

Drainage Calculations

B06275 - Stoke Park SANG



B06275-CLK-XX-CA-C-001 P03

Eastleigh Borough Council

Project: B06275-Stoke Park SANG	Date: 27/09/2023			clarkebond
B06275-CLK-XX-CA-C-001 P03	Designed by: Nicholas Weyer	Checked by: Jamie Penney	Approved By:	
Report Details: Type: Inflows Storm Phase: Phase	Company Address: 129 Cumberland Road Bristol BS1 6UY			



Parking Area

Type : Catchment Area

Area (ha)	0.07
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Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	0.750
Winter Volumetric Runoff	0.840
Time of Concentration (mins)	5
Percentage Impervious (%)	100
Urban Creep (%)	10



Manhole 2 (Rural Runoff)

Type : Catchment Area

Area (ha)	0.20
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Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	0.750
Winter Volumetric Runoff	0.840
Time of Concentration (mins)	5
Percentage Impervious (%)	40
Urban Creep (%)	0



Manhole 1 (Rural Runoff)

Type : Catchment Area

Area (ha)	0.18
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Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	0.750
Winter Volumetric Runoff	0.840
Time of Concentration (mins)	5
Percentage Impervious (%)	35
Urban Creep (%)	0

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B06275-CLK-XX-CA-C-001 P03		Designed by:	Checked by:		Approved By:
		Nicholas Weyer	Jamie Penney		
Report Details: Type: Junctions Storm Phase: Phase		Company Address: 129 Cumberland Road Bristol BS1 6UY			

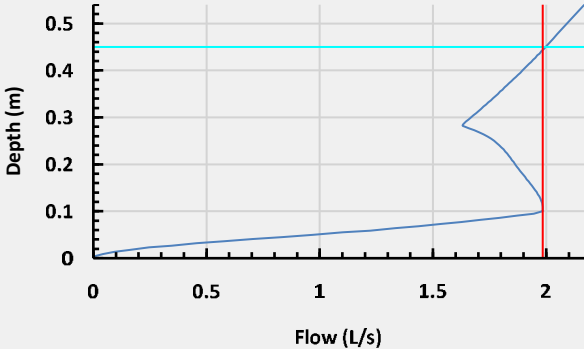
Name	Junction Type	Easting (m)	Northing (m)	Cover Level (m)	Depth (m)	Invert Level (m)	Chamber Shape	Diameter (m)
Flow Control Chamber	Manhole	447655.569	120211.745	25.400	0.850	24.550	Circular	0.600
Outfall	Manhole	447650.297	120222.249	24.500	1.200	23.300	Circular	0.600
Manhole 4 (French Drain)	Manhole	447655.258	120201.449	25.297	0.847	24.450	Circular	0.600
Connection Manhole	Manhole	447654.245	120212.064	25.400	1.200	24.200	Circular	0.600
Manhole 1 (French Drain)	Manhole	447743.662	120163.654	28.788	0.788	28.000	Circular	0.450
Manhole 2 (French Drain)	Manhole	447714.540	120186.806	27.659	1.034	26.625	Circular	0.600
Manhole 3 (French Drain)	Manhole	447689.620	120184.675	27.725	1.625	26.100	Circular	0.600

Name	Lock
Flow Control Chamber	All
Outfall	All
Manhole 4 (French Drain)	All
Connection Manhole	All
Manhole 1 (French Drain)	All
Manhole 2 (French Drain)	All
Manhole 3 (French Drain)	All

Inlets

Junction	Inlet Name	Incoming Item(s)	Bypass Destination	Capacity Type
Flow Control Chamber	Pond Outlet	Pipe 2.000	(None)	No Restriction
Outfall	Inlet flow Control	Pipe 1.004	(None)	No Restriction
Manhole 4 (French Drain)	Inlet	Pipe 1.002	(None)	No Restriction
Connection Manhole	Inlet	Pipe 1.003 Pipe 2.001	(None)	No Restriction
Manhole 1 (French Drain)	Inlet	Manhole 1 (Rural Runoff)	(None)	No Restriction
Manhole 2 (French Drain)	Inlet	Manhole 2 (Rural Runoff) Pipe 1.000	(None)	No Restriction
Manhole 3 (French Drain)	Inlet	Pipe 1.001	(None)	No Restriction

