

997-SCH-02 RAINWATER CALCULATIONS

π = 3.141592654 Date: 23.03.26 Rev: PL01

ZONE	OUTLET	Description	Roof Ref No.	Measured Area	Pitch Angle	Effective Pitch	Scale Factor	Effective Ptich	Calculated Roof Area	No. of Outlets	TOTAL ZONE Effective Roof Area	Rainfall intensity	Max Flow Rate	Max Effective Roof Area	Half Round Gutter Size	Gutter Area	Circular Outlet Size	Calculated Outlet Area	Measured Ex. OUTLET (est.)mm Ø	Estimated Ex. OUTLET (est.)mm Ø	Estimated Ex. OUTLET AREA (mm²)				
RZ.01		Valley Clay tile	RF7D	25.6 m²	57.3 °	60 °	1.87	47.9 m²														RZ.01	Roof area is too large to be served by a single down pipe. Potential for existing foul drainage SVP to be repurposed as a RWP to be confirmed. Refer to drawing 997-457: Roof RF7 Roof Conservation Improvements.		
		Clay tile + dormers + valleys	RF6B (Part)	68.3 m²	52.8 °	60 °	1.87	127.7 m²																	
		Clay tile	RF6C	10.0 m²	60.1 °	60 °	1.87	18.7 m²																	
		Terracotta parapet	RF7-PAR.01	3.6 m²	1.0 °	Flat °	1.00	3.6 m²																	
Exist.	RF6-OUT.01*								197.9 m²	1	197.9 m²	0.02 l/s/m²	3.96 l/s	250 m²	300	mm	35343 mm²	200	mm dia	31,416 mm²	150	140	15,394 mm²	✗	RWP to ground - Failing to meet AD Part H3.
Prop.	RF6-OUT.02								197.9 m²	2	98.9 m²	0.02 l/s/m²	1.98 l/s	103 m²	150	mm	8836 mm²	89	mm dia	6,221 mm²					Proposed additional outlet.
RZ.02		Clay tile + dormers	RF7A	64.3 m²	57.3 °	60 °	1.87	120.2 m²														RZ.02	Roof area is too large to be served by a single down pipe. Only viable option to improve roof drainage is to increase diameter of existing outlet or run a parallel outlet through existing building fabric. Action to be confirmed. Refer to drawings 997-457/458/459: Roof RF7/RF8/RF9 Roof Conservation Improvements.		
		Steep - Clay tile	RF7B (half)	3.5 m²	66.9 °	60 °	1.87	6.5 m²																	
		Clay tile + patent glazing	RF8B	23.5 m²	44.4 °	45 °	1.15	27.0 m²																	
		Clay tile turret	RF9B-to-F	9.8 m²	66.0 °	60 °	1.87	18.3 m²																	
		Asphalt flat roof	RF8-Flat	6.6 m²	1.0	Flat °	1.00	6.6 m²																	
		Asphalt walkable gutter	RF7-VGUT.02	7.6 m²	1.0 °	Flat °	1.00	7.6 m²																	
Exist.	RF8-OUT.01*								186.3 m²	1	186.3 m²	0.02 l/s/m²	3.73 l/s	250 m²	300	mm	35343 mm²	200	mm dia	31,416 mm²	110	100	7,854 mm²	✗	Failing to meet AD Part H3.
Prop.	RF8-OUT.02								186.3 m²	2	93.2 m²	0.02 l/s/m²	1.86 l/s	103	150		89		6,221 mm²					Action - to be confirmed.	
RZ.03		Rubber / asphalt Flat ridge	RF24 Flat (Part)	23.7 m²	3.1 °	Flat °	1.00	23.7 m²														RZ.03	Roof may be served by 2 rain-water down pipes on single gutter run, but overall area is too large to be served by just 2 down pipes. Additional down pipe may help elleviate flow.		
		Slate tile + patent glazing	RF24A	142.1 m²	33.1 °	30 °	1.29	183.3 m²																	
Exist.	RF24-OUT.01	Outlet onto onto RF7.VGUT.02							207.0 m²	1	207.0 m²	0.02 l/s/m²	4.14 l/s	300 m²	350	mm	48106 mm²	200	mm dia	31,416 mm²	110	100	7,854 mm²	✗	Failing to meet AD Part H3.
Prop.	RF24-OUT.03								207.0 m²	2	103.5 m²	0.02 l/s/m²	2.07 l/s	200 m²	250	mm	24544 mm²	150	mm dia	17,671 mm²					Proposed additional outlet to be confirmed Into new Hopper off RF17
