

 ORSNA Sistema Nacional de Aeropuertos	Rehabilitación Integral Pista 02-20 AIR Proyecto Ejecutivo - Memoria Ingeniería Hidráulica ANEXO I - MODELACION HIDRAULICA		 AIR AEROPUERTO INTERNACIONAL ROSARIO ISLAS MALVINAS
	REV. 00 AIR-RWY-HI-01-A1-00	Fecha Rev. 22/7/2021	



**AEROPUERTO
INTERNACIONAL
ROSARIO**
ISLAS MALVINAS

AEROPUERTO INTERNACIONAL DE ROSARIO "ISLAS MALVINAS"

PROYECTO:

Rehabilitación Integral Pista 02-20 AIR

Proyecto Ejecutivo - Memoria Ingeniería Hidráulica

ANEXO I - MODELACION HIDRAULICA

Julio de 2021

	Rehabilitación Integral Pista 02-20 AIR Proyecto Ejecutivo - Memoria Ingeniería Hidráulica ANEXO I - MODELACION HIDRAULICA		
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AEROPUERTO INTERNACIONAL DE ROSARIO "ISLAS MALVINAS"

REHABILITACIÓN INTEGRAL PISTA 02-20 AIR

PROYECTO EJECUTIVO - MEMORIA INGENIERÍA HIDRÁULICA

ANEXO I - MODELACION HIDRAULICA

ALCANTARILLA A1

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 0 cms

Design Flow: 0.49 cms

Maximum Flow: 0.49 cms

Table 1 - Summary of Culvert Flows at Crossing: A1

Headwater Elevation (m)	Total Discharge (cms)	A Discharge (cms)	Contruccin Discharge (cms)	Roadway Discharge (cms)	Iterations
21.33	0.00	0.00	0.00	0.00	0
21.55	0.05	0.02	0.02	0.00	6
21.62	0.09	0.05	0.05	0.00	6
21.67	0.14	0.07	0.07	0.00	7
21.72	0.19	0.09	0.10	0.00	6
21.75	0.23	0.11	0.12	0.00	6
21.78	0.28	0.13	0.15	0.00	5
21.81	0.33	0.16	0.17	0.00	4
21.84	0.38	0.18	0.20	0.00	4
21.87	0.42	0.20	0.23	0.00	4
21.89	0.47	0.22	0.25	0.00	3
22.50	1.70	0.65	1.05	0.00	Overtopping

Table 2 - Culvert Summary Table: A1

Total Discharge (cms)	Culvert Discharge (cms)	Headwater Elevation (m)	Inlet Control Depth (m)	Outlet Control Depth (m)	Flow Type	Normal Depth (m)	Critical Depth (m)	Outlet Depth (m)	Tailwater Depth (m)	Outlet Velocity (m/s)	Tailwater Velocity (m/s)
0.00	0.00	21.33	0.000	0.000	0-NF	0.000	0.000	0.000	0.000	0.000	0.000
0.05	0.02	21.49	0.102	0.202	3-M1t	0.134	0.091	0.202	0.202	0.263	0.383
0.09	0.04	21.54	0.131	0.266	3-M1t	0.188	0.129	0.262	0.262	0.358	0.455
0.14	0.06	21.58	0.158	0.313	3-M1t	0.230	0.156	0.305	0.305	0.431	0.504
0.19	0.08	21.61	0.184	0.352	3-M1t	0.267	0.180	0.340	0.340	0.492	0.541
0.23	0.10	21.64	0.208	0.386	3-M1t	0.301	0.200	0.370	0.370	0.547	0.572
0.28	0.12	21.67	0.231	0.416	3-M1t	0.333	0.219	0.396	0.396	0.598	0.599
0.33	0.14	21.69	0.252	0.443	3-M1t	0.364	0.234	0.420	0.420	0.641	0.623
0.38	0.15	21.71	0.274	0.469	3-M1t	0.398	0.251	0.441	0.441	0.690	0.644
0.42	0.17	21.74	0.294	0.494	3-M1t	0.432	0.266	0.461	0.461	0.733	0.663
0.47	0.19	21.76	0.313	0.510	3-M1t	0.472	0.280	0.480	0.480	0.776	0.681

