	0.00(1)	
18-19	-0.10(1)	-3.34(1)	1.24(1)	-3.34(1)	1.24(1)	0.00(1)	1.24(1)	0.00(1)	
20-21	-0.22(1)	-0.50(1)	-0.83(1)	-0.26(1)	-0.83(1)	-0.76(1)	-0.83(1)	-0.76(1)	
21-22	-0.22(1)	-0.50(1)	-0.83(1)	-0.76(1)	-0.83(1)	-0.26(1)	-0.83(1)	-0.26(1)	
23-24	-0.09(1)	-3.32(1)	-2.71(1)	0.00(1)	-2.71(1)	-3.32(1)	-2.33(1)	-6.07(1)	
24-25	-1.95(1)	-6.66(1)	-2.71(1)	-3.32(1)	-2.33(1)	-6.07(1)	-1.65(1)	0.00(1)	
25-26	-5.27(1)	-7.06(1)	-2.33(1)	-6.07(1)	-1.65(1)	0.00(1)	-1.65(1)	0.00(1)	
26-14	-5.27(1)	-7.06(1)	-2.33(1)	-6.07(1)	-1.65(1)	0.00(1)	-1.65(1)	0.00(1)	
4-16	0.00(1)	-0.00(1)	1.38(1)	-5.67(1)	0.86(1)	-6.08(1)	0.67(1)	-5.02(1)	
16-5	0.00(1)	-0.00(1)	0.86(1)	-6.08(1)	0.67(1)	-5.02(1)	1.24(1)	-3.34(1)	
5-17	-0.00(1)	0.00(5)	0.67(1)	-5.02(1)	1.24(1)	-3.34(1)	-0.83(1)	-0.78(1)	
2 21-8	0.00(5)	0.00(7)	-0.83(1)	-0.76(1)	-0.83(1)	-0.78(1)	-2.14(1)	-5.01(1)	
6 24-11	-0.00(1)	0.00(5)	-2.71(1)	-3.32(1)	-2.14(1)	-5.01(1)	-2.33(1)	-6.07(1)	
7 11-25	-0.00(1)	0.00(7)	-2.14(1)	-5.01(1)	-2.33(1)	-6.07(1)	-2.85(1)	-5.66(1)	
8 25-12	0.00(1)	-0.00(1)	-2.33(1)	-6.07(1)	-2.85(1)	-5.66(1)	-0.83(1)	-0.26(1)	
0 19-20	0.14(1)	-0.00(1)	1.24(1)	0.00(1)	-0.83(1)	-0.26(1)	-0.83(1)	-0.64(1)	
0 20-7	0.31(1)	-0.98(1)	-0.83(1)	-0.26(1)	-0.83(1)	-0.26(1)	-0.83(1)	-0.26(1)	
4 23-22	-0.14(1)	-0.00(1)	-2.71(1)	0.00(1)	-0.83(1)	-0.26(1)	-0.83(1)	-0.64(1)	
4 22-9	-0.31(1)	-1.17(1)	-0.83(1)	-0.26(1)	-0.83(1)	-0.64(1)	-0.83(1)	-0.64(1)	
17-7	0.00(1)	-0.00(5)	1.24(1)	-3.34(1)	-0.83(1)	-0.64(1)	-2.71(1)	-3.32(1)	
5 9-24	-0.00(1)	-0.00(7)	-0.83(1)	-0.64(1)	-2.71(1)	-3.32(1)	-0.83(1)	-0.76(1)	
1 7-21	-0.00(1)	0.00(1)	-0.83(1)	-0.64(1)	-0.83(1)	-0.76(1)	-0.83(1)	-0.64(1)	
3 21-9	0.00(1)	-0.00(5)	-0.83(1)	-0.76(1)	-0.83(1)	-0.64(1)	-0.83(1)	-0.64(1)	

statistiques importantes:

Antiflambage:

Lisse d'Antiflambage necessaires aux barres:

W 5-17, W24-11

La fixation du dispositif d'antiflambage sera réalisé de manière à reprendre par ferme et par versant un effort perpendiculaire à l'arba $F = \text{Effort axial arba}/60 = 0.163\text{kN}$
 Cette valeur est à multiplier par le nombre de fermes intéressées par le dispositif.

- Remarques:
-
1. C'est la responsabilite du client de s'assurer que les donnees ci-dessus: dimensions, pentes, charges et autres caracteristiques sont celles demandees par le maitre d'ouvrage.
 2. Cette note de calcul propre a chaque element triangle ne dispense pas de l'execution d'un plan de pose et de contreventement adapte au batiment etudie.
 3. Poids de la Ferme 81.372 - 89.510 Kg

Informations Plaques

=====

- Plaques utilisees: M20 01.370029v2
1. Les aboutages sont normalement places entre 10 et 25 % de la longueur du panneau.
 2. Tolérance du positionnement = 10 (mm)

Noeud	Plaque		Position(x1)	(y1)	(x2)	(y2) (mm)
	Jauge	Code				
2	M20	1020	37	46		
2	M20	0820	102	38		
2	M20	0820	102	38		
4	M20	1315	0	0		
5	M20	1015	0	0		
6	M20	0815	0	0		
7	M20	1020	102	41		
8	M20	0815	0	0		
9	M20	1020	102	41		
10	M20	0815	0	0		
11	M20	1015	0	0		
12	M20	1315	0	0		
14	M20	1020	42	46		
14	M20	0820	102	38		
14	M20	0820	102	38		
16	M20	1015	0	0		
17	M20	1315	0	0		
18	M20	0815	0	0		
19	M20	0515	0	0		
20	M20	0810	0	0		
21	M20	1315	0	0		
22	M20	0810	0	0		
23	M20	0515	0	0		
24	M20	1315	0	0		
25	M20	1015	0	0		
26	M20	0815	0	0		

** N O T E D E C A L C U L **

FORMATIONS GENERALES

=====

de faite par:

SATOB

ZI PEGUILHAN

Ville, Région HAUTE GARONNE, Pays

Tel : 05.61.88.78.51

Fax : 05.61.88.14.19

resse client:

Adresse chantier:

DIVERS

calculs ont pour base technique:

Les documents techniques unifiés DTU.

Regles N.V.65 et N 84 (carte de neige)

DTU 31.3, Norme P21.110 etc...

mode de calcul utilises:

Calcul hyperstatique de structure plane a barres.

ites utilisees:

mm, deg, MPa

ventions:

Efforts : Negatif (-) = Compression, Positif (+) = Traction

Reactions: Negatif (-) = Soulevement, Positive (+) = Descente

racteristiques des bois:

Categorie de bois : C22 SE

Module d'elasticite axial : 9000.0

Coefficient de fluage : 1.5

Densite : 410.00 Kg/m³

Contraintes admissibles :

Flexion // : 10.00 MPa

Traction // : 6.00 MPa

Traction T : 0.20 MPa

Compression // : 9.00 MPa

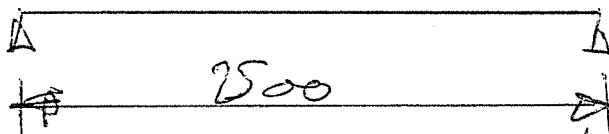
Compression T : 2.20 MPa

Cisaillement // : 1.10 MPa

racteristiques des connecteurs:

ndi 14 Avril 2008

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Panne de reprise des poutres F2 en 90x260

GEOMETRIE ET MODELE DE LA STRUCTURE
=====

Schema de la Structure



Dimensions du batiment:

Longueur (a)	:	15 m	Largeur (b)	:	8 m
Hauteur totale (H)	:	10 m	Hauteur au faitage (h)	:	10 m
Pente Gauche	:	1.00 deg	Pente Droite	:	1.00 deg
Portee	:	2700 mm	Entraxe des fermes	:	100 mm
Hauteur Hors-tout	:	287 mm	Longueur Hors-tout	:	2700 mm
Prolonge Gauche Entrait	:	0 mm	Prolonge Droite Entrait	:	0 mm
Entraxe lattes Arba. (*)	:	100 mm	Entraxe lattes Entrait (*)	:	0 mm

(*) - Valeurs de saisie, voir les longueurs de flambement calculees en 'Caracteristiques des barres.'

