



Pantanas House
Pantanas
Treharris
South Wales
CF46 5BN

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Drive Sub Base Calculations

Property Details:

35 Lancaster Villas
Merthyr Tdfil
CF47 8SN

Client Details:

Mr G Thomas

Contents:

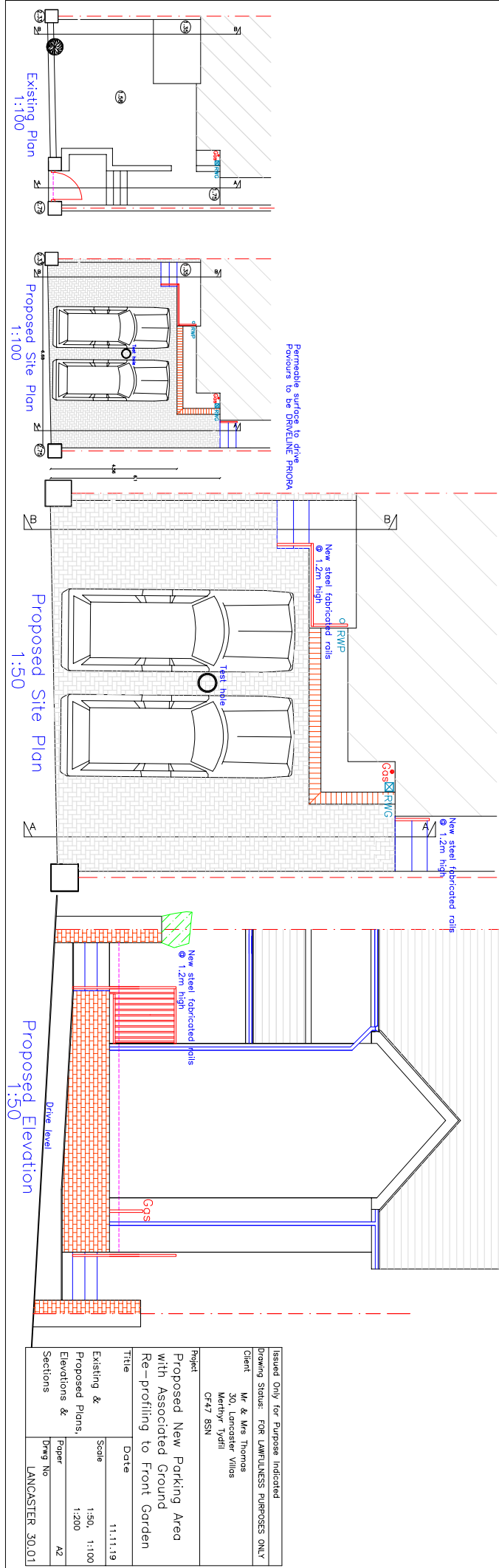
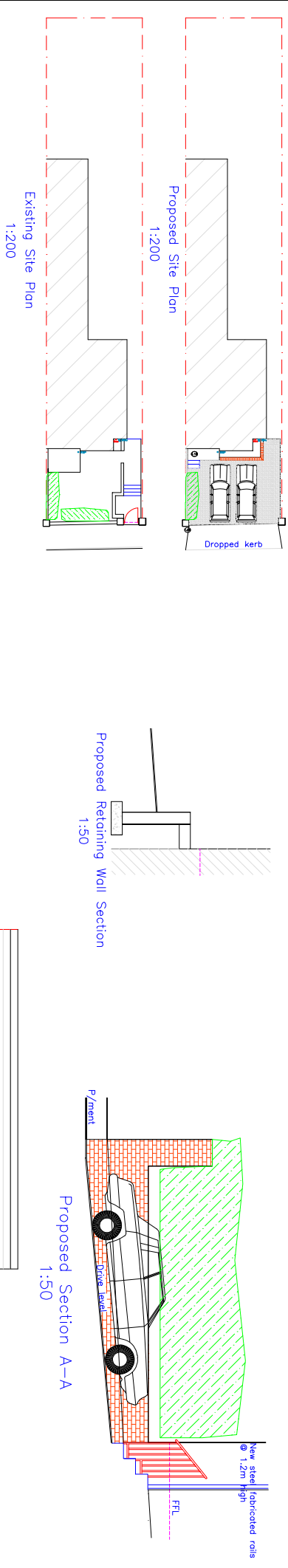
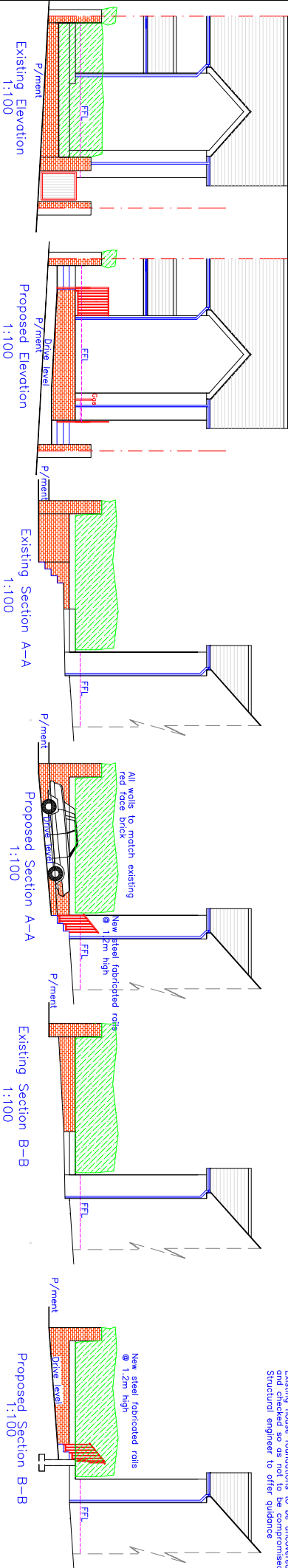
Instruction

