

Rainwater Drainage Calculations

Radcliffe Hub – Market Chambers

26/06/2023

RADHUB-HAN-V2-XX-CA-M-0002 Issue 01

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1.0 Rainwater Flow Rates & Roof Areas

RAINWATER FLOW RATES & ROOF AREAS

Project Roof Areas

Roof Zone	Description	Roof Area
		(m2)
1	Link Block 2nd Floor Roof	50
	Existing Chambers Roof	20
2	Link Block Main Roof	60
3	New External Terrace	90
4	Market Hall Extension Roof	75
5	Existing Chambers Roof	90

BS Calculation Method

Calculate Total Rainwater Flow Rate

The rate of flow of rainwater to be drained away from a roof under steady state conditions shall be calculated from the following equation:

Q = r x A x C

Where;

- Q
- is the flow rate of water (l/s)
- r
- is the rainfall intensity (l/s/m2)
- A
- is the effective roof area (m2)
- C
- is a runoff coefficient (taken as 1.0 unless national and local regulations and practice state otherwise)

Roof Zone 1: Link Block 2nd Floor Roof & Existing Chambers Roof Areas

Details	Units	Value
Rainfall Intensity	(l/s/m2)	0.05
Safety Margin	(%)	10%
Rainfall Intensity 'R'		0.055
Total Roof Area	(m2)	70
Wall 1		
Wall Length	(m)	10.5
Wall Height	(m)	3.8
Wall Surface Area	(m2)	39.9
50% of Surface Area	(m2)	19.95
Effective Roof Area 'A'	(m2)	89.95
Runoff Coefficient 'C'		1.0
Rainwater Flow Rate 'Q'	(l/s)	4.95

Roof Zone 1 Sub Zones - Roof Outlet Numbers & Sizes

Details	Units	1-1
Roof Zone Area	(m2)	70.0
Wall Zone Area	(m2)	39.9
Effective Roof Zone Area	(m2)	90.0
Roof Zone Flow Rate	(l/s)	4.95
Outlet Size	(mmØ)	100
Outlet Type	(mmØ)	WADE TYPE B
Head of Water	(mm)	35
Max Flow Rate	(l/s)	7.5
CHECK		PASS
Total Flow Rate	(l/s)	4.95

Roof Zone 2: Link Block Main Roof

Details	Units	Value
Rainfall Intensity	(l/s/m2)	0.05
Safety Margin	(%)	10%
Rainfall Intensity 'R'		0.055
Roof Area	(m2)	60
Wall		
Wall Length	(m)	
Wall Height	(m)	
Wall Surface Area	(m2)	
50% of Surface Area	(m2)	
Effective Roof Area 'A'	(m2)	60.00
Runoff Coefficient 'C'		1.0
Rainwater Flow Rate 'Q'	(l/s)	3.30

Roof Zone 2 Sub Zones - Roof Outlet Numbers & Sizes

Details	Units	2-1
Roof Zone Area	(m2)	60
Wall Zone Area	(m2)	
Effective Roof Zone Area	(m2)	60.0
Roof Zone Flow Rate	(l/s)	3.30
Outlet Size	(mmØ)	100
Outlet Type	(mmØ)	WADE TYPE B
Head of Water	(mm)	35
Max Flow Rate	(l/s)	7.5
CHECK		PASS
Total Flow Rate	(l/s)	3.30

Roof Zone 3 - New External Terrace

Details	Units	Value
Rainfall Intensity	(l/s/m2)	0.05
Safety Margin	(%)	10%
Rainfall Intensity 'R'		0.055
Roof Area	(m2)	90
Wall 1 (Market Hall)		
Wall Length	(m)	13.9
Wall Height	(m)	4.5
Wall Surface Area	(m2)	62.55
50% of Surface Area	(m2)	31.28
Wall 2 (Link Block)		
Wall Length	(m)	11.5
Wall Height	(m)	10
Wall Surface Area	(m2)	115.00
50% of Surface Area	(m2)	57.50
Wall 3 (Market Chambers)		
Wall Length	(m)	11.2
Wall Height	(m)	10
Wall Surface Area	(m2)	112.00
50% of Surface Area	(m2)	56.00
Effective Roof Area 'A'	(m2)	234.78
Runoff Coefficient 'C'		1.0
Rainwater Flow Rate 'Q'	(l/s)	12.91