Coordonnees des noeuds:

Noeud	Coordonnees		Liberte		
	X	Y	Horiz.	Vert.	Rot.
	(mm)	(mm)			
J1	50	-22	1	1	0 Appui
J2	2650	23	0	1	0 Appui

0=Libre, 1=Fix

Caracteristiques des barres:

-----Section-----					Project.	Longueur	Conditions	
Debut-Fin	Pli	Coef	BxH	Cat	X	Flambage	Pente	Extremites
					(mm)	(mm)	(deg)	Debut-Fin
T1 1-2	1	1.0	90x240	C22	2600	2600	90	1.00 Pin-Pin

HYPOTHESES DE CHARGES ET SURCHARGES =====

Charges permanentes:
 Couverture : 0.500 Plafond bas : 0.440

 charge de neige:
 Région de neige : 1B Altitude : 200 m
 Normale : 0.350 Normale majorée : 0.350
 Extrême : 0.600 Extrême majorée : 0.800
 Accidentelle : 0.800
 Permanente : 0 % Temporaire : 100 %

Barre Pente Coef multiplicateur du a la pente
 1-2 1.000 1.000

charge de vent:
 Région de vent : II Nature du Site : Normal
 Pression de base : 0.600 Permeabilite : 5%

 Longueur (a) : 15000 mm Coef site : 1.000
 Largeur (b) : 8000 mm Coef majoration : 1.000
 Hauteur totale (H) : 10000 mm Coef hauteur : 1.000
 Hauteur au faitage (h) : 10000 mm Valeur pression : 0.600

 Flèche : 47 mm Lambda a : 0.667
 Coef delta : 1.134 Lambda b : 1.250
 f/h : 0.005 Gamma 0 normal : 1.000
 b/a : 0.533 Gamma 0 Parallèle : 1.000

Barre	Pente	-----Exterieur (Ce)-----			--Interieure (Ci)--	
		Au vent	Sous le vent	Parallèle	Succion	Pression
1-2	1.000	-0.525	-0.480	-0.502	-0.300	0.300

Combinaisons de charges vérifiées:

- s 1: Charges Permanentes + Neige Normale (Cas 1)
- s 3: Charges Permanentes + 1kN Arba (Cas 2)
- s 5: Vent Normal G->D Depression Interne (Cas 3)
- s 7: Vent Normal D->G Depression Interne (Cas 3)
- s 11: Charges Permanentes + Neige Extrême (Cas 4)
- s 13: Vent Extrême G->D Surpression Interne (Cas 5)
- s 15: Vent Extrême D->G Surpression Interne (Cas 5)
- s 16: Vent Extrême Parallèle Surpression Interne (Cas 5bis)

Actions d'appuis par Cas de Charges

Cas	Nom	Appui 1	Appui 2
Charge		Verti Horiz	Verti Horiz
		(kN)	(kN)
	TOTAL	11.526	0.000
	DEAD	8.629	0.000
	LIVE	2.898	0.000
3	TOTAL	8.629	0.000
5	TOTAL	11.484	0.001
5	DEAD	8.629	0.000
5	LIVE	2.855	0.001
7	TOTAL	8.613	0.001
7	DEAD	8.629	0.000
7	LIVE	-0.016	0.001
1	TOTAL	11.591	0.000
3	TOTAL	8.482	0.005
5	TOTAL	8.490	0.005
6	TOTAL	8.486	0.005

RESULTATS DE CALCUL

Charges de Charges 1: Coef =1.00 Charges Permanentes + Neige Normale (Cas 1)

Charges Uniformes

Barre	---Debut Barre---	---Fin Barre---
	Vert. Horiz.	Vert. Horiz.
Arbalétrier		
1 1-2	-0.175 0.000	-0.175 0.000

Charges Ponctuelles

Coef	X (mm)	Y (mm)	Vert. (kN)	Horiz. (kN)	Moment (kNm)	Fermes Portées
1	50	-22	-4.080	0.000	0.000	

Noeud	X (mm)	Y (mm)	Vert. (kN)	Horiz. (kN)	Moment (kNm)	Fermes Portées
J2	2650	23	-4.080	0.000	0.000	
J3	600	-13	-4.080	0.000	0.000	
J4	1200	-2	-4.080	0.000	0.000	
J6	1800	8	-4.080	0.000	0.000	
J7	2400	19	-4.080	0.000	0.000	

Efforts/Moments aux Extremites

	----- Debut de Barre -----			----- Fin de Barre -----			Travee
	Effort	Effort	Moment	Effort	Effort	Moment	Moment
	Tranch. (kN)	Normal (kN)	(kNm)	Tranch. (kN)	Normal (kN)	(kNm)	Maxi. (kNm)
Arbalétrier							
T1 1-2	7.445	-0.130	0.000	9.328	0.163	0.000	5.999

Verification des Contraintes pour le cas de charge 1

Barres Externes:

Barre	--Section-- BxH Cat.	--- Maximum --- Effort (kN)	Moment (kNm)	--Plan Ferme -- K	Taux	---Plan Perp--- K	Taux	Signal ATF
T 1-2	90x240 C22	-0.055	5.999	1.000	0.695	1.000	0.695	

Barres Internes:

Barre	--Section-- BxH Cat.	--- Maximum --- Effort (kN)	Moment (kNm)	--Plan Ferme -- K	Taux	---Plan Perp--- K	Taux	Signal ATF
-------	-------------------------	-----------------------------------	-----------------	----------------------	------	----------------------	------	---------------

Noeuds:

Noeud	--Section-- BxH Cat.	--- Maximum --- Effort (kN)	Moment (kNm)	--Plan Ferme -- K	Taux	---Plan Perp--- K	Taux	Signal ATF
J1	T 1-2 90x240 C22	-0.129	1.930	1.000	0.224	1.000	0.224	1
J2	T 1-2 90x240 C22	0.162	2.327		0.271			1

Reactions d'appuis

Noeud	----- Reaction -----		----- Largeur -----		----- Hauteur -----		Signal
Appui	Verti	Horiz	Réelle	Néc.	Réelle	Néc.	Taux
	(kN)	(kN)	(mm)	(mm)	(mm)	(mm)	Cis.
J1	11.526	0.000	100	58	240	113	0.47
J2	13.409	0.000	100	68	240	141	0.59

Verifications des Deformations pour le cas de charge 1

Fleche Locale

	----- Panneau -----		----- Segment -----		Signal
Barre	---Reelle---	---Admiss---	---Reelle---	---Admiss---	
Debut-Fin	Fleche Ratio	Fleche Ratio	Fleche Ratio	Fleche Ratio	
T1 1-2	-6.10 L/425	8.67 L/300	-3.79 L/685	8.67 L/300	

Fleche Globale

Noeud	----- Deplacement -----	----- Admissible -----	Signal
	X Y Rotation	X Y Ratio	
J1	0.000 0.000 0.000	10.000 6.500 L/400	
J2	-0.000 0.000 0.000	10.000 6.500 L/400	

RESUME DU CALCUL

Contraintes

Barre	-Section- BxH Cat.	Cas	Effort (kN)	Moment (kNm)	Taux Max.	Taux Cis.	ATF	Signal
T1 1-2	90x240 C22	1	-0.055	5.999	0.695	0.206		

Noeuds:

Noeud	--Section-- BxH Cat.	Cas	--- Maximum --- Effort (kN)	Moment (kNm)	--Plan (yy)--- K	Taux	---Plan (xx)--- K	Taux	Signal ATF
J1	T 1-2 90x240 C22	1	-0.129	1.930	1.000	0.224	1.000	0.224	1
J2	T 1-2 90x240 C22	1	0.162	2.327		0.271			1

ctions d'appuis

ud	-----Normale-----			-----Extreme-----			Permanente
	vert.	soul.	horz.	vert.	soul.	horz.	vert.
	11.526(1)		0.001(3)	11.591(5)		0.005(6)	8.629
	13.409(1)		0.000(3)	13.474(5)		0.000(8)	10.036

ud	Largeur	Hauteur	Signal
	min. (mm)	min. (mm)	
	58	113	
	68	141	

formations

re	Panneau	Segment	--- Noeud Debut ---	--- Noeud Fin ---	Signal
	Max.	Max.	X Y	X Y	
1-2	-6.10(1)	-3.79(1)	0.00(1) 0.00(1)	-0.00(5) 0.00(1)	

tas importants:

La fixation du dispositif d'antiflambage sera réalisé de manière à reprendre par ferme et par versant un effort perpendiculaire à l'arba $F = \text{Effort axial arba}/60 = 0.003\text{kN}$
 Cette valeur est à multiplier par le nombre de fermes intéressées par le dispositif.