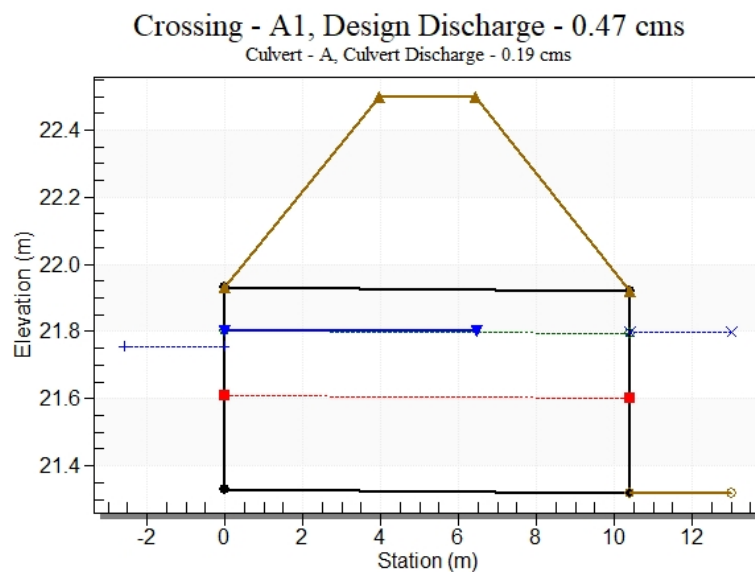
Straight Culvert

Inlet Elevation (invert): 21.33 m, Outlet Elevation (invert): 21.32 m

Culvert Slope: 0.0010

Inlet Throat Elevation: 21.32 m, Inlet Crest Elevation: 0.00 m

Water Surface Profile Plot for Culvert: A



Site Data - A

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 m

Inlet Elevation: 21.33 m

Outlet Station: 10.40 m

Outlet Elevation: 21.32 m

Number of Barrels: 1

Culvert Data Summary - A

Barrel Shape: Circular

Barrel Diameter: 600.00 mm

Barrel Material: Concrete

Embedment: 0.00 mm

Barrel Manning's n: 0.0130

Culvert Type: Side-Tapered, Rectangular

Inlet Configuration: Square Edge Top (26-90°) Wingwall

Inlet Depression: None

Inlet Depression: None

Table 3 - Culvert Summary Table: Contrucción

Total Discharge (cms)	Culvert Discharge (cms)	Headwater Elevation (m)	Inlet Control Depth (m)	Outlet Control Depth (m)	Flow Type	Normal Depth (m)	Critical Depth (m)	Outlet Depth (m)	Tailwater Depth (m)	Outlet Velocity (m/s)	Tailwater Velocity (m/s)
0.00	0.00	21.33	0.000	0.000	0-NF	0.000	0.000	0.000	0.000	0.000	0.000
0.05	0.02	21.49	0.088	0.201	3-M1t	0.101	0.068	0.202	0.202	0.148	0.383
0.09	0.05	21.54	0.107	0.263	3-M1t	0.144	0.099	0.262	0.262	0.215	0.455
0.14	0.08	21.58	0.126	0.308	3-M1t	0.180	0.123	0.305	0.305	0.271	0.504
0.19	0.11	21.61	0.146	0.344	3-M1t	0.211	0.143	0.340	0.340	0.320	0.541
0.23	0.13	21.64	0.165	0.376	3-M1t	0.240	0.163	0.370	0.370	0.368	0.572
0.28	0.16	21.67	0.184	0.405	3-M1t	0.267	0.180	0.396	0.396	0.412	0.599
0.33	0.19	21.69	0.204	0.431	3-M1t	0.295	0.196	0.420	0.420	0.459	0.623
0.38	0.22	21.71	0.221	0.455	3-M1t	0.320	0.211	0.441	0.441	0.498	0.644
0.42	0.25	21.74	0.240	0.478	3-M1t	0.347	0.226	0.461	0.461	0.540	0.663
0.47	0.28	21.76	0.258	0.499	3-M1t	0.374	0.239	0.480	0.480	0.581	0.681