Roof Zone 3 - Roof Outlet Numbers & Sizes

Details	Units	3-1	3-2
Roof Zone Area	(m2)	32.6	58.5
Wall Zone Area	(m2)	178.1	111.1
Effective Roof Zone Area	(m2)	121.6	114.0
Roof Zone Flow Rate	(l/s)	6.69	6.27
Outlet Size	(mmØ)	100	100
Outlet Type	(mmØ)	WADE TYPE B	WADE TYPE B
Head of Water	(mm)	35	35
Max Flow Rate	(l/s)	7.5	7.5
CHECK		PASS	PASS
Total Flow Rate	(l/s)	12.96	

Roof Zone 4 - Market Hall Extension Roof

Details	Units	Value
Rainfall Intensity	(l/s/m2)	0.05
Safety Margin	(%)	10%
Rainfall Intensity 'R'		0.055
Roof Area	(m2)	75
Walls		
Wall Length	(m)	10.8
Wall Height	(m)	7.5
Wall Surface Area	(m2)	81
50% of Surface Area	(m2)	40.5
Effective Roof Area 'A'	(m2)	115.5
Runoff Coefficient 'C'		1.0
Rainwater Flow Rate 'Q'	(l/s)	6.35

Roof Zone 4 - Roof Outlet Numbers & Sizes

Details	Units	4-1	4-2
Roof Zone Area	(m2)	32	43
Wall Zone Area	(m2)	81	0
Effective Roof Zone Area	(m2)	72.5	43.0
Roof Zone Flow Rate	(l/s)	3.99	2.37
Outlet Size	(mmØ)	100	100
Outlet Type	(mmØ)	WADE TYPE B	WADE TYPE B
Head of Water	(mm)	35	35
Max Flow Rate	(l/s)	7.5	7.5
CHECK		PASS	PASS
Total Flow Rate	(l/s)	6.35	

Roof Zone 5: Existing Chambers Roof

Details	Units	Value
Rainfall Intensity	(l/s/m2)	0.05
Safety Margin	(%)	10%
Rainfall Intensity 'R'		0.055
Total Roof Area	(m2)	90
Wall 1		
Wall Length	(m)	
Wall Height	(m)	
Wall Surface Area	(m2)	0
50% of Surface Area	(m2)	0
Effective Roof Area 'A'	(m2)	90
Runoff Coefficient 'C'		1.0
Rainwater Flow Rate 'Q'	(l/s)	4.95