Exist.	RF24.OUT.01	Clay tile + patent glazing	RF6A (Part)	64.1 m²	68.3 °	60 °	1.87	119.9 m²															Additional outlet to upper roof RF24 above RF17 may elliveiate flow rate to final outlet: RW13.OUT. Action - to be confirmed. Refer to drawings 997-457/463: Roof RF7/RF13 Roof Conservation Improvements. Roof area is too large to be served by a single down pipe. Only viable option to improve roof drainage is to increase diameter of existing outlet or run a parallel outlet through existing building fabric. Action to be confirmed.		
		Flat lead roof to hatch	RF7.Hatch.01	2.4 m²	1.0 °	Flat °	1.00	2.4 m²																	
		Hipped + valley clay tile	RF7C (inc. vent)	13.5 m²	68.3 °	60 °	1.87	25.2 m²																	
		Steep - Clay tile	RF7B (half)	3.5 m²	66.9 °	60 °	1.87	6.5 m²																	
		Patent glazing, lead + membane	RF13D (Part)	16.2 m²	39.0 °	45 °	1.15	18.6 m²																	
		Patent glazing, lead + membane	RF13C	10.5 m²	39.0 °	45 °	1.15	12.1 m²																	
		Asphalt non-walkable gutter	RF24-VGUT.14	7.1 m²	1.0 °	Flat °	1.00	7.1 m²																	
Exist.	RF13-OUT.01*								191.9 m²	1	191.9 m²	0.02 l/s/m²	3.84 l/s	250 m²	300	mm	35343 mm²	200	mm dia	31,416 mm²	200	140	15,394 mm²	✗	Failing to meet AD Part H3.
Prop.	RF13-OUT.02								191.9 m²	2	95.9 m²	0.02 l/s/m²	1.92 l/s	103 m²	150	mm	8836 mm²	89	mm dia	6,221 mm²					Action - to be confirmed.
RZ.04		Rubber / asphalt Flat ridge	RF24 Flat (Part)	24.1 m²	3.1 °	Flat °	1.00	24.1 m²														RZ.03	See notes to RZ.03 above.		
		Slate tile + patent glazing	RF24A	143.3 m²	32.6 °	30 °	1.29	184.9 m²																	
	RF24-OUT.02								209.0 m²	1	209.0 m²	0.02 l/s/m²	4.18 l/s	300 m²	350	mm	48106 mm²	200	mm dia	31,416 mm²	100	90	6,362 mm²	✗	Failing to meet AD Part H3.
Prop.	RF24-OUT.03								209.0 m²	3	69.7 m²	0.02 l/s/m²	1.39 l/s	103	150		89		6,221 mm²					Action - to be confirmed.	
RZ.05		Rubber Membrane	RF23 Flat	17.1 m²	1.0 °	Flat °	1.00	17.1 m²														RZ.05	Note this roof may have a continuous gutter and drain at either end. See above RZ.03 and RZ.X below. Wall is 13.6m L x 3.2m T: Wall Area= 43.5m². Refer to drawings 997-467/473: Roof RF17/RF23 Roof Conservation Improvements.		
		Patent glazing, lead + membane	RF23 Glazing	25.4 m²	11.0 °	Flat °	1.00	25.4 m²																	
		Wall above to RF24 block	Wall above to R23	43.5 m²	90.0 °	>70 or wall °	0.50	21.8 m²																	
		Wall above to RF17 block	Wall above to R17	4.1 m²	90.0 °	>70 or wall °	0.50	2.1 m²											(2 No. 100) 2	o. 100)					
Exist.	RF24-OUT.01* & OUT.02*								66.3 m²	2	33.2 m²	0.02 l/s/m²	0.66 l/s	37 m²	100	mm	3927 mm²	63	mm dia	3,117 mm²	150	140	15,394 mm²	✓	This meets AD Part H.
RZ.06																						RZ.06	May have additional capacity to take part of roof RF24 above. Wall above is 8.0m L x 3.6m T: Wall Area= 28.8m². Refer to drawing 997-467: Roof RF17 Roof Conservation Improvements.		
		Slate tile	RF17A (inc. Coping)	52.5 m²	30.1 °	30 °	1.29	67.7 m²																	
		Wall above to RF24 block	Wall above to R24	28.8 m²	90.0 °	>70 or wall °	0.50	14.4 m²																	
Exist.	RF17-OUT.01*								82.1 m²	1	82.1 m²	0.02 l/s/m²	1.64 l/s	103 m²	150	mm	8836 mm²	89	mm dia	6,221 mm²	200	140	15,394 mm²	✓	Meets AD Part H3.
		Half of Rubber / asphalt Flat ridge	RF24 Flat (Part)	11.9	3.1 °	Flat °	1.00	11.9 m²																	
		Half of Slate tile + patent glazing	RF24A	71.1	33.1 °	30 °	1.29	91.7 m²																	