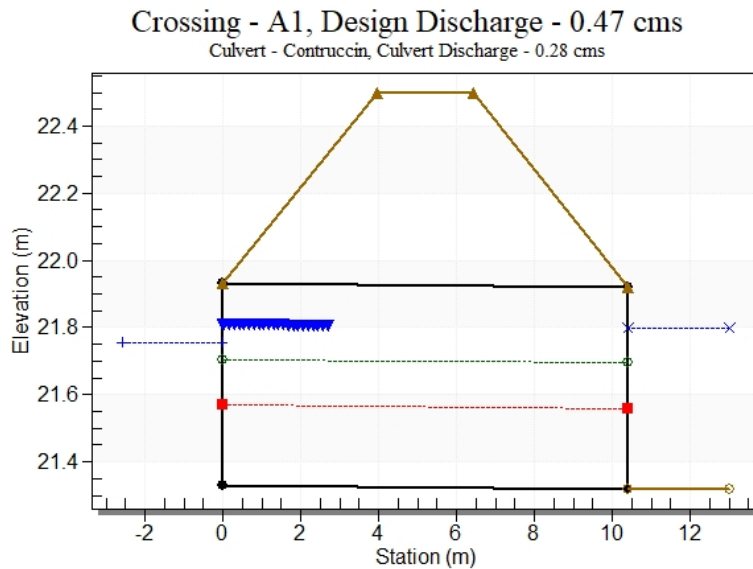
Straight Culvert

Inlet Elevation (invert): 21.33 m, Outlet Elevation (invert): 21.32 m

Culvert Slope: 0.0010

Inlet Throat Elevation: 21.32 m, Inlet Crest Elevation: 0.00 m

Water Surface Profile Plot for Culvert: Contrucción



Site Data - Contrucción

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 m

Inlet Elevation: 21.33 m

Outlet Station: 10.40 m

Outlet Elevation: 21.32 m

Number of Barrels: 2

Culvert Data Summary - Contrucción

Barrel Shape: Circular

Barrel Diameter: 600.00 mm

Barrel Material: Concrete

Embedment: 0.00 mm

Barrel Manning's n: 0.0130

Culvert Type: Side-Tapered, Rectangular

Inlet Configuration: Square Edge Top (26-90°) Wingwall

Inlet Depression: None

ALCANTARILLA A2

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 0 cms

Design Flow: 0.13 cms

Maximum Flow: 0.13 cms

Table 4 - Summary of Culvert Flows at Crossing: A2

Headwater Elevation (m)	Total Discharge (cms)	B Discharge (cms)	Roadway Discharge (cms)	Iterations
20.85	0.00	0.00	0.00	1
20.92	0.01	0.01	0.00	1
20.95	0.03	0.03	0.00	1
20.97	0.04	0.04	0.00	1
20.99	0.05	0.05	0.00	1
21.01	0.07	0.07	0.00	1
21.03	0.08	0.08	0.00	1
21.04	0.09	0.09	0.00	1
21.05	0.10	0.10	0.00	1
21.07	0.12	0.12	0.00	1
21.08	0.13	0.13	0.00	1
22.70	2.05	2.05	0.00	Overtopping

Table 5 - Culvert Summary Table: A2

Total Discharge (cms)	Culvert Discharge (cms)	Headwater Elevation (m)	Inlet Control Depth (m)	Outlet Control Depth (m)	Flow Type	Normal Depth (m)	Critical Depth (m)	Outlet Depth (m)	Tailwater Depth (m)	Outlet Velocity (m/s)	Tailwater Velocity (m/s)
0.00	0.00	20.85	0.000	0.000	0-NF	0.000	0.000	0.000	0.000	0.000	0.000
0.01	0.01	20.96	0.063	0.110	3-M1t	0.052	0.048	0.134	0.134	0.138	0.361
0.03	0.03	21.00	0.073	0.152	3-M1t	0.073	0.070	0.174	0.174	0.191	0.430
0.04	0.04	21.03	0.082	0.181	3-M1t	0.089	0.085	0.203	0.203	0.232	0.475
0.05	0.05	21.06	0.091	0.206	3-M1t	0.102	0.100	0.226	0.226	0.268	0.511
0.07	0.07	21.08	0.101	0.227	3-M1t	0.114	0.112	0.245	0.245	0.299	0.540
0.08	0.08	21.10	0.110	0.245	3-M1t	0.125	0.123	0.263	0.263	0.328	0.565
0.09	0.09	21.11	0.119	0.262	3-M1t	0.135	0.134	0.278	0.278	0.354	0.588
0.10	0.10	21.13	0.128	0.278	3-M1t	0.144	0.143	0.293	0.293	0.380	0.608
0.12	0.12	21.14	0.137	0.293	3-M1t	0.153	0.151	0.306	0.306	0.404	0.626
0.13	0.13	21.16	0.145	0.306	3-M1t	0.161	0.160	0.318	0.318	0.427	0.642

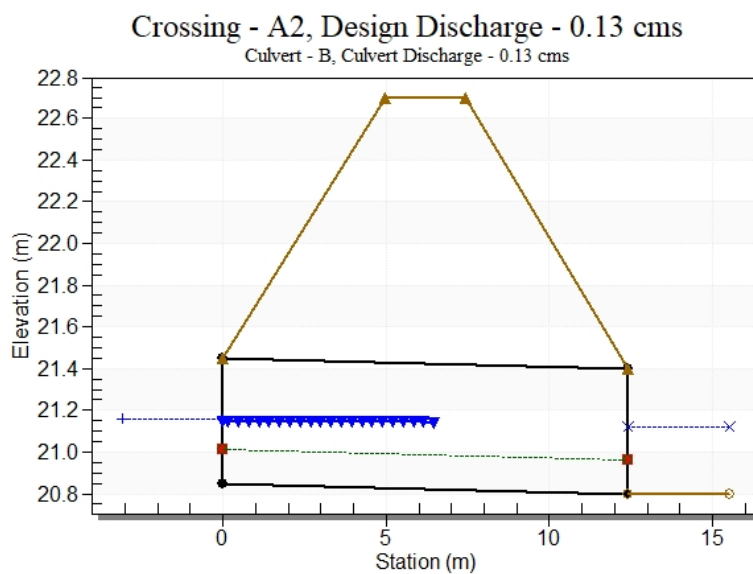
Straight Culvert

Inlet Elevation (invert): 20.85 m, Outlet Elevation (invert): 20.80 m

Culvert Slope: 0.0040

Inlet Throat Elevation: 20.83 m, Inlet Crest Elevation: 0.00 m

Water Surface Profile Plot for Culvert: A2



Site Data – A2

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 m

Inlet Elevation: 20.85 m

Outlet Station: 12.40 m

Outlet Elevation: 20.80 m

Number of Barrels: 2

Culvert Data Summary – A2

Barrel Shape: Circular

Barrel Diameter: 600.00 mm

Barrel Material: Concrete

Embedment: 0.00 mm

Barrel Manning's n: 0.0130

Culvert Type: Side-Tapered, Rectangular

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Inlet Configuration: Square Edge Top (26-90°) Wingwall