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- 5 Type A System Typical Details**
- 6 Maintenance Information**

Instruction

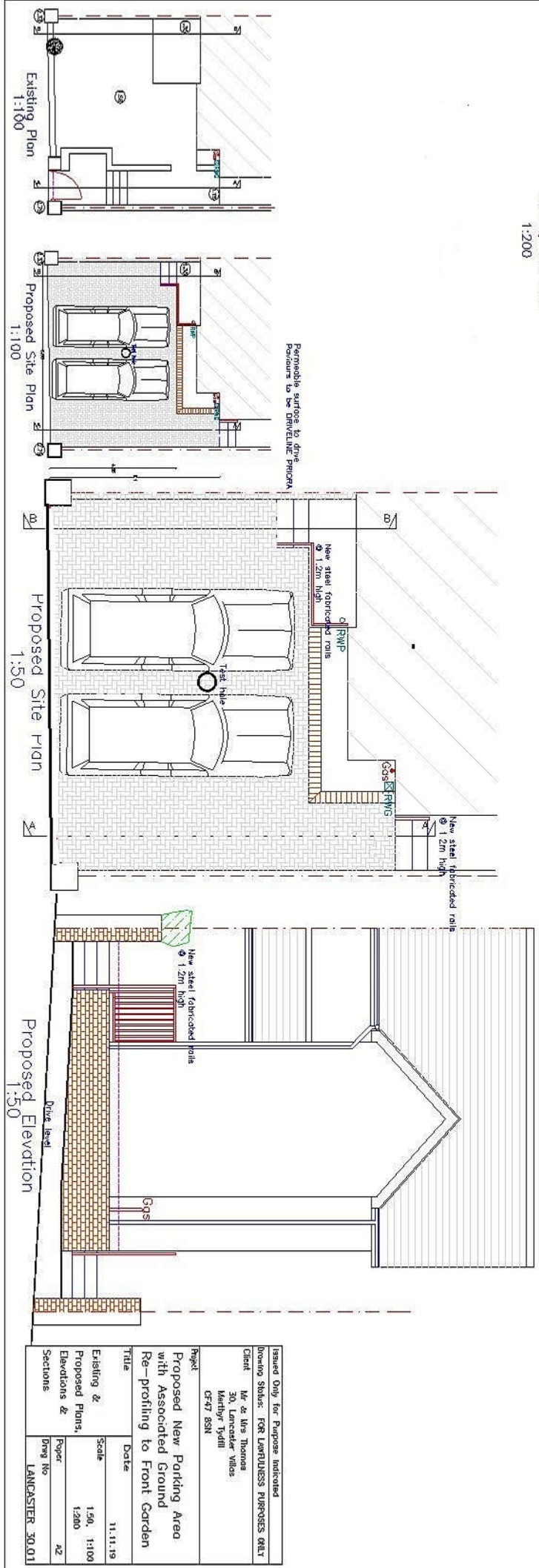
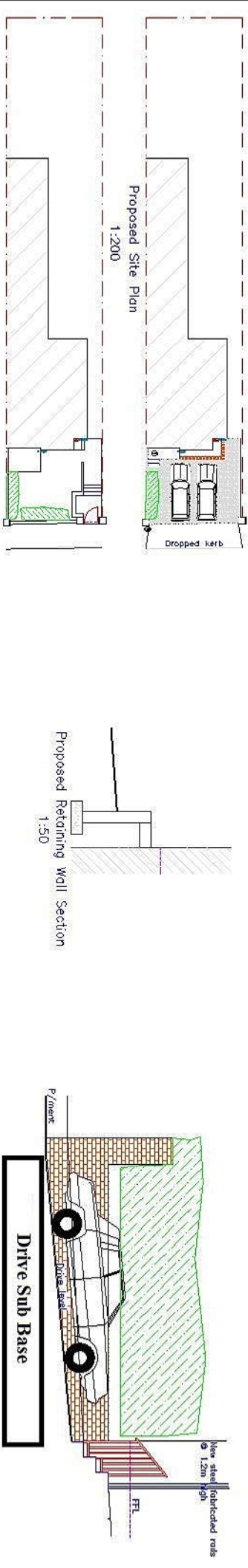
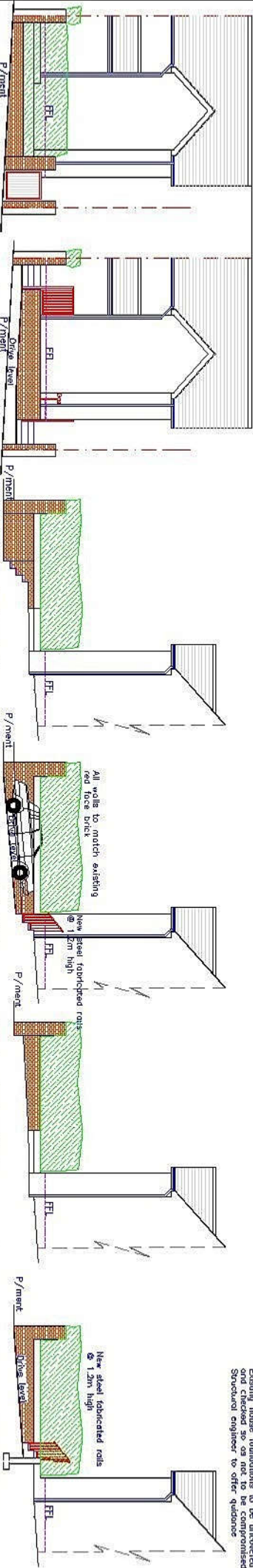
To design a Type A (total infiltration) permeable sub base for a drive with an area of 32m^2