Exist. RF18-OUT.01			97.8 m²	1	97.8 m²	0.02	l/s/m²	1.96	l/s	103 m²	150 mm	8836 mm²	89 mm dia	6,221 mm²	100	90	6,362 mm²	✓		Meets AD Part H3. Discharges to ground.										
RZ.12	Steep clay tile + copper finial	RF19A	12.1 m²	72.9 °	>70 or wall °	0.50	6.1 m²													RZ.12	Effective area is 50% of measured elevational area (survey)									
	Steep clay tile + copper finial	RF19B	19.6 m²	72.9 °	>70 or wall °	0.50	9.8 m²														Effective area is 50% of measured elevational area (survey)									
	Steep clay tile + copper finial	RF19C	12.1 m²	72.9 °	>70 or wall °	0.50	6.1 m²														Effective area is 50% of measured elevational area (survey)									
	Steep clay tile + copper finial	RF19D	19.6 m²	72.9 °	>70 or wall °	0.50	9.8 m²														Effective area is 50% of measured elevational area (survey)									
Exist. RF19-OUT.01			31.7 m²	1	31.7 m²	0.02	l/s/m²	0.63	l/s	37 m²	100 mm	3927 mm²	63 mm dia	3,117 mm²	100	90	6,362 mm²	✓		Meets AD Part H3. Discharges onto RF20 roof below.										
	Bitumen Mineral felt inc. parapet	RF20	52.6 m²	3.0 °	Flat °	1.00	52.6 m²														Wall to RF19: 3.9m L x3.3m H = 12.9m².									
	Masonry Wall to RF19	Wall to RF19	12.9 m²	90.0 °	>70 or wall °	0.50	6.5 m²														Wall to plant equip = 12.8m L x 2.3m H = 29.4m².									
	Plant enclosure walls*	(To RF20)	29.4 m²	90.0 °	>70 or wall °	0.50	14.7 m²														*Discount parapet wall as shielded by plant.									
Exist. RF20-OUT.01			105.5 m²	1	105.5 m²	0.02	l/s/m²	2.11	l/s	200 m²	250 mm	24544 mm²	150 mm dia	17,671 mm²	100	90	6,362 mm²	✗		Marginally failing to meet AD Part H3. RWP to Ground										
RZ.13	Clay tile hipped + rooflight	RF18B	6.7 m²	44.2 °	45 °	1.15	7.7 m²													RZ.13	Note RF18-OUT.02 discharges two ways: Into RF20-EGUT.01 (to final outlet at RF20-OUT.01 to Ground) and to RF18-OUT.02.									
	Clay tiled hipped (part)	RF18C (Part)	21.5 m²	44.3 °	45 °	1.15	24.7 m²																							
Exist. RF18-OUT.02			32.4 m²	2	16.2 m²	0.02	l/s/m²	0.32	l/s	18 m²	75 mm	2209 mm²	50 mm dia	1,963 mm²	150	140	15,394 mm²	✓		Meets AD Part H3. Discharges onto eaves gutter RF20-GUT.01 (that leads to RF20-OUT.01 to Ground) and RF 21-EGUT.01 (that leads to RF21-OUT.01 to ground) Adj. wall to RF20 = 44.6m² and adj. wall to RF18 = 55.4m² (from Survey).										
	Stone pavers over assumed asphalt	RF21-EGUT.01	20.3 m²	3.0 °	Flat °	1.00	20.3 m²																							
	Wall to adjacent Block	Wall to R20	44.6 m²	90.0 °	>70 or wall °	0.50	22.3 m²																							
	Wall to adjacent Block	Wall to R18	55.4 m²	90.0 °	>70 or wall °	0.50	27.7 m²																							
Exist. RF21-OUT.01			102.7 m²	1	102.7 m²	0.02	l/s/m²	2.05	l/s	103 m²	150 mm	8836 mm²	89 mm dia	6,221 mm²	100	90	6,362 mm²	✓												
RZ.14	Clay tile hipped	RF18C (Part)	13.3 m²	44.3 °	45 °	1.15	15.3 m²													RZ.14	Wall to RF18 from survey: 27.0m².									
																					Note RF18-OUT.02 discharges two ways: Into RF20-EGUT.01 (to final outlet at RF20-OUT.01 to Ground) and to RF18-OUT.02.									
Exist. RF18-OUT.03			15.3 m²	2	7.6 m²	0.02	l/s/m²	0.15	l/s	18 m²	75 mm	2209 mm²	50 mm dia	1,963 mm²	100	90	6,362 mm²	✓		Repair to Lead swan-neck required.										