Inlet Depression: None

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ALCANTARILLA A3

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 0 cms

Design Flow: 0.13 cms

Maximum Flow: 0.13 cms

Table 6 - Summary of Culvert Flows at Crossing: A3

Headwater Elevation (m)	Total Discharge (cms)	C Discharge (cms)	Roadway Discharge (cms)	Iterations
20.85	0.00	0.00	0.00	1
21.00	0.01	0.01	0.00	1
21.04	0.03	0.03	0.00	1
21.08	0.04	0.04	0.00	1
21.11	0.05	0.05	0.00	1
21.13	0.07	0.07	0.00	1
21.15	0.08	0.08	0.00	1
21.18	0.09	0.09	0.00	1
21.19	0.10	0.10	0.00	1
21.21	0.12	0.12	0.00	1
21.23	0.13	0.13	0.00	1
22.75	1.09	1.09	0.00	Overtopping

Table 7 - Culvert Summary Table: A3

Total Discharge (cms)	Culvert Discharge (cms)	Headwater Elevation (m)	Inlet Control Depth (m)	Outlet Control Depth (m)	Flow Type	Normal Depth (m)	Critical Depth (m)	Outlet Depth (m)	Tailwater Depth (m)	Outlet Velocity (m/s)	Tailwater Velocity (m/s)
0.00	0.00	20.85	0.000	0.000	0-NF	0.000	0.000	0.000	0.000	0.000	0.000
0.01	0.01	21.00	0.097	0.146	7-H2t	-0.305	0.070	0.140	0.140	0.260	0.332
0.03	0.03	21.04	0.115	0.193	7-H2t	-0.305	0.100	0.181	0.181	0.361	0.395
0.04	0.04	21.08	0.134	0.227	7-H2t	-0.305	0.123	0.211	0.211	0.439	0.437
0.05	0.05	21.11	0.152	0.256	7-H2t	-0.305	0.143	0.235	0.235	0.506	0.470
0.07	0.07	21.13	0.169	0.281	7-H2t	-0.305	0.160	0.256	0.256	0.566	0.497
0.08	0.08	21.15	0.186	0.304	7-H2t	-0.305	0.176	0.274	0.274	0.620	0.520
0.09	0.09	21.18	0.203	0.325	7-H2t	-0.305	0.191	0.290	0.290	0.672	0.540
0.10	0.10	21.19	0.220	0.345	7-H2t	-0.305	0.204	0.305	0.305	0.720	0.559
0.12	0.12	21.21	0.236	0.363	7-H2t	-0.305	0.217	0.319	0.319	0.766	0.575
0.13	0.13	21.23	0.252	0.381	7-H2t	-0.305	0.229	0.332	0.332	0.811	0.591

Straight Culvert

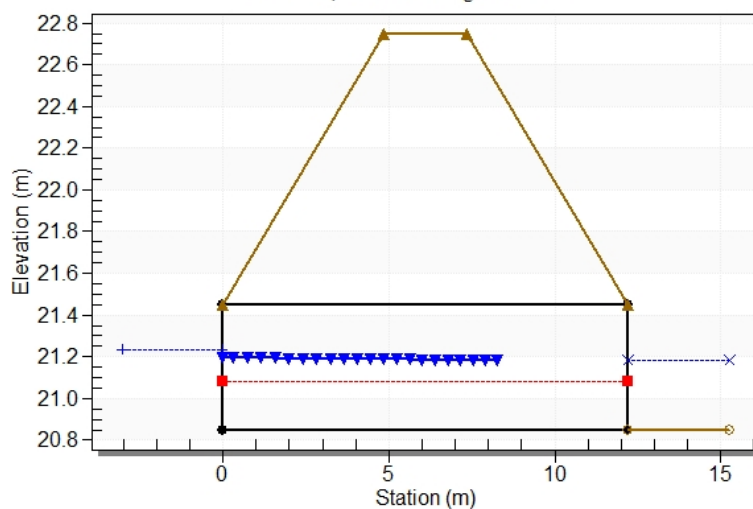
Inlet Elevation (invert): 20.85 m, Outlet Elevation (invert): 20.85 m

Culvert Slope: 0.0000

Inlet Throat Elevation: 20.85 m, Inlet Crest Elevation: 0.00 m

Water Surface Profile Plot for Culvert: A3

Crossing - A3, Design Discharge - 0.13 cms
Culvert - C, Culvert Discharge - 0.13 cms



Site Data – A3

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 m

Inlet Elevation: 20.85 m

Outlet Station: 12.20 m

Outlet Elevation: 20.85 m

Number of Barrels: 1

Culvert Data Summary – A3

Barrel Shape: Circular

Barrel Diameter: 600.00 mm

Barrel Material: Concrete

Embedment: 0.00 mm

Barrel Manning's n: 0.0130

Culvert Type: Side-Tapered, Rectangular

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Inlet Configuration: Square Edge Top (26-90°) Wingwall

Inlet Depression: None

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ALCANTARILLA A4

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 0 cms

Design Flow: 0.11 cms

Maximum Flow: 0.11 cms

Table 8 - Summary of Culvert Flows at Crossing: A4

Headwater Elevation (m)	Total Discharge (cms)	D Discharge (cms)	Roadway Discharge (cms)	Iterations
21.22	0.00	0.00	0.00	1
21.31	0.01	0.01	0.00	1
21.35	0.02	0.02	0.00	1
21.38	0.03	0.03	0.00	1
21.41	0.04	0.04	0.00	1
21.43	0.05	0.05	0.00	1
21.45	0.07	0.07	0.00	1
21.47	0.08	0.08	0.00	1
21.49	0.09	0.09	0.00	1
21.51	0.10	0.10	0.00	1
21.52	0.11	0.11	0.00	1
22.65	0.90	0.90	0.00	Overtopping