Roof Zone 5 Sub Zones - Roof Outlet Numbers & Sizes

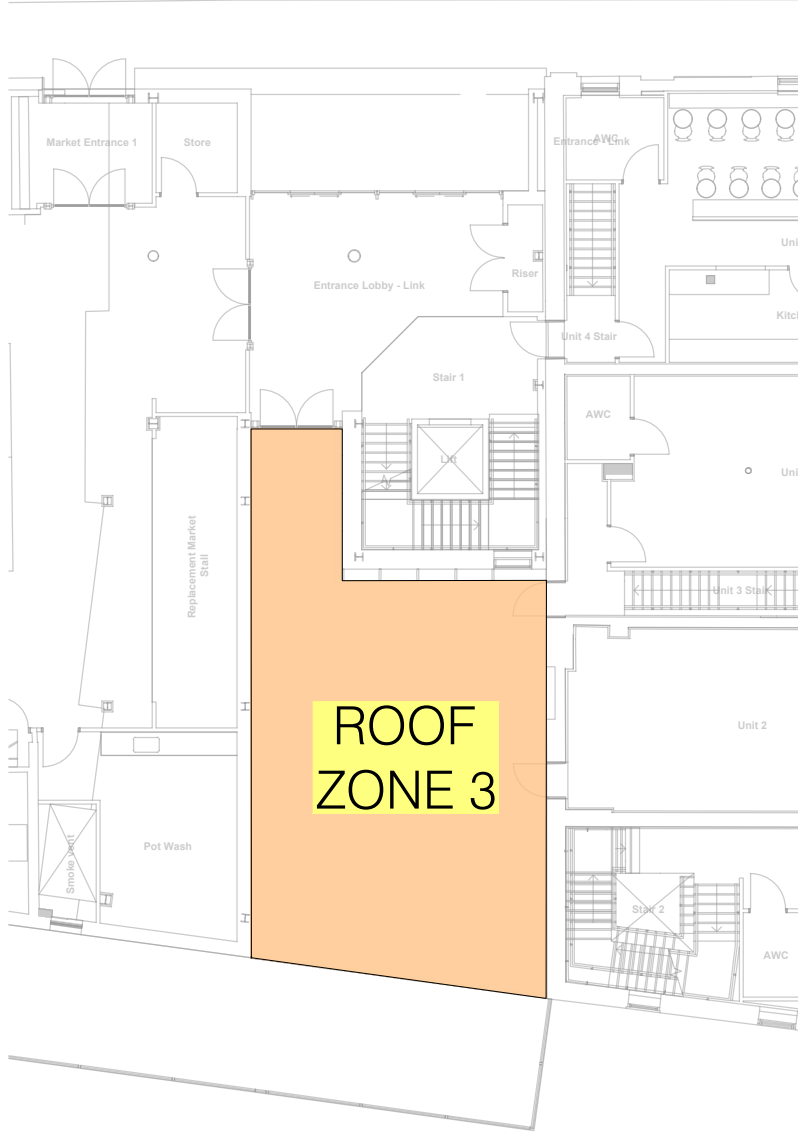
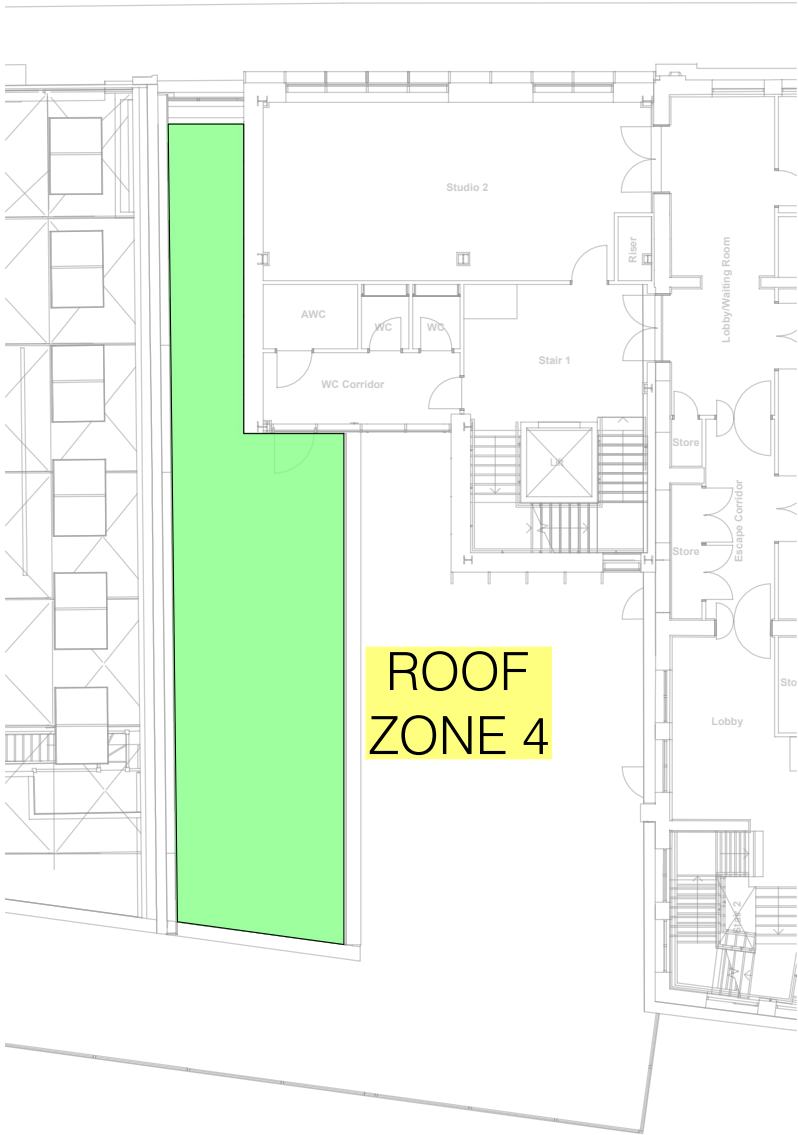
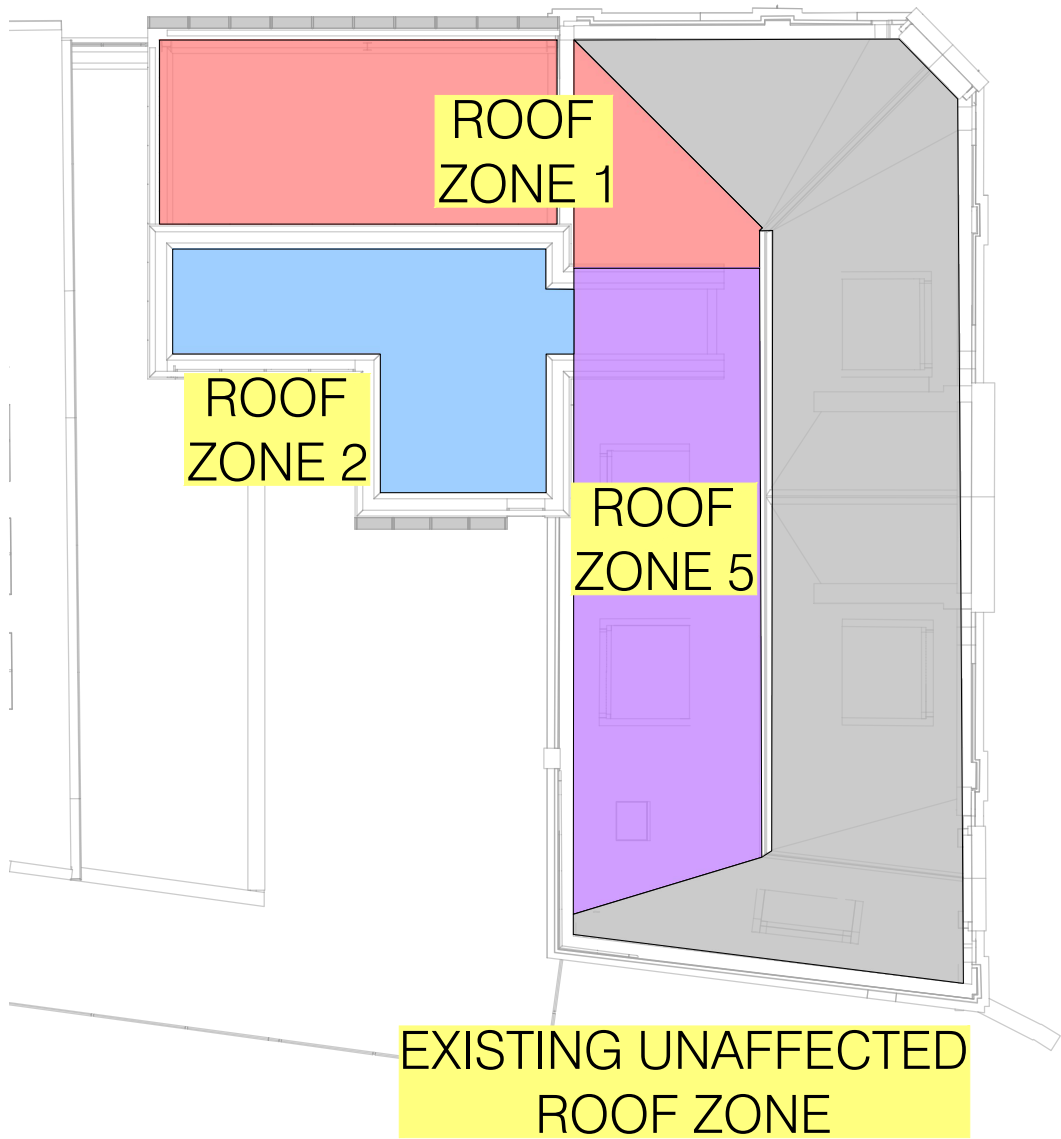
Details	Units	5-1
Roof Zone Area	(m2)	90.0
Wall Zone Area	(m2)	
Effective Roof Zone Area	(m2)	90.0
Roof Zone Flow Rate	(l/s)	4.95
Outlet Size	(mmØ)	100
Outlet Type	(mmØ)	WADE TYPE B
Head of Water	(mm)	35
Max Flow Rate	(l/s)	7.5
CHECK		PASS
Total Flow Rate	(l/s)	4.95

