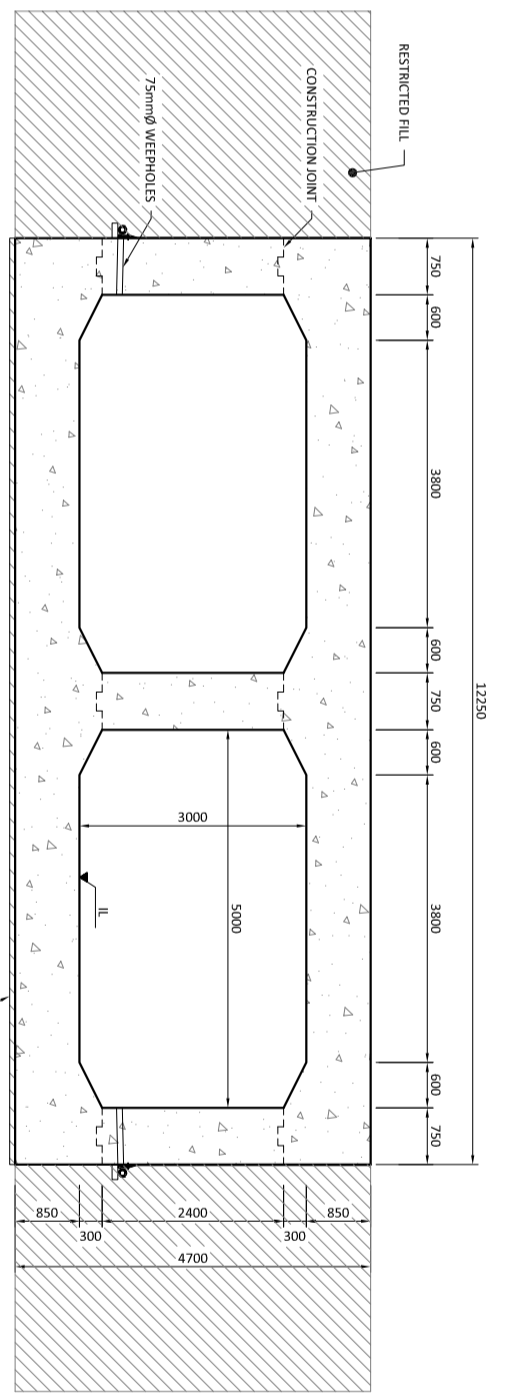
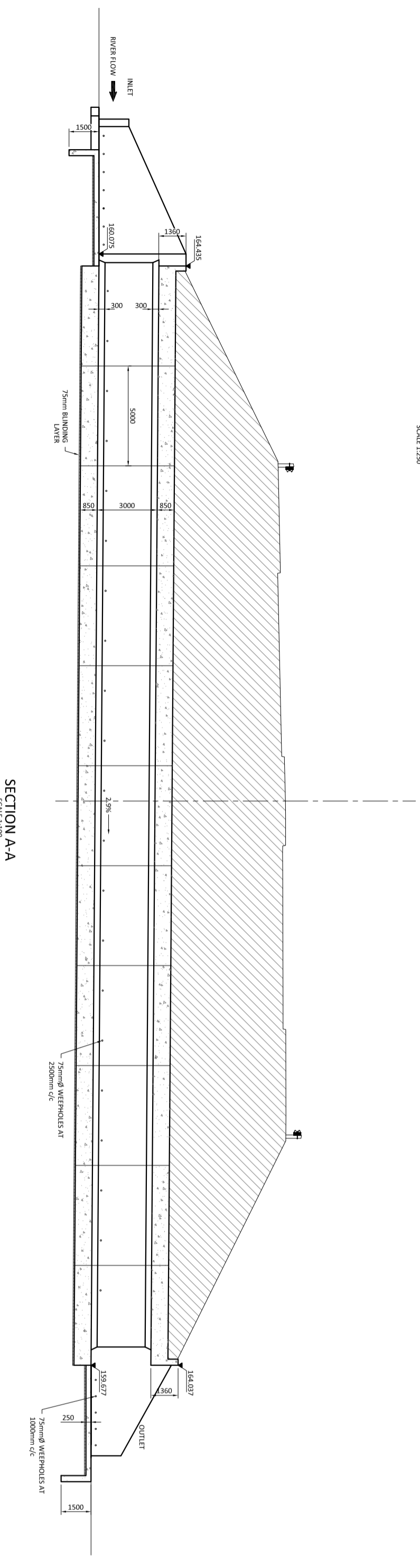