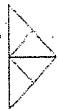
marques:

C'est la responsabilite du client de s'assurer que les donnees ci-dessus: dimensions, pentes, charges et autres caracteristiques sont celles demandees par le maitre d'ouvrage.
 Cette note de calcul propre a chaque element triangle ne dispense pas de l'execution d'un plan de pose et de contreventement adapte au batiment etudie.
 Poids de la Ferme 23.473 - 25.820 Kg

formations Plaques

Les aboutages sont normalement placés entre 10 et 25 % de la longueur du panneau.
 Tolérance du positionnement = 10 (mm)

peud	Plaque	Position(x1)	(y1)	(x2)	(y2) (mm)
	Jauge Code				



Logo
Fabricant

SATOB
ZA PEGULHAN
31350 BOULOGNE SUR GESSE
Tél.: 05-61-88-78-51 Fax.: 05-61-88-14-19

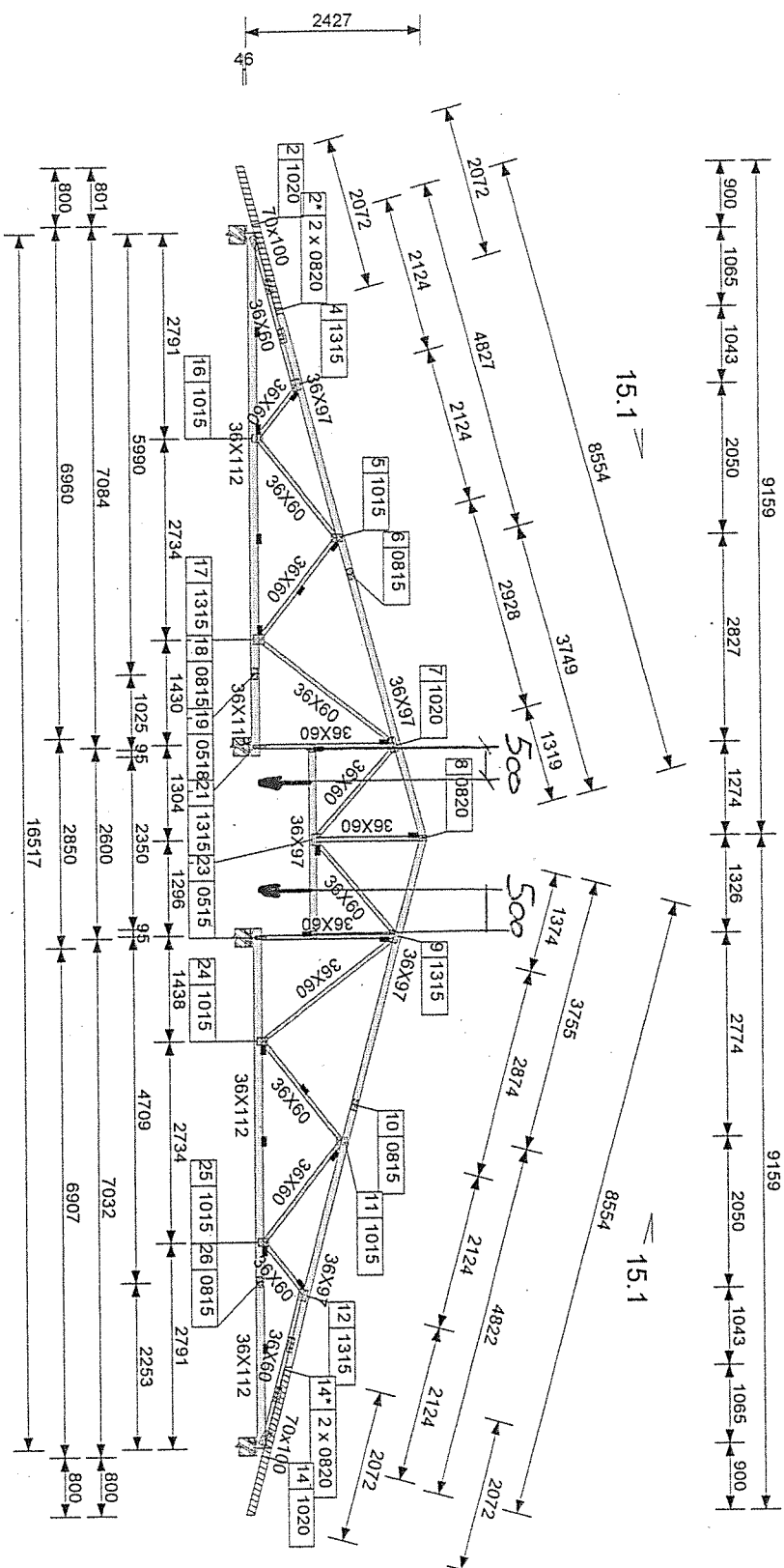


Date: 29 May 2008 16:08:17
Utilis.: Administrateur
Vers.: 5.10.6

Job: 704846
Desc.: Auzerville Tolosane
Client: DIVERS

Ferme: F2SUP
Qté Fab: 1

Reprise des gaines: charge 50 dal/m² soit ponctuelle de 2 x 12 dal.



Echelle 1:100

Ce dessin doit être accompagné de la note de calcul

☒ Lisse d'arrondissement

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Charges (kN/m²)

Sections

Plaque

Réaction Appui Maxi (kN)

Entraxe Ferme: 600 mm
Entraxe Lattes: 540 mm
Altitude: 200 m
Quantité Fermes: 1
Poids Ferme: 89 kg

Arbalétrier: 0.500
Couverture: 0.350
Neige: 0.600
Vent: 0.440

Arbalétrier: 36X97 C24 SE
Entraxe: 36X97 C24 SE
Entraxe: 36X112 C24 SE
Fiches: 36X60 C24 SE
Autres barr: 36X60 C24 SE

Surf. total (dm²): M20 78.45
Bois: 2 3.375 1 0.620 15 -0.926 13
Cube Net (m³): 19 4.192 1 0.000 1
Cube Brut (m³): 0.183 23 4.161 1 0.000 1

0.198 14 3.354 1 0.000 7 -1.098 15

** N O T E D E C A L C U L **

ORMATIONS GENERALES

de faite par:
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ZA PEGUILHAN
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Tel : 05-61-88-78-51
Fax : 05-61-88-14-19

esse client: Adresse chantier:

DIVERS

s calculs ont pour base technique:
Les documents techniques unifiés DTU.
Regles N.V.65 et N 84 (carte de neige)
DTU 31.3, Norme P21.110 etc...

thode de calcul utilisees:
Calcul hyperstatique de structure plane a barres.

ites utilisees:
mm, deg, MPa

nventions:
Efforts : Negatif (-) = Compression, Positif (+) = Traction
Reactions: Negatif (-) = Soulevement, Positive (+) = Descente

racteristiques des bois:
Categorie de bois : C22 SE
Module d'elasticite axial : 9000.0
Coefficient de fluage : 1.5
Densite : 410.00 Kg/m^3
Contraintes admissibles :
Flexion // : 10.00 MPa
Traction // : 6.00 MPa
Traction T : 0.20 MPa
Compression // : 9.00 MPa
Compression T : 2.20 MPa
Cisaillement // : 1.10 MPa
Categorie de bois : C24 SE
Module d'elasticite axial : 10000.0
Coefficient de fluage : 1.5
Densite : 420.00 Kg/m^3
Contraintes admissibles :
Flexion // : 11.00 MPa
Traction // : 6.50 MPa
Traction T : 0.20 MPa
Compression // : 9.50 MPa
Compression T : 2.30 MPa
Cisaillement // : 1.10 MPa

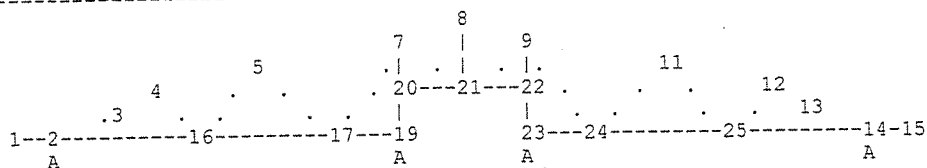
aracteristiques des connecteurs:
Type de plaque : M20 Réf. PV Essai 01.370029v2

eudi 29 Mai 2008

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EOMETRIE ET MODELE DE LA STRUCTURE

chema de la Structure



Dimensions du batiment:

Longueur (a)	: 15 m	Largeur (b)	: 8 m
Hauteur totale (H)	: 10 m	Hauteur au faitage (h)	: 10 m
Pente Gauche	: 15.11 deg	Pente Droite	: 15.11 deg
Portee	: 16517 mm	Entraxe des fermes	: 600 mm
Hauteur Hors-tout	: 2576 mm	Longueur Hors-tout	: 18317 mm
Prolonge Gauche Entrait	: 0 mm	Prolonge Droite Entrait	: 0 mm
Entraxe lattes Arba.(*)	: 600 mm	Entraxe lattes Entrait(*)	: 0 mm

(*) - Valeurs de saisie, voir les longueurs de flambement calculees en 'Caracteristiques des barres.'