Existing house foundations to be uncovered and checked so as not to be compromised
Structural engineer to offer guidance



Issued Only for Purpose Indicated			
Drawing Status: FOR LAMINATES PURPOSES ONLY			
Client:	Mr. & Mrs Thomas 30, Lancaster Villas Merrivoy Tydri CF47 8SN		
Project:	Proposed New Parking Area With Associated Ground Re-profiling to Front Garden		
Title	Date	11.11.19	
Existing & Proposed Plans, Elevations & Sections	Scale	1:50, 1:100 1:200	Paper A2
	Dwg No	LANCASTER 30.01	

Existing house foundations to be uncovered and checked so as not to be compromised. Structural engineers to offer guidance.



Issued Only for Purpose Indicated	
Drawing Status: FOR LIAISON PURPOSES ONLY	
Client	
Mr & Mrs Thomas	
30, Lancaster Villas	
Marbury Telford	
CF47 8SN	
Project	
Proposed New Parking Area	
with Associated Ground	
Re-profiling to Front Garden	
Title	Date
Existing & Proposed Plans, Elevations & Sections	11.11.19
Scale	1:50, 1:100
Proposed Plans, Elevations & Sections	1:200
Page:	A2
Dwg No	LANCASTER 30.01

Sub Base Calculation



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Job No.	Drive		
Sheet no.	1		
Date	28/01/20		
By	RAF	Checked	Reviewed

Project **30 Lanaster Villas**

Title **Data for Permeable Paviers Exfiltration system A**

Local Hydrology constants for MERTHYR TYDFIL:-

M5-60 = 20

r = 0.22

Storm Return period = 100 yrs + 30%

Design data:-

System type = A - Total infiltration

Loading = Domestic

CBR value = 5

Site traffic = None

Infiltration coeff = 0.0426000 m/hr

Pavior area = 32 m²

Calculations :-

Paving course - 80mm

Laying course - 50mm

Optional permeable membrane

Coarse grade aggregate - 250mm

Adjustment to coarse grade aggregate - 150mm for a CBR of 5.

