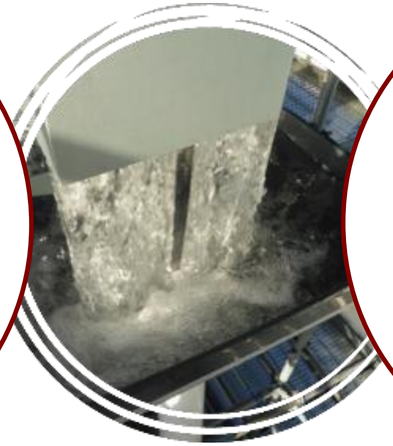
Dam Buster Products



Performance Solutions

DAM BUSTER

Presentation to AHSCA (Vic)

13 April 2022

Presenters

Russell Kirkwood, Forensic Plumber & Founder
Rowan Gregory, Technical Manager & Civil Engineer

GOOD DESIGN AWARD® WINNER
PRODUCT DESIGN
HARDWARE AND BUILDING
DAM BUSTER RAIN HEAD

ASSOCIATION OF HYDRAULIC SERVICES CONSULTANTS AUSTRALIA
AHSCA
RESEARCH FOUNDATION

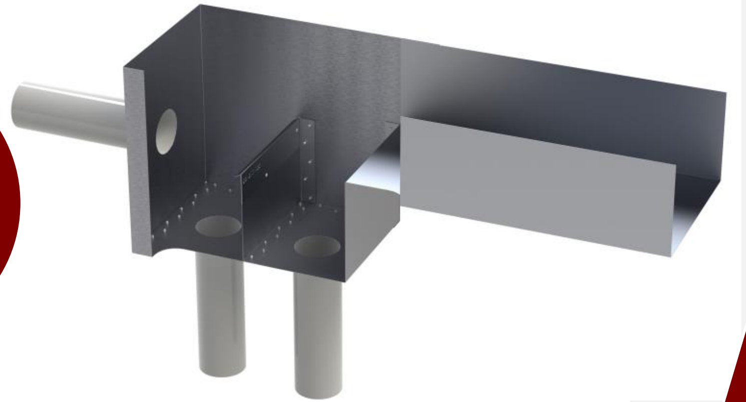
AUSTRALIAN OWNED
#00581

DAM BUSTER

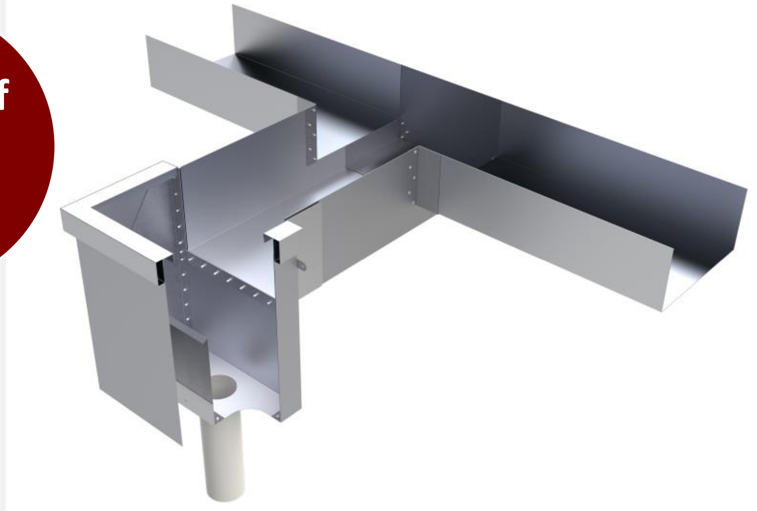
The Dam Buster Solution

- Rainhead

- Free Flow Sumps



- Change of Direction Devices



- Safe
- Easy to use
- Easy to design
- Cost effective
- Quality assured
- Standard sizes
- Interlocking components
- The 'Ikea' of roof drainage
- Solves change of direction problem

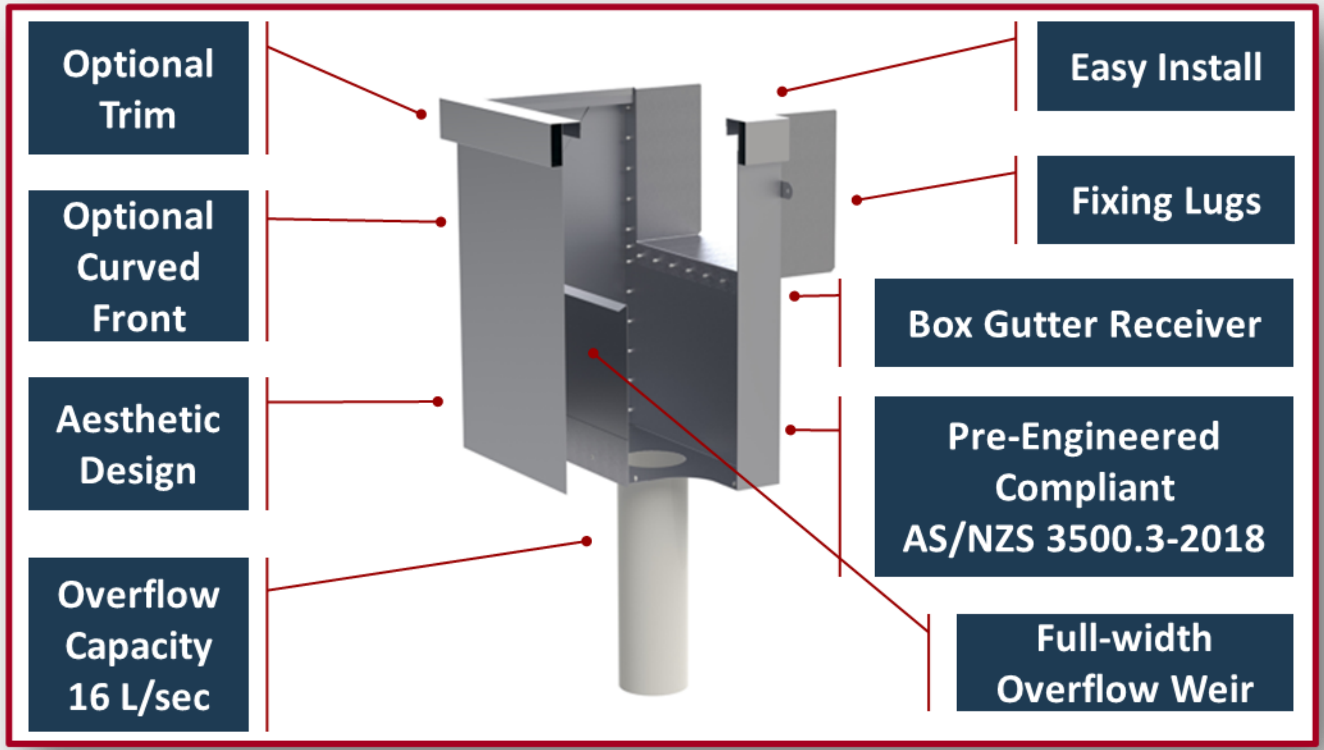
AHSCA – Association of Hydraulic Services Consultants Australia – Research Foundation