Table 9 - Culvert Summary Table: A4

Total Discharge (cms)	Culvert Discharge (cms)	Headwater Elevation (m)	Inlet Control Depth (m)	Outlet Control Depth (m)	Flow Type	Normal Depth (m)	Critical Depth (m)	Outlet Depth (m)	Tailwater Depth (m)	Outlet Velocity (m/s)	Tailwater Velocity (m/s)
0.00	0.00	21.22	0.000	0.000	0-NF	0.000	0.000	0.000	0.000	0.000	0.000
0.01	0.01	21.32	0.078	0.102	3-M1t	0.067	0.064	0.126	0.126	0.255	0.346
0.02	0.02	21.36	0.094	0.145	3-M1t	0.094	0.091	0.163	0.163	0.353	0.412
0.03	0.03	21.40	0.109	0.176	3-M1t	0.115	0.113	0.190	0.190	0.429	0.456
0.04	0.04	21.42	0.125	0.203	3-M1t	0.132	0.131	0.212	0.212	0.493	0.490
0.05	0.05	21.45	0.140	0.226	3-M1t	0.148	0.146	0.230	0.230	0.550	0.518
0.07	0.07	21.47	0.155	0.247	3-M1t	0.162	0.161	0.247	0.247	0.602	0.542
0.08	0.08	21.49	0.169	0.266	3-M1t	0.176	0.175	0.261	0.261	0.651	0.564
0.09	0.09	21.50	0.184	0.284	3-M1t	0.189	0.188	0.275	0.275	0.697	0.583
0.10	0.10	21.52	0.198	0.301	3-M1t	0.201	0.199	0.287	0.287	0.740	0.600
0.11	0.11	21.54	0.212	0.317	3-M1t	0.212	0.210	0.299	0.299	0.782	0.616

Straight Culvert

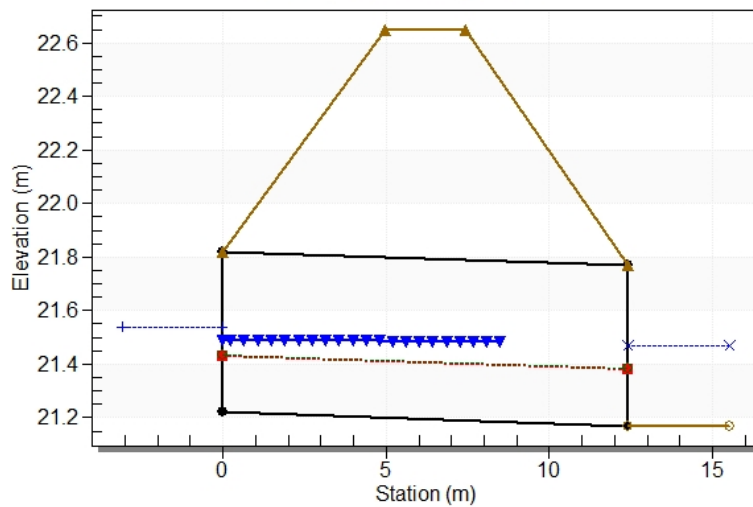
Inlet Elevation (invert): 21.22 m, Outlet Elevation (invert): 21.17 m

Culvert Slope: 0.0040

Inlet Throat Elevation: 21.20 m, Inlet Crest Elevation: 0.00 m

Water Surface Profile Plot for Culvert: A4

Crossing - A4, Design Discharge - 0.11 cms
Culvert - D, Culvert Discharge - 0.11 cms



Site Data – A4

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 m

Inlet Elevation: 21.22 m

Outlet Station: 12.40 m

Outlet Elevation: 21.17 m

Number of Barrels: 1

Culvert Data Summary – A4

Barrel Shape: Circular

Barrel Diameter: 600.00 mm

Barrel Material: Concrete

Embedment: 0.00 mm

Barrel Manning's n: 0.0130

Culvert Type: Side-Tapered, Rectangular

Inlet Configuration: Square Edge Top (26-90°) Wingwall

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Inlet Depression: None

ALCANTARILLA A5

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 0 cms

Design Flow: 0.49 cms

Maximum Flow: 0.49 cms

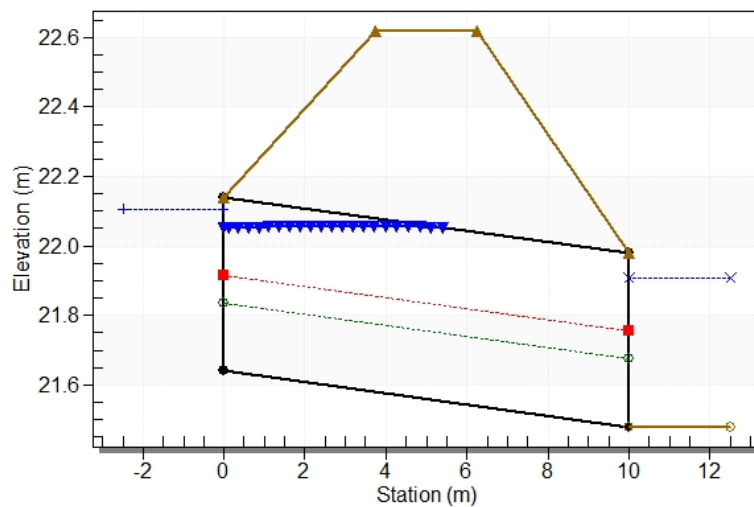
Table 10 - Summary of Culvert Flows at Crossing: A5