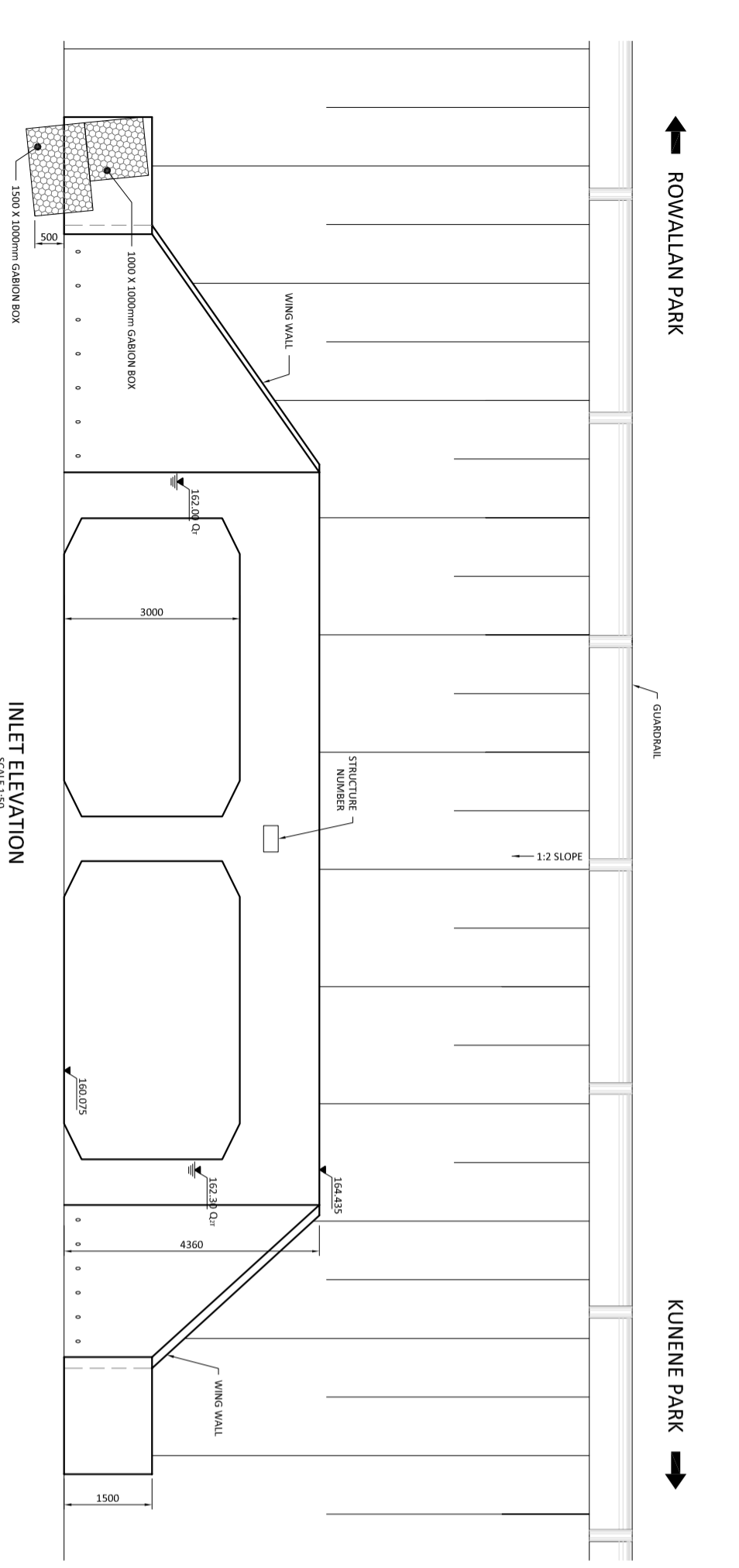
PLAN
SCALE 1:500



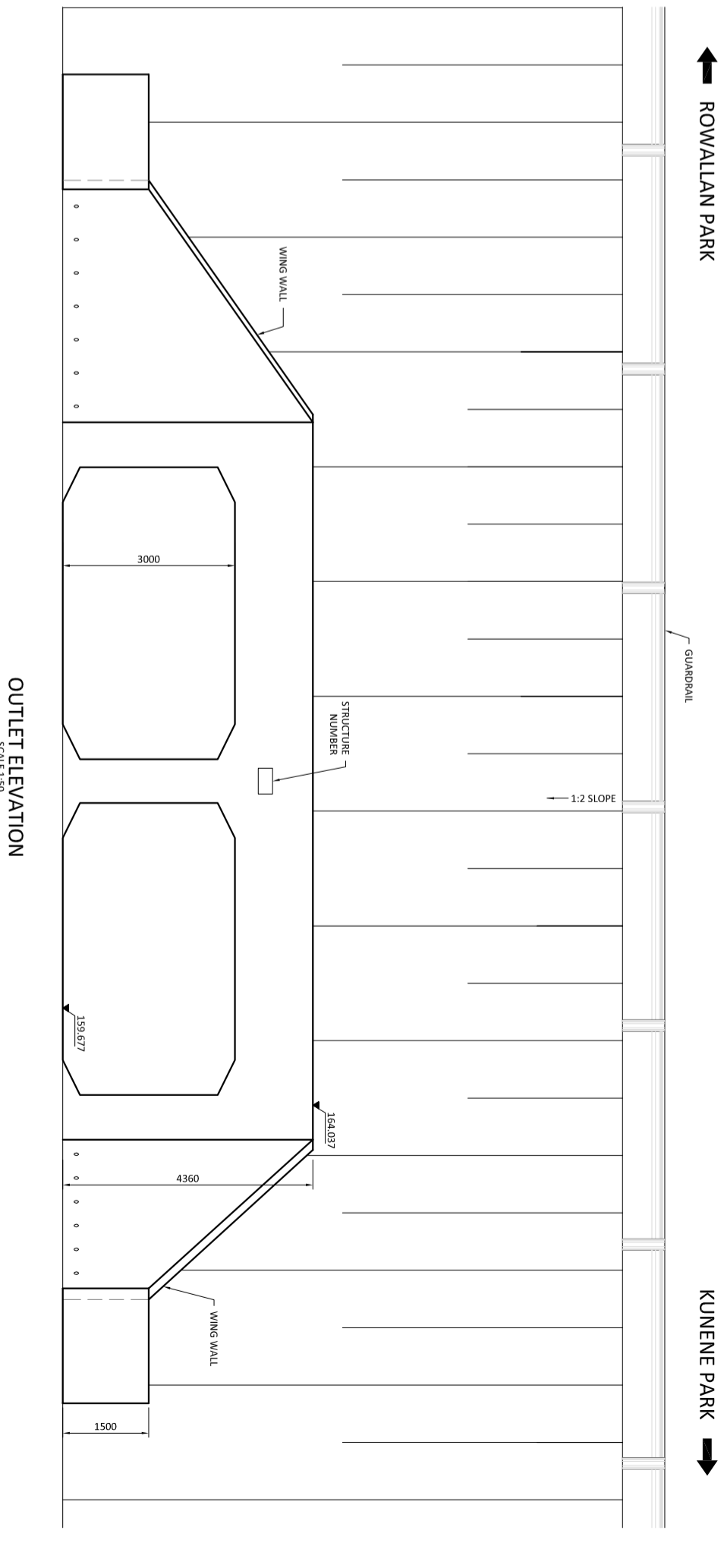
CROSS SECTION
SCALE 1:50



SECTION A-A
SCALE 1:100



INLET ELEVATION
SCALE 1:50



OUTLET ELEVATION
SCALE 1:50

NOTES

- 1.1 GENERAL
 - 1.1 DESIGN OF THE STRUCTURE IS IN ACCORDANCE WITH CODE OF PRACTICE FOR THE PLANNING AND DESIGN OF HIGHWAY AND ROAD STRUCTURES IN SOUTH AFRICA, FEBRUARY 2002 AND THIRD CODE OF PRACTICE FOR THE DESIGN OF HIGHWAY BRIDGES AND CULVERTS IN SOUTH AFRICA, 1981 AND AMENDMENTS TO DATE.
 2. DESCRIPTION OF STRUCTURE
 - 2.1 DOUBLE CELL 5.0m X 3.0m REINFORCED CONCRETE CULVERT
 - 2.2 THE STRUCTURE IS FOUNDED ON HARD ROCK.
 - 2.3 DESIGN BEARING PRESSURE = 150 t/m²
 - 2.4 DESIGN BEARING PRESSURE = 150 t/m²
 3. DESIGN LOADS
 - 3.1 DESIGN LINE LOAD