Outlets

Junction	Outlet Name	Outgoing Connection	Outlet Type
Flow Control Chamber	Outlet	Pipe 2.001	Hydro-Brake®
	Invert Level (m)	24.550	
	Design Depth (m)	0.450	
	Design Flow (L/s)	2.0	
	Objective	Minimise Blockage Risk	
	Application	Surface Water Only	
	Sump Available	☒	
	Unit Reference	SCL-0070-2000-0450-2000	
			
Manhole 4 (French Drain)	Outlet	Pipe 1.003	Free Discharge
Connection Manhole	Outlet	Pipe 1.004	Free Discharge
Manhole 1 (French Drain)	Outlet	Pipe 1.000	Free Discharge
Manhole 2 (French Drain)	Outlet	Pipe 1.001	Free Discharge
Manhole 3 (French Drain)	Outlet	Pipe 1.002	Free Discharge

Project: B06275-Stoke Park SANG		Date: 27/09/2023		clarkebond	
B06275-CLK-XX-CA-C-001 P03		Designed by: Nicholas Weyer	Checked by: Jamie Penney		Approved By:
Report Details: Type: Stormwater Controls Storm Phase: Phase		Company Address: 129 Cumberland Road Bristol BS1 6UY			



Pond

Type : Pond

Dimensions

Exceedance Level (m)	25.400
Depth (m)	1.150
Base Level (m)	24.250
Freeboard (mm)	350
Initial Depth (m)	0.350
Porosity (%)	100
Average Slope (1:X)	4.127
Total Volume (m³)	47.367

Depth (m)	Area (m²)	Volume (m³)
0.000	16.296	0.000
0.100	24.184	2.011
0.200	34.000	4.906
0.300	43.764	8.784
0.400	55.700	13.746
0.500	68.829	19.960
0.600	83.187	27.550
0.700	98.801	36.638
0.800	116.000	47.367
0.900	123.000	59.315
1.000	135.000	72.210
1.100	145.000	86.207
1.150	155.000	93.706

Inlets

Parking Catchment

Inlet Type	Point Inflow
Incoming Item(s)	Parking Area
Bypass Destination	(None)
Capacity Type	No Restriction

Outlets

Outlet

Outgoing Connection	Pipe 2.000
Outlet Type	Free Discharge

Advanced

Perimeter	Circular
Length (m)	13.067
Friction Scheme	Manning's n
n	0.035

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B06275-CLK-XX-CA-C-001 P03		Designed by:	Checked by:		Approved By:
		Nicholas Weyer	Jamie Penney		
Report Details: Type: Connections Storm Phase: Phase		Company Address: 129 Cumberland Road Bristol BS1 6UY			

Name	Length (m)	Connection Type	Slope (1:X)	Manning's n	Colebrook-White Roughness (mm)	Diameter / Base Width (mm)	Curved	Upstream Cover Level (m)
Pipe 1.004	10.923	Pipe	12.137		0.6	225	☐	25.400
Pipe 1.003	10.663	Pipe	42.653		0.6	225	☐	25.297
Pipe 2.001	1.361	Pipe	3.889		0.6	225	☐	25.400
Pipe 2.000	6.517	Pipe	130.342		0.6	225	☐	25.400
Pipe 1.001	25.602	Pipe	48.766		0.6	225	☒	27.659
Pipe 1.002	38.238	Pipe	23.174		0.6	225	☐	27.725
Pipe 1.000	38.175	Pipe	29.365		0.6	150	☐	28.788