GOOD DESIGN AWARD® WINNER – PRODUCT DESIGN – HARDWARE AND BUILDING – DAM BUSTER RAIN HEAD

AUSTRALIAN OWNED #00581

DAM BUSTER

Dam Buster Rainheads

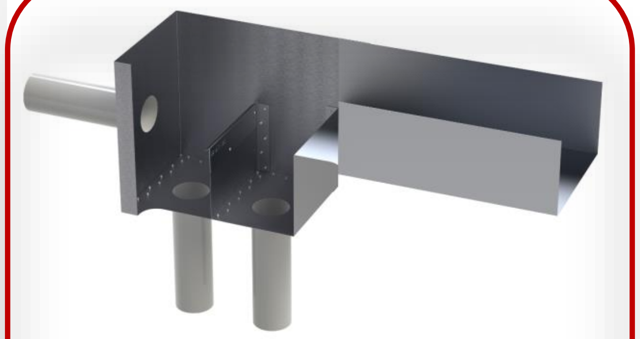


Unique rainhead features include:

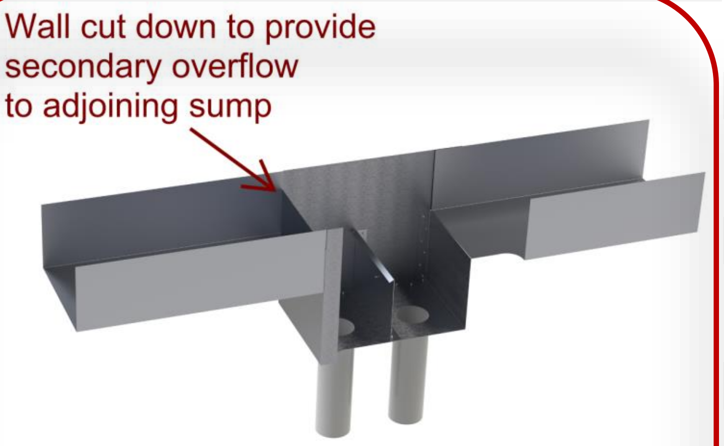
- Full width overflow weir
- Rear seal
- Front chute
- Fixing lugs
- High performance

16 L/sec min overflow in all models

Dam Buster Free Flow Sumps



Sump with indicator



Continuous sump

- Unique free flow design
- World first idea
- Use singly or in a series
- Operates under free flow only
- Full blockage overflow indicator
- Safer and smaller than prescribed AS high capacity sump devices

GOOD DESIGN AWARD® WINNER
PRODUCT DESIGN
HARDWARE AND BUILDING
DAM BUSTER RAIN HEAD

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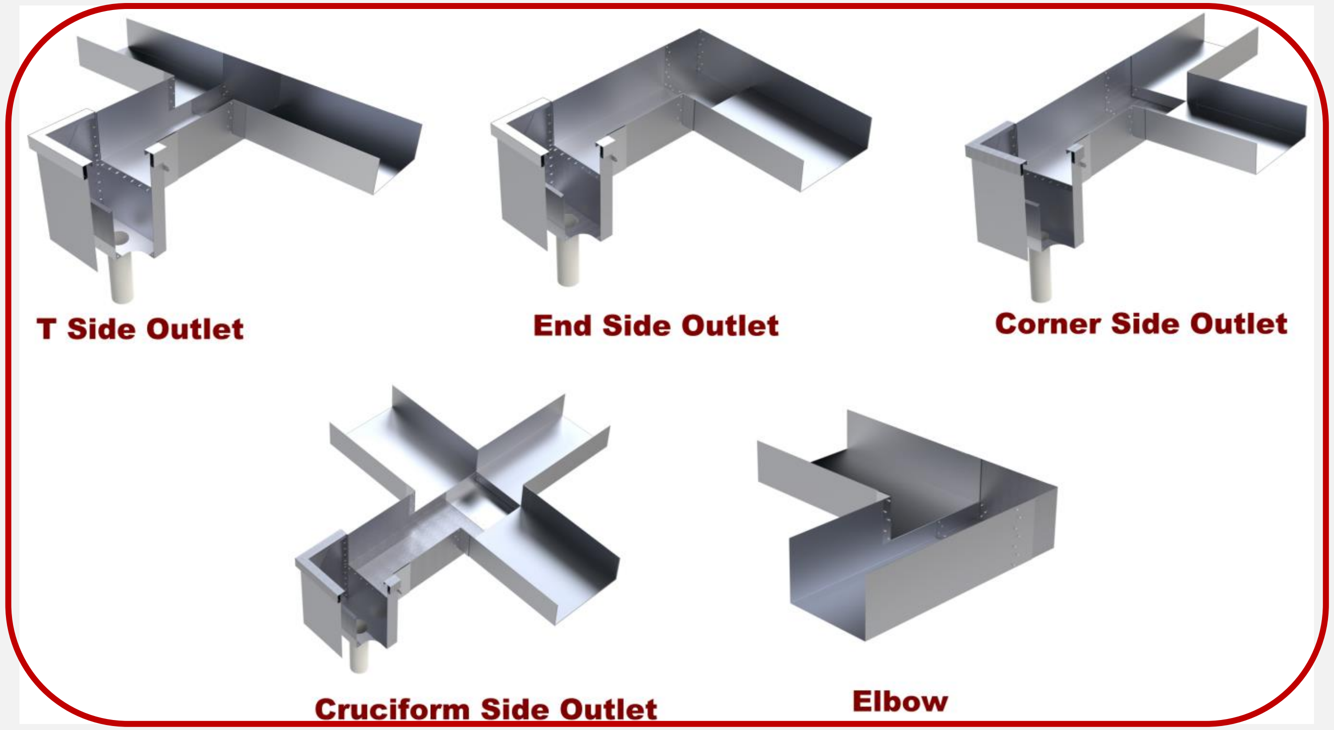
Dam Buster Change of Direction Devices

Direction Change Devices
- T Side Outlet
- End Side Outlet
- Corner Side Outlet
- Cruciform Side Outlet
- Elbows

More world unique designs

Fully integrated

In built adjustability for ease of selection and installation

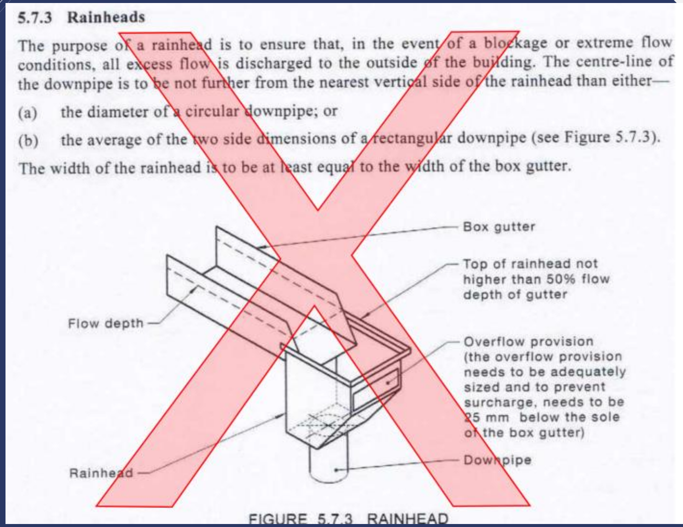


Example – two changes of direction with an Elbow and a T Side Outlet

DAM BUSTER

SA HB 39 2015 Amd 1

Published 30 July 2021 – Every single rainhead other than Figure I2 or the Dam Buster rainhead is now non-compliant



5.7.3 Rainheads

The purpose of a rainhead is to ensure that, in the event of a blockage or extreme flow conditions, all excess flow is discharged to the outside of the building. The centre-line of the downpipe is to be not further from the nearest vertical side of the rainhead than either—

(a) the diameter of a circular downpipe; or

(b) the average of the two side dimensions of a rectangular downpipe (see Figure 5.7.3).