Headwater Elevation (m)	Total Discharge (cms)	E Discharge (cms)	Roadway Discharge (cms)	Iterations
21.64	21.64	0.00	0.00	1
21.69	21.67	0.05	0.05	1
21.74	21.69	0.10	0.10	1
21.78	21.73	0.15	0.15	1
21.83	21.77	0.20	0.20	1
21.87	21.80	0.25	0.25	1
21.91	21.82	0.29	0.29	1
21.95	21.97	0.34	0.34	1
21.98	22.00	0.39	0.39	1
22.02	22.03	0.44	0.44	1
22.05	22.11	0.49	0.49	1
22.62	22.62	1.18	1.18	Overtopping

Table 11 - Culvert Summary Table: A5

Total Discharge (cms)	Culvert Discharge (cms)	Headwater Elevation (m)	Inlet Control Depth (m)	Outlet Control Depth (m)	Flow Type	Normal Depth (m)	Critical Depth (m)	Outlet Depth (m)	Tailwater Depth (m)	Outlet Velocity (m/s)	Tailwater Velocity (m/s)
0.00	0.00	21.64	0.000	0.000	0-NF	0.000	0.000	0.000	0.000	0.000	0.000
0.05	0.05	21.67	0.027	0.0*	1-JS1t	0.061	0.083	0.221	0.148	0.189	0.352
0.10	0.10	21.69	0.053	0.049	1-JS1t	0.086	0.118	0.280	0.207	0.280	0.423
0.15	0.15	21.73	0.081	0.090	1-JS1t	0.105	0.146	0.323	0.250	0.483	0.471
0.20	0.20	21.77	0.109	0.125	1-JS1t	0.121	0.169	0.358	0.285	0.547	0.507
0.25	0.25	21.80	0.136	0.155	1-JS1t	0.136	0.190	0.389	0.315	0.607	0.537
0.29	0.29	21.82	0.162	0.182	1-JS1t	0.149	0.210	0.416	0.342	0.664	0.563
0.34	0.34	21.97	0.187	0.333	1-S1t	0.162	0.228	0.366	0.366	0.721	0.585
0.39	0.39	22.00	0.211	0.360	1-S1t	0.174	0.245	0.389	0.389	0.778	0.605
0.44	0.44	22.03	0.234	0.386	1-S1t	0.185	0.260	0.409	0.409	0.834	0.624
0.49	0.49	22.11	0.257	0.467	1-S1f	0.196	0.274	0.573	0.428	0.892	0.641

Crossing - A5, Design Discharge - 0.49 cms
Culvert - E, Culvert Discharge - 0.49 cms



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Straight Culvert

Inlet Elevation (invert): 21.64 m, Outlet Elevation (invert): 21.48 m

Culvert Slope: 0.0160

Inlet Throat Elevation: 21.57 m, Inlet Crest Elevation: 0.00 m

Water Surface Profile Plot for Culvert: A5

Site Data – A5

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 m

Inlet Elevation: 21.64 m

Outlet Station: 10.00 m

Outlet Elevation: 21.48 m

Number of Barrels: 3

Culvert Data Summary – A5

Barrel Shape: Circular

Barrel Diameter: 500.00 mm

Barrel Material: Concrete

Embedment: 0.00 mm

Barrel Manning's n: 0.0130

Culvert Type: Side-Tapered, Rectangular

Inlet Configuration: Square Edge Top (26-90°) Wingwall

Inlet Depression: None

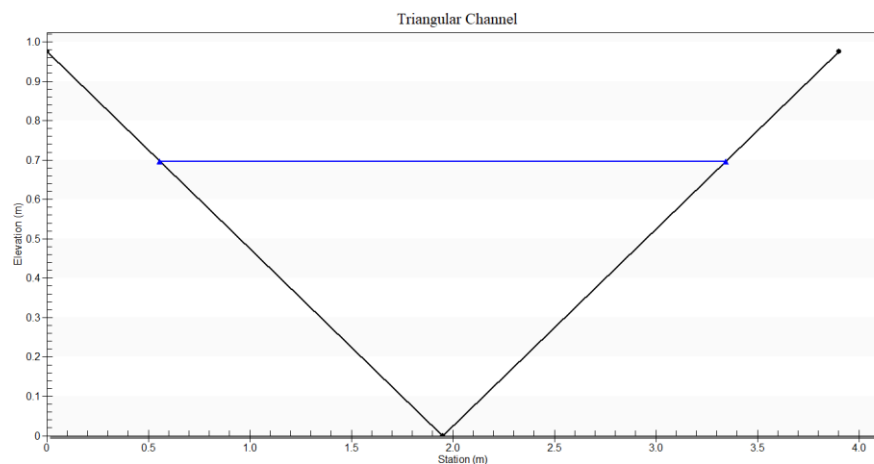
Channel Analysis: A1

Input Parameters

Channel Type: Triangular
Side Slope 1 (Z1): 2.00 m/m
Side Slope 2 (Z2): 2.00 m/m
Longitudinal Slope: 0.0010 m/m
Manning's n: 0.030
Flow: 0.47 cms