Sub-base layer -390mm

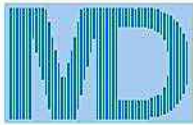
Loading -Domestic

Storage @ 30% void -3.7 m³

Infiltration volume per hour = 1.4 m³

Total depth = 920

Duration	Mean intens	Total inflow	Infiltration vol.	Storage requ.	Storage avail	Safety factor
4 mins	152.6	0.407	0.114	0.293	3.7	12.77
10 mins	121.5	0.648	0.227	0.421	3.7	8.89
15 mins	104.1	0.832	0.341	0.492	3.7	7.61
30 mins	75.7	1.210	0.682	0.529	3.7	7.08
1	52.7	1.685	1.363	0.322	3.7	11.63
1.5	41.7	2.003	2.045	-----	3.7	-----
2	35.0	2.239	2.726	-----	3.7	-----
2.5	30.3	2.422	3.408	-----	3.7	-----
3	26.9	2.582	4.090	-----	3.7	-----
4	22.3	2.853	5.453	-----	3.7	-----
6	17.0	3.272	8.179	-----	3.7	-----
10	12.1	3.861	13.632	-----	3.7	-----
16	8.7	4.468	21.811	-----	3.7	-----
24	6.6	5.043	32.717	-----	3.7	-----
36	4.9	5.700	49.075	-----	3.7	-----
48	4.1	6.223	65.434	-----	3.7	-----
72	3.1	7.066	98.150	-----	3.7	-----
96	2.5	7.766	130.867	-----	3.7	-----
120	2.2	8.391	163.584	-----	3.7	-----
144	1.9	8.972	196.301	-----	3.7	-----



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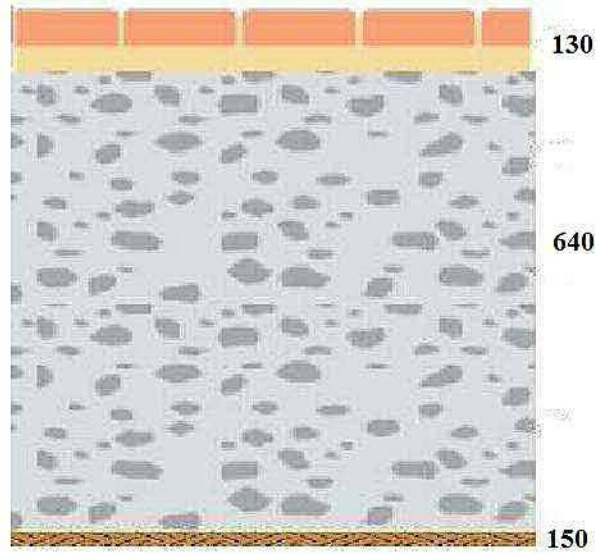
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Project **30 Lanaster Villas**

Title **Data for Permeable Paviers Exfiltration system A**



Critical storm duration is 0.50 hours.

Calculation method from BS7533 Part 13.

See also the Interpave design guide for permeable pavements. - www.paving.org.uk

Infiltration Coefficient Details

Sub Base Infiltration Coefficient:

Site Address	147 Worcester Street				
Trial Pit Number	Date	Test Number	Result m/sec	Result m/hr	Time Mins
1	22/01/2020	1	2.604E ⁻⁵	0.0937	30
1	23/01/2020	2	2.604E ⁻⁵	0.0937	30
1	24/01/20120	3	2.367E ⁻⁵	0.0852	33
The lowest of the test figures will be used in the Sub Base design					

Plane Infiltration Drainage System Safety Factor

In line with Welsh Ministers Statutory SuDS Standards Table G1.1, a safety factor should be applied to all infiltration drainage systems

Table G1.1 Suggested factors of safety for use for hydraulic design of infiltration systems

Size of area to be drained	Consequences of failure		
	No damage or inconvenience	Minor inconvenience (e.g. surface water on car parking)	Damage to buildings or structures, or major inconvenience (e.g. flooding of roads)
< 100m ²	1.5	2	10
100-1000m ²	1.5	3	10
>1000m ²	1.5	5	10

Having regard to the surface area drained and the consequence of failure a safety factor of 2 has been applied to the site infiltration rate

Design Infiltration Rate Including Safety Factor	0.0426m/hr
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Infiltration Test Results



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Job No. Drive		
Sheet no. 1		
Date 27/01/20		
By RAF	Checked	Reviewed

Project **30 Lanaster Villas**

Title **Drive Sub Base**

SOIL INFILTRATION TEST

Location data

Location : 30 Lancaster Villas

Soil type: Granular

Trial pit data

Pit dimensions : Length = 300mm Width = 300mm Depth = 300mm

Trial pit number: 1 Test number: 1 Date of test: 22/01/2020

SEEPAGE TEST RESULTS

Depth	Time	Mins		Depth	Time	Mins		Depth	Time	Mins
1	00:00	0								
50	00:02	2								
100	00:04	4								
150	00:07	7								
200	00:18	18								
250	00:40	40								
300	01:00	60								