Name	Upstream Invert Level (m)	Downstream Cover Level (m)	Downstream Invert Level (m)	Lock	Flow Restriction (L/s)
Pipe 1.004	24.200	24.500	23.300	All	
Pipe 1.003	24.450	25.400	24.200	All	
Pipe 2.001	24.550	25.400	24.200	All	2.0
Pipe 2.000	24.600	25.400	24.550	All	2.0
Pipe 1.001	26.625	27.725	26.100	All	
Pipe 1.002	26.100	25.297	24.450	All	
Pipe 1.000	28.000	27.659	26.700	All	

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B06275-CLK-XX-CA-C-001 P03	Designed by: Nicholas Weyer	Checked by: Jamie Penney	
Report Title: Rainfall Analysis Criteria	Company Address: 129 Cumberland Road Bristol BS1 6UY		

Runoff Type	Dynamic
Output Interval (mins)	5
Time Step	Default
Urban Creep	Use Catchment Values
Junction Flood Risk Margin (mm)	300
Perform No Discharge Analysis	☐

Rainfall	
FEH	Type: FEH
Site Location	GB 447485 120183 SU 47485 20183
Rainfall Version	2022
Summer	☒
Winter	☒

Return Period	
Return Period (years)	Increase Rainfall (%)
100.0	45.000
30.0	0.000
2.0	0.000

Storm Durations	
Duration (mins)	Run Time (mins)
15	30
30	60
60	120
120	240
240	480
360	720
480	960
960	1920
1440	2880

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B06275-CLK-XX-CA-C-001 P03	Designed by: Nicholas Weyer	Checked by: Jamie Penney	Approved By:	
Report Title: UK and Ireland Rural Runoff Calculator	Company Address: 129 Cumberland Road Bristol BS1 6UY			

ICP SUDS / IH 124

Details

Method	ICP SUDS
Area (ha)	0.075
SAAR (mm)	800.0
Soil	0.47
Region	Region 7
Urban	0
Return Period (years)	0

Results

Region	QBAR Rural (L/s)	QBAR Urban (L/s)	Q 1 (years) (L/s)	Q 30 (years) (L/s)	Q 100 (years) (L/s)
Region 7	0.4	0.4	0.4	1.0	1.4

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Report Details: Type: Junctions Summary Storm Phase: Phase		Company Address: 129 Cumberland Road Bristol BS1 6UY			



FEH: 100 years: Increase Rainfall (%): +45: Critical Storm Per Item: Rank By: Max. Depth

Junction	Storm Event	Cover Level (m)	Invert Level (m)	Max. Level (m)	Max. Depth (m)	Max. Inflow (L/s)	Max. Resident Volume (m³)	Max. Flooded Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Status
Flow Control Chamber	FEH: 100 years: +45 %: 60 mins: Winter	25.400	24.550	25.018	0.468	2.2	0.132	0.000	2.0	12.709	Surcharged
Outfall	FEH: 100 years: +45 %: 15 mins: Winter	24.500	23.300	23.415	0.115	77.8	0.000	0.000	77.8	44.944	OK
Manhole 4 (French Drain)	FEH: 100 years: +45 %: 15 mins: Winter	25.297	24.450	24.665	0.215	77.5	0.061	0.000	76.0	42.286	OK
Connection Manhole	FEH: 100 years: +45 %: 15 mins: Winter	25.400	24.200	24.331	0.131	77.8	0.037	0.000	77.8	44.944	OK
Manhole 1 (French Drain)	FEH: 100 years: +45 %: 15 mins: Winter	28.788	28.000	28.373	0.373	40.3	0.059	0.000	32.7	18.748	Surcharged
Manhole 2 (French Drain)	FEH: 100 years: +45 %: 15 mins: Winter	27.659	26.625	27.037	0.412	83.8	0.117	0.000	79.1	42.312	Surcharged
Manhole 3 (French Drain)	FEH: 100 years: +45 %: 15 mins: Winter	27.725	26.100	26.241	0.141	79.1	0.040	0.000	77.5	42.297	OK

