

STONE CONSULTING ENGINEERS LTD.

CONSULTING CIVIL, STRUCTURAL AND
FOUNDATION ENGINEERS

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Job No. 1735

Date: April 2018

QA INFORMATION

CLIENT:	Farndell Builders Ltd
JOB ID:	172 Elmer Road
SCOPE OF WORK:	Soakaway Design
DESIGN CODES AND REFERENCES:	BRE 365
SOFTWARE:	MS EXCEL
SUB-SOIL/ FOUNDATION DATA:	N/A

MATERIAL DATA

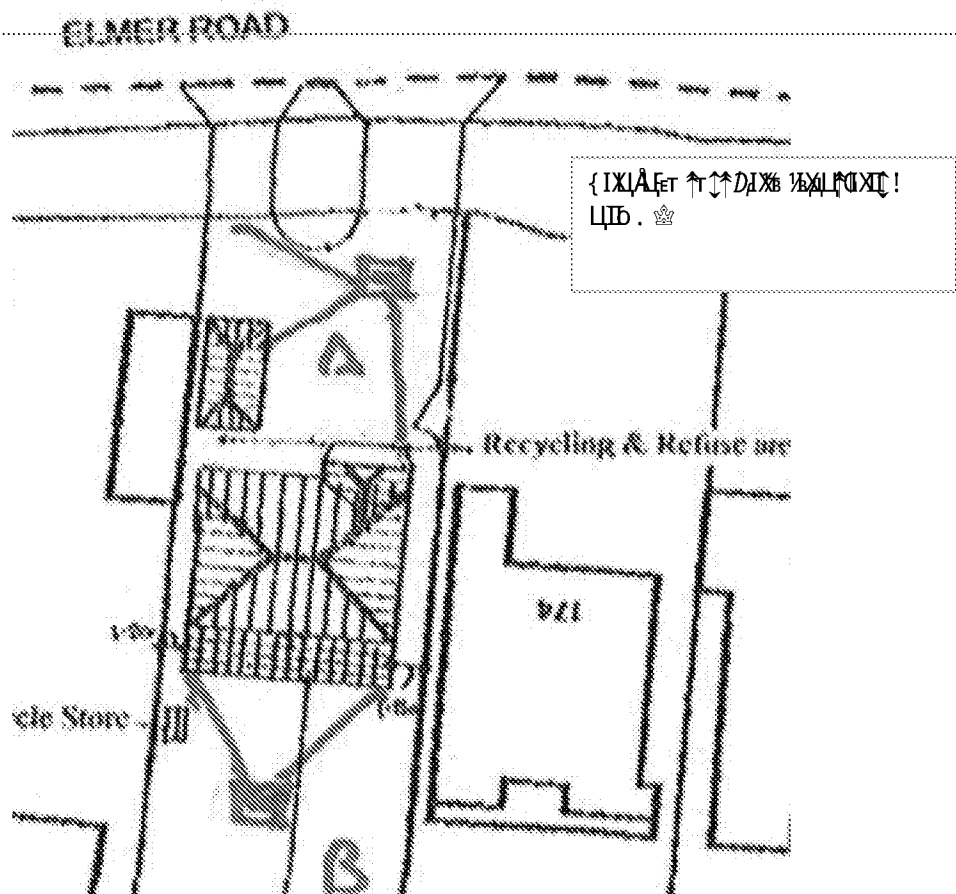
CONCRETE:	
REINFORCEMENT:	
STEELWORK:	
TIMBER:	
OTHER:	Soakage test by others (data included)

OTHER INFORMATION / NOTES

Rev A	First issue
Rev B	Revised for 30% climate increase

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To new soakaways

Garage	Area	
	17.00	m^2
100% house	100.00	m^2
Base design on	117.00	m^2

Soakaway to be located in rear garden

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SOAKAWAY DESIGN TO BRE(1991)

SOAKAWAY DETAILS

Ring	Pit/crates
Soakaway size, Ds = 2.50 m	Length = 3 m
Depth of below invert, Hs = 1.00 m	Width = 2 m
	Depth below invert = 1.2 m
Free volume, S = 4.91 m ³	= 7.20 m ³
Rubble filled volume, S' = 1.47 m ³	= 2.38 m ³

INITIAL SOAKAWAY SIZING

Drained area to soakaway = 117.00 m²
 Climate change allowance = 30 %

INFLOW

Inflow, I = (run off area) x (design rainfall)
 = A x (M10-D)

DESIGN RAINFALL

Return period = 100 yrs
 Ratio of 60 min to 2-Day rainfalls of 5 year return period, r = 0.35 BRE(1991) Fig 1.

M5 rainfalls are calculated from table 1 (BRE 365) using Z1 factor

duration (mins)	Z1	M5-D (mm)	Z2 M10 (cor. Fac)	M10-D* rainfall	Z2 M100 Design	100 yr rainfall
5	0.36	7.2	1.19	11.14	1.84	17.22
10	0.51	10.2	1.22	16.18	1.91	25.33
15	0.62	12.4	1.23	19.83	1.95	31.43
30	0.79	15.8	1.22	25.06	2.00	41.08
60	1	20	1.24	32.24	2.03	52.78
120	1.23	24.6	1.24	39.66	2.01	64.28
240	1.5	30	1.22	47.58	1.97	76.83
360	1.69	33.8	1.21	53.17	1.94	85.24
600	1.94	38.8	1.2	60.53	1.90	95.84
1440	2.48	49.6	1.18	76.09	1.81	116.71