Infiltration test time (25% to 75%) = 30 mins

Infiltration coefficient = 0.0938 m/hr

Infiltration coefficient = 2.604E-5 m/sec



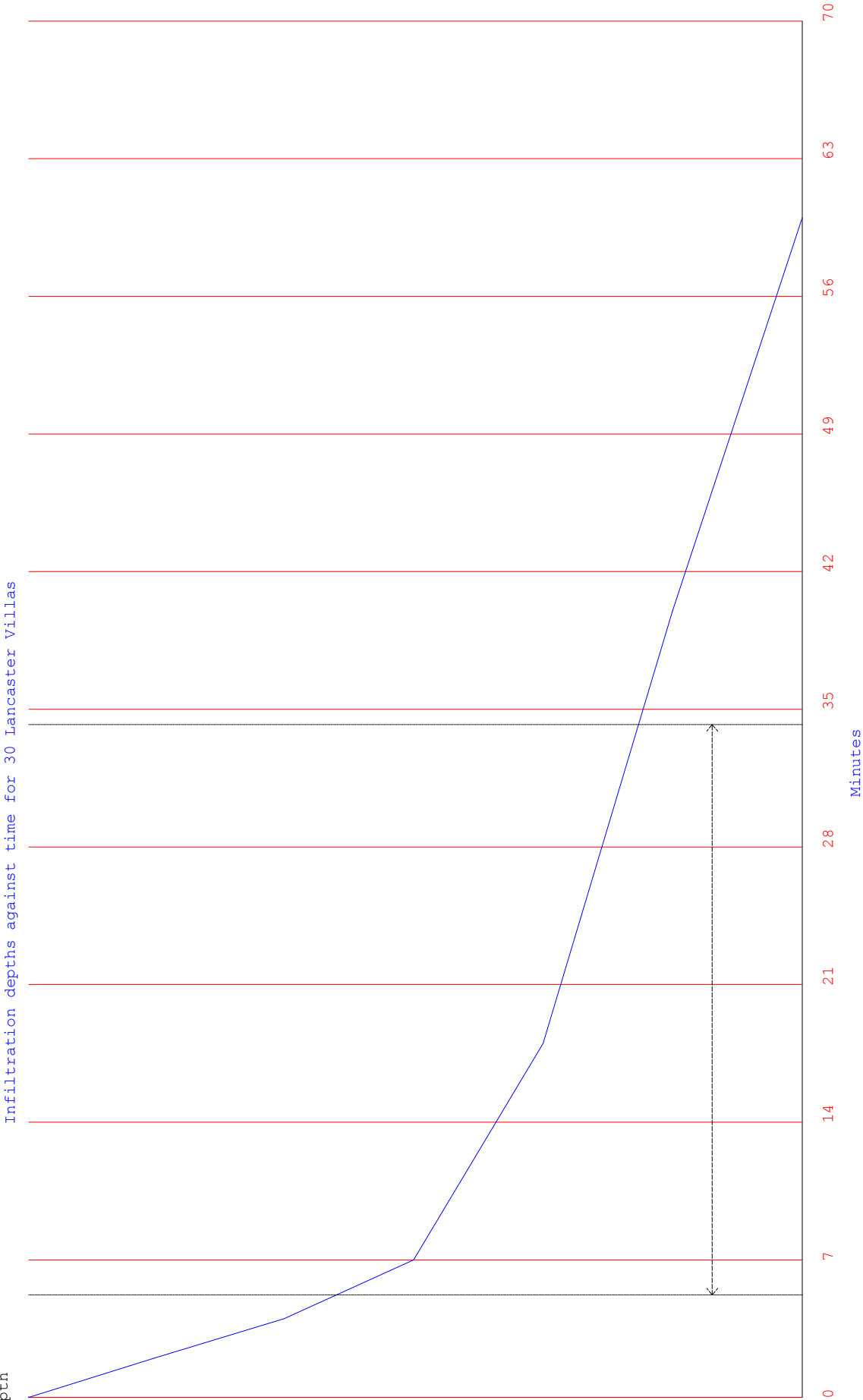
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mm depth

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	Sheet no. 2	
	Date 27/01/20	
Title Drive Sub Base	By RAF	Checked
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Test pit No. 1 Test No. 1 Test date 22/01/2020 Inf.time = 29 mins.



