



UNITED NATIONS DEVELOPMENT PROGRAMME

**FEASIBILITY ASSESSMENT AND DESIGN
FOR THE UPGRADE OF IRRIGATION NETWORKS
IN NORTH LEBANON AND THE BEKAA**

**Qab Elias
IRRIGATION CANALS**

Tender Drawings
September 2016

LIST OF DRAWINGS

- Drawing 01 : GENERAL LAYOUT
- Drawing 02 : CANAL'S TYPICAL CROSS SECTION EXCEPT FOR LINE#9
- Drawing 03 : TYPICAL CROSS SECTION FOR LINE #9
- Drawing 04 : LONGITUDINAL PROFILE LINES 3 & 4
- Drawing 05 : LONGITUDINAL PROFILE LINES 9 & 17
- Drawing 06 : LONGITUDINAL PROFILE LINES 31 & 32
- Drawing 07 : LONGITUDINAL PROFILE LINES 34, 37, 38 & 39
- Drawing 08 : LONGITUDINAL PROFILE LINES 40, 41 ,42 & 43
- Drawing 09 : LONGITUDINAL PROFILE LINES 44, 45 & 47
- Drawing 10 : LONGITUDINAL PROFILE LINES 48, 50 & 51

GENERAL NOTES

1. Particular Specifications

The present General Notes and the specifications shown on the present set of drawings are to be considered as Particular Specifications and prevail over the General Specifications.

2. Construction Drawings

The present set of drawings is for tendering purpose only and therefore is not suitable for construction.
It is the Contractor's responsibility to prepare his own construction drawings and shop drawings and submit for the approval of the Engineer.

3. Topographical Survey

The general layout (drawing 01) shows the actual location of the channels on the ground, which is not necessarily within the cadastral boundaries of a public domain and may well go through private properties.
Moreover, the Longitudinal Profiles (Drawings 03 and above) are given for information only and are not suitable for construction in particular as regards to the levels shown.
It is the Contractor's responsibility to carry out his own surveying and to approach the relevant Cadastral Authorities in order to get the layout of the public domains and make sure that the concrete canals shall NOT be constructed through private properties.
It is also the Contractor's responsibility to take his own level measurements and to establish his own Longitudinal Profiles.
The proposed canals' layout and Longitudinal Profiles shall be submitted for the approval of the Engineer prior to any construction work.

4. Dimensions and Levels

Unless otherwise explicitly mentioned on the drawings, all dimensions are in cm. and all levels are "meters above sea level" (masl).

5. Concrete Specifications

Reinforced concrete for ground slab and walls shall be Class 45 Dosage 400 kg/m³.
Lean concrete shall be Class 45, Dosage 250 kg/m³

6. Reinforcement Steel

High Adherence steel (HA) limit of elasticity : 4 000 Kg/cm²
Mild steel : Limit of elasticity : 2 400 Kg/cm²

