Gemeente Texel .txl

Behoort bij besluit van
Burgemeester en Wethouders van Texel,
zaaknummer: 3782945
kenmerk document: bijlage 7/10
namens de burgemeester en wethouders van Texel,

de heer R.J. Nieuwenhuijzen
teamleider Vergunningen, Toezicht & Handhaving a.i.

Bijlage D

Berekening globale stabiliteit

Royal HaskoningDHV
Enhancing Society Together

Input parameters for mass calculation

Height lighthouse	H_sh	36000	mm	total height
Height inner shaft	H_sh_in	24220	mm	
Average diameter shaft	D_avg	8020	mm	outer diameter of ring
Average diameter inner shaft	D_avg_in	6145	mm	outer diameter of ring
Number of floors	n_floors	6	-	shaft floors including last slab 460mm thick
Thickness outer walls shaft	t_o_w	390	mm	
Average thickness inner walls shaft	t_av_i_w	1055	mm	
Equivalent thickness cast iron floors	t_eq_ci_f	15	mm	floor 10mm and six beams IPE180 radiate
Thickness top concrete floor shaft	t_sh_c_f	500	mm	assume a thickness of 500mm (460mm in reality) and the average diameter of the outer walls to account for concrete floors between walls
Height Superstructure	H_s	5700	mm	
Average diameter superstructure	D_avg_s	5560	mm	assume that the polygon is a circle - outer diameter of circle
Number of floors superstructure	n_floors_s	2	-	
Average thickness walls superstructure	t_av_w_s	209	mm	wall thickness + 3 square columns with edge 279mm in every polygon corner - conservative assumption to account for ribs in concrete walls
Equivalent thickness concrete floor superstructure	t_eq_s_c_f	207	mm	ribbed concrete floor

volumetric weight cast iron	gamma_ci	72.5	kN/m3	
volumetric weight r.concrete	gamma_rc	25	kN/m3	is it okay to use for the shotcrete with kristalcement?
volumetric weight masonry	gamma_m	20	kN/m3	

Mass Calculation

1) Shaft

Walls outer

Area	A_w_o	9.35E+06	mm2	=	9.35 m2
Vol	V_w_o	2.26E+11	mm3	=	226.42 m3
Equivalent density	gamma_e_w_o	2.37E+01	kN/m3		
Mass	M_w_o	5.37E+03	kN		

Walls inner

Area	A_w_i	1.69E+07	mm2	=	16.87 m2
Vol	V_w_i	4.09E+11	mm3	=	408.60 m3
Mass	M_w_i	8.17E+03	kN		

Floors

Cast iron

Area of one floor	A_f	1.28E+07	mm2	=	12.79 m2
Volume of all floors	V_f	9.59E+08	mm3	=	0.96 m3
Mass	M_f_ci	6.95E+01	kN		

Concrete

Area of one floor	A_f	5.05E+07	mm2	=	50.52 m2
Volume of all floors	V_f	2.53E+10	mm3	=	25.26 m3
Mass	M_f_rc	6.31E+02	kN		

2) Superstructure

Walls

Area	A_w	3.51E+06	mm2	=	3.51 m2
Vol	V_w	2.00E+10	mm3	=	20.03 m3
Mass	M_w	5.01E+02	kN		

Floors

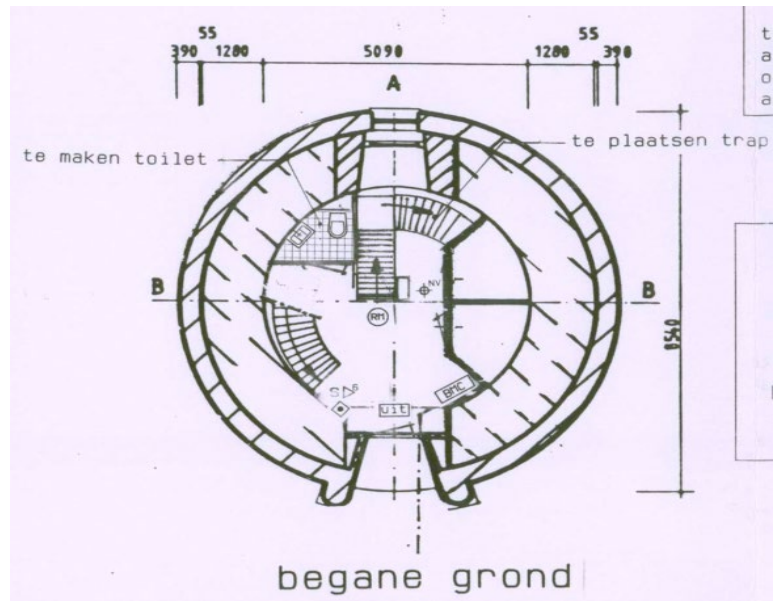
Area of one floor	A_f	2.43E+07	mm2	=	24.28 m2
Volume of all floors	V_f	1.01E+10	mm3	=	10.05 m3
Mass	M_f	2.51E+02	kN		

Total

Mass	M_t	1.50E+04	kN

Check if tension occurs on the foundation

	Characteristic value	EQU load combination*
Wind force (kN/m2)	1.05	1.58
Wind load radar (kN)	18.80	28.20
Self-weight (kN)	14995	13495.50
H(m)	36.00	
B(m)	8.54	
Overturning moment (kNm)	9767.43	
Stress due to axial force (MPa)	-0.37	
Stress due to bending (MPa)	0.18	
Total stress on the windward side (MPa)	**-0.18**	



*factors from Tabel 31 in BI6464-109-VT-WAD-RI-RP-0001-Uitgangspuntenrapport-WIP

Global Stability Check - Texel Lighthouse

	Characteristic value	EQU load combination*
Wind force (kN/m2)	1.05	1.58
Wind load radar (kN)	18.80	28.20
Self-weight (kN)	14995	13495.50
H(m)	36.00	
B(m)	8.54	
Overturning moment point A (kNm)	9767.43	
Stabilizing moment point A (kNm)	57625.79	
Global stability check result	**STABLE**	
UC(-)	0.17	

*factors from Tabel 31 in BI6464-109-VT-WAD-RI-RP-0001-Uitgangspuntenrapport-WIP

