

Basic Hydraulics Report



Project name: C8
Project number: 2026-Ex2
Client: SANRAL
Designer: Marco van Dijk
Date analysed: 2026-09-16 13:51:26

Included sections

1. Culvert analysis – Culvert 1 – C8a
2. Culvert analysis – Culvert 2 – C8b

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Culvert Analysis Input

PROJECT INFORMATION	
Project name	C8
Project number	2026-Ex2
Client	SANRAL
Designer	Marco van Dijk
Date	2026-09-16
Project notes	This is an example file
Culvert	Culvert 1 - C8a

CULVERT PROPERTIES	
Solver	HY-8 / HDS-5
Culvert type	Circular
Material	Concrete
Number of barrels	1
Diameter	0.600 m
Inlet configuration	Square edge with headwall
Inlet station	0.000 m
Inlet elevation	1268.130 m
Outlet station	7.350 m
Outlet elevation	1267.161 m
Manning n	0.0130 s/m ^{1/3}
Entrance loss coefficient	0.500
Outlet loss coefficient	1.000

TAILWATER / ANALYSIS	
Design discharge	2.400 m ³ /s
Calculation steps	10
Tailwater method	Channel Shape - Rectangular
Downstream channel invert	1267.161 m
Downstream bottom width	1.500 m
Downstream slope	0.13180 m/m
Downstream Manning n	0.0300 s/m ^{1/3}

ROADWAY DATA	
Roadway profile	Constant Roadway Elevation
Crest length	20.000 m
Crest elevation	1269.315 m
Top width	7.350 m
Weir coefficient	1.660

Culvert Performance and Flow Characteristics

Culvert : Culvert 1 - C8a

CULVERT PERFORMANCE

Q total	Q culvert	Q road	HW elevation	Inlet control HW depth	TW elevation	Outlet control HW depth	Governing HW	HW/D	Control	HY-8 type	Profile	V outlet	Exit loss
(m³/s)	(m³/s)	(m³/s)	(m)	(m)	(m)	(m)	(m)		(-)	(-)	(-)	(m/s)	(m)
0.240	0.240	0.000	1268.564	0.434	1267.239	0.000	0.434	0.723	Inlet	1-S2-n	Steep	4.271	0.037
0.480	0.480	0.000	1268.869	0.739	1267.281	0.000	0.739	1.232	Inlet	5-S2-n	Steep	4.753	0.147
0.720	0.714	0.006	1269.318	1.188	1267.317	0.156	1.188	1.980	Inlet	5-S2-n	Steep	5.100	0.325
0.960	0.728	0.232	1269.352	1.222	1267.348	0.182	1.222	2.036	Inlet	5-S2-n	Steep	5.121	0.338
1.200	0.737	0.463	1269.373	1.243	1267.378	0.200	1.243	2.072	Inlet	5-S2-n	Steep	5.134	0.346
1.440	0.744	0.696	1269.391	1.261	1267.406	0.214	1.261	2.102	Inlet	5-S2-n	Steep	5.145	0.353
1.680	0.751	0.929	1269.407	1.277	1267.432	0.227	1.277	2.129	Inlet	5-S2-n	Steep	5.155	0.360
1.920	0.757	1.163	1269.422	1.292	1267.458	0.238	1.292	2.153	Inlet	5-S2-n	Steep	5.164	0.365
2.160	0.763	1.397	1269.436	1.306	1267.483	0.249	1.306	2.177	Inlet	5-S2-n	Steep	5.172	0.371
2.400	0.768	1.632	1269.449	1.319	1267.507	0.260	1.319	2.199	Inlet	5-S2-n	Steep	5.180	0.376