7. Reinforcement bars Cover

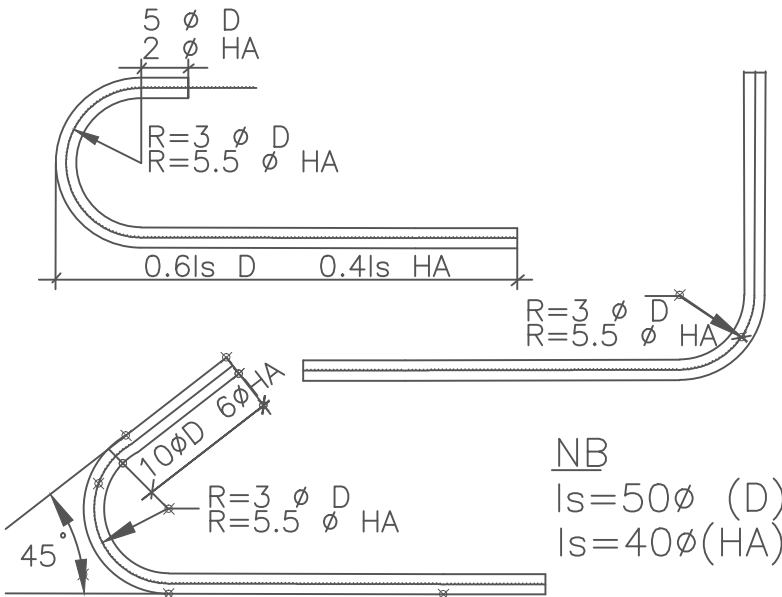
Min 5 cm

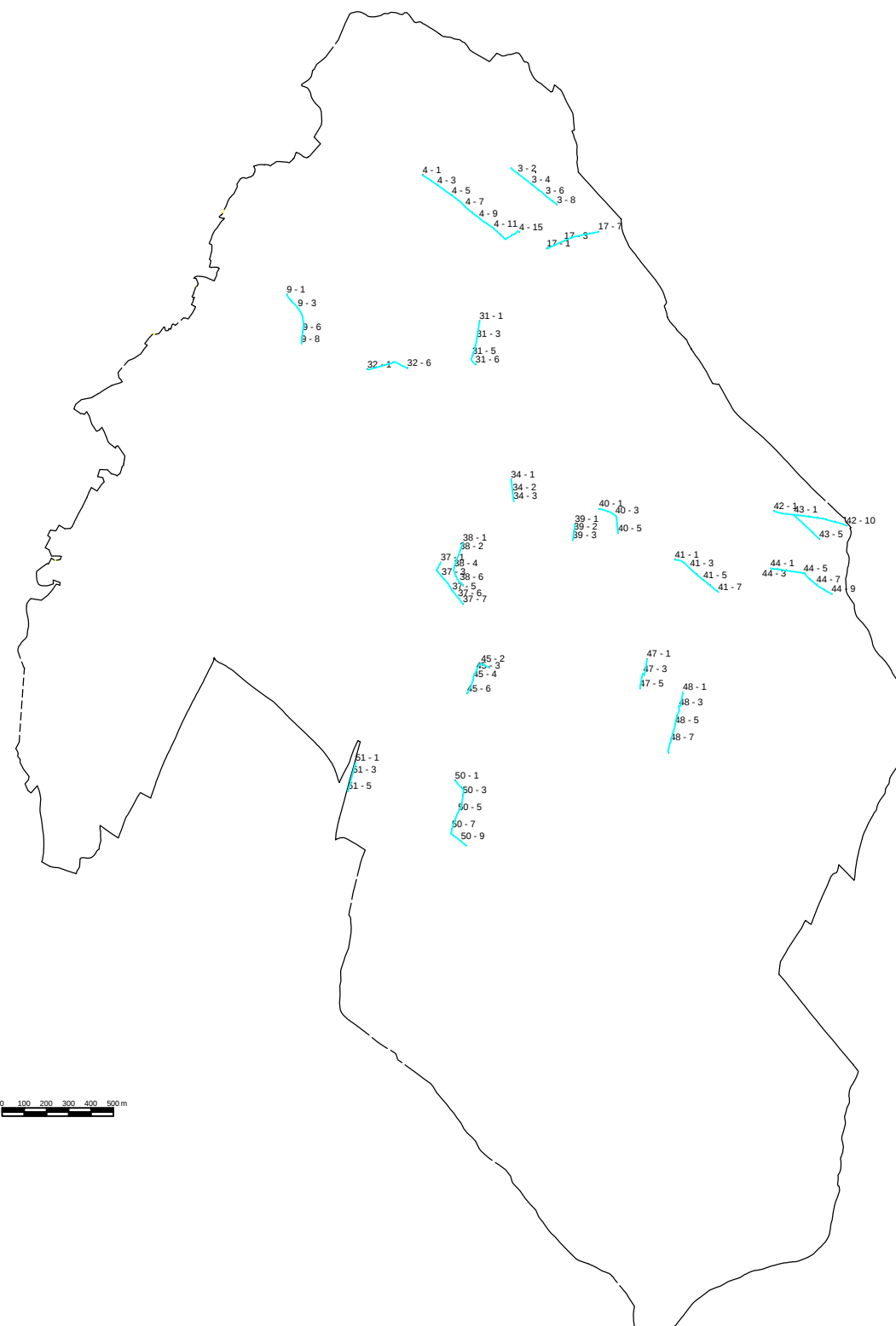
8. Reinforcement bars overlapping

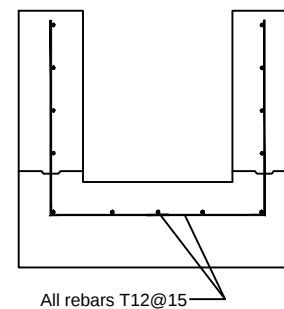
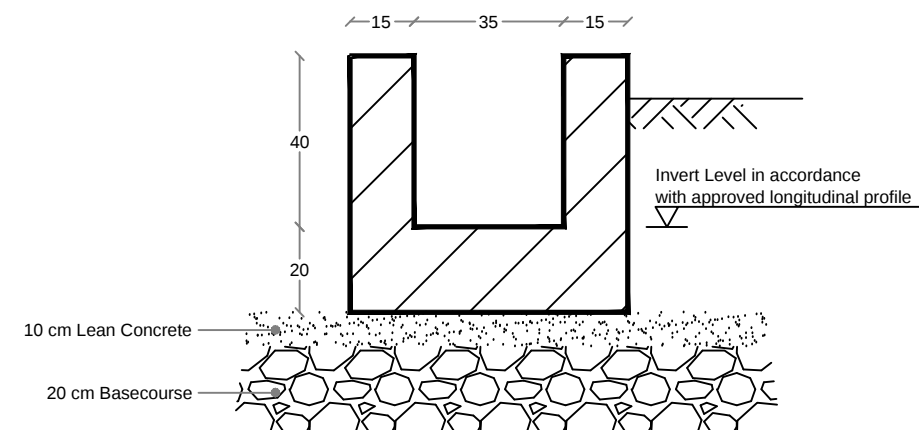
Min 40 cm