The width of the rainhead is to be at least equal to the width of the box gutter.

FIGURE 5.7.3 RAINHEAD

Clause 5.7.3 &

Figure 5.7.3 were

DELETED

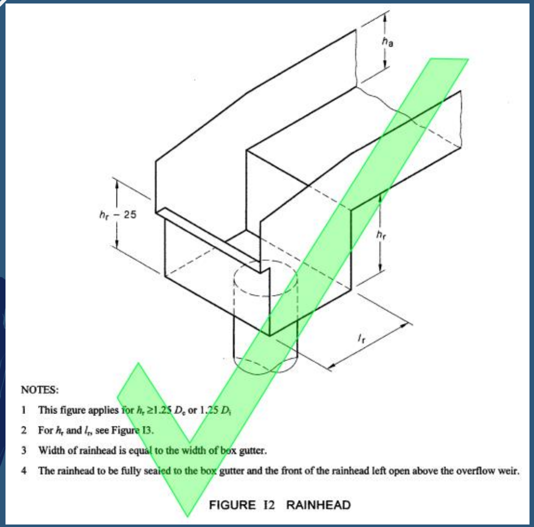
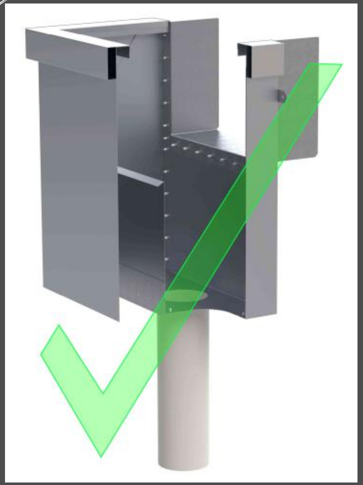


FIGURE I2 RAINHEAD

Figure I2

AS/NZS 3500.3-2018



Dam Buster Rainhead

Rainheads are proliferating on today's contemporary buildings, yet this significant amendment has not been openly communicated to the industry.

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Governing Provisions of NCC

- Same for all volumes 1, 2 & 3
- A2.0 - Compliance
  - Must comply with Governing Provisions & Performance Requirements
- A2.1 - Compliance with Performance Requirement
  - DtS Solution and / or Performance Solution
- A2.2 - Performance Solution
  - Various assessment methods include:
    - Evidence of Suitability to Part A5
    - Verification methods
    - Expert Judgement
  - A2.2 (4) specifies the Performance Solution Process
    - Came into effect on 1 July 2021

COMPLIANCE

Governing Provisions of NCC

Governing Provisions –

Evidence of Suitability

- Required for all three volumes of the NCC
- A5.2 - Evidence of Suitability – Vols 1 & 2
  - NCC Volumes 1 & 2 – BCA Vol 1 & BCA Vol 2
  - Roof drainage designed by an Engineer
- A5.3 - Evidence of Suitability – Vol 3
  - NCC Volume 3 – Plumbing Code of Australia (PCA)
  - Roof drainage designed by a Plumber
  - Note – Roof drainage is a Victorian and Tasmanian state addition within the PCA.

GOVERNING PROVISIONS

Evidence of Suitability

Dam Buster – Evidence of Suitability

- Need to comply with both A5.2 & A5.3
- Dam Buster adopts
  - Product Technical Statement
  - Evidence of Suitability Document
  - Installation Manual
- Verification methods use a combination
  - Physical testing
  - Numerical analysis
  - Expert judgement by Adjunct Assoc. Professor Robert Keller
  - Benchmarking against AS/NZS 3500.3-2018 DtS Solutions
  - Detailed analysis of freeboard

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Evidence of Suitability

Dam Buster – Hydraulic engineering

- **Box gutters are free flow in all cases**
  - All Dam Buster overflow devices are free flow in both the ‘normal’ and overflow conditions =>
    - All box gutters are DtS per Figure I1 of AS/NZS 3500.3
    - Box gutters are designed independently of the Dam Buster overflow device
- **Backwatering cannot occur in box gutters discharging to DB devices**
  - For change of direction devices
    - Energy loss in at the bend is always less than the drop
  - Consequently, backwatering cannot occur in correctly sized and installed Dam Buster overflow devices =>
    - As noted above, the box gutter design is independent of the overflow device

DAM BUSTER

Hydraulic engineering

Dam Buster – Hydraulic engineering

- **Box Gutter Design**
  - Select minimum upstream depth from design chart
  - Design charts provided for:
    - 1 in 200, 1 in 150, 1 in 100 & 1 in 40 slopes
  - Design for 3 L/s minimum
- **Dam Buster Rainhead**
  - Select rainhead size and DP combination from design chart
- **Dam Buster Side Outlet and Rainhead combination**
  - No design required for Side Outlet itself
  - Provided the rainhead and DP combination is designed for the total flow in the (deep) outlet box gutter, the Side Outlet will be sized correctly
- **Dam Buster Sump**
  - Select sump size, depth and DP combination from design chart
  - Design aerial DP from design chart

Design chart for box gutters discharging to Dam Buster devices

Design flow rate L/s	Box gutter width (mm)								
	200	250	300	350	400	450	500	550	600
3.0	107	101	96	93	90	88	86	84	83
3.5	113	105	100	96	93	91	89	87	85
4.0	118	110	104	100	96	94	91	89	88
4.5	122	114	107	103	99	96	94	92	90
5.0	127	118	111	106	102	99	96	94	92
5.5	131	121	114	109	105	101	99	96	94
6.0	135	125	118	112	107	104	101	98	96
6.5	140	129	121	115	110	106	103	101	98
7.0	144	132	124	118	113	109	105	103	100
7.5	148	135	127	120	115	111	107	105	102
8.0	151	139	130	123	118	113	110	107	104
8.5	155	142	133	125	120	115	112	108	106
9.0	159	145	135	128	122	118	114	110	107
9.5	162	148	138	131	125	120	116	112	109
10.0	166	151	141	133	127	122	118	114	111
10.5	170	154	144	135	129	124	119	116	113
11.0	173	157	146	138	131	126	121	118	114
11.5	176	160	149	140	133	128	123	119	116
12.0	180	163	151	142	135	130	125	121	118
12.5	183	166	154	145	137	132	127	123	119
13.0	186	169	156	147	140	134	129	124	121
13.5	190	172	159	149	142	135	130	126	122
14.0	193	174	161	151	144	137	132	128	124
14.5	196	177	164	154	146	139	134	129	125
15.0	199	180	166	156	148	141	135	131	127
15.5	202	182	168	158	149	143	137	132	128
16.0	205	185	171	160	151	144	139	134	130

Minimum UPSTREAM box gutter depth (mm) for **1 in 200** slope

DAM BUSTER

Hydraulic engineering (cont.)