 - (a) HA
 - (b) HB
 - (c) HC
 - 3.2 UNIT WEIGHTS OF MATERIAL:
 - 20 kN/m³ (a) FILL MATERIAL
 - 25 kN/m³ (b) REINFORCED CONCRETE
 - 21 kN/m³ (c) ASPHALT
 - 3.3 EARTH PRESSURE ON REMAINING STRUCTURES IN ACCORDANCE WITH TMH 7, PART 2.4.2.2.
 - (a) EARTH = 50 kN/m² PER METER DEPTH.
 - (b) FILL MATERIAL
 - (c) NO ADDITIONAL PRESSURE DUE TO WATER HAS BEEN ALLOWED FOR (SUBSOIL DRAINAGE HAS BEEN PROVIDED).
 - 3.4 SUPPLEMENTARY ACTIONS, WHERE APPLICABLE, ARE IN ACCORDANCE WITH TMH PARTS 1 AND 2.
 4. MATERIAL AND FINISHES
 - 4.1 THE MATERIAL AND WORK SHALL COMPLY WITH THE RELEVANT CLAUSES OF SERIES 2000, 3000, 5000, 6000 AND 7000 OF THE STANDARD SPECIFICATIONS. THE PROVED SPECIFICATIONS SHALL INCLUDE THE FOLLOWING.
 - 4.2 CHARACTERISTIC STRENGTH OF MATERIALS:

DESCRIPTION	CHARACTERISTIC STRENGTH (MPa)	YOUNG'S MODULUS (GPa)
MILD STEEL BARS	250	200
HIGH TENSILE STEEL	450	200
WELDED STEEL	450	200
WELDED STEEL MESH FABRIC	450	200
 - 4.2.1 REINFORCEMENT:
 - 4.2.2 CONCRETE:

DESCRIPTION	CHARACTERISTIC STRENGTH (MPa)	CONCRETE CLASS (MINIMUM)
SLAB	30	W30/25
WALLS	30	W30/25
WINGS/WALLS	30	W30/25
RAMMED/MASS CONCRETE	15	W15/10
 - 4.3 SURFACE FINISHES:

EXPOSED SURFACES	FORMED	UNFORMED
CONCRETE SURFACES	F1	U1
 - 4.4 MINIMUM CONCRETE COVER: 50mm
 - 4.5 ALL REINFORCING BARS SHALL BE CHAMFERED 25mm, 25mm
 - 4.6 JOINTS TO BE SEALED USING DOW CORNING 985 OR EQUIVALENT (NEEDS) AND RETURN IMPREGNATED STRIPS (OUTSIDE).
 - 4.7 BACKFILL AND BEDDING MATERIAL REQUIREMENTS AS SPECIFIED.
5. CONSTRUCTION
 - 5.1 FOUNDING:
 - 5.1.1 FOUNDING CONDITIONS NEED TO BE CHECKED ON SITE BEFORE COMMENCEMENT OF CONSTRUCTION.
 - 5.1.2 FOUNDING NOTICES TO BE GIVEN TO THE ENGINEER SHOULD BEARING CAPACITY BE LESS THAN IS REQUIRED.
 - 5.1.3 FOUNDATION FILL OR MASS CONCRETE SHALL BE REMOVED TO A DEPTH AS INDICATED BY THE ENGINEER AND REPLACED WITH APPROVED NEW IN-SITU CONCRETE.
 - 5.2 ALL CONSTRUCTION JOINTS MUST BE PREPARED STRICTLY IN ACCORDANCE WITH SECTION 6.04 OF THE SPECIFICATION.
 - 5.2.2 CONSTRUCTION JOINTS, OTHER THAN THOSE INDICATED, SHALL NOT BE ALLOWED UNLESS APPROVED BY THE ENGINEER.
6. HYDRAULIC DATA