9. Bars Bending

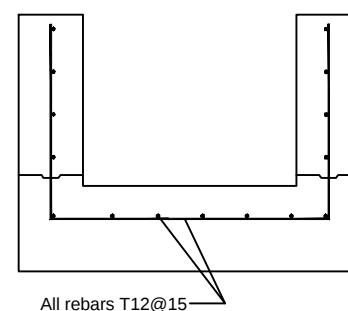
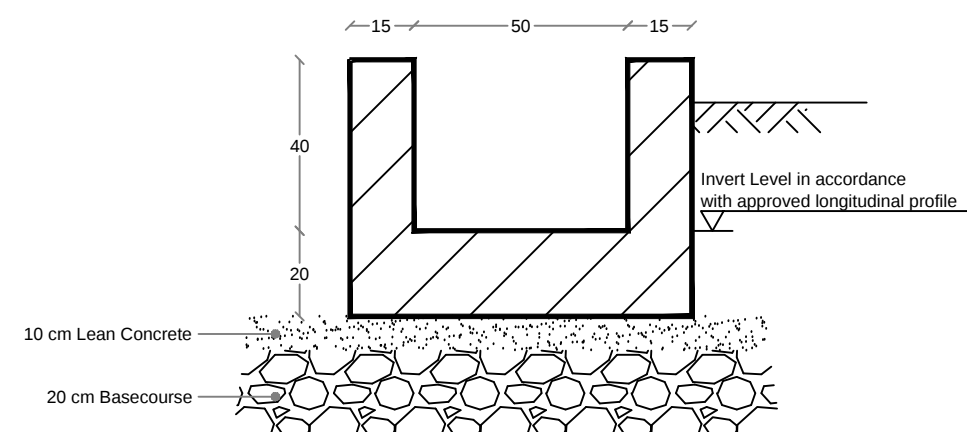
- Ø > 12 mm : Mechanically
 - Ø ≤ 12 mm Manually accepted
- Unbending is not allowed