Dam Buster – Hydraulic engineering (cont.)

- Dam Buster Elbow
  - Upstream box gutter designed for total flow from upstream and downstream box gutter catchment areas
  - This conservative approach allows the design to be simplified
- SUMMARY - Hydraulic design is now very simple !!!
  - The only calculations required are to determine the design flow rates
  - ALL Dam Buster products are SELECTED from Design Tables
  - The minimum (UPSTREAM) depths of all box gutters is also SELECTED from charts for Fig I1

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Hydraulic Engineering (cont.)

Performance Solutions Templates

- **Performance Solutions are for Innovative products**
  - Templates are NOT intended for unique installations
  - Templates ARE for the usage of Dam Buster's innovative roof drainage products

- **Performance Solution Templates**
  - Performance requirements differ (but are similar) in
    - BCA Volume 1
    - BCA Volume 2
    - PCA (Victorian State Addition)
    - PCA (Tasmanian State Addition)
  - Templates prepared for:
    - PBDB – Performance Based Design brief
      - Templates for each of the above PBDBs
    - Final report
      - One template only (final report appends PBDB)
      - NOTE- The final report can be extended to cater for unique installations

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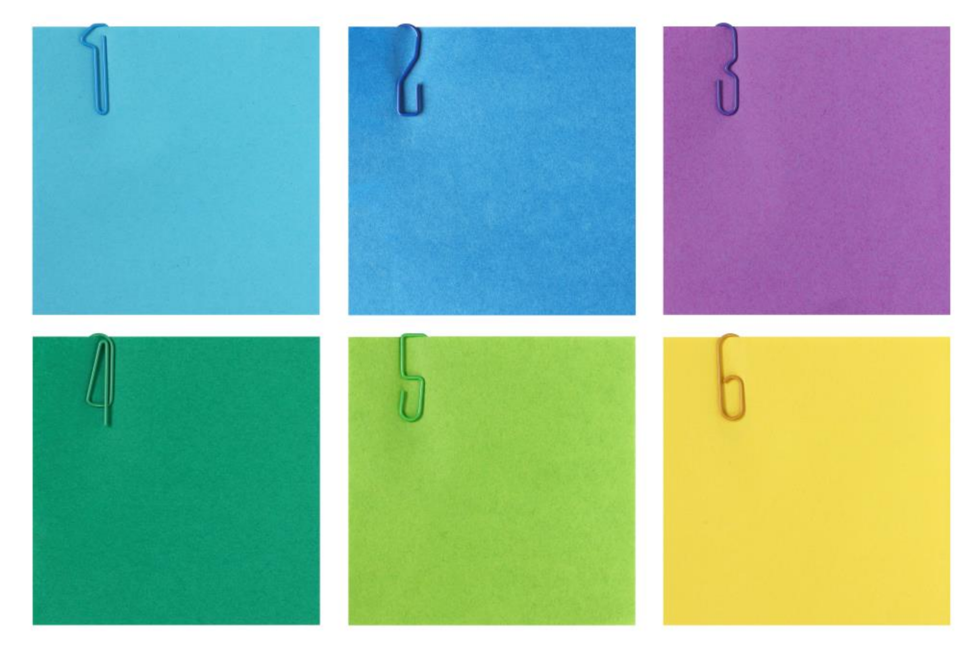
Performance Solution Templates

Design process in practice

Steps from start to finish

1. Provide quotation to client
2. Provide Performance Based Design Brief (template)
3. Client arranges for key stakeholders to sign PBDB
    - Key stakeholders
        - Builder Owner
        - Hydraulic Engineer or Plumber
        - Building Contractor
        - RBS ? Depends on the RBS's views !
4. Carry out design and documentation
5. Prepare Final Report (template), appending signed PBDB
6. Issue final documentation. For engineers, the Reg 126 (Certificate of Compliance – Design) references the drawings, computations and Performance Solution.



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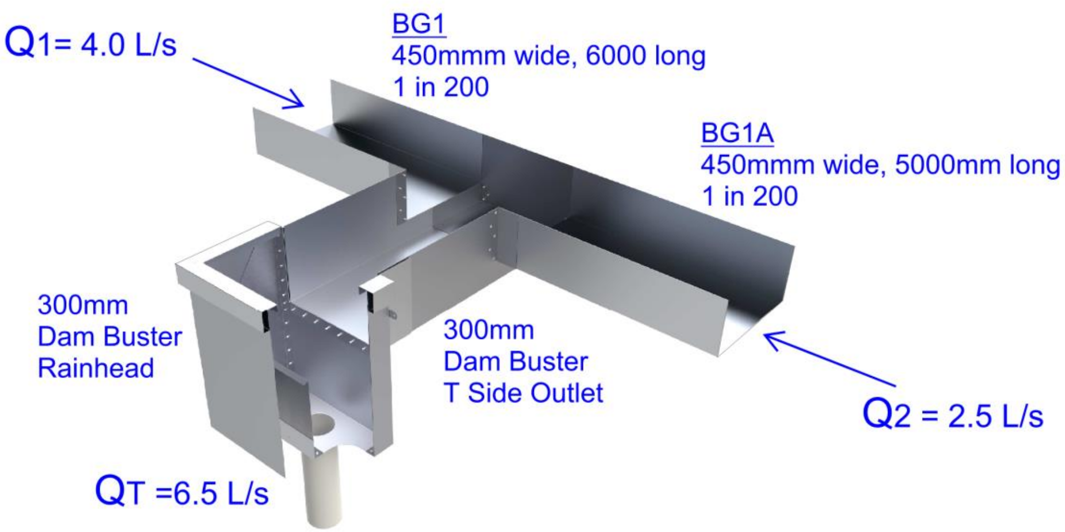
Design Process in Practice

Design example - Tee Side Outlet and Rainhead combination



Downpipe size	Equivalent diameter	Dam Buster Rainhead size				
		DB200	DB300	DB400	DB500	DB600
100 x 50	79 mm	4.00				
80 diam.	80 mm	4.00				
90 diam.	90 mm	4.70	6.50			
100 x 75	97 mm	5.00	7.30	8.00		
100 diam.	100 mm	5.00	7.60	8.80	8.80	
100 x 100	112 mm		8.80	12.0	12.0	
125 diam.	125 mm		9.50	13.8	15.4	15.9
150 x 100	137 mm			15.8	16.0	16.0
150 diam.	150 mm			16.0	16.0	16.0
Overflow Capacity of device (l/s)		> 16.0	> 16.0	> 16.0	> 16.0	> 16.0

Not recommended or not possible.

