SOUTH WEST STRUCTURES LTD	0605/01 FREMINGTON PARISH COUNCIL - Queen Elizabeth II Community Pavilion, Tews Lane	Date	23/2/21
		Sheet no.	1
	Structural Calculations by SW	REVISION A - 10/06/24	

CALCULATIONS:

The following calculation sheets provide design information and recommendations relevant to the above project.

As shown on drawing 0605/DR01 and the Architect's details an existing single storey community building is proposed for extension.

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SOUTH WEST STRUCTURES LTD	0605/01 FREMINGTON PARISH COUNCIL - Queen Elizabeth II Community Pavilion, Tews Lane	Date	23/2/21
		Sheet no.	2
	Structural Calculations by SW	REVISION A - 10/06/24	

CALCULATIONS:

Storm Drainage Design

Adopted rainfall intensity	75	mm/hr				
Runoff coefficient	1.0					
Roof Area	174.72	m²	(40% increase)			
Roof Flowrate	3.64	l/s				
Yard Area	0	m²				
Yard Flowrate	0.00	l/s				
Total Flowrate	3.64	l/s	(intial values)			

See attached drainage calculations.

Storm Drainage run 1:						
Roof Area	87.36	m²				
Floor Area	0	m²				
Runoff Flow	1.82	l/s	Total Flow	1.82	l/s	
Storm Drainage run 2:						
Roof Area	87.36	m²				
Floor Area	0	m²				
Runoff Flow	1.82	l/s	Total Flow	1.82	l/s	
Storm Drainage run 3:						
Roof Area	174.72	m²				
Floor Area	0	m²				
Runoff Flow	3.64	l/s	Total Flow	3.64	l/s	

Attenuation design

Rainfall ratio r =	0.3			
Impermeable surface area drained to the soakaway:	174.72	m²		
SWW allowable discharge rate	2.00	l/s	= 0.002	m³/s

Storm duration D min	Z1	M5-D min = 20mm x Z1	Z2	M10-D min = R mm	**Inflow I m³**	**Outflow O m³**	**Storage required m³**
10	0.49	9.8	1.22	11.956	**2.089**	**1.200**	**0.889**
15	0.59	11.8	1.23	14.514	**2.536**	**1.800**	**0.736**
30	0.77	15.4	1.24	19.096	**3.336**	**3.600**	**-0.264**
60	1	20	1.24	24.800	**4.333**	**7.200**	**-2.867**
120	1.25	25	1.24	31.000	**5.416**	**14.400**	**-8.984**
240	1.57	31.4	1.22	38.308	**6.693**	**28.800**	**-22.107**
360	1.78	35.6	1.2	42.720	**7.464**	**43.200**	**-35.736**
600	2.12	42.4	1.19	50.456	**8.816**	**72.000**	**-63.184**
1440	2.84	56.8	1.17	66.456	**11.611**	**172.800**	**-161.189**

Maximum storage required: **0.889 m³**

Recommend 1 cubic meters of atenuation to manufacturer's recommendations

Job Number	**0605/02**
Job Reference	**QE II Community Pavilion**
Date	**6/10/24**
Drain Reference	**Storm Drainage run 1 RevA**
Design by	**SW**
Approved by	**SW**

BS EN 752-4:1997

	Internal Pipe Diameter		100	mm			
	Peak Flow		1.82	l/s	0.0018	m^3/s	
8 & Table B.1	Minimum Self Cleansing Velocity		0.7	m/s	(based on flow of 2 x 300l/occupant/day)		
Table NA.1	Minimum Self Cleansing Gradient	1:	80	m/m	(if velocity can not be achieved)		
	Hydraulic Gradient	J_E = 1:	90	m/m			**>1:80 therefore design for >0.7m/s**
	Gravitational Constant	g	9.81	m/s^2			
Table NB.1	Hydraulic Pipeline Roughness	k	0.0015	m			
	Kinematic Viscosity	v	0.000001	m^2/s			
9.2.3	Manning Coefficient	K	48.466	$m^{1/3}/s$			
	Hydraulic Radius	R_h	0.025	m	(pipe flowing full)		
		R_h	0.030	m	(pipe flowing 75%full)		
	Colebrook-White:						
	Velocity of Flow =		0.71	m/s	(pipe flowing full)		**ok**
	Area of Flow		7854	mm^2			
	Maximum Flow		0.0056	m^3/s			**ok**
	Velocity of Flow =		0.79	m/s	(pipe flowing 75%full)		**ok**
	Area of Flow		5890	mm^2			
	Maximum Flow		0.0047	m^3/s			**ok**
	Manning:						
	Velocity of Flow =		0.44	m/s	(pipe flowing full)		**lower than self cleansing velocity**
	Area of Flow		7854	mm^2			
	Maximum Flow		0.0034	m^3/s			**ok**
	Velocity of Flow =		0.49	m/s	(pipe flowing 75%full)		**lower than self cleansing velocity**
	Area of Flow		5890	mm^2			
	Maximum Flow		0.0029	m^3/s			**ok**

Job Number	**0605/02**
Job Reference	**QE II Community Pavilion**
Date	**6/10/24**
Drain Reference	**Storm Drainage run 2 RevA**
Design by	**SW**
Approved by	**SW**