Coordonnees des noeuds:

Noeud	Coordonnees		Liberte		
	X (mm)	Y (mm)	Horiz.	Vert.	Rot.
J2	-100	56	1	1	0 Appui
J8	8259	2377	0	0	0
J16	2791	56	0	0	0
J4	2061	703	0	0	0
J5	4145	1266	0	0	0
J17	5525	56	0	0	0
J21	8259	849	0	0	0
J11	12372	1266	0	0	0
J24	10993	56	0	0	0
J25	13726	56	0	0	0
J12	14456	703	0	0	0
J7	6985	2033	0	0	0
J19	6985	56	0	1	0 Appui
J9	9585	2019	0	0	0
J23	9585	56	0	1	0 Appui
J14	16617	56	0	1	0 Appui
J22	9585	849	0	0	0
J20	6985	849	0	0	0
J1	-900	-98	0	0	0
J3	1108	415	0	0	0
J13	15410	415	0	0	0
J15	17417	-98	0	0	0

0=Libre, 1=Fix

Caracteristiques des barres:

Barre	Section				Longueur (mm)	Project. X (mm)	Longueur Flambage (mm)	Pente (deg)	Conditions Extremites Debut-Fin
	Debut-Fin	Pli	Coef	BxH Cat					
T1 1-2	1	1.0	0x0	C22 +	815	800	540	10.88	Pin-Fix
T1 1-2	1	1.0	70x100	C22					
T1 2-3	1	1.0	36x157	C24 +	1260	1207	540	16.55	Fix-Fix
T1 2-3	1	1.0	70x100	C22					
T1 3-4	1	1.0	36x157	C24	996	954	540	16.84	Fix-Fix
T1 4-5	1	1.0	36x97	C24	2159	2084	540	15.11	Fix-Fix
T1 5-6	1	1.0	36x97	C24	524	506	540	15.11	Fix-Fix
T1 6-7	1	1.0	36x97	C24	2417	2333	540	15.11	Fix-Fix
T1 7-8	1	1.0	36x97	C24	1319	1274	540	15.11	Fix-Pin
T2 8-9	1	1.0	36x97	C24	1374	1326	540	-15.11	Pin-Fix
T2 9-10	1	1.0	36x97	C24	2368	2286	540	-15.11	Fix-Fix
T2 10-11	1	1.0	36x97	C24	519	501	540	-15.11	Fix-Fix
T2 11-12	1	1.0	36x97	C24	2159	2084	540	-15.11	Fix-Fix
T2 12-13	1	1.0	36x157	C24	996	954	540	-16.84	Fix-Fix
T2 13-14	1	1.0	36x157	C24 +	1260	1207	540	-16.55	Fix-Fix
T2 13-14	1	1.0	70x100	C22					
T2 14-15	1	1.0	0x0	C22 +	815	800	540	-10.88	Fix-Pin
T2 14-15	1	1.0	70x100	C22					
B3 2-16	1	1.0	36x112	C24	2891	2891	1446	0.00	Pin-Fix
B3 16-17	1	1.0	36x112	C24	2734	2734	1367	0.00	Fix-Fix
B3 17-18	1	1.0	36x112	C24	465	465	1460	0.00	Fix-Fix
B3 18-19	1	1.0	36x112	C24	995	995	1460	0.00	Fix-Pin
B4 20-21	1	1.0	36x97	C24	1274	1274	1470	0.00	Pin-Fix
B4 21-22	1	1.0	36x97	C24	1326	1326	1326	0.00	Fix-Pin
B5 23-24	1	1.0	36x112	C24	1408	1408	1408	0.00	Pin-Fix
B5 24-25	1	1.0	36x112	C24	2734	2734	1367	0.00	Fix-Fix
B5 25-26	1	1.0	36x112	C24	538	538	1446	0.00	Fix-Fix
B5 26-14	1	1.0	36x112	C24	2353	2353	1446	0.00	Fix-Pin
W6 4-16	1	1.0	36x60	C24	976	730	976	-41.56	Pin-Pin

ar ut-Fin	-----Section-----				Longueur (mm)	Project. X (mm)	Longueur Flambage (mm)	Pente (deg)	Conditions Extremities Debut-Fin
	Pli	Coef	BxH	Cat					
16-5	1	1.0	36x60	C24	1816	1354	1816	41.78	Pin-Pin
5-17	1	1.0	36x60	C24	1835	1380	918	-41.26	Pin-Pin
21-8	1	1.0	36x60	C24	1528	1528	1528	90.00	Pin-Pin
24-11	1	1.0	36x60	C24	1835	1380	918	41.26	Pin-Pin
11-25	1	1.0	36x60	C24	1816	1354	1816	-41.78	Pin-Pin
25-12	1	1.0	36x60	C24	976	730	976	41.56	Pin-Pin
19-20	1	1.0	36x60	C24	793	793	793	90.00	Pin-Fix
20-7	1	1.0	36x60	C24	1184	1184	1184	90.00	Fix-Pin
23-22	1	1.0	36x60	C24	793	793	793	90.00	Pin-Fix
22-9	1	1.0	36x60	C24	1170	1170	1170	90.00	Fix-Pin
17-7	1	1.0	36x60	C24	2458	1460	2458	53.55	Pin-Pin
9-24	1	1.0	36x60	C24	2415	1408	2415	-54.35	Pin-Pin
7-21	1	1.0	36x60	C24	1739	1274	1739	-42.92	Pin-Pin
21-9	1	1.0	36x60	C24	1769	1326	1769	41.42	Pin-Pin

HYPOTHESES DE CHARGES ET SURCHARGES
=====

Charges permanentes:
Couverture : 0.500 Plafond bas : 0.440

Surcharge de neige:
Region de neige : 1B Altitude : 200 m
Normale : 0.350 Normale majoree : 0.350
Extreme : 0.600 Extreme majoree : 0.800
Accidentelle : 0.800
Permanente : 0 % Temporaire : 100 %

Barre Pente Coef multiplicateur du a la pente
1-8 15.110 1.000
8-15 -15.110 1.000

Surcharge de vent:
Région de vent : II Nature du Site : Normal
Pression de base : 0.600 Permeabilite : 5%

Longueur (a) : 15000 mm Coef site : 1.000
Largeur (b) : 8000 mm Coef majoration : 1.000
Hauteur totale (H) : 10000 mm Coef hauteur : 1.000
Hauteur au faitage (h) : 10000 mm Valeur pression : 0.600

Flèche : 2473 mm Lambda a : 0.667
Coef delta : 0.909 Lambda b : 1.250
f/h : 0.247 Gamma 0 normal : 1.000
b/a : 0.533 Gamma 0 Parallèle : 1.000

Barre	Pente	-----Exterieur (Ce)-----			--Interieure (Ci)--	
		Au vent	Sous le vent	Parallèle	Succion	Pression
1-2	15.110	-0.633	-0.334	-0.502	0.000	0.000
14-15	-15.110	-0.633	-0.334	-0.502	0.000	0.000
2-8	15.110	-0.633	-0.334	-0.502	-0.300	0.300
8-14	-15.110	-0.633	-0.334	-0.502	-0.300	0.300

Combinaisons de charges vérifiées:

- Cas 1: Charges Permanentes + Neige Normale (Cas 1)
- Cas 3: Charges Permanentes + 1kN Arba (Cas 2)
- Cas 4: Charges Permanentes + Neige + 1kN Entrait (Cas 2bis)
- Cas 5: Vent Normal G->D Depression Interne (Cas 3)
- Cas 7: Vent Normal D->G Depression Interne (Cas 3)
- Cas 11: Charges Permanentes + Neige Extreme (Cas 4)
- Cas 13: Vent Extreme G->D Surpression Interne (Cas 5)
- Cas 15: Vent Extreme D->G Surpression Interne (Cas 5)
- Cas 16: Vent Extreme Parallele Surpression Interne (Cas 5bis)