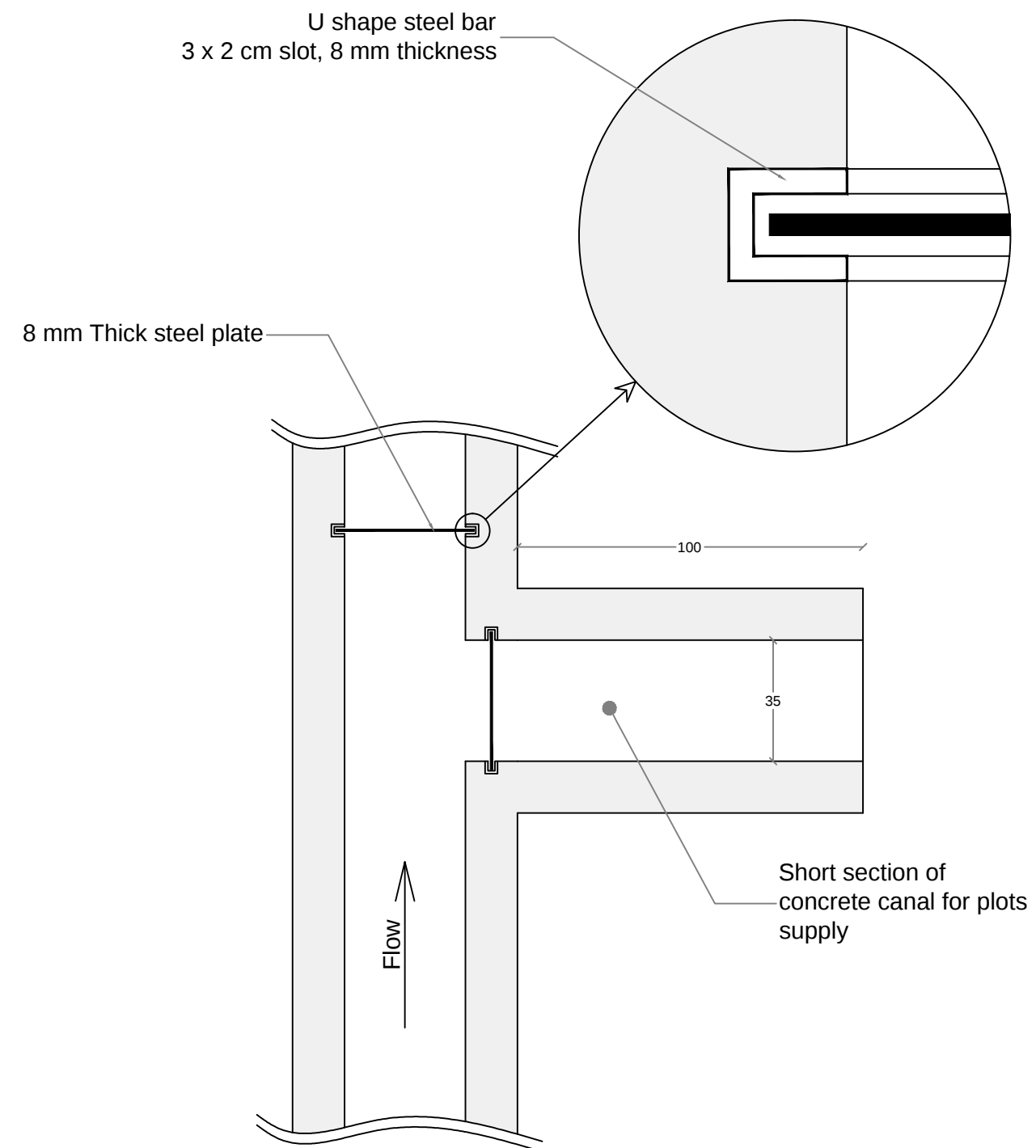




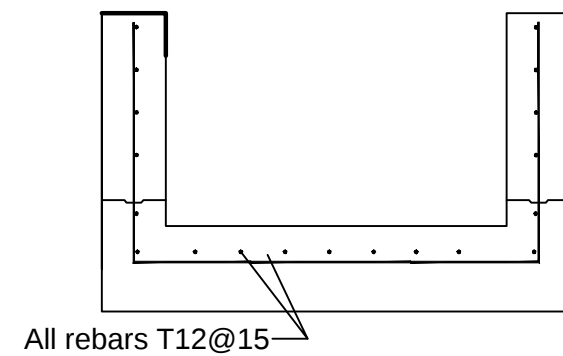
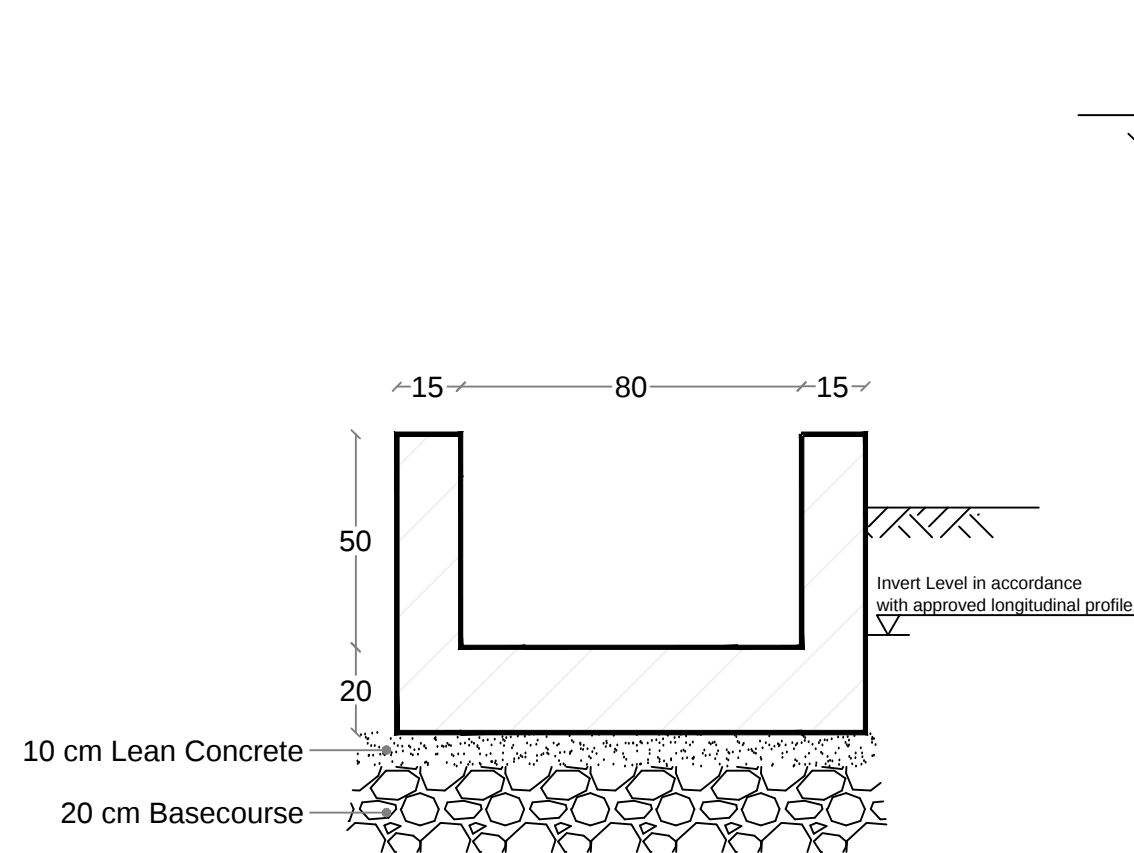
**Canal Typical Cross Section
for wall height ≤ 70 cm**