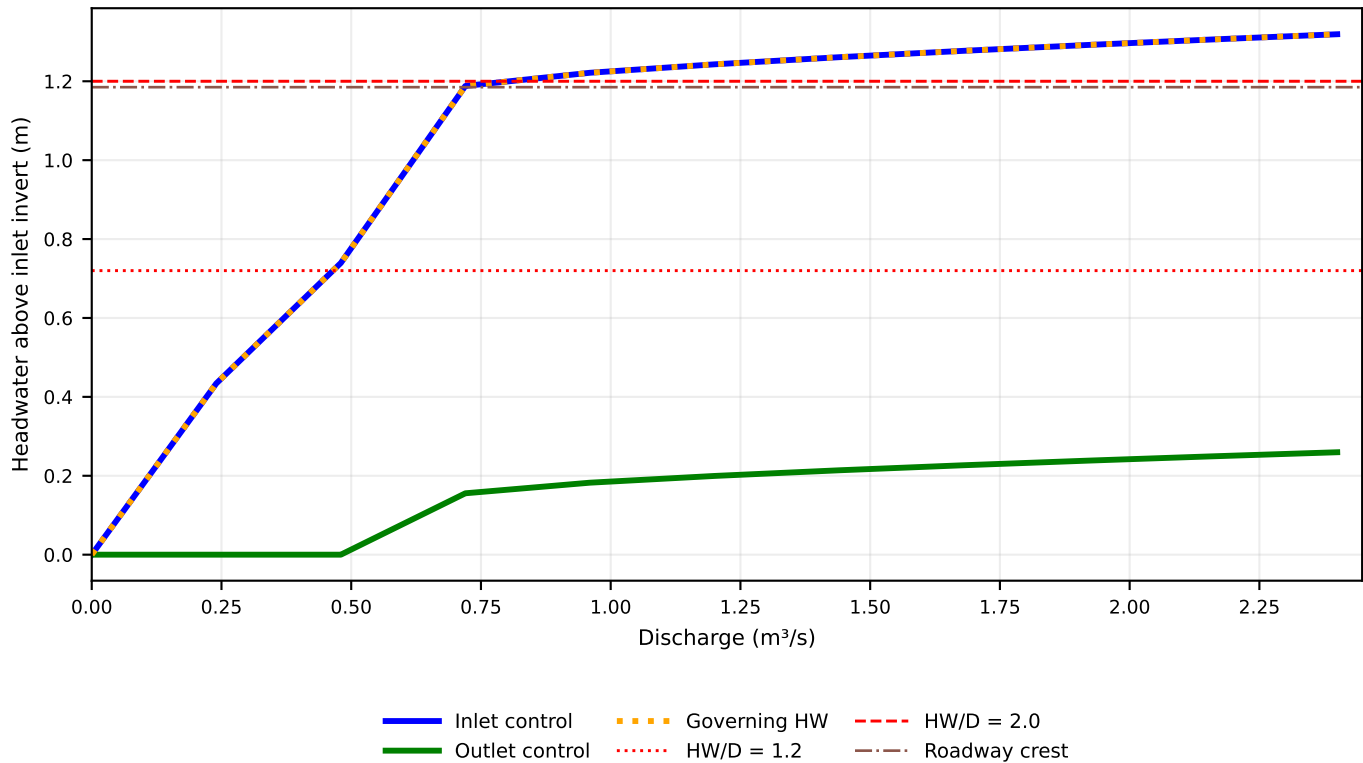
FLOW CHARACTERISTICS

Q total	Q culvert	Culvert yc	Culvert yn	Outlet depth	Outlet velocity	Downstream yc	Downstream yn	Downstream velocity	Froude no.
(m³/s)	(m³/s)	(m)	(m)	(m)	(m/s)	(m)	(m)	(m/s)	(-)
0.240	0.240	0.318	0.133	0.152	4.271	0.138	0.078	2.062	2.363
0.480	0.480	0.454	0.189	0.232	4.753	0.219	0.120	2.667	2.458
0.720	0.714	0.537	0.233	0.298	5.100	0.286	0.156	3.086	2.499
0.960	0.728	0.541	0.236	0.301	5.121	0.347	0.187	3.415	2.519
1.200	0.737	0.543	0.237	0.304	5.134	0.403	0.217	3.688	2.529
1.440	0.744	0.545	0.239	0.306	5.145	0.455	0.245	3.922	2.532
1.680	0.751	0.546	0.240	0.307	5.155	0.504	0.271	4.128	2.531
1.920	0.757	0.547	0.241	0.309	5.164	0.551	0.297	4.312	2.527
2.160	0.763	0.549	0.242	0.310	5.172	0.596	0.322	4.478	2.521
2.400	0.768	0.550	0.243	0.311	5.180	0.639	0.346	4.629	2.514