FLOW	REFERENCE INTERVAL	97 km ²	100 km ²	150 km ²	200 km ²	250 km ²	300 km ²	350 km ²	400 km ²	450 km ²	500 km ²	550 km ²	600 km ²	650 km ²	700 km ²	750 km ²	800 km ²	850 km ²	900 km ²	950 km ²	1000 km ²																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																							
Q ₁	3	38.1	44.4	50.7	57.0	63.3	69.6	75.9	82.2	88.5	94.8	101.1	107.4	113.7	120.0	126.3	132.6	138.9	145.2	151.5	157.8	164.1	170.4	176.7	183.0	189.3	195.6	201.9	208.2	214.5	220.8	227.1	233.4	239.7	246.0	252.3	258.6	264.9	271.2	277.5	283.8	290.1	296.4	302.7	309.0	315.3	321.6	327.9	334.2	340.5	346.8	353.1	359.4	365.7	372.0	378.3	384.6	390.9	397.2	403.5	409.8	416.1	422.4	428.7	435.0	441.3	447.6	453.9	460.2	466.5	472.8	479.1	485.4	491.7	498.0	504.3	510.6	516.9	523.2	529.5	535.8	542.1	548.4	554.7	561.0	567.3	573.6	579.9	586.2	592.5	598.8	605.1	611.4	617.7	624.0	630.3	636.6	642.9	649.2	655.5	661.8	668.1	674.4	680.7	687.0	693.3	699.6	705.9	712.2	718.5	724.8	731.1	737.4	743.7	750.0	756.3	762.6	768.9	775.2	781.5	787.8	794.1	800.4	806.7	813.0	819.3	825.6	831.9	838.2	844.5	850.8	857.1	863.4	869.7	876.0	882.3	888.6	894.9	901.2	907.5	913.8	920.1	926.4	932.7	939.0	945.3	951.6	957.9	964.2	970.5	976.8	983.1	989.4	995.7	1002.0	1008.3	1014.6	1020.9	1027.2	1033.5	1039.8	1046.1	1052.4	1058.7	1065.0	1071.3	1077.6	1083.9	1090.2	1096.5	1102.8	1109.1	1115.4	1121.7	1128.0	1134.3	1140.6	1146.9	1153.2	1159.5	1165.8	1172.1	1178.4	1184.7	1191.0	1197.3	1203.6	1209.9	1216.2	1222.5	1228.8	1235.1	1241.4	1247.7	1254.0	1260.3	1266.6	1272.9	1279.2	1285.5	1291.8	1298.1	1304.4	1310.7	1317.0	1323.3	1329.6	1335.9	1342.2	1348.5	1354.8	1361.1	1367.4	1373.7	1380.0	1386.3	1392.6	1398.9	1405.2	1411.5	1417.8	1424.1	1430.4	1436.7	1443.0	1449.3	1455.6	1461.9	1468.2	1474.5	1480.8	1487.1	1493.4	1499.7	1506.0	1512.3	1518.6	1524.9	1531.2	1537.5	1543.8	1550.1	1556.4	1562.7	1569.0	1575.3	1581.6	1587.9	1594.2	1600.5	1606.8	1613.1	1619.4	1625.7	1632.0	1638.3	1644.6	1650.9	1657.2	1663.5	1669.8	1676.1	1682.4	1688.7	1695.0	1701.3	1707.6	1713.9	1720.2	1726.5	1732.8	1739.1	1745.4	1751.7	1758.0	1764.3	1770.6	1776.9	1783.2	1789.5	1795.8	1802.1	1808.4	1814.7	1821.0	1827.3	1833.6	1839.9	1846.2	1852.5	1858.8	1865.1	1871.4	1877.7	1884.0	1890.3	1896.6	1902.9	1909.2	1915.5	1921.8	1928.1	1934.4	1940.7	1947.0	1953.3	1959.6	1965.9	1972.2	1978.5	1984.8	1991.1	1997.4	2003.7	2010.0	2016.3	2022.6	2028.9	2035.2	2041.5	2047.8	2054.1	2060.4	2066.7	2073.0	2079.3	2085.6	2091.9	2098.2	2104.5	2110.8	2117.1	2123.4	2129.7	2136.0	2142.3	2148.6	2154.9	2161.2	2167.5	2173.8	2180.1	2186.4	2192.7	2199.0	2205.3	2211.6	2217.9	2224.2	2230.5	2236.8	2243.1	2249.4	2255.7	2262.0	2268.3	2274.6	2280.9	2287.2	2293.5	2299.8	2306.1	2312.4	2318.7	2325.0	2331.3	2337.6	2343.9	2350.2	2356.5	2362.8	2369.1	2375.4	2381.7	2388.0	2394.3	2400.6	2406.9	2413.2	2419.5	2425.8	2432.1	2438.4	2444.7	2451.0	2457.3	2463.6	2469.9	