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Report Details: Type: Junctions Summary Storm Phase: Phase		Company Address: 129 Cumberland Road Bristol BS1 6UY			



FEH: 30 years: Increase Rainfall (%): +0: Critical Storm Per Item: Rank By: Max. Depth

Junction	Storm Event	Cover Level (m)	Invert Level (m)	Max. Level (m)	Max. Depth (m)	Max. Inflow (L/s)	Max. Resident Volume (m³)	Max. Flooded Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Status
Flow Control Chamber	FEH: 30 years: +0 %: 60 mins: Winter	25.400	24.550	24.843	0.293	2.2	0.083	0.000	2.0	11.328	Surcharged
Outfall	FEH: 30 years: +0 %: 15 mins: Winter	24.500	23.300	23.387	0.087	47.8	0.000	0.000	47.8	26.055	OK
Manhole 4 (French Drain)	FEH: 30 years: +0 %: 15 mins: Winter	25.297	24.450	24.590	0.140	47.7	0.040	0.000	46.3	23.394	OK
Connection Manhole	FEH: 30 years: +0 %: 15 mins: Winter	25.400	24.200	24.296	0.096	48.3	0.027	0.000	47.8	26.055	OK
Manhole 1 (French Drain)	FEH: 30 years: +0 %: 15 mins: Winter	28.788	28.000	28.092	0.092	22.3	0.015	0.000	21.4	10.322	OK
Manhole 2 (French Drain)	FEH: 30 years: +0 %: 15 mins: Winter	27.659	26.625	26.772	0.147	49.7	0.042	0.000	48.9	23.412	OK
Manhole 3 (French Drain)	FEH: 30 years: +0 %: 15 mins: Winter	27.725	26.100	26.205	0.105	48.9	0.030	0.000	47.7	23.406	OK

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FEH: 2 years: Increase Rainfall (%): +0: Critical Storm Per Item: Rank By: Max. Depth

Junction	Storm Event	Cover Level (m)	Invert Level (m)	Max. Level (m)	Max. Depth (m)	Max. Inflow (L/s)	Max. Resident Volume (m³)	Max. Flooded Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Status
Flow Control Chamber	FEH: 2 years: +0 %: 60 mins: Winter	25.400	24.550	24.702	0.152	2.1	0.043	0.000	2.0	9.515	OK
Outfall	FEH: 2 years: +0 %: 15 mins: Winter	24.500	23.300	23.360	0.060	23.6	0.000	0.000	23.6	13.854	OK
Manhole 4 (French Drain)	FEH: 2 years: +0 %: 15 mins: Winter	25.297	24.450	24.539	0.089	22.8	0.025	0.000	22.1	11.279	OK
Connection Manhole	FEH: 2 years: +0 %: 15 mins: Winter	25.400	24.200	24.264	0.064	23.8	0.018	0.000	23.6	13.854	OK
Manhole 1 (French Drain)	FEH: 2 years: +0 %: 15 mins: Winter	28.788	28.000	28.059	0.059	10.8	0.009	0.000	10.3	4.977	OK
Manhole 2 (French Drain)	FEH: 2 years: +0 %: 15 mins: Winter	27.659	26.625	26.718	0.093	23.9	0.026	0.000	23.5	11.290	OK
Manhole 3 (French Drain)	FEH: 2 years: +0 %: 15 mins: Winter	27.725	26.100	26.170	0.070	23.5	0.020	0.000	22.8	11.288	OK

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Report Details: Type: Stormwater Controls Summary Storm Phase: Phase		Company Address: 129 Cumberland Road Bristol BS1 6UY			



FEH: 100 years: Increase Rainfall (%): +45: Critical Storm Per Item: Rank By: Max. US Depth