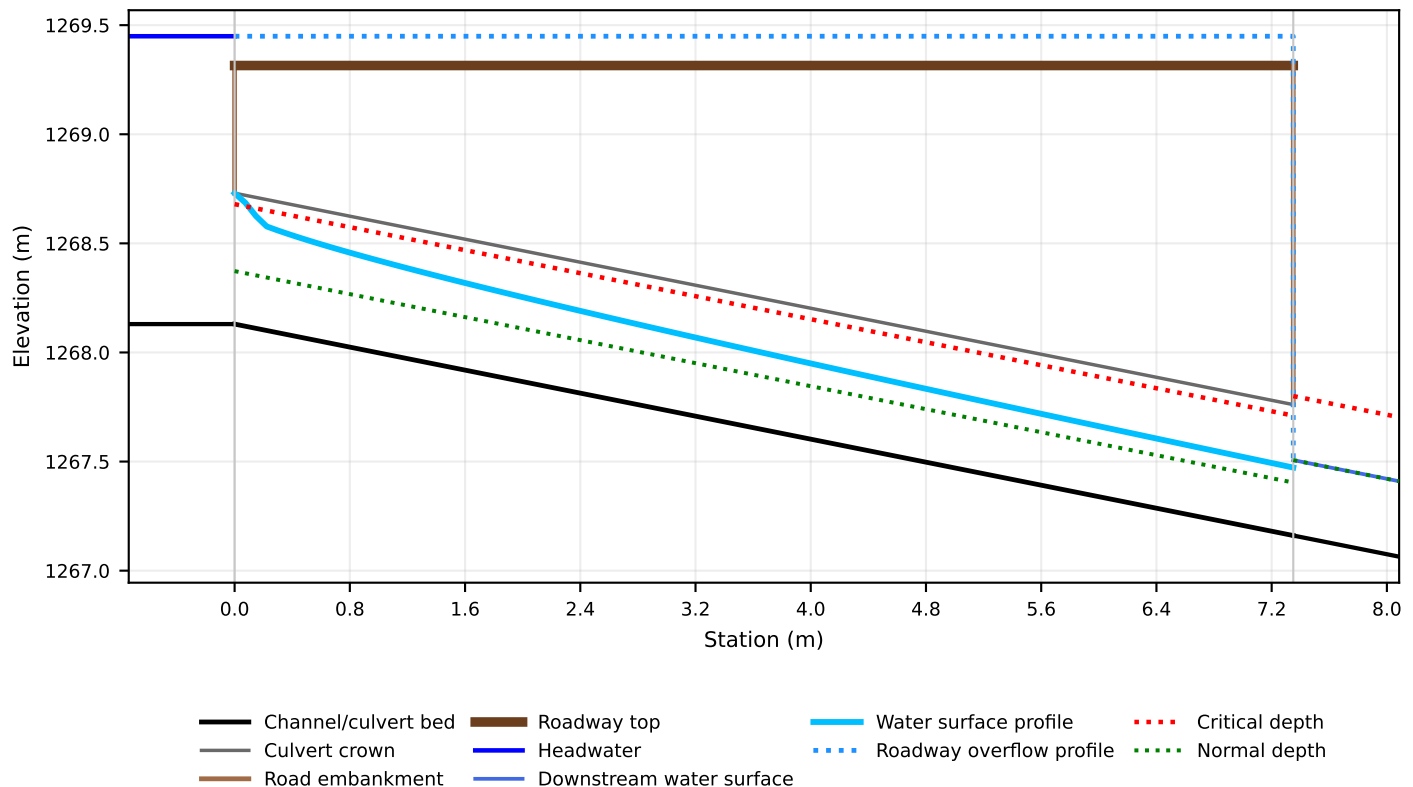
Culvert Analysis Graphs

Culvert : Culvert 1 - C8a

Culvert Performance Curve



Culvert Side View — Q = 2.400 m³/s



Culvert Analysis Input

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Project name	C8
Project number	2026-Ex2
Client	SANRAL
Designer	Marco van Dijk
Date	2026-09-16
Project notes	This is an example file
Culvert	Culvert 2 - C8b