**Canal Typical Cross Section
for wall height > 80 cm**

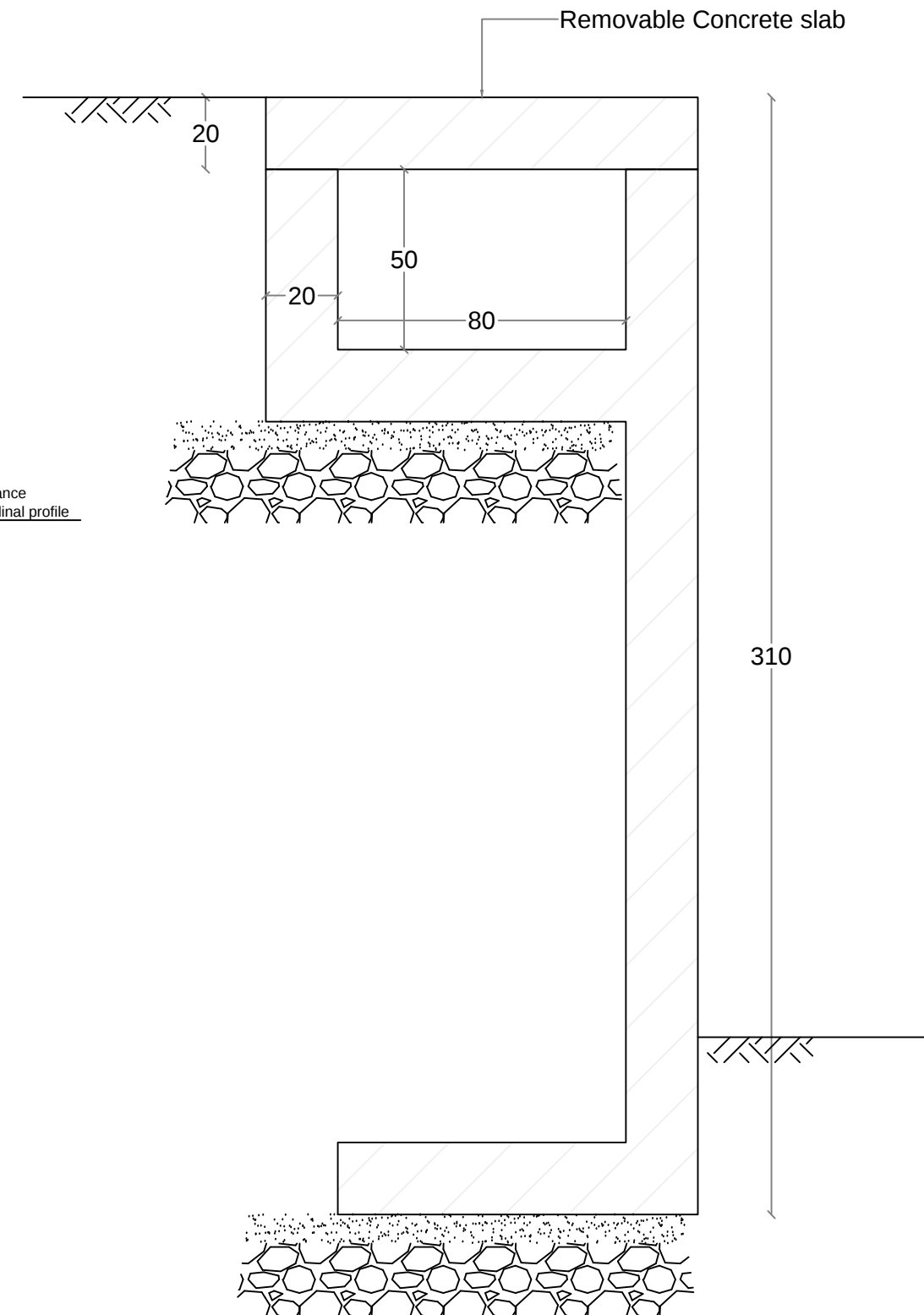


**Sluice Gate Typical Arrangement
(PlanView)**

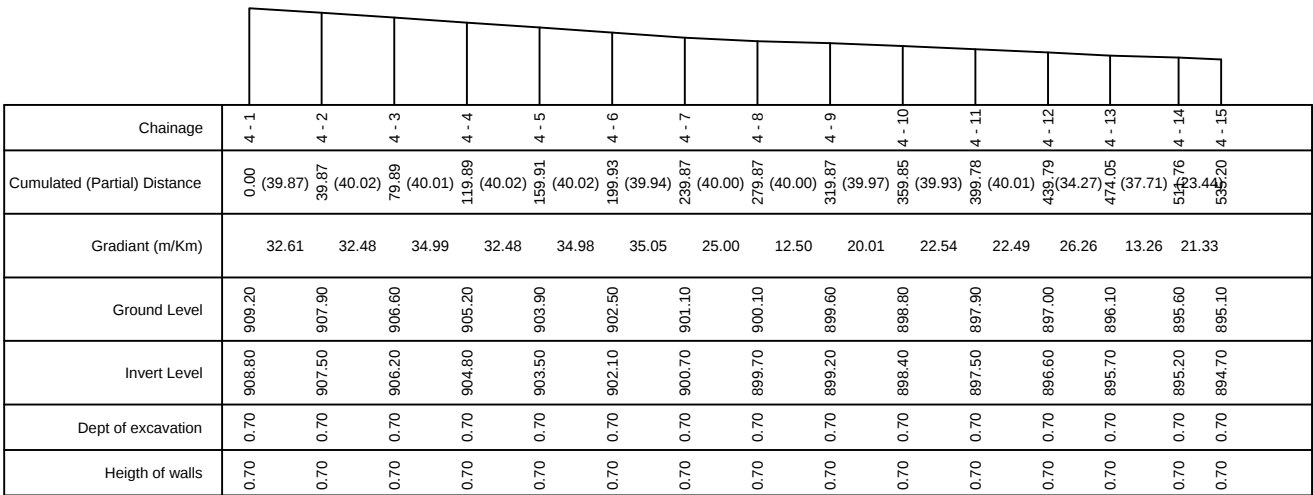
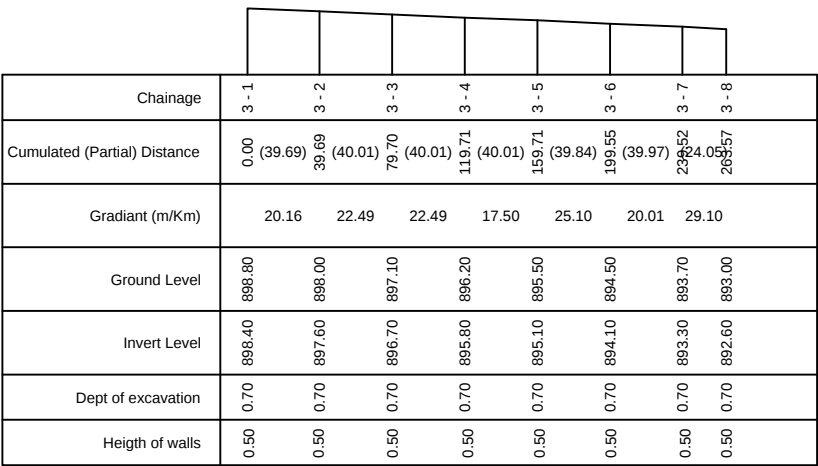