Maximum permissible flow rates (litres / sec)

STEP 1 - Design the box gutters

From design charts, minimum upstream depths:

BG1 - 94mm, adopt 95mm

BG2 - 88mm, adopt 90mm

Downstream depths:

BG1 = 95 + 6000/200 = 95 + 30 = 125mm

BG2 = 90 + 5000/200 = 90 + 25 = 115mm

Adopt

BG1 - (100 mm to 140 mm) Deep x 450mm wide

BG2 - " " " " "

Note - 140mm is the standard heigh of a 300mm Side Outlet

STEP 2 - Select overflow device and DP

The only design required is for the rainhead, as the side is automatically designed

Adopt

Dam Buster TSO-300 Side Outlet & 300-R Rainhead combination with 90mm Diam. DP

Note - All box gutters designed for Qmin = 3.0 L/s

DAM BUSTER

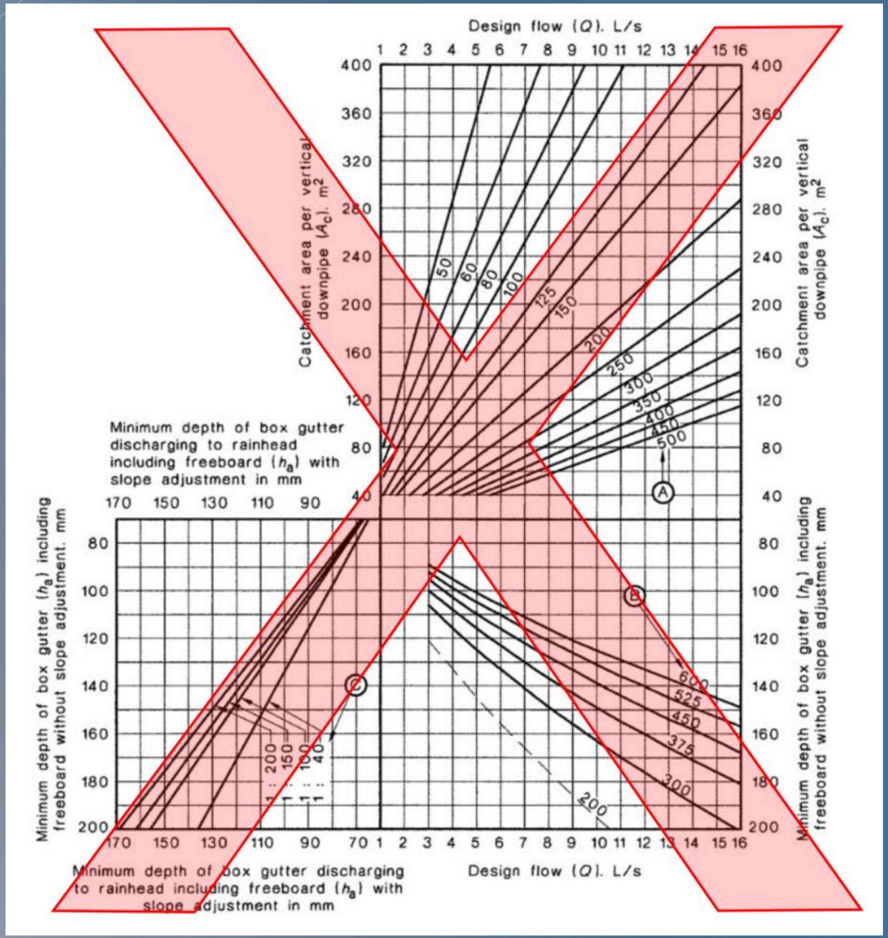
Hydraulic Design / Selection

Design chart for box gutters discharging to Dam Buster devices

Design flow rate L/s	Box gutter width (mm)								
	200	250	300	350	400	450	500	550	600
3.0	107	101	96	93	90	88	86	84	83
3.5	113	105	100	96	93	91	89	87	85
4.0	118	110	104	100	96	94	91	89	88
4.5	122	114	107	103	99	96	94	92	90
5.0	127	118	111	106	102	99	96	94	92
5.5	131	121	114	109	105	101	99	96	94
6.0	135	125	118	112	107	104	101	98	96
6.5	140	129	121	115	110	106	103	101	98
7.0	144	132	124	118	113	109	105	103	100
7.5	148	135	127	120	115	111	107	105	102
8.0	151	139	130	123	118	113	110	107	104
8.5	155	142	133	125	120	115	112	108	106
9.0	159	145	135	128	122	118	114	110	107
9.5	162	148	138	131	125	120	116	112	109
10.0	166	151	141	133	127	122	118	114	111
10.5	170	154	144	135	129	124	119	116	113
11.0	173	157	146	138	131	126	121	118	114
11.5	176	160	149	140	133	128	123	119	116
12.0	180	163	151	142	135	130	125	121	118
12.5	183	166	154	145	137	132	127	123	119
13.0	186	169	156	147	140	134	129	124	121
13.5	190	172	159	149	142	135	130	126	122
14.0	193	174	161	151	144	137	132	128	124
14.5	196	177	164	154	146	139	134	129	125
15.0	199	180	166	156	148	141	135	131	127
15.5	202	182	168	158	149	143	137	132	128
16.0	205	185	171	160	151	144	139	134	130

Minimum UPSTREAM box gutter depth (mm) for **1 in 200** slope

+5mm depth for every 1.0 m downstream



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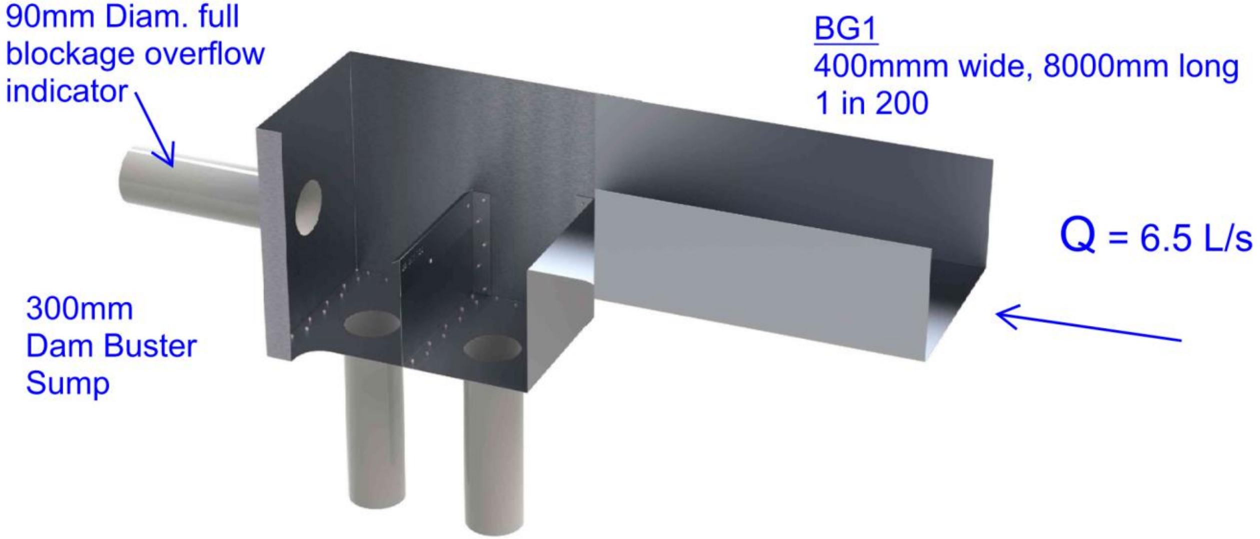
Design Chart for Free Flow box gutters per Figure I1, AS/NZS 3500.3