CULVERT PROPERTIES	
Solver	SANRAL
Culvert type	Circular
Material	Concrete
Number of barrels	1
Diameter	1.000 m
Inlet configuration	Square edge with headwall
Inlet station	0.000 m
Inlet elevation	0.000 m
Outlet station	20.000 m
Outlet elevation	-0.100 m
Manning n	0.0140 s/m ^{1/3}
Entrance loss coefficient	0.500
Outlet loss coefficient	1.000

TAILWATER / ANALYSIS	
Design discharge	2.000 m ³ /s
Calculation steps	10
Tailwater method	Channel Shape - Trapezium
Downstream channel invert	-0.100 m
Downstream bottom width	1.000 m
Downstream side slope	2.000 H:V
Downstream slope	0.00100 m/m
Downstream Manning n	0.0300 s/m ^{1/3}

ROADWAY DATA	
Roadway profile	Constant Roadway Elevation
Crest length	12.000 m
Crest elevation	4.000 m
Top width	6.000 m
Weir coefficient	1.660

Culvert Performance and Flow Characteristics

Culvert : Culvert 2 - C8b

CULVERT PERFORMANCE

Q total	Q culvert	Q road	HW elevation	Inlet control HW depth	TW elevation	Outlet control HW depth	Governing HW	HW/D	Control	HY-8 type	Profile	V outlet	Exit loss
(m³/s)	(m³/s)	(m³/s)	(m)	(m)	(m)	(m)	(m)		(-)	(-)	(-)	(m/s)	(m)
0.200	0.200	0.000	0.388	0.388	0.221	0.227	0.388	0.388	Inlet	—	—	0.255	0.003
0.400	0.400	0.000	0.559	0.559	0.356	0.382	0.559	0.559	Inlet	—	—	0.509	0.013
0.600	0.600	0.000	0.692	0.692	0.456	0.516	0.692	0.692	Inlet	—	—	0.764	0.030
0.800	0.800	0.000	0.805	0.805	0.539	0.644	0.805	0.805	Inlet	—	—	1.019	0.053
1.000	1.000	0.000	0.935	0.935	0.609	0.774	0.935	0.935	Inlet	—	—	1.273	0.083
1.200	1.200	0.000	1.055	1.055	0.672	0.909	1.055	1.055	Inlet	—	—	1.528	0.119
1.400	1.400	0.000	1.170	1.170	0.729	1.051	1.170	1.170	Inlet	—	—	1.783	0.162
1.600	1.600	0.000	1.202	1.200	0.781	1.202	1.202	1.202	Outlet	—	—	2.037	0.212
1.800	1.800	0.000	1.362	1.244	0.829	1.362	1.362	1.362	Outlet	—	—	2.292	0.268
2.000	2.000	0.000	1.532	1.418	0.875	1.532	1.532	1.532	Outlet	—	—	2.546	0.331