BS EN 752-4:1997

	Internal Pipe Diameter		100	mm			
	Peak Flow		1.82	l/s	0.0018	m^3/s	
8 & Table B.1	Minimum Self Cleansing Velocity		0.7	m/s	(based on flow of 2 x 300l/occupant/day)		
Table NA.1	Minimum Self Cleansing Gradient	1:	80	m/m	(if velocity can not be achieved)		
	Hydraulic Gradient	J_E = 1:	90	m/m			**>1:80 therefore design for >0.7m/s**
	Gravitational Constant	g	9.81	m/s^2			
Table NB.1	Hydraulic Pipeline Roughness	k	0.0015	m			
	Kinematic Viscosity	v	0.000001	m^2/s			
9.2.3	Manning Coefficient	K	48.466	$m^{1/3}/s$			
	Hydraulic Radius	R_h	0.025	m	(pipe flowing full)		
		R_h	0.030	m	(pipe flowing 75%full)		
	Colebrook-White:						
	Velocity of Flow =		0.71	m/s	(pipe flowing full)		**ok**
	Area of Flow		7854	mm^2			
	Maximum Flow		0.0056	m^3/s			**ok**
	Velocity of Flow =		0.79	m/s	(pipe flowing 75%full)		**ok**
	Area of Flow		5890	mm^2			
	Maximum Flow		0.0047	m^3/s			**ok**
	Manning:						
	Velocity of Flow =		0.44	m/s	(pipe flowing full)		**lower than self cleansing velocity**
	Area of Flow		7854	mm^2			
	Maximum Flow		0.0034	m^3/s			**ok**
	Velocity of Flow =		0.49	m/s	(pipe flowing 75%full)		**lower than self cleansing velocity**
	Area of Flow		5890	mm^2			
	Maximum Flow		0.0029	m^3/s			**ok**

Job Number	**0605/02**
Job Reference	**QE II Community Pavilion**
Date	**6/10/24**
Drain Reference	**Storm Drainage run 3 RevA**
Design by	**SW**
Approved by	**SW**

BS EN 752-4:1997

	Internal Pipe Diameter		100	mm			
	Peak Flow		3.64	l/s	0.0036	m^3/s	
8 & Table B.1	Minimum Self Cleansing Velocity		0.7	m/s	(based on flow of 2 x 300l/occupant/day)		
Table NA.1	Minimum Self Cleansing Gradient	1:	80	m/m	(if velocity can not be achieved)		
	Hydraulic Gradient	J_E = 1:	90	m/m			**>1:80 therefore design for >0.7m/s**
	Gravitational Constant	g	9.81	m/s^2			
Table NB.1	Hydraulic Pipeline Roughness	k	0.0015	m			
	Kinematic Viscosity	v	0.000001	m^2/s			
9.2.3	Manning Coefficient	K	48.466	$m^{1/3}/s$			
	Hydraulic Radius	R_h	0.025	m	(pipe flowing full)		
		R_h	0.030	m	(pipe flowing 75%full)		
	Colebrook-White:						
	Velocity of Flow =		0.71	m/s	(pipe flowing full)		**ok**
	Area of Flow		7854	mm^2			
	Maximum Flow		0.0056	m^3/s			**ok**
	Velocity of Flow =		0.79	m/s	(pipe flowing 75%full)		**ok**
	Area of Flow		5890	mm^2			
	Maximum Flow		0.0047	m^3/s			**ok**
	Manning:						
	Velocity of Flow =		0.44	m/s	(pipe flowing full)		**lower than self cleansing velocity**
	Area of Flow		7854	mm^2			
	Maximum Flow		0.0034	m^3/s			**too low**
	Velocity of Flow =		0.49	m/s	(pipe flowing 75%full)		**lower than self cleansing velocity**
	Area of Flow		5890	mm^2			
	Maximum Flow		0.0029	m^3/s			**too low**

								Job Number			**0605/02**		
								Job Reference			**QE II Community Pavilion**		
								Date			**6/10/24**		
								Drain Reference			**Storm Drainage run 4 RevA**		
								Design by			**SW**		
								Approved by			**SW**		
BS EN 752-4:1997													
	Internal Pipe Diameter				100	mm							
	Peak Flow				2	l/s	0.0020	m³/s					
8 & Table B.1	Minimum Self Cleansing Velocity				0.7	m/s	(based on flow of 2 x 300l/occupant/day)						
Table NA.1	Minimum Self Cleansing Gradient			1:	80	m/m	(if velocity can not be achieved)						
	Hydraulic Gradient			J_E = 1:	90	m/m			**>1:80 therefore design for >0.7m/s**				
	Gravitational Constant			g	9.81	m/s²							
Table NB.1	Hydraulic Pipeline Roughness			k	0.0015	m							
	Kinematic Viscosity			v	0.000001	m²/s							
9.2.3	Manning Coefficient			K	48.466	m$^{1/3}$/s							
	Hydraulic Radius			R_h	0.025	m	(pipe flowing full)						
				R_h	0.030	m	(pipe flowing 75%full)						
	Colebrook-White:												
		Velocity of Flow =			0.71	m/s	(pipe flowing full)		**ok**				
		Area of Flow			7854	mm²							
		Maximum Flow			0.0056	m³/s			**ok**				
		Velocity of Flow =			0.79	m/s	(pipe flowing 75%full)		**ok**				
		Area of Flow			5890	mm²							
		Maximum Flow			0.0047	m³/s			**ok**				
	Manning:												
		Velocity of Flow =			0.44	m/s	(pipe flowing full)		**lower than self cleansing velocity**				
		Area of Flow			7854	mm²							
		Maximum Flow			0.0034	m³/s			**ok**				
		Velocity of Flow =			0.49	m/s	(pipe flowing 75%full)		**lower than self cleansing velocity**				
		Area of Flow			5890	mm²							
		Maximum Flow			0.0029	m³/s			**ok**				