Design example - Free Flow Sump



Normal downpipe size	Overflow Downpipe size	Sump Depth (mm)	Dam Buster^{R} Sump width (mm)				
			200	300	400	500	600
90 diam.	90 diam.	100	2.85				
" "	" "	125	(3.20)				
" "	" "	150	3.60				
90 diam.	100 diam.	100	3.40	(3.40)			
" "	" "	125	(4.60)	4.60			
" "	" "	150	5.05	(5.05)	5.05		
" "	" "	200	(5.90)	5.90	5.90		
100 diam.	100 diam.	125	(5.70)	5.70	(5.70)		
" "	" "	150	6.25	(6.25)	6.25	6.25	6.25
" "	" "	200		7.30	7.30	7.30	7.30
150 diam.	150 diam.	150			12.2	12.2	12.2
" "	" "	200			16.0	16.0	16.0

STEP 1 - Design the box gutters

From design charts, minimum upstream depths:

BG1 - 110mm

Downstream depths:

BG1 =110 + 8000/200 =110 + 40 = 150mm

Adopt

BG1 - (110 mm to 150 mm) Deep x 400mm wide

STEP 2 - Select overflow device and DP

The only design required is for the rainhead, as the side is automatically designed

Adopt

Dam Buster TSO-300 Side Outlet & R-300 Rainhead combination with 90mm Diam. DP

Dam Buster^{R} sump standard sizes

Depth \ Width	200 mm	300 mm	400 mm	500 mm	600 mm
100 mm	SU-200-100				
125 mm		SU-300-125			
150 mm	SU-200-150		SU-400-150	SU-500-150	SU-600-150
200 mm		SU-300-200	SU-400-200	SU-500-200	SU-600-200

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Hydraulic Design / Selection Process

Design chart for aerial downpipes

Slope	Pipe diameter			
	90mm	100mm	150mm	225mm
1 in 200	4.14	5.49	16.2	47.5
1 in 190	4.26	5.65	16.6	48.9
1 in 180	4.39	5.82	17.1	50.3
1 in 170	4.53	6.00	17.7	51.9
1 in 160	4.68	6.21	18.3	53.7
1 in 150	4.85	6.43	18.9	55.6
1 in 140	5.04	6.68	19.6	57.7
1 in 130	5.25	6.96	20.5	60.1
1 in 120	5.49	7.27	21.4	62.7
1 in 110	5.76	7.63	22.4	65.7
1 in 100	6.07	8.04	23.6	69.2
1 in 90	6.43	8.52	25.0	73.3
1 in 80	6.86	9.09	26.7	78.0
1 in 70	7.38	9.77	28.7	83.9
1 in 60	8.03	10.6	31.2	91.1
1 in 50	8.87	11.7	34.4	100.4

Maximum flow rates* (L/s)

* Based on a standard Colebrook-White calculator

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Design of aerial downpipes for Dam Buster Sump

ROOF DRAINAGE SIZES UNO

Box gutters

Upper roof - 400mm wide x 90mm MIN deep at the upstream end, 1 in 200 min fall to outlet

Lower roof - 350mm wide x 100mm MIN deep at the upstream end, 1 in 200 mm fall to outlet

Overflow devices

Type 1 Dam Buster TSO-300 Tee Side Outlet with Dam Buster 300-R rainhead & 100mm DIAM DP

Type 2 Dam Buster ESO-300-L End Side Outlet with Dam Buster 300-R rainhead & 100mm DIAM DP

Type 3 Dam Buster ESO-300-R End Side Outlet with Dam Buster 300-R rainhead & 100mm DIAM DP

