Structural Checking

Of

Precast Concrete Block Pavilion

In Sai Kung

(Rev. 0)

13 July 2014

Job Ref.: SJ14-001

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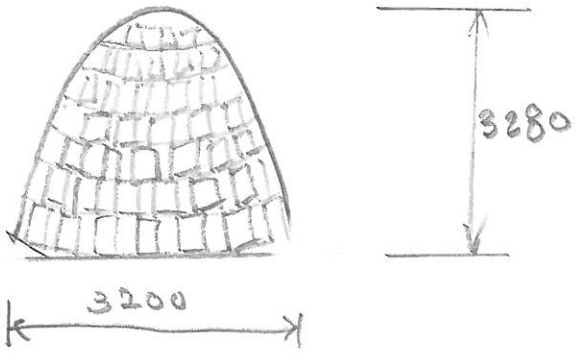
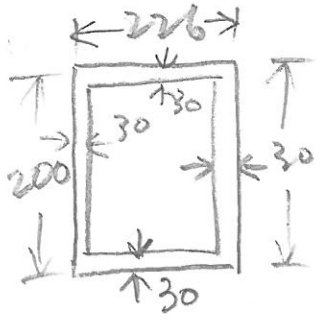
Structural Calculation of the Pavilion

2014-7-13

A. Stability





$$\text{Solidity} = \frac{200\times226-(166\times160)}{200\times226}$$

$$= 49\%$$

1. Assume the pavilion is located any where from 0 to 500 m above ground, then the corresponding wind pressure according to wind code 2004.

   is 3.72 kPa

2. Assume the concrete blocks are fully combined together and the stability of the pavilion shall be considered as a whole.

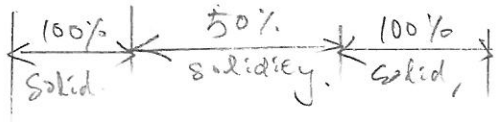
3. Dead load of each block (assume type 1 & type 2 are the same)

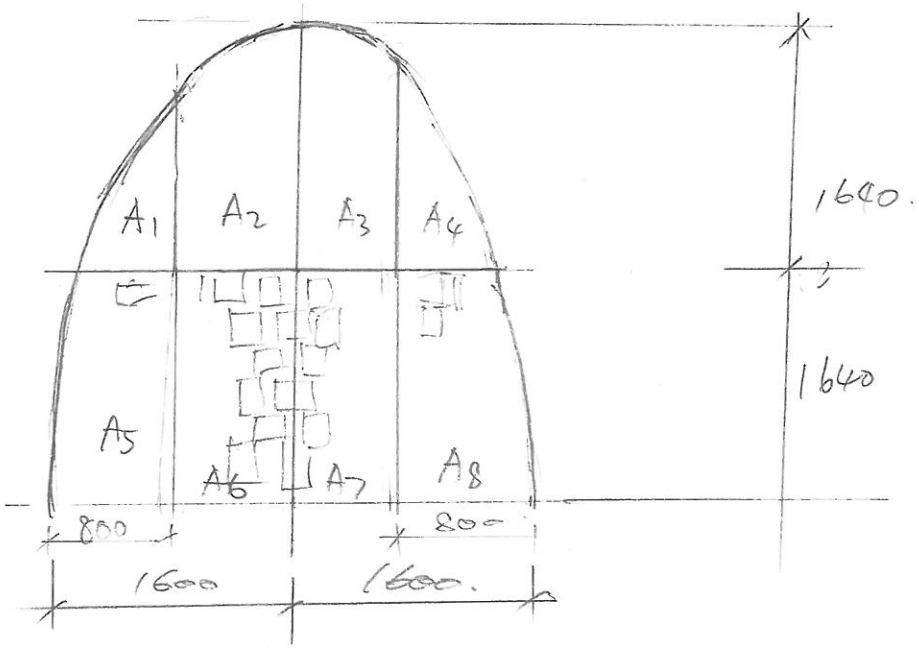
   average section area:

   section area front $= 0.03\times(0.2+0.23)\times 2$

   $= 0.0258\ m^2$

4. Check against overturning.





$A_5 \simeq 0.8 \times 1.64 = 1.3$

$A_6 = 0.8 \times 1.64 = 1.3$

$A_7 = 1.3$

$A_8 = 1.3$

$A_1 = 0.6 \times 1.1/2 = 0.33$

$A_4 = 0.33$

$A_2 = 0.8 \times 1.4 = 1.12$

$A_3 = 1.12$

4.

Pressure = 3.72

	Area	Solidity	Force	Lever arm	Moment
A_1	0.33	1	1.23	2.04	2.05
A_4	0.33	1	1.23	2.04	2.05
A_2	1.12	0.5	2.08	2.34	4.87
A_3	1.12	0.5	2.08	2.34	4.87
A_5	1.3	1	4.84	0.82	3.97
A_8	1.3	1	4.84	0.82	3.97
A_6	1.3	0.5	2.42	0.82	1.98
A_7	1.3	0.5	2.42	0.82	1.98

$\Sigma F = 21.14$ kN ✓ $\quad \Sigma$ Moment $= 25.75$ kNm

Resisting moment by dead load of the pavilion = Wt. × moment arm

$= 65.8$ kN $\times 3.2/2$

$= 105$ kNm ✓

∴ F.O.S against overturning $= \frac{105}{25.75} = 4 > 1.5$

∴ O.K.

5. Check Against Sliding.

The resisting sliding force shall be provided by the frictional force between the concrete block and the soil ground / concrete ground.

∴ the frictional coeffient shall be.

$\tan 30° = 0.577$.

∴ resisting friction force of the pavilion $= 65.8 \times 0.577$

$= 37.9 \text{ KN}$

∴ F.O.S against sliding $= \frac{37.9}{21.14}$

$= 1.79 > 1.5$

∴ O.K.

B. Conclusion

The precast concrete blocks formed is structurally adequate standing by itself for wind load of a return period of 50 years.