Result Parameters

Depth: 0.6965 m
Area of Flow: 0.9703 m²
Wetted Perimeter: 3.1149 m
Hydraulic Radius: 0.3115 m
Average Velocity: 0.4844 m/s
Top Width: 2.7861 m
Froude Number: 0.2620
Critical Depth: 0.4076 m
Critical Velocity: 1.4143 m/s
Critical Slope: 0.0174 m/m
Critical Top Width: 1.63 m
Calculated Max Shear Stress: 6.8274 N/m²
Calculated Avg Shear Stress: 3.0533 N/m²



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Channel Analysis: A2

Input Parameters

Channel Type: Custom Cross Section

Cross Section Data

Elevation (m)	Elevation (m)	Manning's n
0.00	21.30	0.0300
13.69	21.01	0.0300
14.72	21.43	-----

Longitudinal Slope: 0.0040 m/m

Flow: 0.13 cms

Result Parameters

Depth: 0.1252 m

Area of Flow: 0.3921 m²

Wetted Perimeter: 6.2879 m

Hydraulic Radius: 0.0624 m

Average Velocity: 0.3315 m/s

Top Width: 6.2622 m

Froude Number: 0.4229

Critical Depth: 0.0888 m

Critical Velocity: 0.6600 m/s

Critical Slope: 0.0251 m/m

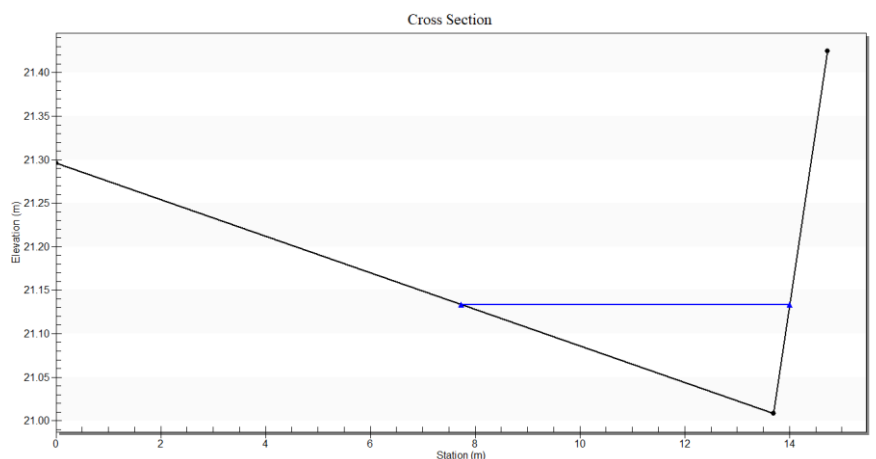
Critical Top Width: 4.44 m

Calculated Max Shear Stress: 4.9102 N/m²

Calculated Avg Shear Stress: 2.4451 N/m²

Composite Manning's n Equation: Lotter method

Manning's n: 0.030



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Channel Analysis: A3

Input Parameters

Channel Type: Custom Cross Section

Cross Section Data

Elevation (m)	Elevation (m)	Manning's n
0.00	21.55	0.0300
35.91	21.24	0.0300
40.84	21.55	-----

Longitudinal Slope: 0.0010 m/m

Flow: 0.13 cms

Result Parameters

Depth: 0.1132 m

Area of Flow: 0.8365 m²

Wetted Perimeter: 14.7791 m

Hydraulic Radius: 0.0566 m

Average Velocity: 0.1554 m/s

Top Width: 14.7750 m

Froude Number: 0.2085

Critical Depth: 0.0605 m

Critical Velocity: 0.5448 m/s

Critical Slope: 0.0284 m/m

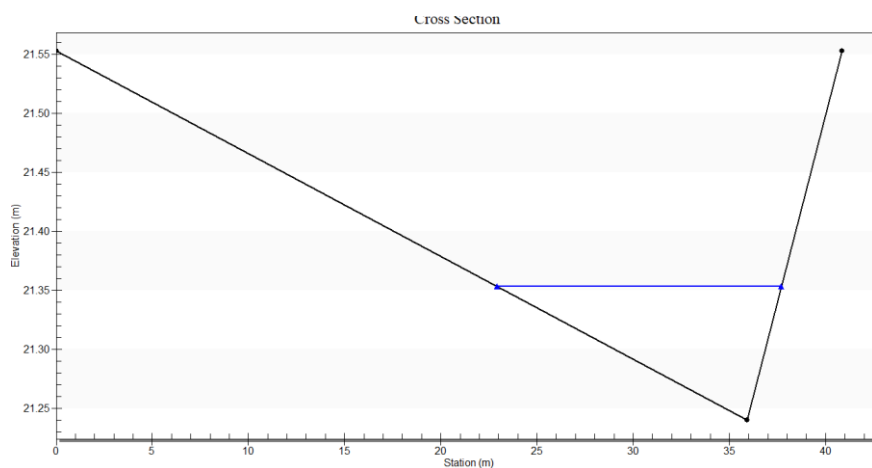
Critical Top Width: 7.89 m

Calculated Max Shear Stress: 1.1100 N/m²

Calculated Avg Shear Stress: 0.5548 N/m²

Composite Manning's n Equation: Lotter method

Manning's n: 0.0300



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Channel Analysis: A4

Input Parameters

Channel Type: Custom Cross Section

Cross Section Data

Elevation (m)	Elevation (m)	Manning's n
0.00	21.30	0.0300
13.69	21.01	0.0300
14.40	21.30	-----