Reactions d'appuis par Cas de Charges

Cas	Nom	Appui	2	Appui	19	Appui	23	Appui	14
rge		Verti	Horiz	Verti	Horiz	Verti	Horiz	Verti	Horiz
		(kN)	(kN)	(kN)	(kN)	(kN)	(kN)	(kN)	(kN)
	TOTAL	3.375	0.000	4.192	0.000	4.161	0.000	3.354	0.000
	DEAD	2.471	0.000	3.166	0.000	3.144	0.000	2.455	0.000
	LIVE	0.904	0.000	1.026	0.000	1.017	0.000	0.899	0.000
	TOTAL	2.425	0.000	3.212	0.000	3.188	0.000	2.410	0.000
	TOTAL	3.375	0.000	4.192	0.000	4.161	0.000	3.354	0.000
	TOTAL	2.005	0.323	3.143	0.000	3.097	0.000	2.365	0.000
	DEAD	2.471	0.000	3.166	0.000	3.144	0.000	2.455	0.000
	LIVE	-0.466	0.323	-0.023	0.000	-0.047	0.000	-0.090	0.000
	TOTAL	2.291	-0.323	3.210	0.000	3.209	0.000	1.899	0.000
	DEAD	2.471	0.000	3.166	0.000	3.144	0.000	2.455	0.000
	LIVE	-0.180	-0.323	0.044	0.000	0.066	0.000	-0.556	0.000
	TOTAL	4.764	0.000	5.792	0.000	5.747	0.000	4.736	0.000
	TOTAL	-0.926	0.620	0.129	0.000	1.007	0.000	0.662	0.000
	TOTAL	0.493	-0.620	1.188	0.000	0.288	0.000	-1.097	0.000
	TOTAL	0.223	0.000	0.553	0.000	0.543	0.000	0.222	0.000

SULTATS DE CALCUL

s de Charges 1: Coef =1.00 Charges Permanentes + Neige Normale (Cas 1)

arges Uniformes

	---Debut Barre---		---Fin Barre---	
	Vert.	Horiz.	Vert.	Horiz.
balétrier				
1-2	-0.544	0.000	-0.544	0.000
2-3	-0.552	0.000	-0.552	0.000
3-4	-0.553	0.000	-0.553	0.000
4-5	-0.550	0.000	-0.550	0.000
5-6	-0.550	0.000	-0.550	0.000
6-7	-0.550	0.000	-0.550	0.000
7-8	-0.550	0.000	-0.550	0.000
8-9	-0.550	0.000	-0.550	0.000
9-10	-0.550	0.000	-0.550	0.000
10-11	-0.550	0.000	-0.550	0.000
11-12	-0.550	0.000	-0.550	0.000
12-13	-0.553	0.000	-0.553	0.000
13-14	-0.552	0.000	-0.552	0.000
14-15	-0.544	0.000	-0.544	0.000
trait				
2-16	-0.285	0.000	-0.285	0.000
16-17	-0.285	0.000	-0.285	0.000
17-18	-0.285	0.000	-0.285	0.000
18-19	-0.285	0.000	-0.285	0.000
20-21	-0.285	0.000	-0.285	0.000
21-22	-0.285	0.000	-0.285	0.000
23-24	-0.285	0.000	-0.285	0.000
24-25	-0.285	0.000	-0.285	0.000
25-26	-0.285	0.000	-0.285	0.000
26-14	-0.285	0.000	-0.285	0.000
ches				

arges Ponctuelles

	X	Y	Vert.	Horiz.	Moment	Fermes Portées
	(mm)	(mm)	(kN)	(kN)	(kNm)	
deud						
37	7515	849	-0.120	0.000	0.000	
38	9055	849	-0.120	0.000	0.000	

fforts/Moments aux Extremites

	----- Debut de Barre -----			----- Fin de Barre -----			----- Travee -----
	Effort	Effort	Moment	Effort	Effort	Moment	Moment
	Tranch.	Normal		Tranch.	Normal		Maxi.
	(kN)	(kN)	(kNm)	(kN)	(kN)	(kNm)	(kNm)
rbalétrier							
1 1-2	0.000	0.000	0.000	0.428	0.082	-0.174	0.000
1 2-3	0.623	-7.048	0.174	0.017	-6.858	0.208	0.087
1 3-4	-0.051	-6.858	-0.208	0.556	-6.705	-0.095	0.208
1 4-5	0.448	-6.191	0.095	0.659	-5.893	-0.323	-0.193
1 5-6	0.759	-2.156	0.323	-0.490	-2.084	0.004	-0.122
1 6-7	0.490	-2.084	-0.004	0.749	-1.749	-0.309	0.239
1 7-8	0.572	-0.497	0.309	0.104	-0.314	0.000	-0.238
2 8-9	0.134	-0.306	0.000	0.570	-0.496	-0.299	-0.226
2 9-10	0.735	-1.682	0.299	0.479	-2.010	0.005	0.228
2 10-11	-0.479	-2.010	-0.005	0.745	-2.082	-0.313	-0.119
2 11-12	0.652	-5.821	0.313	0.455	-6.120	-0.099	-0.184
2 12-13	0.558	-6.640	0.099	-0.053	-6.793	0.205	0.205
2 13-14	0.019	-6.793	-0.205	0.621	-6.983	-0.174	0.086
2 14-15	0.428	0.082	0.174	0.000	0.000	0.000	0.000

Charge des gaines.

	----- Debut de Barre -----			----- Fin de Barre -----			Travee
	Effort Tranch. (kN)	Effort Normal (kN)	Moment (kNm)	Effort Tranch. (kN)	Effort Normal (kN)	Moment (kNm)	Moment Maxi. (kNm)
Intrait							
33 2-16	0.335	6.579	0.000	0.489	6.579	-0.222	0.197
33 16-17	0.436	4.114	0.222	0.344	4.114	-0.096	-0.114
33 17-18	0.274	-0.016	0.096	-0.141	-0.016	0.000	-0.059
33 18-19	0.141	-0.016	-0.000	0.142	-0.016	0.000	0.035
34 20-21	0.194	-0.027	0.000	0.288	-0.027	-0.073	0.063
34 21-22	0.292	-0.027	0.073	0.206	-0.027	0.000	0.069
35 23-24	0.133	-0.016	0.000	0.268	-0.016	-0.095	-0.060
35 24-25	0.343	4.032	0.095	0.436	4.032	-0.223	-0.114
35 25-26	0.489	6.517	0.223	-0.336	6.517	-0.001	-0.093
35 26-14	0.336	6.517	0.001	0.335	6.517	0.000	0.197
Fiches							
W6 4-16	0.000	-0.960	0.000	0.000	-0.960	0.000	0.000
W7 16-5	0.000	2.342	0.000	0.000	2.342	0.000	0.000
W8 5-17	0.000	-2.966	0.000	0.000	-2.966	0.000	0.000
W12 21-8	0.000	-0.069	0.000	0.000	-0.069	0.000	0.000
W16 24-11	0.000	-2.948	0.000	0.000	-2.948	0.000	0.000
W17 11-25	0.000	2.357	0.000	0.000	2.357	0.000	0.000
W18 25-12	0.000	-0.972	0.000	0.000	-0.972	0.000	0.000
W10 19-20	-0.016	-4.050	0.000	0.016	-4.050	-0.013	-0.012
W10 20-7	0.011	-3.856	0.013	-0.011	-3.856	0.000	-0.012
W14 23-22	0.016	-4.028	0.000	-0.016	-4.028	0.013	0.012
W14 22-9	-0.011	-3.821	-0.013	0.011	-3.821	0.000	0.012
W9 17-7	0.000	3.199	0.000	0.000	3.199	0.000	0.000
W15 9-24	0.000	3.144	0.000	0.000	3.144	0.000	0.000
W11 7-21	0.000	0.489	0.000	0.000	0.489	0.000	0.000
W13 21-9	0.000	0.477	0.000	0.000	0.477	0.000	0.000