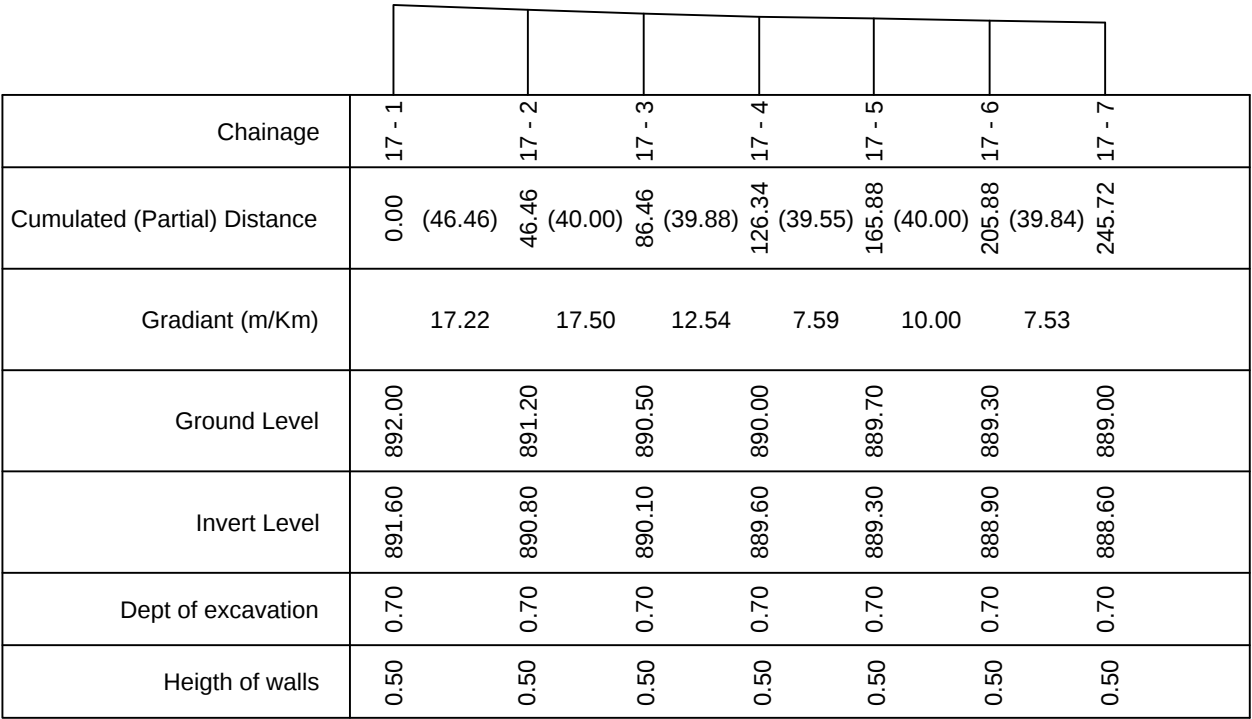
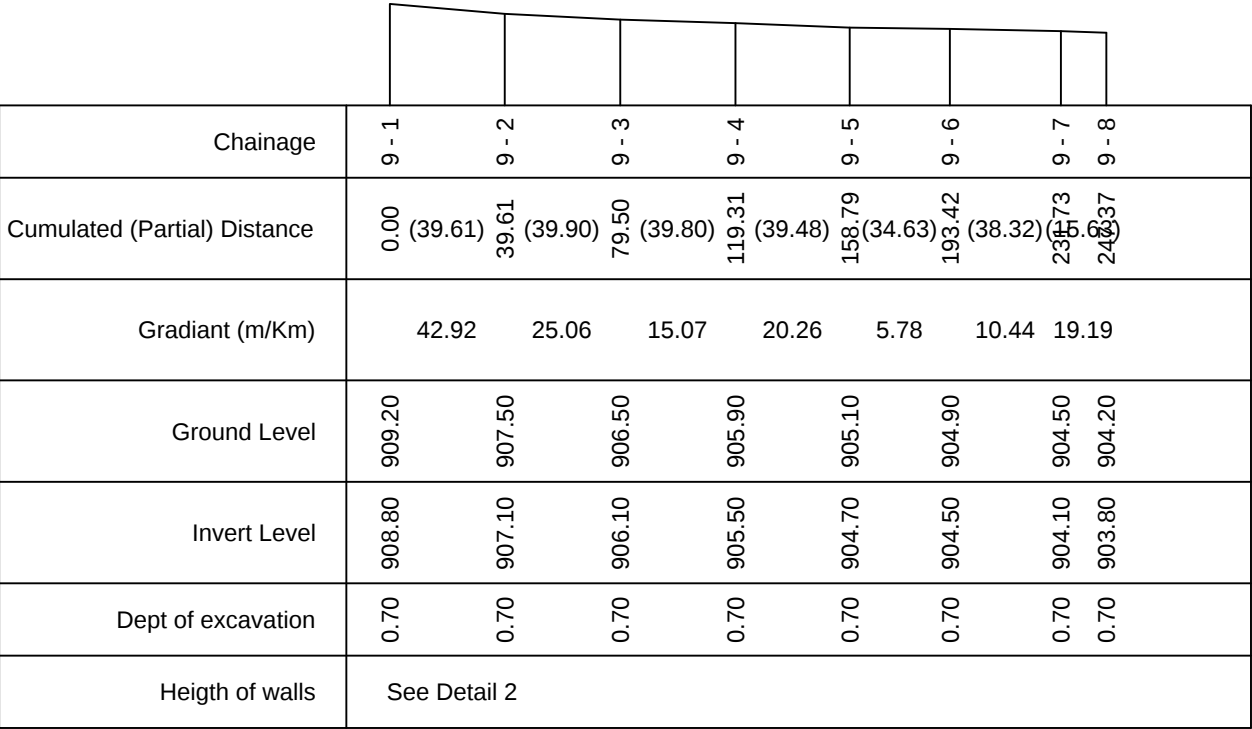
Typical Cross Section