Type 4 Dam Buster 300-R Rainhead & 100mm DIAM DP

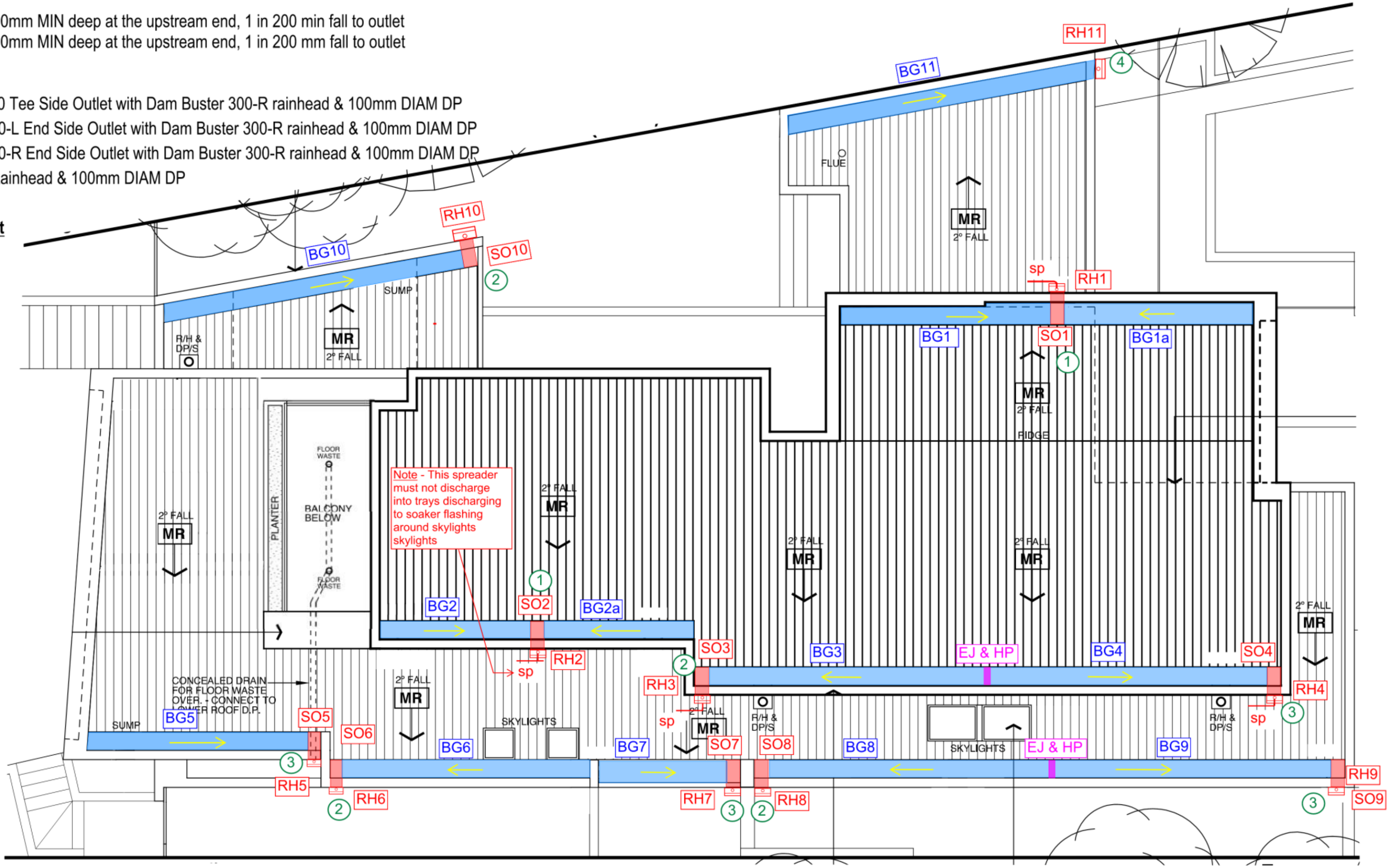
Expansion joint & High Point

EJ & HP

Spreaders

sp - 600mmm long

PROJECT NORTH



Roof plan

1:100 @ A3

Maintenance & cleaning

Refer to note on drawing RD05

Dam Buster products required (Upper Roof only)

11 x R-300 Rainheads

11 x CL-300 Chute Lids

2 x TS0-300 Tee Side Outlets

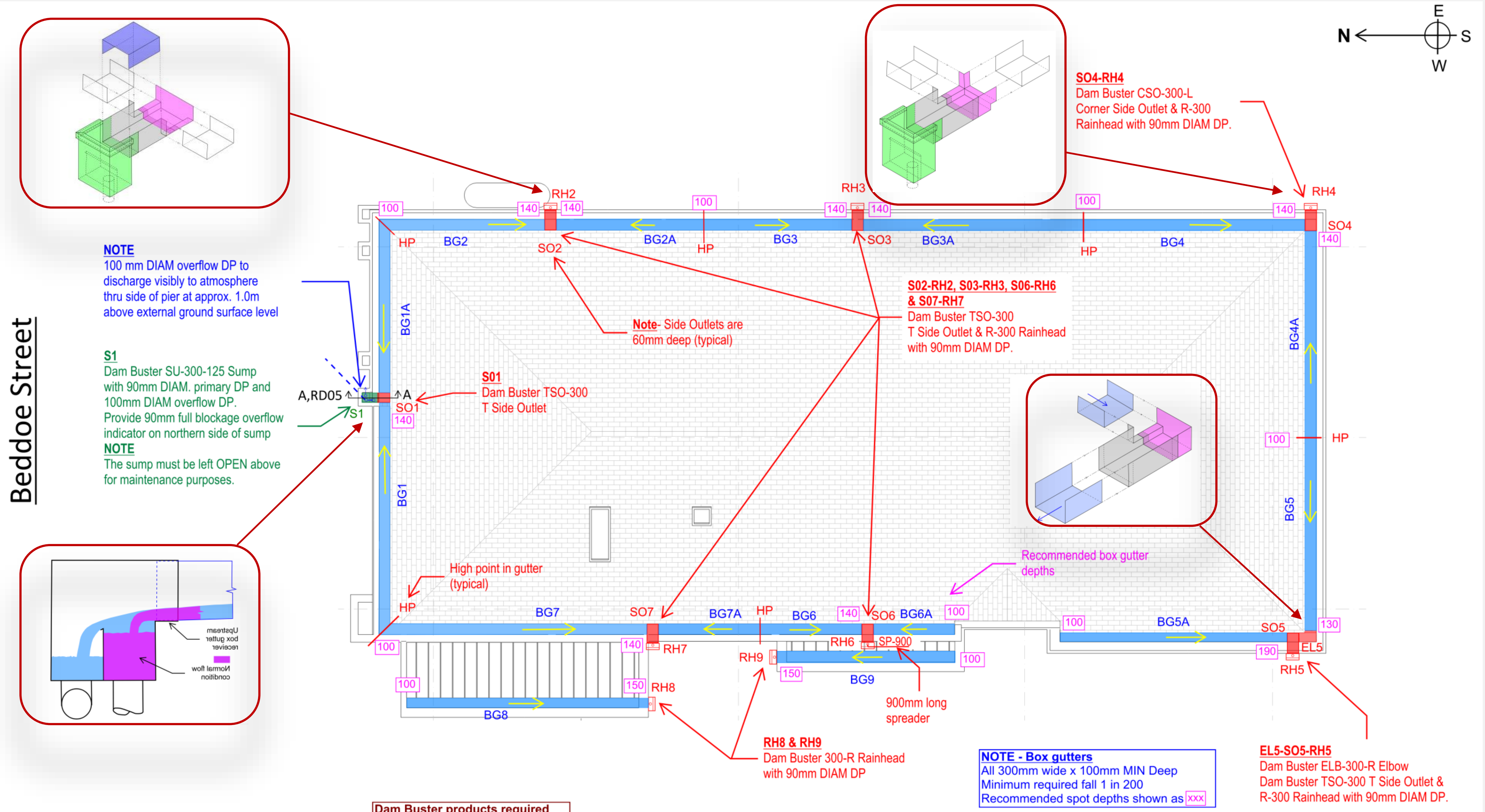
4 x ES0-300-L End Side Outlets

4 x ESO-300-R End Side Outlets

Note

Substitutions are not permitted.