	Slate hipped	RF22A (Part)	4.8 m²	28.2 °	30 °	1.29	6.2 m²														Gutter RF22-EGUT.01 has 2 outlets: FR22-OUT.02 and RF22-OUT.01 (to Zone RZ15)									
	Slate hipped	RF22D	4.9 m²	28.0 °	30 °	1.29	6.3 m²																							
	Slate hipped	RF22C (Part)	9.3 m²	28.0 °	30 °	1.29	12.0 m²																							
	Asphalt Gutters	RF18-GUT.02(Part) /01	10.2 m²	2.0 °	Flat °	1.00	10.2 m²																							
	Masonry Wall to RF19	Wall to RF18	27.0 m²	90.0 °	>70 or wall °	0.50	13.5 m²																							
	Masonry Wall to RF16	Wall to RF16	83.5 m²	90.0 °	>70 or wall °	0.50	41.8 m²																							
Exist. RF22-OUT.02			105.3 m²	2	52.6 m²	0.02	l/s/m²	1.05	l/s	53 m²	115 mm	5194 mm²	63 mm dia	3,117 mm²	100	100	7,854 mm²	✓		Meets AD Part H3 (2 outlets). Discharges onto RF 21-EGUT.01.										
RZ.15	Slate hipped	RF22A (Part)	4.9 m²	28.2 °	30 °	1.29	6.3 m²													RZ.15	Wall to RF18 from survey: 8.1m².									
	Slate hipped	RF22B	4.9 m²	28.0 °	30 °	1.29	6.3 m²														Wall to RF16 from survey: 28.7m².									
	Slate hipped	RF22C (Part)	9.1 m²	28.0 °	30 °	1.29	11.7 m²														Note RF18-OUT.02 discharges two ways: Into RF20-EGUT.01 (to final outlet at RF20-OUT.01 to Ground) and to RF18-OUT.02.									
	Asphalt Gutters	RF18-GUT.02(Part) /03	4.3 m²	2.0 °	Flat °	1.00	4.3 m²																							
	Masonry Wall to RF19	Wall to RF18	8.1 m²	90.0 °	>70 or wall °	0.50	4.1 m²																							
	Masonry Wall to RF21	Wall to RF21	28.7 m²	90.0 °	>70 or wall °	0.50	14.4 m²																							
Exist. RF22-OUT.01			152.3 m²	2	76.2 m²	0.02	l/s/m²	1.52	l/s	103 m²	150 mm	8836 mm²	89 mm dia	6,221 mm²	100	100	7,854 mm²	✓		Meets AD Part H3. Discharges to ground										
NEW WORKS																														
RZ.03													103.5 m²																	
RZ.06													92.8 m²																	
Prop. RF17-GAR.01			New Hopper and 2No. RWP	Adj. RF17											196.3 m²	0.02	l/s/m²	3.93	l/s	250 m²	300 mm	35343 mm²	200 mm dia	31,416 mm²	100	100	7,854 mm²	✗		Single RWP failing to meet AD Part H.
													196.3 m²	2	98.2 m²	0.02	l/s/m²	1.96	l/s	103 m²	150 mm	8836 mm²	89 mm dia	6,221 mm²	100	100	7,854 mm²	✓		Meets AD Part H3. To be routed to discharge to ground
RZ.01					Comments																									
Prop. RF6-GAR.01			Lead Lined Gargoyle ~225mm W x 150mm T	RF6	Above existing RF06- RWP.01															✓										
Prop. RF6-HOP.01			J&JW Longbottom Ltd. No. 37 o.s.a.	RF6	Adjusted existing RF06- RWP.01 Hopper size: (280 BW) 241 W x 178 D x 286 H mm (!)=Bracket W															✓										
Prop. RF6-GAR.02			Lead Lined Gargoyle ~225mm W x 150mm T	RF6	To existing SVP - renamed RF06- RWP.02															✓										
Prop. RF6-HOP.02			J&JW Longbottom Ltd. No. 37 o.s.a.	RF6	Adjusted SVP - renamed RF06- RWP.02 Hopper size: (280 BW) 241 W x 178 D x 286 H mm															✓										
RZ.06																														
Prop. RF17-GAR.01			Lead Lined Gargoyle ~225mm W x 150mm T	RF17	Note new RWP or hopper is not practicable but new gargoyle overflow will effectively reduce flow.															✓										