Longitudinal Slope: 0.0040 m/m

Flow: 0.11 cms

Result Parameters

Depth: 0.1176 m

Area of Flow: 0.3459 m²

Wetted Perimeter: 5.9058 m

Hydraulic Radius: 0.0586 m

Average Velocity: 0.3180 m/s

Top Width: 5.8816 m

Froude Number: 0.4185

Critical Depth: 0.0830 m

Critical Velocity: 0.6383 m/s

Critical Slope: 0.0256 m/m

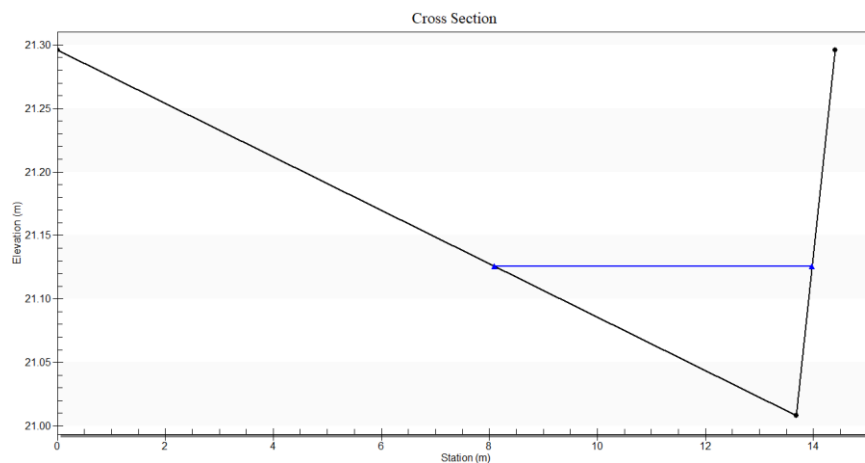
Critical Top Width: 4.15 m

Calculated Max Shear Stress: 4.6122 N/m²

Calculated Avg Shear Stress: 2.2966 N/m²

Composite Manning's n Equation: Lotter method

Manning's n: 0.0300



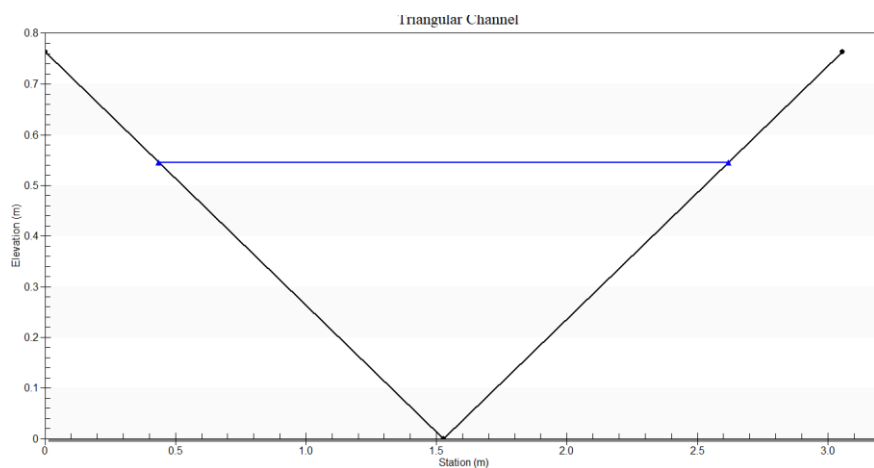
Channel Analysis: A5

Input Parameters

Channel Type: Triangular
 Side Slope 1 (Z1): 2.00 m/m
 Side Slope 2 (Z2): 2.00 m/m
 Longitudinal Slope: 0.0040 m/m
 Manning's n: 0.030
 Flow: 0.49cms

Result Parameters

Depth: 0.5455 m
 Area of Flow: 0.5952 m²
 Wetted Perimeter: 2.4398 m
 Hydraulic Radius: 0.2440 m
 Average Velocity: 0.8232 m/s
 Top Width: 2.1822 m
 Froude Number: 0.5031
 Critical Depth: 0.4145 m
 Critical Velocity: 1.4262 m/s
 Critical Slope: 0.0173 m/m
 Critical Top Width: 1.66 m
 Calculated Max Shear Stress: 21.3903 N/m²
 Calculated Avg Shear Stress: 9.5660 N/m²





República Argentina - Poder Ejecutivo Nacional
AÑO DE LA RECONSTRUCCIÓN DE LA NACIÓN ARGENTINA

Hoja Adicional de Firmas
Informe gráfico

Número:

Referencia: MODELACIÓN HIDRÁULICA ANXO I

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