2.0 Rainwater Stacks

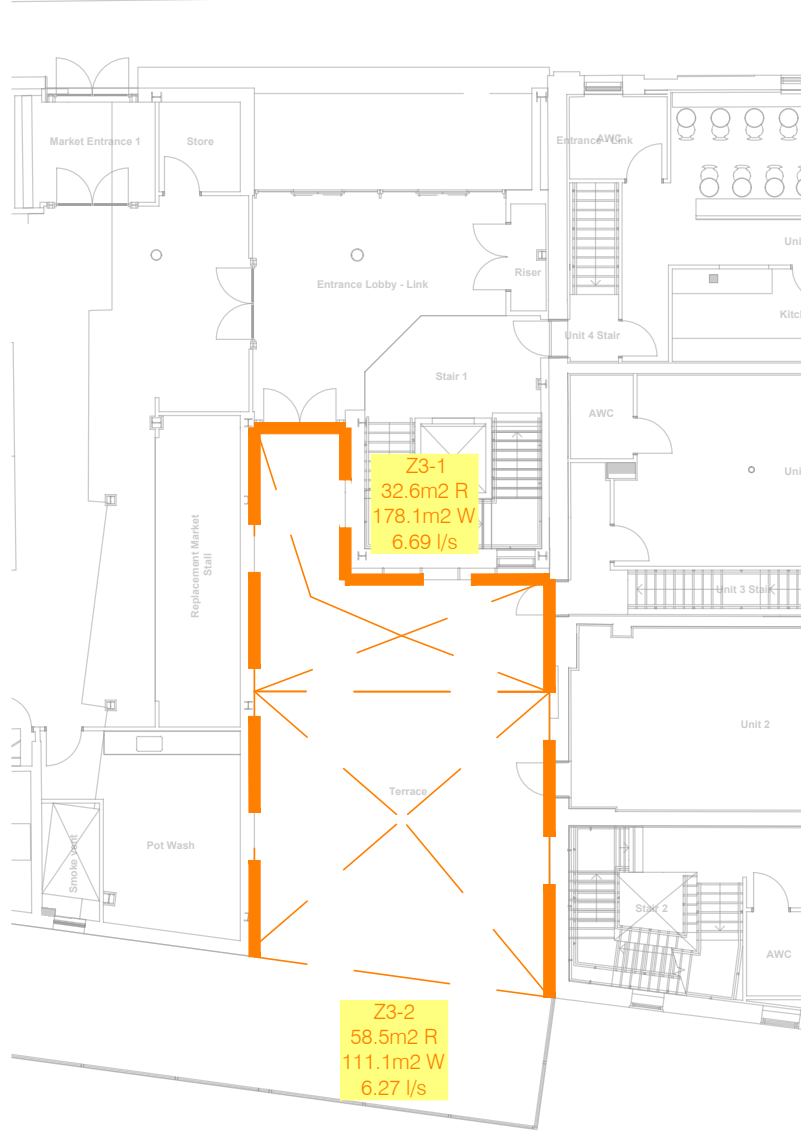
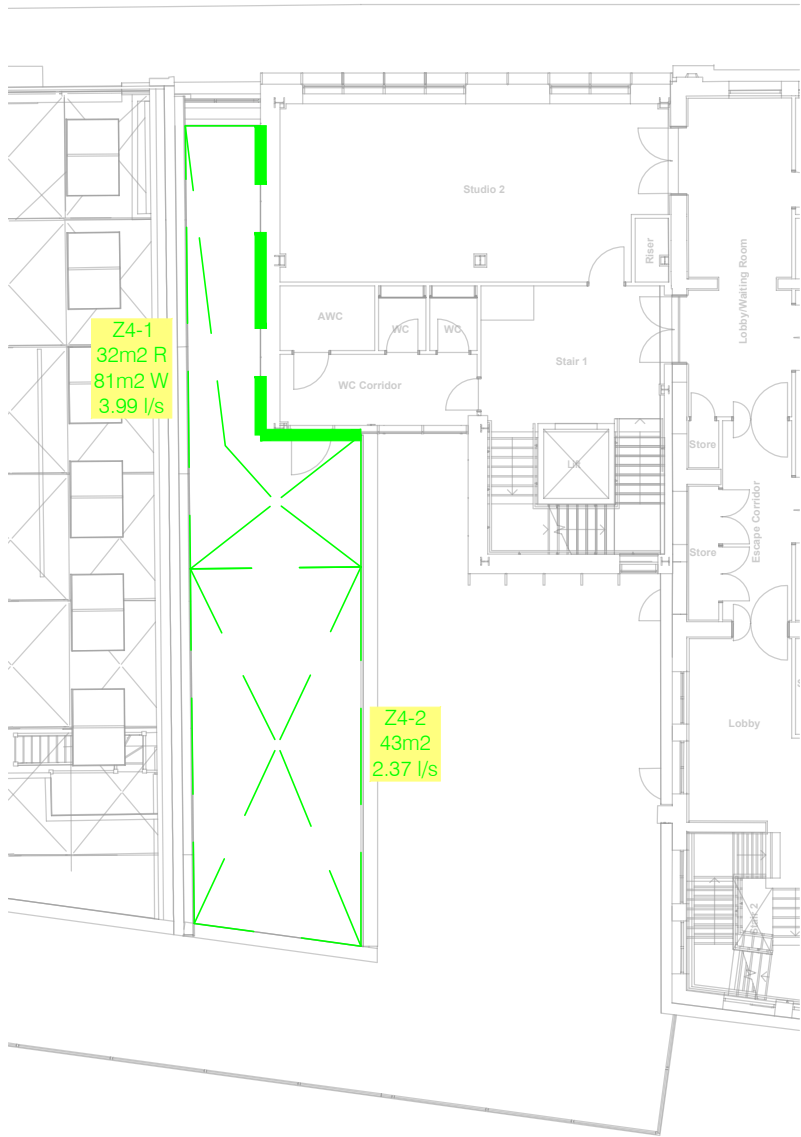
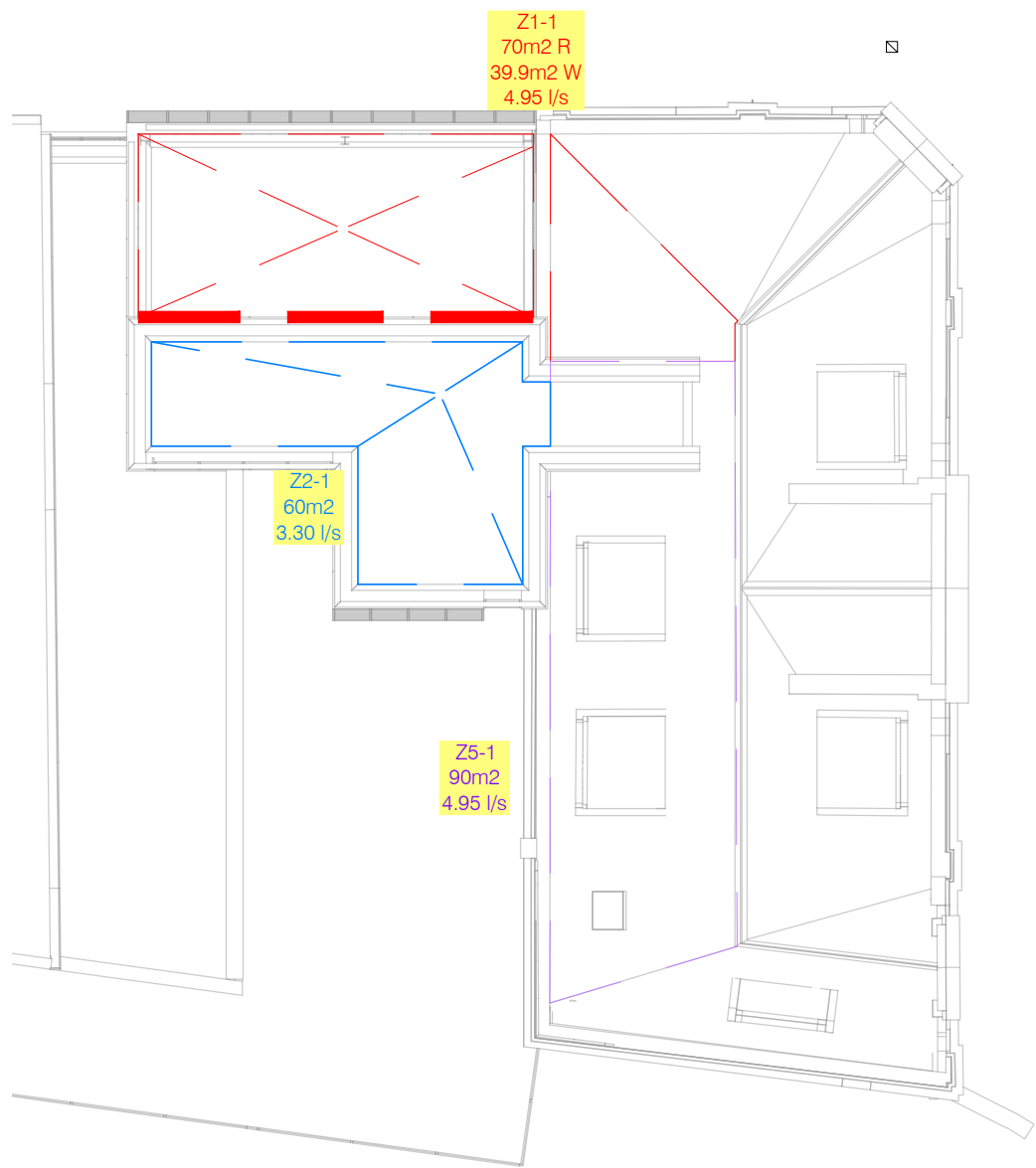
RAINWATER STACKS

Ref	Roof Zones Served	Roof Zone Flow Rate	Total Flow Rate	Size	Flow Rate (f = 0.33)
		(l/s)	(l/s)	(mm)	(l/s)
RW01	2-1	3.30	8.25	110Ø	10.70
	1-1	4.95			
RW02	5-1 (half)	2.48	2.48	110Ø	10.70
RW03	5-1 (half)	2.48	2.48	110Ø	10.70
RW04	4-1	3.99	3.99	110Ø	10.70
RW05	4-2	2.37	2.37	110Ø	10.70
Terrace (no stack)	3-1	6.69	6.69	110Ø	10.70
	3-2	6.27	6.27	110Ø	10.70
EXISTING OUTFALL CONNECTION			32.52	200Ø	68.00

3.0 Roof Zones



4.0 Roof Sub Zones



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