RZ.07					
Prop.	RF16-GAR.01	Lead Lined Gargoyle ~225mm W x 150mm T	RF16	Above existing outlet R16-OUT.01	✓
Prop.	RF16-HOP.01	J&JW Longbottom Ltd. No. 196 o.s.a.	RF16	Hopper size: (610 BW) 432 W x 191 D x 508 H mm	✓
Prop.	RF16-RWP.01	J&JW Longbottom Ltd. 6" Circular o.s.a.	RF16	RWP size: 150mm Ø (6" Ø) cast iron.	✓
RZ.08					
Prop.	RF15-GAR.01	Lead Lined Gargoyle ~225mm W x 150mm T	RF15	New overflow above new outlet repositioned to side of existing window above roof RF18.	✓
Prop.	RF15-HOP.01	J&JW Longbottom Ltd. No. 196 o.s.a.	RF15	Hopper size: (610 BW) 432 W x 191 D x 508 H mm	✓
Prop.	RF15-RWP.01	J&JW Longbottom Ltd. 6" Circular o.s.a.	RF16	RWP size: 150mm Ø (6" Ø) cast iron to replace smaller diameter RWP (removed)	✓
Prop.	RF15-HOP.02	J&JW Longbottom Ltd. No. 196 o.s.a.	RF15	Hopper size: (610 BW) 432 W x 191 D x 508 H mm	✓
RZ.10					
Prop.	RF11-GAR.02	Lead Lined Gargoyle ~225mm W x 150mm T	RF11	Above existing RF11- RWP.01	✓
Prop.	RF11-HOP.02	J&JW Longbottom Ltd. No. 37 o.s.a.	RF11	Adjusted existing RF11- RWP.01 Hopper size: (280 BW) 241 W x 178 D x 286 H mm (I)=Bracket W	✓
RZ.11					
Prop.	RF14-GAR.01	Lead Lined Gargoyle ~225mm W x 150mm T	RF14	Above existing RF14- RWP.01	✓
Prop.	RF14-HOP.01	J&JW Longbottom Ltd. No. 37 o.s.a.	RF14	Adjusted existing RF14- RWP.01 Hopper size: (280 BW) 241 W x 178 D x 286 H mm (I)=Bracket W	✓
Prop.	RF14-GAR.02	Lead Lined Gargoyle ~225mm W x 150mm T	RF14	Above existing RF14- RWP.01	✓
Prop.	RF14-HOP.02	J&JW Longbottom Ltd. No. 37 o.s.a.	RF14	Adjusted existing RF14- RWP.01 Hopper size: (280 BW) 241 W x 178 D x 286 H mm (I)=Bracket W	✓
Prop.	RF15-RWP.01	J&JW Longbottom 4.5" Circular o.s.a.	RF16	New RWP size: 100mm Ø (4.5" Ø) cast iron	✓
Prop.	RF18-GAR.02	Lead Lined Gargoyle ~225mm W x 150mm T	RF18	Above existing RF18- RWP.01	✓
Prop.	RF18-HOP.02	J&JW Longbottom Ltd. No. 37 o.s.a.	RF18	Adjusted existing RF18- RWP.01 Hopper size: (280 BW) 241 W x 178 D x 286 H mm (I)=Bracket W	✓