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Date 27/01/20		
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Title **Drive Sub Base**

SOIL INFILTRATION TEST

Location data

Location : 30 Lancaster Villas

Soil type: Granular

Trial pit data

Pit dimensions : Length = 300mm Width = 300mm Depth = 300mm

Trial pit number: 1 Test number: 2 Date of test: 23/01/2020

SEEPAGE TEST RESULTS

Depth	Time	Mins	Depth	Time	Mins	Depth	Time	Mins
1	00:00	0						
50	00:02	2						
100	00:04	4						
150	00:08	8						
200	00:19	19						
250	00:41	41						
300	01:03	63						

Infiltration test time (25% to 75%) = 30 mins

Infiltration coefficient = 0.0938 m/hr

Infiltration coefficient = 2.604E-5 m/sec



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mm depth

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Title **Drive Sub Base**

Job No.
Drive

Sheet no.

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Date

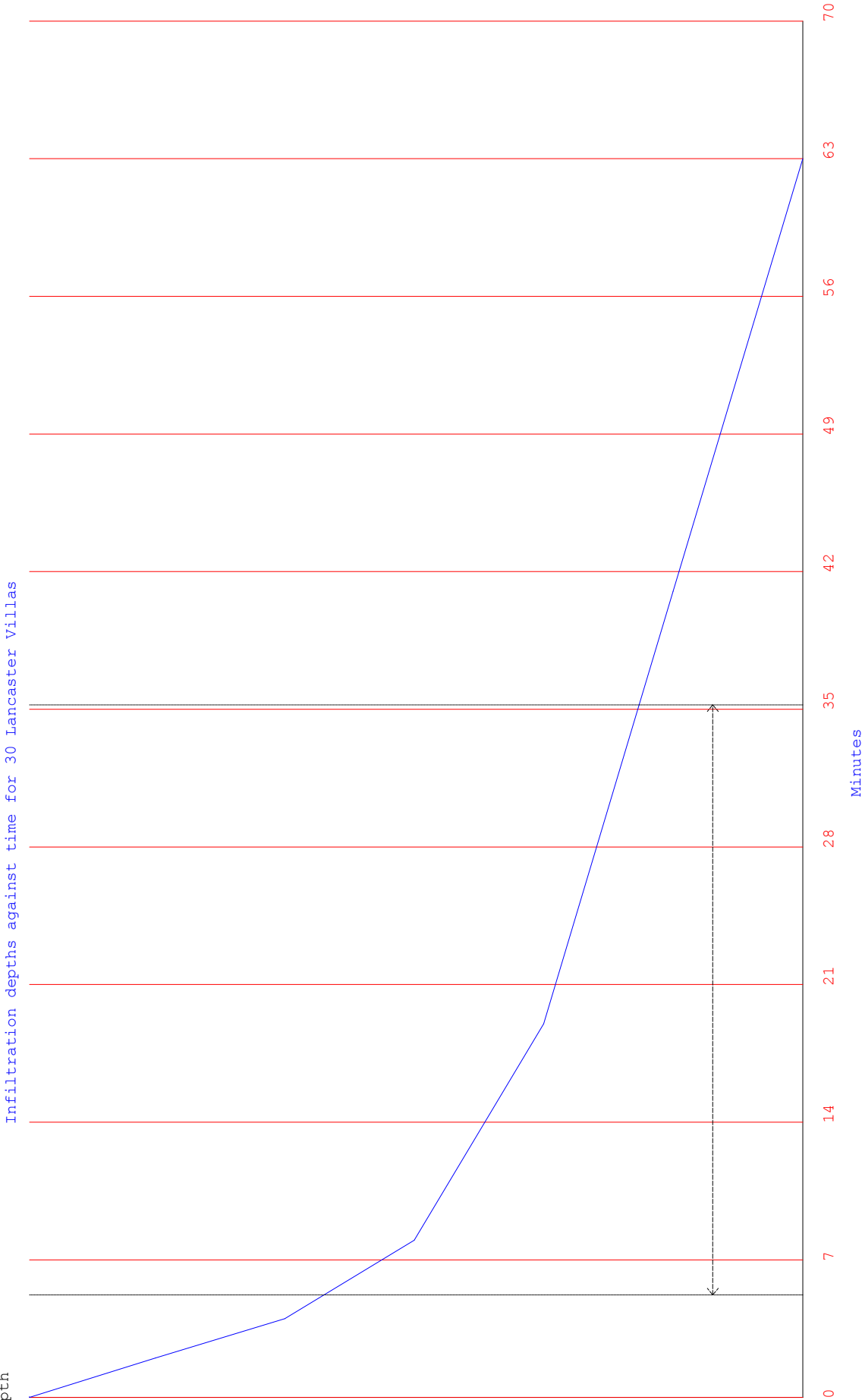
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Test pit No. 1 Test No. 2 Test date 23/01/2020 Inf.time = 30 mins.