2476.2	2482.5	2488.8	2495.1	2501.4	2507.7	2514.0	2520.3	2526.6	2532.9	2539.2	2545.5	2551.8	2558.1	2564.4	2570.7	2577.0	2583.3	2589.6	2595.9	2602.2	2608.5	2614.8	2621.1	2627.4	2633.7	2640.0	2646.3	2652.6	2658.9	2665.2	2671.5	2677.8	2684.1	2690.4	2696.7	2703.0	2709.3	2715.6	2721.9	2728.2	2734.5	2740.8	2747.1	2753.4	2759.7	2766.0	2772.3	2778.6	2784.9	2791.2	2797.5	2803.8	2810.1	2816.4	2822.7	2829.0	2835.3	2841.6	2847.9	2854.2	2860.5	2866.8	2873.1	2879.4	2885.7	2892.0	2898.3	2904.6	2910.9	2917.2	2923.5	2929.8	2936.1	2942.4	2948.7	2955.0	2961.3	2967.6	2973.9	2980.2	2986.5	2992.8	2999.1	3005.4	3011.7	3018.0	3024.3	3030.6	3036.9	3043.2	3049.5	3055.8	3062.1	3068.4	3074.7	3081.0	3087.3	3093.6	3100.0	3106.3	3112.6	3118.9	3125.2	3131.5	3137.8	3144.1	3150.4	3156.7	3163.0	3169.3	3175.6	3181.9	3188.2	3194.5	3200.8	3207.1	3213.4	3219.7	3226.0	3232.3	3238.6	3244.9	3251.2	3257.5	3263.8	3270.1	3276.4	3282.7	3289.0	3295.3	3301.6	3307.9	3314.2	3320.5	3326.8	3333.1	3339.4	3345.7	3352.0	3358.3	3364.6	3370.9	3377.2	3383.5	3389.8	3396.1	3402.4	3408.7	3415.0	3421.3	3427.6	3433.9	3440.2	3446.5	3452.8	3459.1	3465.4	3471.7	3478.0	3484.3	3490.6	3496.9	3503.2	3509.5	3515.8	3522.1	3528.4	3534.7	3541.0	3547.3	3553.6	3560.0	3566.3	3572.6	3578.9	3585.2	3591.5	3597.8	3604.1	3610.4	3616.7	3623.0	3629.3	3635.6	3641.9	3648.2	3654.5	3660.8	3667.1	3673.4	3679.7	3686.0	3692.3	3698.6	3704.9	3711.2	3717.5	3723.8	3730.1	3736.4	3742.7	3749.0	3755.3	3761.6	3767.9	3774.2	3780.5	3786.8	3793.1	3799.4	3805.7	3812.0	3818.3	3824.6	3830.9	3837.2	3843.5	3849.8	3856.1	3862.4	3868.7	3875.0	3881.3	3887.6	3893.9	3900.2	3906.5	3912.8	3919.1	3925.4	3931.7	3938.0	3944.3	3950.6	3956.9	3963.2	3969.5	3975.8	3982.1	3988.4	3994.7	4001.0	4007.3	4013.6	4020.0	4026.3	4032.6	4038.9	4045.2	4051.5	4057.8	4064.1	4070.4	4076.7	4083.0	4089.3	4095.6	4101.9	4108.2	4114.5	4120.8	4127.1	4133.4	4139.7	4146.0	4152.3	4158.6	4164.9	4171.2	4177.5	4183.8	4190.1	4196.4	4202.7	4209.0	4215.3	4221.6	4227.9	4234.2	4240.5	4246.8	4253.1	4259.4	4265.7	4272.0	4278.3	4284.6	4290.9	4297.2	4303.5	4309.8	4316.1	4322.4	4328.7	4335.0	4341.3	4347.6	4353.9	4360.2	4366.5	4372.8	4379.1	4385.4	4391.7	4398.0	4404.3	4410.6	4416.9	4423.2	4429.5	4435.8	4442.1	4448.4	4454.7	4461.0	4467.3	4473.6	4479.9	4486.2	4492.5	4498.8	4505.1	4511.4	4517.7	4524.0	4530.3	4536.6	4542.9	4549.2	4555.5	4561.8	4568.1	4574.4	4580.7	4587.0	4593.3	4599.6	4605.9	4612.2	4618.5	4624.8	4631.1	4637.4	4643.7	4650.0	4656.3	4662.6	4668.9	4675.2	4681.5	4687.8	4694.1	4700.4	4706.7	4713.0	4719.3	4725.6	4731.9	4738.2	4744.5	4750.8	4757.1	4763.4	4769.7	4776.0	4782.3	4788.6	4794.9	4801.2	4807.5	4813.8	4820.1	4826.4	4832.7	4839.0	4845.3	4851.6	4857.9	4864.2	4870.5	4876.8	4883.1	4889.4	4895.7	4902.0	4908.3	4914.6	4920.9	4927.2	4933.5	4939.8	4946.1	4952.4	4958.7	4965.0	4971.3	4977.6	4983.9	4990.2	4996.5	5002.8	5009.1	5015.4	5021.7	5028.0	5034.3	50