DAM BUSTER



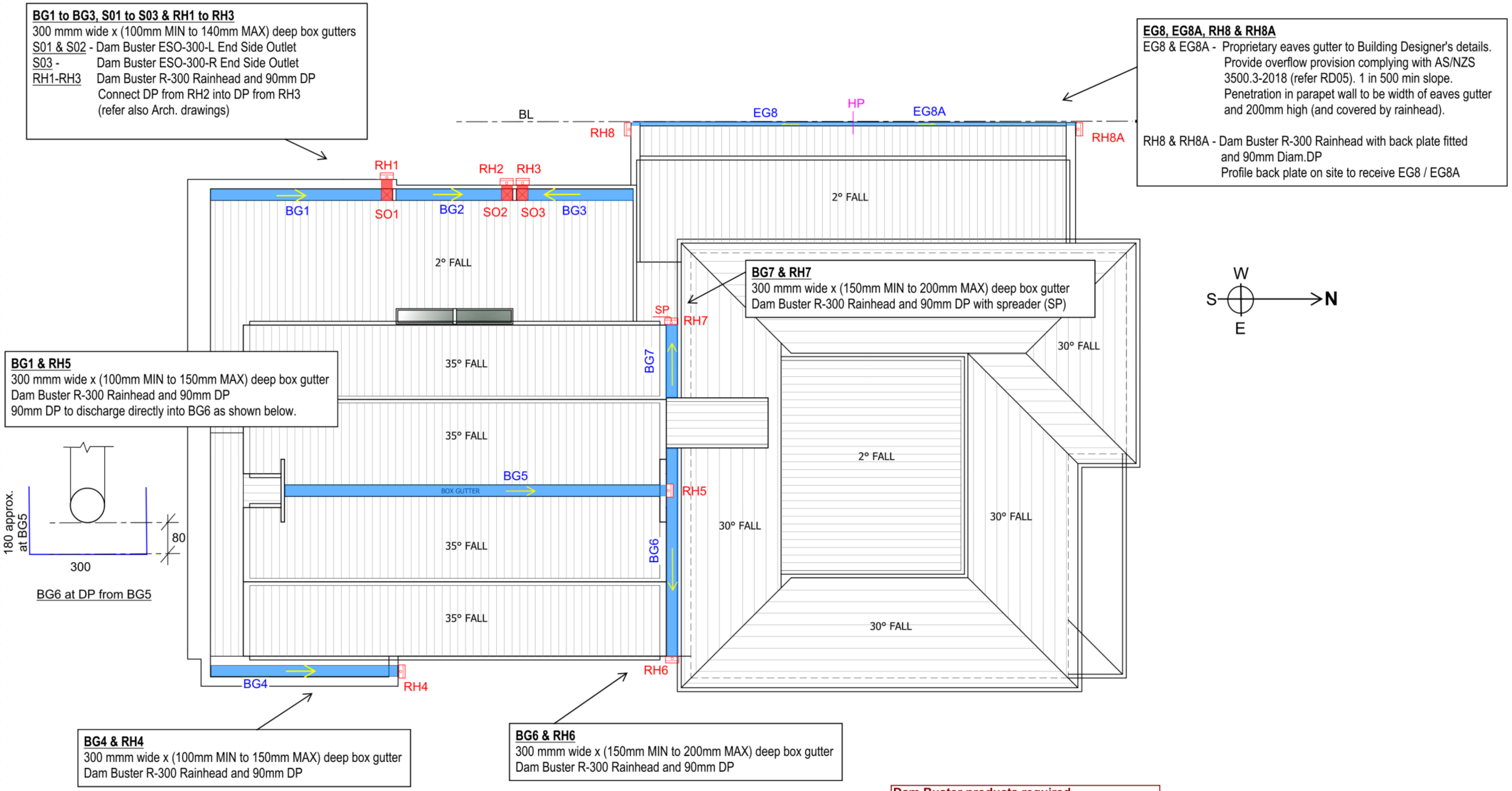
Dam Buster products required
8 x R-300 Rainheads
8 x CL-300 Chute Lids
6 x TSO-300 T Side Outlet
1 x SU-300-125 Sump
1 x CSO-300-L Corner Side Outlet
1 x ELB-300-R Elbow, Sliding

Roof plan

1:100 @ A3

Maintenance & cleaning

Refer to note on drawing RD04.



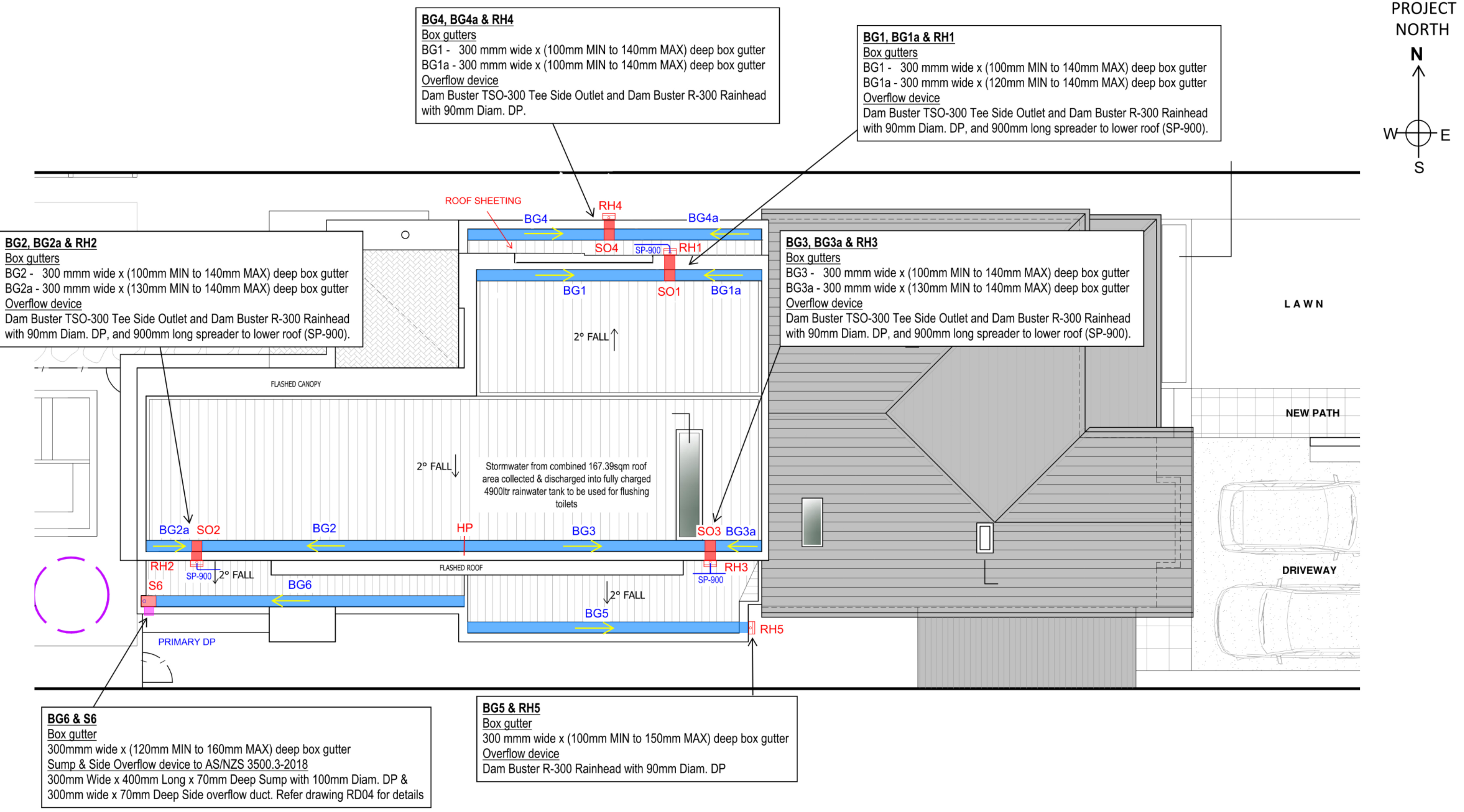
Roof plan

1:100 @ A3

Maintenance & cleaning

Refer to note on drawing RD05.

Dam Buster products required
7 x R-300 Rainheads
6 x CL-300 Chute Lids
2 x R-300 Rainheads with back plate fitted
2 x ESO-300-L End Side Outlets
1 x ESO-300-R End Side Outlet
Note
Roofing plumber to confirm the above quantities.



Roof plan
1:100 @ A3

Maintenance & cleaning
Refer to note on drawing RD05.

Dam Buster products required
5 x R-300 Rainheads
5 x CL-300 Chute Lids
4 x TSO-300-R Tee Side Outlets
Note
Substitutions are not permitted.

DAM BUSTER