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Project **30 Lancaster Villas**

Title **Drive Sub Base**

SOIL INFILTRATION TEST

Location data

Location : 30 Lancaster Villas

Soil type: Granular

Trial pit data

Pit dimensions : Length = 300mm Width = 300mm Depth = 300mm

Trial pit number: 1 Test number: 3 Date of test: 24/01/2020

SEEPAGE TEST RESULTS

Depth	Time	Mins		Depth	Time	Mins		Depth	Time	Mins
1	00:00	0								
50	00:02	2								
100	00:04	4								
150	00:08	8								
200	00:20	20								
250	00:44	44								
300	01:05	65								

Infiltration test time (25% to 75%) = 33 mins

Infiltration coefficient = 0.0852 m/hr

Infiltration coefficient = 2.367E-5 m/sec



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Project **30 Lancaster Villas**

Title **Drive Sub Base**

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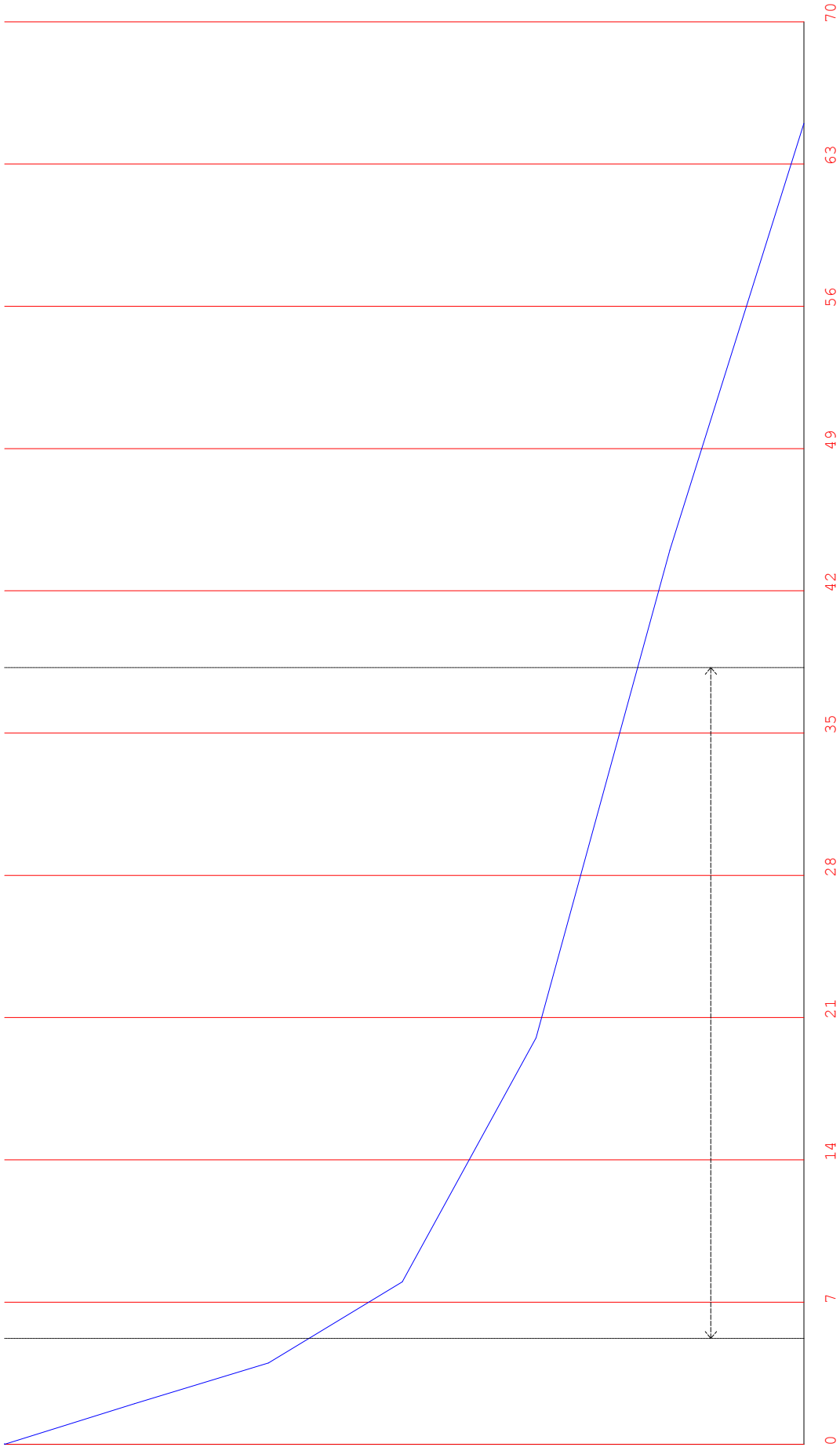
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mm depth