- NOTES
1. Outlet Size is as measured from Survey by Sovo, but actual down pipes may be smaller than the diameters stated.

2. For example a 110mm Øe external outlet may have a 100mm internal diameter, a 150mm Øe > 140mm Øi, a 200mm Øe > 140mm Øi.

3. Estimated outlet areas are calculated as πr^2 wher r is half the diameter (the radius) of the estimated internal pipe dimension.

4. For full description and Roof reference refer to Existing Roof Plan 997/015 and individual roof plan drawings 997/400 series.

5. Note the Roof Zones depect 'catchment areas' typically made of multiple roof planes, and flat roofs.

6. Roof outlets are shown to each 'catchment area'. Where one catchment flows directly onto another the same zone colour is used.

7. Roof Areas are measured as follows: Flat roofs and pitches upto 70 degrees are measured as plan areas.

Roof Pitches over 70 degrees and walls (capturing wind driven precipitation) are measured as elevational areas.

8. Measure Pitch Angles are illustrated.

9. Effective pitch angles are used for calculation purposes according to table 1 of AD Part H3 to give the roof area multiplication factor.

10. The Effective Roof Area is the Measured Area x Scale Factor

11. The calculated roof area totals are illustrated for each catchment summing the individual Effective Roof Areas for that catchment.

12. Most catchment areas are served by one outlet, however where two are illustrated this halves the Effective Roof Area.

13. TOTAL Effective Roof Area is the Effective Roof Area divided by the number of outtlest serving that area.

14. Rainfall Intensity fo rthe Reading Area is 0.20 l/s/m².

15. Max Flow Rate = TOTAL Effective Roof Area / Rainfall Intensity

16. The MaxFlow Rate informs the calculated Gutter size (assumes half round) and Outlet size (assumes circular) according to Table 2 of AD Part H3.

17. Note Table 2 has been adapted to include larger Effective Roof Areas for illustrative purposes only were Maximum effective roof area of 103m² is exceeded.

18. Note swan-necks, plinth offsets, access points (for rodding) show outlets, connectors and brackets have not been scheduled bust should be included in costings.

Max Effective		Half Round		Gutter Area		Circular Outlet Size		Outlet Area		Flow Rate
6	m ²	-		-		-		-		-
18	m ²	75	mm	2209	mm ²	50	mm dia	1,963	mm ²	0.38 l/s
37	m ²	100	mm	3927	mm ²	63	mm dia	3,117	mm ²	0.78 l/s
53	m ²	115	mm	5194	mm ²	63	mm dia	3,117	mm ²	1.11 l/s
65	m ²	125	mm	6136	mm ²	75	mm dia	4,418	mm ²	1.37 l/s
103	m ²	150	mm	8836	mm ²	89	mm dia	6,221	mm ²	2.16 l/s
150	m ²	200	mm	15708	mm ²	100	mm dia	7,854	mm ²	2.62 l/s
200	m ²	250	mm	24544	mm ²	150	mm dia	17,671	mm ²	5.89 l/s
250	m ²	300	mm	35343	mm ²	200	mm dia	31,416	mm ²	10.47 l/s

Adapted Table 2 - AD Part H3 (2010)