DETAIL 1



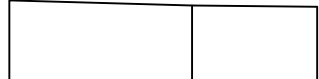
DETAIL 2



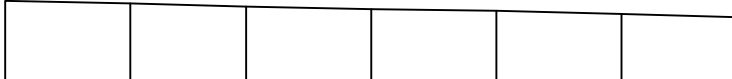


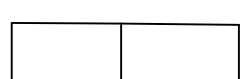
Chainage	31 - 1	31 - 2	31 - 3	31 - 4	31 - 5	31 - 6
Cumulated (Partial) Distance	0.00 (41.10)	41.10 (40.00)	81.10 (39.94)	121.04 (39.99)	161.03 (42.06)	203.09
Gradient (m/Km)	14.60	10.00	17.53	7.50	23.77	
Ground Level	893.80	893.20	892.80	892.10	891.80	890.80
Invert Level	893.40	892.80	892.40	891.70	891.40	890.40
Dept of excavation	0.70	0.70	0.70	0.70	0.70	0.70
Heigth of walls	0.50	0.50	0.50	0.50	0.50	0.50

Chainage	32 - 1	32 - 2	32 - 3	32 - 4	32 - 5	32 - 6
Cumulated (Partial) Distance	0.00 (39.32)	39.32 (40.00)	79.32 (40.00)	119.31 (37.76)	157.07 (30.54)	187.61
Gradient (m/Km)	5.09	7.50	7.50	5.30	6.55	
Ground Level	897.00	896.80	896.50	896.20	896.00	895.80
Invert Level	896.60	896.40	896.10	895.80	895.60	895.40
Dept of excavation	0.70	0.70	0.70	0.70	0.70	0.70
Heigth of walls	0.50	0.50	0.50	0.50	0.50	0.50

			
Chainage	34 - 1	34 - 2	34 - 3
Cumulated (Partial) Distance	0.00	(58.30) 58.30	(40.00) 98.30
Gradient (m/Km)		13.72	5.00
Ground Level	885.80	885.00	884.80
Invert Level	885.40	884.60	884.40
Dept of excavation	0.70	0.70	0.70
Heigth of walls	0.50	0.50	0.50

							
Chainage	38 - 1	38 - 2	38 - 3	38 - 4	38 - 5	38 - 6	38 - 7
Cumulated (Partial) Distance	0.00	(40.00) 40.00	(40.00) 80.00	(39.93) 119.93	(38.96) 158.89	30.11 189.00	22.24 211.24
Gradient (m/Km)		10.00	5.00	10.02	15.40	13.28	4.50
Ground Level	884.50	884.10	883.90	883.50	882.90	882.50	882.40
Invert Level	884.10	883.70	883.50	883.10	882.50	882.10	882.00
Dept of excavation	0.70	0.70	0.70	0.70	0.70	0.70	0.70
Heigth of walls	0.50	0.50	0.50	0.50	0.50	0.50	0.50

							
Chainage	37 - 1	37 - 2	37 - 3	37 - 4	37 - 5	37 - 6	37 - 7
Cumulated (Partial) Distance	0.00	(40.00) 40.00	(36.98) 76.98	(39.93) 116.92	(39.91) 156.83	(39.99) 196.82	(36.51) 233.33
Gradient (m/Km)		10.00	13.52	10.02	7.52	12.50	13.70
Ground Level	883.90	883.50	883.00	882.60	882.30	881.80	881.30
Invert Level	883.50	883.10	882.60	882.20	881.90	881.40	880.90
Dept of excavation	0.70	0.70	0.70	0.70	0.70	0.70	0.70
Heigth of walls	0.50	0.50	0.50	0.50	0.50	0.50	0.50

			
Chainage	39 - 1	39 - 2	39 - 3
Cumulated (Partial) Distance	0.00	(34.86) 34.86	(37.66) 72.52
Gradient (m/Km)		2.87	5.31
Ground Level	881.30	881.20	881.00
Invert Level	880.90	880.80	880.60
Dept of excavation	0.70	0.70	0.70
Heigth of walls	0.50	0.50	0.50

Chainage	40 - 1	40 - 2	40 - 3	40 - 4	40 - 5
Cumulated (Partial) Distance	0.00 (39.48)	39.48 (39.71)	79.19 (38.32)	117.51 (40.79)	158.29
Gradiant (m/Km)	12.67	10.07	7.83	4.90	
Ground Level	880.70	880.20	879.80	879.50	879.30
Invert Level	880.30	879.80	879.40	879.10	878.90
Dept of excavation	0.70	0.70	0.70	0.70	0.70
Heigth of walls	0.50	0.50	0.50	0.50	0.50

Chainage	42 - 1	42 - 2	42 - 3	42 - 4	42 - 5	42 - 6	42 - 7	42 - 8	42 - 9	42 - 10
Cumulated (Partial) Distance	0.00 (39.95)	39.95 (39.98)	79.93 (40.00)	119.92 (40.00)	159.92 (40.00)	199.92 (39.43)	239.36 (40.00)	279.36 (39.99)	319.34 (40.00)	359.61
Gradiant (m/Km)	5.01	5.00	5.00	7.50	5.00	5.07	7.50	2.50	14.02	
Ground Level	875.40	875.20	875.00	874.80	874.50	874.30	874.10	873.80	873.70	873.50
Invert Level	875.00	874.80	874.60	874.40	874.10	873.90	873.70	873.40	873.30	873.10
Dept of excavation	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70
Heigth of walls	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50