Infiltration depths against time for 30 Lancaster Villas

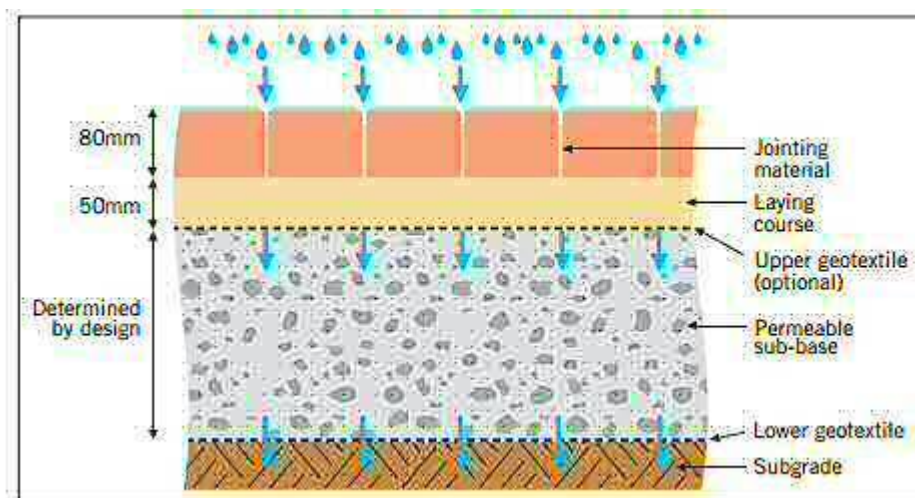


Test pit No. 1 Test No. 3 Test date 24/01/2020 Inf.time = 33 mins.

Type A System Typical Details

CBPP - Typical System A – Total Infiltration - Typical Details

CBPP - Typical System A – Total Infiltration Cross Section



Paviors as per design.

Thickness of paving blocks may vary with manufacturer and site specific loading requirements. Refer to product manufacturers technical literature.

Jointing Material - 2 to 4mm granular material

Refer to product manufacturers technical literature for product specific jointing material specification.

Laying Course - 2 to 6mm granular material.

Laying course comprises material mostly passing through a 6.3mm sieve and mostly retained on a 3mm sieve and complying with the requirements of BS EN13242:2002

Permeable Sub Base - 4 to 20mm Course Graded Aggregate.

Coarse graded aggregate comprises material mostly passing through a 20mm sieve and mostly retained on a 4mm sieve and complying with the requirements of BS EN 13242:2002

Geotextile

Geotextiles may be used in two locations within Concrete Block Permeable pavements;

- An optional upper Geotextile at the laying course/Course Graded Aggregate interface may be included according to the paving Block manufacturers recommendations.
- Between the laying course and the permeable sub-base

The Geotextile can be either a monofilament woven, non woven fully bonded or needle punched non woven fabric. The geotextile should function as a filter and must be installed in line with the product manufacturers requirements.

6.0 Sustainable Drainage Maintenance Specification

General Requirements

General Requirements	
Maintenance activities comprise · Regular Maintenance · Occasional tasks · Remedial work	

TABLE 20.15 Operation and maintenance requirements for pervious pavements

Maintenance schedule	Required action	Typical frequency
Regular maintenance	Brushing and vacuuming (standard cosmetic sweep over whole surface)	Once a year, after autumn leaf fall, or reduced frequency as required, based on site-specific observations of clogging or manufacturer's recommendations – pay particular attention to areas where water runs onto pervious surface from adjacent impermeable areas as this area is most likely to collect the most sediment
Occasional maintenance	Stabilise and mow contributing and adjacent areas	As required
	Removal of weeds or management using glyphosate applied directly into the weeds by an applicator rather than spraying	As required – once per year on less frequently used pavements
Remedial Actions	Remediate any landscaping which, through vegetation maintenance or soil slip, has been raised to within 50 mm of the level of the paving	As required
	Remedial work to any depressions, rutting and cracked or broken blocks considered detrimental to the structural performance or a hazard to users, and replace lost jointing material	As required
	Rehabilitation of surface and upper substructure by remedial sweeping	Every 10 to 15 years or as required (if infiltration performance is reduced due to significant clogging)
Monitoring	Initial inspection	Monthly for three months after installation
	Inspect for evidence of poor operation and/or weed growth – if required, take remedial action	Three-monthly, 48 h after large storms in first six months
	Inspect silt accumulation rates and establish appropriate brushing frequencies	Annually
	Monitor inspection chambers	Annually