*including 20% for climate change

OUTFLOW

Soil infiltration rate*, f = 2.98E-05 m/sec
 effective storage depth, a(50) = H x .5 = 0.5 m (ring)
 Outflow /sec = 3.142 x Dia x a(50) = 1.17E-04 m3/sec (ring)
 effective storage depth, a(50) = H x .5 = 0.6 m (pit)
 Outflow /sec = 2(L + W) x a(50) x f = 1.79E-04 m3/sec (pit)

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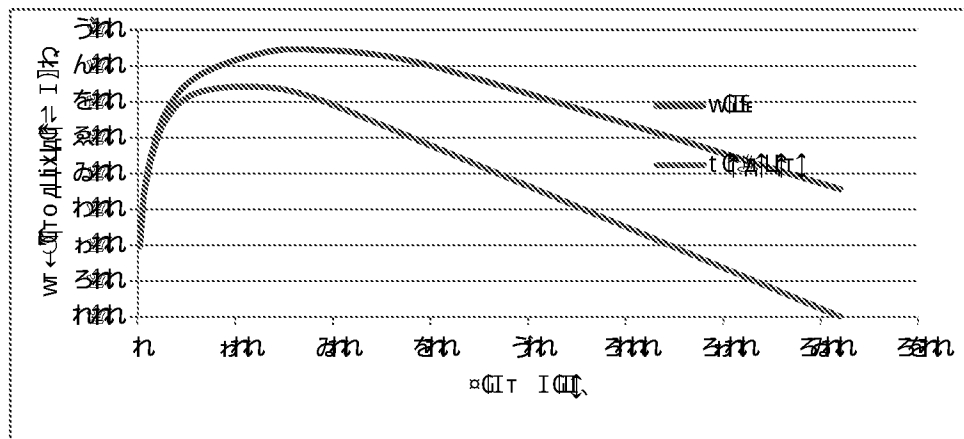
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STORAGE CAPACITY

$$\text{Storage capacity, } S = \text{Inflow} - \text{Outflow}$$

$$= I - O = [A \times (M10-D)] - O$$

Duration (mins)	Ring soakaway			Pit/crates soakaway	
	Inflow S(1) m³	Outflow Max m³	Required capacity m³	Outflow Max m³	Required capacity m³
5	2.02	0.04	1.98	0.05	1.96
10	2.96	0.07	2.89	0.11	2.86
15	3.68	0.11	3.57	0.16	3.52
30	4.81	0.21	4.60	0.32	4.48
60	6.18	0.42	5.75	0.64	5.53
120	7.52	0.84	6.68	1.29	6.24
240	8.99	1.68	7.31	2.57	6.42
360	9.97	2.52	7.45	3.86	6.12
600	11.21	4.21	7.01	6.43	4.78
1440	13.65	10.10	3.56	15.43	n/a
Max required capacity =			7.45	= 6.42	
Max ring capacity =			4.91	Free volume =	7.20 OK
Rubble filled volume =			1.47	Rubble filled volume =	2.38 FAIL



Options

Ring soakaway				Status
Diameter	2.50	m	Unfilled	FAIL
Depth below invert =	1.00	m	Filled	FAIL
Pit or trench				Status
Length =	3.00	m	Unfilled	OK
Width =	2.00	m	Filled	FAIL
Depth below invert =	1.2	m		

Note: for ring option calculation is conservative as ring is normally placed in square hole with rubble surround providing additional storage capacity.

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Soakage test data

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Depth of water at start of test = 0.3 m
 Length of pit = 0.3 m
 Width of pit = 0.3 m

Water level drop of 0.15 m in 137.25 mins
 Total volume out = 0.0135 m³

Mean area sides = 0.18 m² (50% of water depth)
 Area base = 0.09 m²
 Total outflow area = 0.27 m²

Infiltration rate = 6.07E-06 m/sec

▯T↑↑DIX.

Depth of water at start of test = 0.3 m
 Length of pit = 0.3 m
 Width of pit = 0.3 m

Water level drop of 0.15 m in 28 mins
 Total volume out = 0.0135 m³

Mean area sides = 0.18 m² (50% of water depth)
 Area base = 0.09 m²
 Total outflow area = 0.27 m²

Infiltration rate = 2.98E-05 m/sec

Average infiltration rate = 1.79E-05 m/sec

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Typical installation procedure for AquaCell Eco (or similar) crated

1. Excavate the trench to the required depth ensuring that the plan area is slightly greater than that of the AquaCell units.
2. Lay 100mm bed of coarse sand or non angular granular material, level and compact.
3. Lay the geotextile over the base and up the sides of the trench.
4. Lay the AquaCell units parallel with each other. In multiple layer applications, whenever possible, continuous vertical joints should be avoided. AquaCell units can be laid in a 'brick bonded' formation (i.e. to overlap the joints below). For single layer applications use the AquaCell Clips and for multi layers use the AquaCell Clips and the AquaCell Shear Connectors (vertical rods).
5. Fit the Adaptors to the AquaCell units as required and connect pipework.
6. In order to prevent silt from entering the tank, clogging inlet pipework and reducing storage capacity, it is recommended that the Domestic Silt Trap (BL3300) or the standard Silt Trap (BL3900) is installed prior to the inlet pipework.
7. Wrap and overlap the geotextile covering the entire AquaCell structure.
8. Lay 100mm of coarse sand or non angular granular material between the trench walls and the AquaCell structure and compact.
9. Lay 100mm of coarse sand or non angular granular material over the geotextile and compact.
10. Backfill with suitable material.
11. Rainwater from roof areas may discharge directly into the soakaway but rainwater from car parks must discharge through a catchpit manhole and/or a petrol interceptor.

Crates installed in three layers