Verification des Contraintes pour le cas de charge 1

Barres Externes:		---Section---		--- Maximum ---		--Plan Ferme --		---Plan Perp---		Signal
Barre		BxH Cat.		Effort (kN)	Moment (kNm)	K	Taux	K	Taux	ATF
T 2-4	36x157	C24		-6.858	0.208	0.965	0.275	0.826	0.298	
T 4-5	36x97	C24		-5.923	-0.193	0.710	0.561	0.826	0.526	
T 5-7	36x97	C24		-1.953	0.239	0.439	0.518	0.826	0.455	
T 7-8	36x97	C24		-0.479	-0.238	0.998	0.398	0.826	0.401	
T 8-9	36x97	C24		-0.477	-0.226	0.979	0.378	0.826	0.381	
T 9-11	36x97	C24		-1.882	0.228	0.456	0.492	0.826	0.436	
T11-12	36x97	C24		-5.851	-0.184	0.710	0.544	0.826	0.509	
T12-14	36x157	C24		-6.793	0.205	0.965	0.272	0.826	0.295	
B 2-16	36x112	C24		6.579	0.197		0.489			1
B16-17	36x112	C24		4.114	-0.114		0.294			1
B17-19	36x112	C24		-0.016	-0.059	1.000	0.072	0.156	0.074	
B20-21	36x97	C24		-0.027	0.063	1.000	0.102	0.206	0.105	
B21-22	36x97	C24		-0.027	0.069	0.995	0.112	0.190	0.116	
B23-24	36x112	C24		-0.016	-0.060	1.000	0.073	0.169	0.075	
B24-25	36x112	C24		4.032	-0.114		0.292			1
B25-14	36x112	C24		6.517	0.197		0.486			1
O 1-2	0x0	C22 +		0.000	0.000					
O 1-2	70x100	C22								
O14-15	0x0	C22 +		0.000	0.000					
O14-15	70x100	C22								

Barres Internes:		---Section---		--- Maximum ---		--Plan Ferme --		---Plan Perp---		Signal
Barre		BxH Cat.		Effort (kN)	Moment (kNm)	K	Taux	K	Taux	ATF
W 4-16	36x60	C24		-0.960	0.000	0.774	0.060	0.352	0.133	
W16-5	36x60	C24		2.342	0.000		0.167			
W 5-17	36x60	C24		-2.966	0.000	0.276	0.523	0.398	0.363	1
W21-8	36x60	C24		-0.069	0.000	0.398	0.008	0.138	0.024	
W24-11	36x60	C24		-2.948	0.000	0.276	0.520	0.398	0.361	1
W11-25	36x60	C24		2.357	0.000		0.168			
W25-12	36x60	C24		-0.972	0.000	0.774	0.061	0.352	0.135	
W19-20	36x60	C24		-4.050	-0.012	1.000	0.247	0.533	0.420	
W20-7	36x60	C24		-3.856	-0.012	0.794	0.286	0.239	0.836	
W23-22	36x60	C24		-4.028	0.012	1.000	0.245	0.533	0.417	
W22-9	36x60	C24		-3.821	0.012	0.801	0.281	0.245	0.811	
W17-7	36x60	C24		3.199	0.000		0.228			
W 9-24	36x60	C24		3.144	0.000		0.224			
W 7-21	36x60	C24		0.489	0.000		0.035			
W21-9	36x60	C24		0.477	0.000		0.034			

Noeuds:		---Section---		--- Maximum ---		--Plan Ferme --		---Plan Perp---		Signal
Noeud		BxH Cat.		Effort (kN)	Moment (kNm)	K	Taux	K	Taux	ATF
J2	T 2-4	36x157	C24 +	-4.552	-0.113	1.000	0.175	1.000	0.175	1
J2	T 2-4	70x100	C22							

ud	--Section--		--- Maximum ---		--Plan Ferme --		---Plan Perp---		Signal
	BxH	Cat.	Effort (kN)	Moment (kNm)	K	Taux	K	Taux	
T 4-5	36x97	C24	-6.191	-0.095	1.000	0.339	1.000	0.339	1
T 4-5	36x97	C24	-5.893	-0.323	1.000	0.697	1.000	0.697	1
T 5-7	36x97	C24	-1.749	-0.309	1.000	0.550	1.000	0.550	1
T 7-8	36x97	C24	-0.333	0.009	1.000	0.025	1.000	0.025	1
T 8-9	36x97	C24	-0.325	0.014	1.000	0.032	1.000	0.032	1
T 9-11	36x97	C24	-1.682	-0.299	1.000	0.532	1.000	0.532	1
T11-12	36x97	C24	-5.821	-0.313	1.000	0.679	1.000	0.679	1
T11-12	36x97	C24	-6.120	-0.099	1.000	0.344	1.000	0.344	1
B 2-16	36x112	C24	6.579	0.085		0.354			1
B 2-16	36x112	C24	6.579	-0.222		0.519			1
B16-17	36x112	C24	4.114	-0.096		0.273			1
B17-19	36x112	C24	-0.016	0.018	1.000	0.022	1.000	0.022	1
B20-21	36x97	C24	-0.027	0.022	1.000	0.037	1.000	0.037	1
B21-22	36x97	C24	-0.027	-0.073	1.000	0.118	1.000	0.118	1
B21-22	36x97	C24	-0.027	0.025	1.000	0.041	1.000	0.041	1
B23-24	36x112	C24	-0.016	0.016	1.000	0.020	1.000	0.020	1
B24-25	36x112	C24	4.032	-0.095		0.268			1
B25-14	36x112	C24	6.517	-0.223		0.518			1
B25-14	36x112	C24	6.517	0.085		0.351			1
W19-20	36x60	C24	-4.050	-0.001	1.000	0.203	1.000	0.203	1
W19-20	36x60	C24	-4.050	-0.013	1.000	0.252	1.000	0.252	1
W20-7	36x60	C24	-3.856	-0.001	1.000	0.193	1.000	0.193	1
W23-22	36x60	C24	-4.028	0.001	1.000	0.202	1.000	0.202	1
W23-22	36x60	C24	-4.028	0.013	1.000	0.251	1.000	0.251	1
W22-9	36x60	C24	-3.821	0.001	1.000	0.192	1.000	0.192	1

actions d'appuis

eud pui	----- Reaction -----		----- Largeur -----		----- Hauteur -----		Signal
	Verti (kN)	Horiz (kN)	Réelle (mm)	Néc. (mm)	Réelle (mm)	Néc. (mm)	
	3.375	0.000	250	41	112	13	0.11
9	4.192	0.000	250	51	112	5	0.05
3	4.161	0.000	250	50	112	5	0.04
4	3.354	0.000	250	41	112	13	0.11

ifications des Deformations pour le cas de charge 1

leche Locale

Barre	----- Panneau -----		----- Segment -----		Signal
	---Reelle---	---Admiss.---	---Reelle---	---Admiss.---	
But-Fin	Fleche Ratio	Fleche Ratio	Fleche Ratio	Fleche Ratio	
1-2	0.13 L/999	2.72 L/300	1.64 L/610	5.00 L/200	
2-3	-0.92 L/999	7.52 L/300	-4.69 L/999	28.92 L/300	
3-4	-0.92 L/999	7.52 L/300	-4.69 L/999	28.92 L/300	
4-5	-1.08 L/999	7.20 L/300	-6.35 L/999	28.92 L/300	
5-6	-7.24 L/406	9.80 L/300	-6.98 L/999	28.92 L/300	
6-7	-7.24 L/406	9.80 L/300	-6.98 L/999	28.92 L/300	
7-8	0.83 L/999	4.40 L/300	-0.72 L/999	28.92 L/300	
8-9	0.77 L/999	4.58 L/300	-0.56 L/999	28.92 L/300	
9-10	-6.65 L/433	9.62 L/300	-8.91 L/973	28.92 L/300	
10-11	-6.65 L/433	9.62 L/300	-8.91 L/973	28.92 L/300	
11-12	-1.14 L/999	7.20 L/300	-6.11 L/999	28.92 L/300	
12-13	-0.91 L/999	7.52 L/300	-5.56 L/999	28.92 L/300	
13-14	-0.91 L/999	7.52 L/300	-5.56 L/999	28.92 L/300	
14-15	0.13 L/999	2.72 L/300	1.60 L/626	5.00 L/200	
15-16	-5.19 L/557	7.23 L/400	-8.25 L/859	17.71 L/400	
16-17	-1.92 L/999	6.83 L/400	-6.63 L/999	17.71 L/400	
17-18	-0.11 L/999	3.65 L/400	-3.36 L/999	17.71 L/400	
18-19	-0.11 L/999	3.65 L/400	-3.36 L/999	17.71 L/400	
20-21	-0.40 L/999	3.18 L/400	-0.63 L/999	6.50 L/400	
21-22	-0.49 L/999	3.32 L/400	-0.75 L/999	6.50 L/400	
23-24	-0.08 L/999	3.52 L/400	-3.23 L/999	17.58 L/400	
24-25	-1.93 L/999	6.83 L/400	-6.53 L/999	17.58 L/400	
25-26	-5.18 L/558	7.23 L/400	-6.97 L/999	17.58 L/400	
26-14	-5.18 L/558	7.23 L/400	-6.97 L/999	17.58 L/400	