Stormwater Control	Storm Event	Max. US Level (m)	Max. DS Level (m)	Max. US Depth (m)	Max. DS Depth (m)	Max. Inflow (L/s)	Max. Resident Volume (m³)	Max. Flooded Volume (m³)	Total Lost Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Percentage Available (%)	Status
Pond	FEH: 100 years: +45 %: 60 mins: Winter	25.018	25.018	0.768	0.768	25.3	43.770	0.000	0.000	2.2	13.183	7.593	OK

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FEH: 30 years: Increase Rainfall (%): +0: Critical Storm Per Item: Rank By: Max. US Depth

Stormwater Control	Storm Event	Max. US Level (m)	Max. DS Level (m)	Max. US Depth (m)	Max. DS Depth (m)	Max. Inflow (L/s)	Max. Resident Volume (m³)	Max. Flooded Volume (m³)	Total Lost Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Percentage Available (%)	Status
Pond	FEH: 30 years: +0 %: 60 mins: Winter	24.843	24.843	0.593	0.593	13.8	26.962	0.000	0.000	2.2	11.577	43.078	OK

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FEH: 2 years: Increase Rainfall (%): +0: Critical Storm Per Item: Rank By: Max. US Depth

Stormwater Control	Storm Event	Max. US Level (m)	Max. DS Level (m)	Max. US Depth (m)	Max. DS Depth (m)	Max. Inflow (L/s)	Max. Resident Volume (m³)	Max. Flooded Volume (m³)	Total Lost Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Percentage Available (%)	Status
Pond	FEH: 2 years: +0 %: 60 mins: Winter	24.703	24.703	0.453	0.453	6.5	16.847	0.000	0.000	2.1	9.549	64.432	OK

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Report Details: Type: Connections Summary Storm Phase: Phase		Company Address: 129 Cumberland Road Bristol BS1 6UY			



FEH: 100 years: Increase Rainfall (%): +45: Critical Storm Per Item: Rank By: Max. Flow

Connection	Storm Event	Connection Type	From	To	Upstream Cover Level (m)	Max. US Water Level (m)	Max. Flow Depth (m)	Discharge Volume (m³)	Max. Velocity (m/s)	Flow / Capacity	Max. Flow (L/s)	Status
Pipe 1.004	FEH: 100 years: +45 %: 15 mins: Winter	Pipe	Connection Manhole	Outfall	25.400	24.331	0.123	44.944	3.5	0.52	77.8	OK
Pipe 1.003	FEH: 100 years: +45 %: 15 mins: Winter	Pipe	Manhole 4 (French Drain)	Connection Manhole	25.297	24.665	0.173	42.286	2.3	0.95	76.0	OK
Pipe 2.001	FEH: 100 years: +45 %: 60 mins: Winter	Pipe	Flow Control Chamber	Connection Manhole	25.400	25.018	0.054	12.692	1.5	0.01	2.0	Surcharged
Pipe 2.000	FEH: 100 years: +45 %: 15 mins: Summer	Pipe	Pond	Flow Control Chamber	25.400	24.873	0.225	2.956	0.3	0.06	2.6	Surcharged
Pipe 1.001	FEH: 100 years: +45 %: 15 mins: Winter	Pipe	Manhole 2 (French Drain)	Manhole 3 (French Drain)	27.659	27.037	0.225	42.312	2.0	1.06	79.1	Surcharged
Pipe 1.002	FEH: 100 years: +45 %: 15 mins: Winter	Pipe	Manhole 3 (French Drain)	Manhole 4 (French Drain)	27.725	26.241	0.178	42.297	2.3	0.71	77.5	OK
Pipe 1.000	FEH: 100 years: +45 %: 15 mins: Winter	Pipe	Manhole 1 (French Drain)	Manhole 2 (French Drain)	28.788	28.373	0.150	18.748	1.9	0.99	32.7	Surcharged

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FEH: 30 years: Increase Rainfall (%): +0: Critical Storm Per Item: Rank By: Max. Flow