Chainage	41 - 1	41 - 2	41 - 3	41 - 4	41 - 5	41 - 6	41 - 7
Cumulated (Partial) Distance	0.00 (39.35)	39.35 (40.00)	79.35 (39.97)	119.32 (40.00)	159.32 (40.00)	199.32 (45.89)	245.21
Gradiant (m/Km)	7.62	5.00	7.51	7.50	5.00	6.54	
Ground Level	877.30	877.00	876.80	876.50	876.20	876.00	875.70
Invert Level	876.90	876.60	876.40	876.10	875.80	875.60	875.30
Dept of excavation	0.70	0.70	0.70	0.70	0.70	0.70	0.70
Heigth of walls	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Chainage	43 - 1	43 - 2	43 - 3	43 - 4	43 - 5
Cumulated (Partial) Distance	0.00 (37.28)	37.28 (40.00)	77.28 (40.00)	117.28 (40.00)	157.28
Gradiant (m/Km)	5.36	5.00	5.00	5.00	
Ground Level	874.90	874.70	874.50	874.30	874.10
Invert Level	874.50	874.30	874.10	873.90	873.70
Dept of excavation	0.70	0.70	0.70	0.70	0.70
Heigh of walls	0.50	0.50	0.50	0.50	0.50

Chainage	44 - 1	44 - 2	44 - 3	44 - 4	44 - 5	44 - 6	44 - 7	44 - 8	44 - 9
Cumulated (Partial) Distance	0.00 (31.17)	31.17 (39.97)	71.14 (40.00)	111.14 (40.00)	151.14 (38.43)	189.57 (39.98)	229.55 (39.97)	269.52 (39.99)	309.51
Gradiant (m/Km)	3.21	5.00	5.00	5.00	7.81	2.50	5.00	5.00	
Ground Level	874.80	874.70	874.50	874.30	874.10	873.80	873.70	873.50	873.30
Invert Level	874.40	874.30	874.10	873.90	873.70	873.40	873.30	873.10	872.90
Dept of excavation	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70
Heigth of walls	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50

Chainage	45 - 1	45 - 2	45 - 3	45 - 4	45 - 5	45 - 6
Cumulated (Partial) Distance	0.00 (39.96)	39.96 (36.75)	76.71 (39.66)	116.37 (39.89)	156.26 (32.14)	188.40
Gradiant (m/Km)	2.50	2.72	7.56	7.52	6.22	
Ground Level	878.50	878.40	878.30	878.00	877.70	877.50
Invert Level	878.10	878.00	877.90	877.60	877.30	877.10
Dept of excavation	0.70	0.70	0.70	0.70	0.70	0.70
Heigth of walls	0.50	0.50	0.50	0.50	0.50	0.50

Chainage	47 - 1	47 - 2	47 - 3	47 - 4	47 - 5
Cumulated (Partial) Distance	0.00 (40.00)	40.00 (30.15)	70.15 (34.70)	104.85 (31.70)	136.55
Gradiant (m/Km)	5.00	3.32	2.88	3.16	
Ground Level	875.90	875.70	875.60	875.50	875.40
Invert Level	875.50	875.30	875.20	875.10	875.00
Dept of excavation	0.70	0.70	0.70	0.70	0.70
Heigth of walls	0.50	0.50	0.50	0.50	0.50

Chainage	50 - 1	50 - 2	50 - 3	50 - 4	50 - 5	50 - 6	50 - 7	50 - 8	50 - 9	50 - 10		
Cumulated (Partial) Distance	0.00	(39.82)	39.82	(35.87)	75.69	(40.00)	115.69	(38.80)	154.49	(39.86)	194.35	(40.02)
Gradiant (m/Km)		5.02	8.36	10.00	5.15	5.02	10.00	5.91	5.00	3.32		
Ground Level	873.90		873.70	873.40	873.00	872.80	872.60	872.20	872.00	871.80	871.70	
Invert Level	873.50		873.30	873.00	872.60	872.40	872.20	871.80	871.60	871.40	871.30	
Dept of excavation	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	
Heigh of walls	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	

Chainage	48 - 1	48 - 2	48 - 3	48 - 4	48 - 5	48 - 6	48 - 7	48 - 8				
Cumulated (Partial) Distance	0.00	(40.00)	40.00	31.61	71.61	(39.20)	110.81	(39.85)	150.66	(39.99)	190.65	(40.00)
Gradiant (m/Km)		2.50	3.16	2.55	2.51	7.50	2.50	4.00				
Ground Level	874.70		874.60	874.50	874.40	874.30	874.00	873.90	873.70			
Invert Level	874.30		874.20	874.10	874.00	873.90	873.60	873.50	873.30			
Dept of excavation	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70			
Heigh of walls	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50			

Chainage	51 - 1	51 - 2	51 - 3	51 - 4	51 - 5							
Cumulated (Partial) Distance	0.00	13.80	(40.00)	53.80	(40.00)	93.80	(39.54)	133.34				
Gradiant (m/Km)		7.25	7.50	12.50	7.59							
Ground Level	873.90	873.80	873.50	873.00	872.70							
Invert Level	873.50	873.40	873.10	872.60	872.30							
Dept of excavation	0.70	0.70	0.70	0.70	0.70							
Heigh of walls	0.50	0.50	0.50	0.50	0.50							