leche Globale

oeud	----- Deplacement -----			----- Admissible -----			Signal
	X	Y	Rotation	X	Y	Ratio	
1	-0.316	1.639	0.000	10.000	5.000	L/200	
2	0.000	0.000	0.000	10.000	17.712	L/400	
4	1.397	-5.604	-0.003	10.000	17.712	L/400	
5	0.703	-5.018	-0.001	10.000	17.712	L/400	
7	-0.795	-0.658	-0.002	10.000	17.712	L/400	
8	-0.795	-0.816	0.004	10.000	17.712	L/400	
9	-0.793	-0.648	0.000	10.000	17.712	L/400	
11	-2.055	-4.894	-0.004	10.000	17.712	L/400	
12	-2.755	-5.524	0.001	10.000	17.712	L/400	
14	-1.570	0.000	0.001	10.000	17.712	L/400	

Noeud	----- Deplacement -----			----- Admissible -----			Signal
	X	Y	Rotation	X	Y	Ratio	
J15	-1.313	1.595	0.002	10.000	5.000	L/200	
J16	0.864	-6.036	-0.003	10.000	17.712	L/400	
J17	1.247	-3.362	0.001	10.000	17.712	L/400	
J19	1.246	0.000	0.002	10.000	17.712	L/400	
J20	-0.790	-0.272	0.001	10.000	17.712	L/400	
J21	-0.791	-0.807	0.001	10.000	17.712	L/400	
J22	-0.793	-0.271	-0.000	10.000	17.712	L/400	
J23	-2.610	0.000	0.000	10.000	17.712	L/400	
J24	-2.611	-3.232	0.000	10.000	17.712	L/400	
J25	-2.236	-5.938	-0.002	10.000	17.712	L/400	

RESUME DU CALCUL
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Contraintes

Barre	-Section- BxH Cat.	Cas	Effort (kN)	Moment (kNm)	Taux Max.	Taux Cis.	ATF	Signal
T1 2-3	36x157 C24	+	-2.296	0.229	0.249	0.023		
T1 2-3	70x100 C22							
T1 3-4	36x157 C24	3	-5.205	0.472	0.313	0.119		
T1 4-5	36x97 C24	1	-5.923	-0.193	0.561	0.257		
T1 5-6	36x97 C24	3	-1.799	-0.259	0.386	0.190		
T1 6-7	36x97 C24	3	-1.698	0.533	0.697	0.157		
T1 7-8	36x97 C24	3	-0.371	-0.374	0.440	0.215		
T2 8-9	36x97 C24	3	-0.367	-0.362	0.426	0.213		
T2 9-10	36x97 C24	3	-1.640	0.518	0.673	0.155		
T2 10-11	36x97 C24	3	-1.739	-0.254	0.374	0.188		
T2 11-12	36x97 C24	1	-5.851	-0.184	0.544	0.255		
T2 12-13	36x157 C24	3	-5.159	0.469	0.310	0.119		
T2 13-14	36x157 C24	+	-2.277	0.228	0.248	0.022		
T2 13-14	70x100 C22							
B3 2-16	36x112 C24	1	6.579	0.197	0.489	0.165	1	
B3 16-17	36x112 C24	1	4.114	-0.114	0.294	0.147	1	
B3 17-18	36x112 C24	5	-0.013	-0.063	0.078	0.094		
B3 18-19	36x112 C24	1	-0.016	0.035	0.046	0.048		
B4 20-21	36x97 C24	1	-0.027	0.063	0.105	0.076		
B4 21-22	36x97 C24	1	-0.027	0.069	0.116	0.114		
B5 23-24	36x112 C24	7	-0.012	-0.063	0.078	0.092		
B5 24-25	36x112 C24	1	4.032	-0.114	0.292	0.148	1	
B5 25-26	36x112 C24	1	6.517	-0.093	0.361	0.165	1	
B5 26-14	36x112 C24	1	6.517	0.197	0.486	0.114	1	
W6 4-16	36x60 C24	11	-1.527	0.000	0.141	0.000		
W7 16-5	36x60 C24	1	2.342	0.000	0.167	0.000		
W8 5-17	36x60 C24	1	-2.966	0.000	0.523	0.000	1	
W12 21-8	36x60 C24	15	-0.426	0.000	0.100	0.000		
W16 24-11	36x60 C24	1	-2.948	0.000	0.520	0.000	1	
W17 11-25	36x60 C24	1	2.357	0.000	0.168	0.000		
W18 25-12	36x60 C24	11	-1.546	0.000	0.143	0.000		
W10 19-20	36x60 C24	1	-4.050	-0.012	0.420	0.010		
W10 20-7	36x60 C24	1	-3.856	-0.012	0.836	0.007		
W14 23-22	36x60 C24	1	-4.028	0.012	0.417	0.010		
W14 22-9	36x60 C24	1	-3.821	0.012	0.811	0.007		
W9 17-7	36x60 C24	1	3.199	0.000	0.228	0.000		
W15 9-24	36x60 C24	1	3.144	0.000	0.224	0.000		
W11 7-21	36x60 C24	7	0.538	0.000	0.038	0.000		
W13 21-9	36x60 C24	7	0.527	0.000	0.038	0.000		

Noeuds:		--Section--		Cas	----- Maximum -----		---Plan (yy)---		---Plan (xx)---		Signal
Noeud		BxH Cat.			Effort (kN)	Moment (kNm)	K	Taux	K	Taux	
J2	T 2-4	36x157 C24	+	3	-3.624	-0.069	1.000	0.089	1.000	0.089	1
J2	T 2-4	70x100 C22									
J4	T 4-5	36x97 C24		3	-5.043	-0.304	1.000	0.458	1.000	0.458	1
J5	T 4-5	36x97 C24		3	-4.598	-0.525	1.000	0.703	1.000	0.703	1
J7	T 5-7	36x97 C24		3	-1.312	-0.514	1.000	0.619	1.000	0.619	1
J8	T 7-8	36x97 C24		3	-0.020	0.037	1.000	0.043	1.000	0.043	1
J8	T 8-9	36x97 C24		3	-0.012	0.043	1.000	0.049	1.000	0.049	1
J9	T 9-11	36x97 C24		3	-1.256	-0.506	1.000	0.609	1.000	0.609	1
J11	T11-12	36x97 C24		3	-4.544	-0.513	1.000	0.688	1.000	0.688	1
J12	T11-12	36x97 C24		3	-4.989	-0.309	1.000	0.462	1.000	0.462	1
J14	O12-14	36x157 C24		1	-4.510	-0.113	1.000	0.174	1.000	0.174	1
J2	B 2-16	36x112 C24		1	6.579	0.085		0.354			1
J16	B 2-16	36x112 C24		1	6.579	-0.222		0.519			1
J17	B16-17	36x112 C24		5	3.046	-0.100		0.237			1
J19	B17-19	36x112 C24		5	-0.013	0.017	1.000	0.021	1.000	0.021	1
J20	B20-21	36x97 C24		5	-0.021	0.022	1.000	0.036	1.000	0.036	1
J21	B20-21	36x97 C24		5	-0.021	-0.076	1.000	0.123	1.000	0.123	1
J22	B21-22	36x97 C24		5	-0.020	0.025	1.000	0.040	1.000	0.040	1
J23	B23-24	36x112 C24		7	-0.012	0.016	1.000	0.019	1.000	0.019	1
J24	B24-25	36x112 C24		1	4.032	-0.095		0.268			1
J25	B25-14	36x112 C24		1	6.517	-0.223		0.518			1
J14	B25-14	36x112 C24		1	6.517	0.085		0.351			1