Connection	Storm Event	Connection Type	From	To	Upstream Cover Level (m)	Max. US Water Level (m)	Max. Flow Depth (m)	Discharge Volume (m³)	Max. Velocity (m/s)	Flow / Capacity	Max. Flow (L/s)	Status
Pipe 1.004	FEH: 30 years: +0 %: 15 mins: Winter	Pipe	Connection Manhole	Outfall	25.400	24.296	0.092	26.055	3.1	0.32	47.8	OK
Pipe 1.003	FEH: 30 years: +0 %: 15 mins: Winter	Pipe	Manhole 4 (French Drain)	Connection Manhole	25.297	24.590	0.118	23.394	2.2	0.58	46.3	OK
Pipe 2.001	FEH: 30 years: +0 %: 30 mins: Summer	Pipe	Flow Control Chamber	Connection Manhole	25.400	24.794	0.045	5.601	1.5	0.01	2.0	Surcharged
Pipe 2.000	FEH: 30 years: +0 %: 15 mins: Summer	Pipe	Pond	Flow Control Chamber	25.400	24.759	0.184	2.899	0.3	0.05	2.4	OK
Pipe 1.001	FEH: 30 years: +0 %: 15 mins: Winter	Pipe	Manhole 2 (French Drain)	Manhole 3 (French Drain)	27.659	26.772	0.126	23.412	2.1	0.65	48.9	OK
Pipe 1.002	FEH: 30 years: +0 %: 15 mins: Winter	Pipe	Manhole 3 (French Drain)	Manhole 4 (French Drain)	27.725	26.205	0.122	23.406	2.2	0.44	47.7	OK
Pipe 1.000	FEH: 30 years: +0 %: 15 mins: Winter	Pipe	Manhole 1 (French Drain)	Manhole 2 (French Drain)	28.788	28.092	0.090	10.322	1.9	0.65	21.4	OK

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FEH: 2 years: Increase Rainfall (%): +0: Critical Storm Per Item: Rank By: Max. Flow

Connection	Storm Event	Connection Type	From	To	Upstream Cover Level (m)	Max. US Water Level (m)	Max. Flow Depth (m)	Discharge Volume (m³)	Max. Velocity (m/s)	Flow / Capacity	Max. Flow (L/s)	Status
Pipe 1.004	FEH: 2 years: +0 %: 15 mins: Winter	Pipe	Connection Manhole	Outfall	25.400	24.264	0.062	13.854	2.6	0.16	23.6	OK
Pipe 1.003	FEH: 2 years: +0 %: 15 mins: Winter	Pipe	Manhole 4 (French Drain)	Connection Manhole	25.297	24.539	0.077	11.279	1.8	0.28	22.1	OK
Pipe 2.001	FEH: 2 years: +0 %: 15 mins: Summer	Pipe	Flow Control Chamber	Connection Manhole	25.400	24.674	0.037	2.519	1.5	0.01	2.0	OK
Pipe 2.000	FEH: 2 years: +0 %: 30 mins: Summer	Pipe	Pond	Flow Control Chamber	25.400	24.688	0.112	5.390	0.2	0.05	2.1	OK
Pipe 1.001	FEH: 2 years: +0 %: 15 mins: Winter	Pipe	Manhole 2 (French Drain)	Manhole 3 (French Drain)	27.659	26.718	0.082	11.290	1.8	0.32	23.5	OK
Pipe 1.002	FEH: 2 years: +0 %: 15 mins: Winter	Pipe	Manhole 3 (French Drain)	Manhole 4 (French Drain)	27.725	26.170	0.080	11.288	1.8	0.21	22.8	OK
Pipe 1.000	FEH: 2 years: +0 %: 15 mins: Winter	Pipe	Manhole 1 (French Drain)	Manhole 2 (French Drain)	28.788	28.059	0.058	4.977	1.6	0.31	10.3	OK



clarkebond

Engineering outstanding solutions for community and place

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