Aquadam lateral force resistance calculation 16' dam with 10' and 8' back up

Single dam				
Dam height, h	16	feet	4.9	Meters
height of retained water, d	8.2	feet	2.5	Meters
Temp of water in dam and being retained assumed similar	68	deg F	20	deg C
Density of water, g	62.3	lbs/cuft	998.0	Kg/cuMeter
flow rate normal to dam, v	0	feet/second	0.0	Meters/Second
Contact width across bottom of dam, w	26	feet	7.9	Meters
Coeficient of friction, m	0.14		0.14	
Lateral force from flow = dgv^2/2	0	lbs/ft dam length	0.0	N/M dam length
Lateral force from static height = gd^2/2	2,095	lbs/ft dam length	470.9	N/M dam length
Total lateral force	2,095	lbs/ft dam length	470.9	N/M dam length
Total pressure acting on interior dam membrane contact width, = ghw	25,917	lbs/ft dam length	5826.3	N/M dam length
Flotation force from static height = gdw/2	6,641	lbs/ft dam length	1493.0	N/M dam length
Net gravitational force creating friction = ghw – gdw/2	19,276	lbs/ft dam length	4333.3	N/M dam length
Frictional force resisting lateral movement	2,699	lbs/ft dam length	606.7	N/M dam length
Factor of safety against lateral displacement	1.29		1.29	
Lateral force resistance with second dam as back up				
Second dam height, h	10	feet	3.0	Meters
Second dam contact width across bottom of dam, w	16	feet	4.9	Meters
Frictional force resisting lateral movement = ghwm	1396	lbs/ft dam length	313.7	N/M dam length
Combined frictional force resisting lateral force	4094	lbs/ft dam length	920.4	N/M dam length
Combined factor of safety	1.95		1.95	
Lateral force resistance with third dam as back up				
Third dam height	8	feet	2.4	Meters
Third dam contact width across bottom	13	feet	4.0	Meters
Frictional force resisting lateral movement = ghwm	907	lbs/ft dam length	203.9	N/M dam length
Combined frictional force resisting lateral force	7700	lbs/ft dam length	1731.0	N/M dam length
Combined factor of safety	3.68		3.68	