ud	--Section-- BxH Cat.	Cas	Maximum Effort (kN)	Maximum Moment (kNm)	Plan (yy) K	Plan (xx) Taux	Plan (xx) K	Plan (xx) Taux	Signal ATF
W19-20	36x60 C24	1	-4.050	-0.001	1.000	0.203	1.000	0.203	1
W19-20	36x60 C24	1	-4.050	-0.013	1.000	0.252	1.000	0.252	1
W20-7	36x60 C24	1	-3.856	-0.001	1.000	0.193	1.000	0.193	1
W23-22	36x60 C24	1	-4.028	0.001	1.000	0.202	1.000	0.202	1
W23-22	36x60 C24	1	-4.028	0.013	1.000	0.251	1.000	0.251	1
W22-9	36x60 C24	1	-3.821	0.001	1.000	0.192	1.000	0.192	1

ctions d'appuis

ud	vert.	Normale soul.	horz.	vert.	Extreme soul.	horz.	Permanente vert.
	3.375(1)		0.323(4)	4.764(6)	-0.926(7)	-0.620(8)	2.471
	4.192(1)		0.000(-1)	5.792(6)		0.000(-1)	3.166
	4.161(1)		0.000(-1)	5.747(6)		0.000(-1)	3.144
	3.354(1)		0.000(5)	4.736(6)	-1.097(8)	0.000(6)	2.455

ud	Largeur min. (mm)	Hauteur min. (mm)	Signal
	41	13	
	51	5	
	50	5	
	41	13	

formations

rre	Panneau Max.	Segment Max.	Noeud Debut X	Noeud Debut Y	Noeud Fin X	Noeud Fin Y	Signal
1-2	0.13(1)	3.09(5)	-0.60(5)	3.09(5)	0.00(1)	0.00(1)	
2-3	-1.05(5)	-4.69(1)	0.00(1)	0.00(1)	1.40(1)	-5.60(1)	
3-4	-1.05(5)	-4.69(1)	0.00(1)	0.00(1)	1.40(1)	-5.60(1)	
4-5	-1.08(1)	-6.35(1)	1.40(1)	-5.60(1)	0.70(1)	-5.02(1)	
5-6	-7.24(1)	-6.98(1)	0.70(1)	-5.02(1)	-0.79(1)	-0.66(1)	
6-7	-7.24(1)	-6.98(1)	0.70(1)	-5.02(1)	-0.79(1)	-0.66(1)	
7-8	0.83(1)	-0.72(1)	-0.79(1)	-0.66(1)	-0.79(1)	-0.82(1)	
8-9	0.77(1)	-0.56(1)	-0.79(1)	-0.82(1)	-0.79(1)	-0.65(1)	
9-10	-6.65(1)	-8.91(1)	-0.79(1)	-0.65(1)	-2.06(1)	-4.89(1)	
10-11	-6.65(1)	-8.91(1)	-0.79(1)	-0.65(1)	-2.06(1)	-4.89(1)	
11-12	-1.14(1)	-6.11(1)	-2.06(1)	-4.89(1)	-2.75(1)	-5.52(1)	
12-13	-1.02(7)	-5.56(1)	-2.75(1)	-5.52(1)	-1.57(1)	0.00(1)	
13-14	-1.02(7)	-5.56(1)	-2.75(1)	-5.52(1)	-1.57(1)	0.00(1)	
14-15	0.13(1)	3.04(7)	-1.57(1)	0.00(1)	-1.31(1)	3.04(7)	
2-16	-5.19(1)	-8.25(1)	0.00(1)	0.00(1)	0.86(1)	-6.04(1)	
16-17	-1.92(1)	-6.63(1)	0.86(1)	-6.04(1)	1.25(1)	-3.36(1)	
17-18	-0.11(1)	-3.36(1)	1.25(1)	-3.36(1)	1.25(1)	0.00(1)	
18-19	-0.11(1)	-3.36(1)	1.25(1)	-3.36(1)	1.25(1)	0.00(1)	
20-21	-0.40(1)	-0.63(1)	-0.79(1)	-0.27(1)	-0.79(1)	-0.81(1)	
21-22	-0.49(1)	-0.75(1)	-0.79(1)	-0.81(1)	-0.79(1)	-0.27(1)	
23-24	-0.08(1)	-3.23(1)	-2.61(1)	0.00(1)	-2.61(1)	-3.23(1)	
24-25	-1.93(1)	-6.53(1)	-2.61(1)	-3.23(1)	-2.24(1)	-5.94(1)	
25-26	-5.18(1)	-6.97(1)	-2.24(1)	-5.94(1)	-1.57(1)	0.00(1)	
26-14	-5.18(1)	-6.97(1)	-2.24(1)	-5.94(1)	-1.57(1)	0.00(1)	
4-16	-0.00(1)	-0.00(1)	1.40(1)	-5.60(1)	0.86(1)	-6.04(1)	
16-5	-0.00(7)	-0.00(1)	0.86(1)	-6.04(1)	0.70(1)	-5.02(1)	
5-17	0.00(1)	0.00(1)	0.70(1)	-5.02(1)	1.25(1)	-3.36(1)	
21-8	-0.00(1)	-0.00(7)	-0.79(1)	-0.81(1)	-0.79(1)	-0.82(1)	
16 24-11	0.00(1)	0.00(1)	-2.61(1)	-3.23(1)	-2.06(1)	-4.89(1)	
17 11-25	-0.00(1)	-0.00(7)	-2.06(1)	-4.89(1)	-2.24(1)	-5.94(1)	
18 25-12	0.00(1)	-0.00(1)	-2.24(1)	-5.94(1)	-2.75(1)	-5.52(1)	
10 19-20	0.14(1)	-0.00(5)	1.25(1)	0.00(1)	-0.79(1)	-0.27(1)	
10 20-7	0.31(1)	-0.97(1)	-0.79(1)	-0.27(1)	-0.79(1)	-0.66(1)	
14 23-22	-0.14(1)	-0.00(7)	-2.61(1)	0.00(1)	-0.79(1)	-0.27(1)	
14 22-9	-0.30(1)	-1.14(1)	-0.79(1)	-0.27(1)	-0.79(1)	-0.65(1)	
9 17-7	0.00(1)	-0.00(1)	1.25(1)	-3.36(1)	-0.79(1)	-0.66(1)	
15 9-24	-0.00(1)	-0.00(1)	-0.79(1)	-0.65(1)	-2.61(1)	-3.23(1)	
11 7-21	0.00(1)	-0.00(7)	-0.79(1)	-0.66(1)	-0.79(1)	-0.81(1)	
13 21-9	0.00(1)	-0.00(7)	-0.79(1)	-0.81(1)	-0.79(1)	-0.65(1)	

otas importants:

Antiflambage:

Lisse d'Antiflambage necessaires aux barres:

W 5-17, W24-11

La fixation du dispositif d'antiflambage sera réalisé de manière à reprendre par ferme
 et par versant un effort perpendiculaire à l'arba F = Effort axial arba/60 = 0.163kN

Cette valeur est à multiplier par le nombre de fermes intéressées par le dispositif.

Remarques:

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1. C'est la responsabilite du client de s'assurer que les donnees ci-dessus: dimensions, pentes, charges et autres caracteristiques sont celles demandees par le maitre d'ouvrage.
 2. Cette note de calcul propre a chaque element triangule ne dispense pas de l'execution d'un plan de pose et de contreventement adapte au batiment etudie.
 3. Poids de la Ferme 86.935 - 95.629 Kg

Informations Plaques

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Plaques utilisees: M20 01.370029v2

1. Les aboutages sont normalement places entre 10 et 25 % de la longueur du panneau.
2. Tolérance du positionnement = 10 (mm)

Noeud	Plaque		Position(x1)	(y1)	(x2)	(y2) (mm)
	Jauge	Code				
2	M20	1020	31	17		
2	M20	0820	102	38		
2	M20	0820	102	38		
4	M20	1315	0	0		
5	M20	1015	0	0		
6	M20	0815	0	0		
7	M20	1020	76	41		
8	M20	0820	38	99		
9	M20	1315	55	56		
10	M20	0815	0	0		
11	M20	1015	0	0		
12	M20	1315	0	0		
14	M20	1020	31	17		
14	M20	0820	102	38		
14	M20	0820	102	38		
16	M20	1015	0	0		
17	M20	1315	0	0		
18	M20	0815	0	0		
19	M20	0518	0	0		
20	M20	0810	0	0		
21	M20	1315	0	0		
22	M20	0810	0	0		
23	M20	0515	2	84		
24	M20	1015	0	0		
25	M20	1015	0	0		
26	M20	0815	0	0		