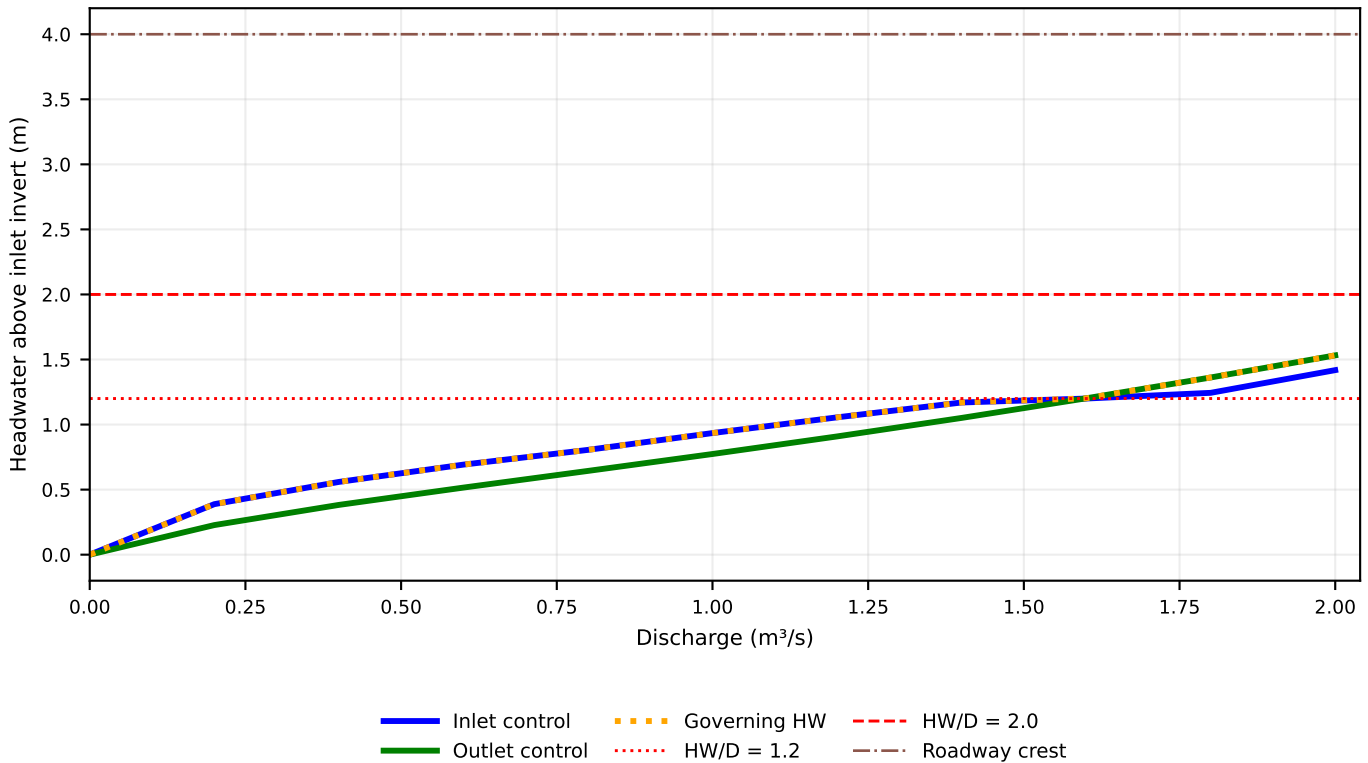
FLOW CHARACTERISTICS

Q total	Q culvert	Culvert yc	Culvert yn	Outlet depth	Outlet velocity	Downstream yc	Downstream yn	Downstream velocity	Froude no.
(m³/s)	(m³/s)	(m)	(m)	(m)	(m/s)	(m)	(m)	(m/s)	(-)
0.200	0.200	0.248	0.241	0.321	0.920	0.144	0.321	0.380	0.253
0.400	0.400	0.355	0.344	0.456	1.146	0.218	0.456	0.459	0.264
0.600	0.600	0.439	0.428	0.556	1.336	0.275	0.556	0.510	0.270
0.800	0.800	0.510	0.505	0.639	1.511	0.323	0.639	0.550	0.275
1.000	1.000	0.573	0.579	0.709	1.679	0.365	0.709	0.583	0.278
1.200	1.200	0.630	0.654	0.772	1.844	0.402	0.772	0.611	0.281
1.400	1.400	0.682	0.734	0.829	2.011	0.437	0.829	0.635	0.284
1.600	1.600	0.730	1.000	0.881	2.184	0.469	0.881	0.657	0.286
1.800	1.800	0.773	1.000	0.929	2.366	0.499	0.929	0.677	0.288
2.000	2.000	0.812	1.000	0.975	2.564	0.527	0.975	0.696	0.290

Culvert Analysis Graphs

Culvert : Culvert 2 - C8b

Culvert Performance Curve



Culvert Side View — Q = 2.000 m³/s

