



UNITED NATIONS DEVELOPMENT PROGRAMME

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

**KFARNABRAKH  
IRRIGATION CANALS**

**Tender Drawings**

August 2016

**LIST OF DRAWINGS**

- Drawing 01 : GENERAL LAYOUT
- Drawing 02 : CROSS SECTION
- Drawing 03 : LONGITUDINAL PROFILE LINES A, B, C & D
- Drawing 04 : LONGITUDINAL PROFILE LINES E ,F & G
- Drawing 05 : LONGITUDINAL PROFILE LINE H
- Drawing 06 : LONGITUDINAL PROFILE LINES I & J
- Drawing 07 : LONGITUDINAL PROFILE LINES K, L, M & N
- Drawing 08 : LONGITUDINAL PROFILE LINES O, P, Q & R
- Drawing 09 : LONGITUDINAL PROFILE LINES S & T
- Drawing 10 : LONGITUDINAL PROFILE LINES U, V & W

# 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

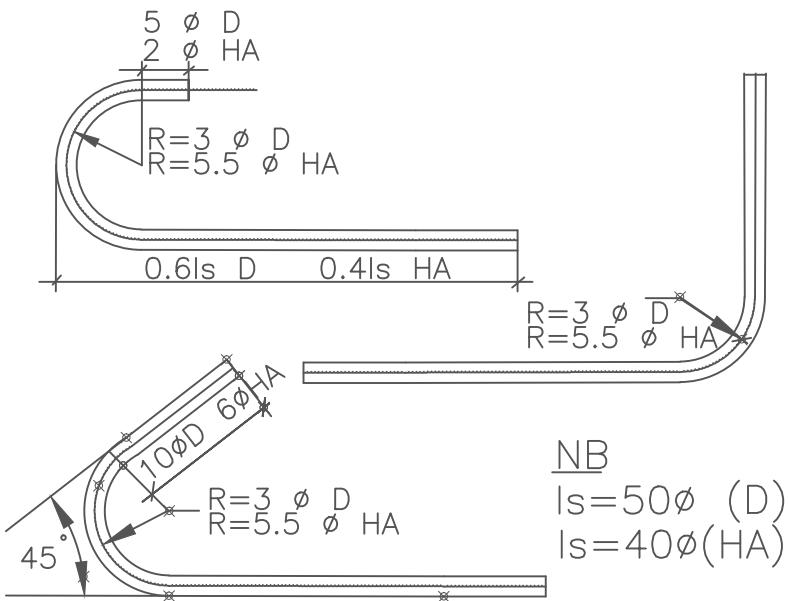
Min 5 cm

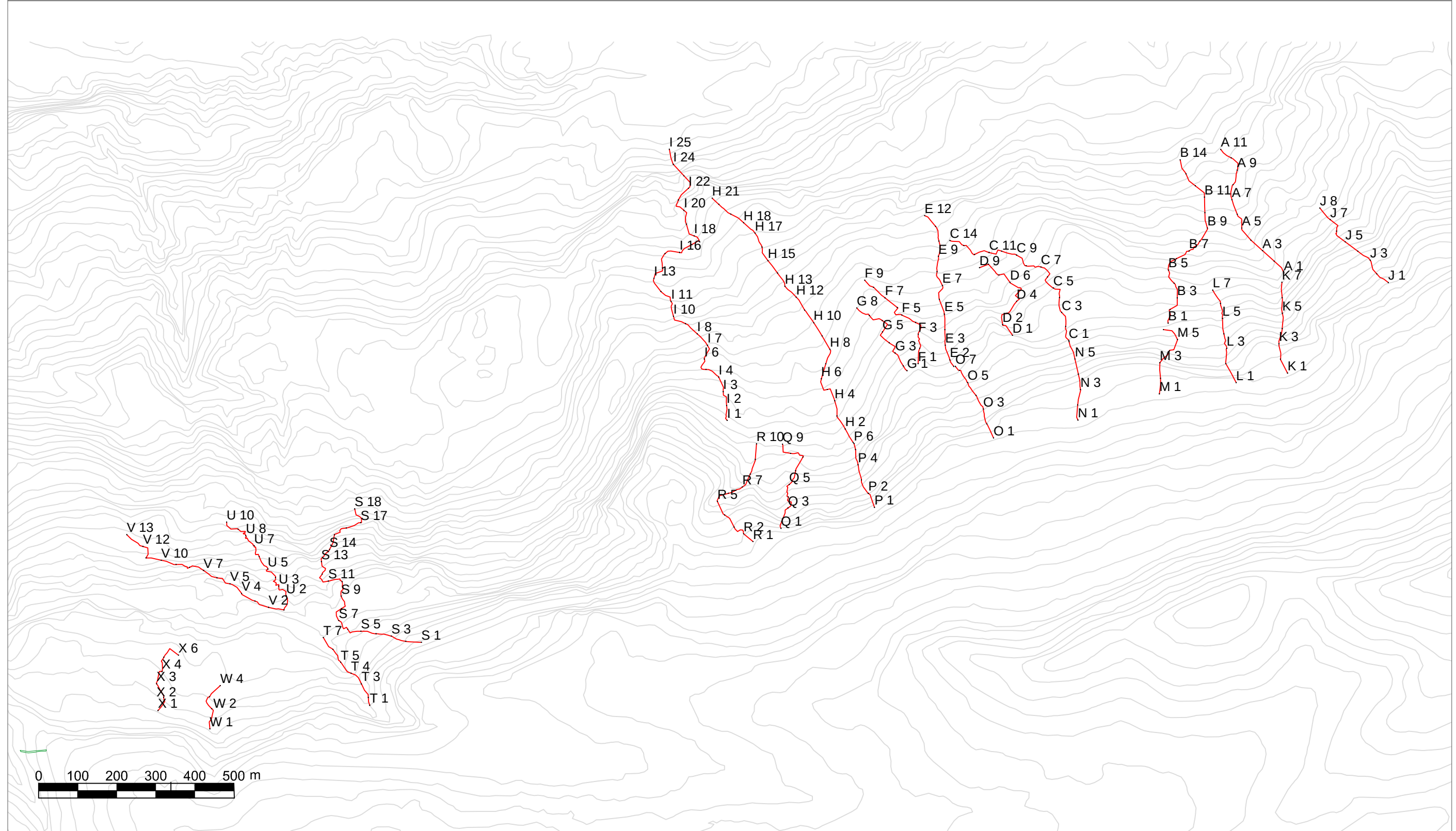
8. Reinforcement bars overlapping

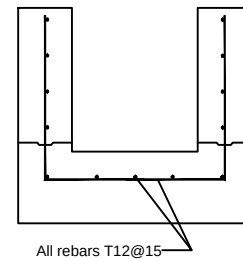
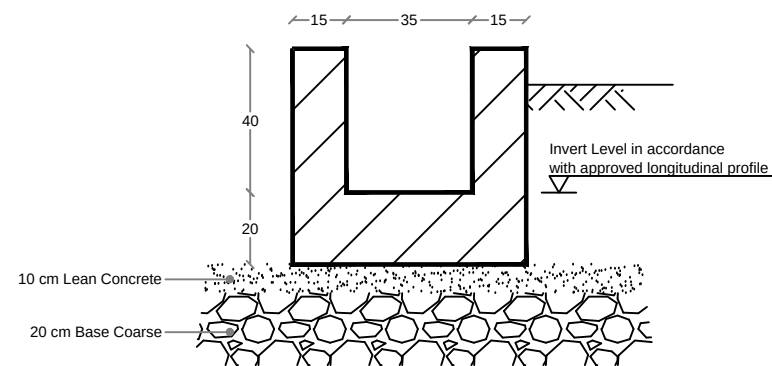
Min 40 cm

9. Bars Bending

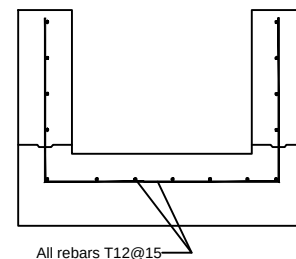
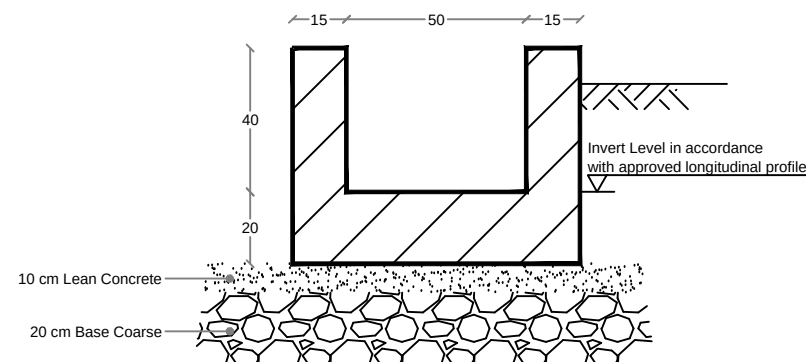
- Ø > 12 mm : Mechanically
  - Ø ≤ 12 mm Manually accepted
- Unbending is not allowed



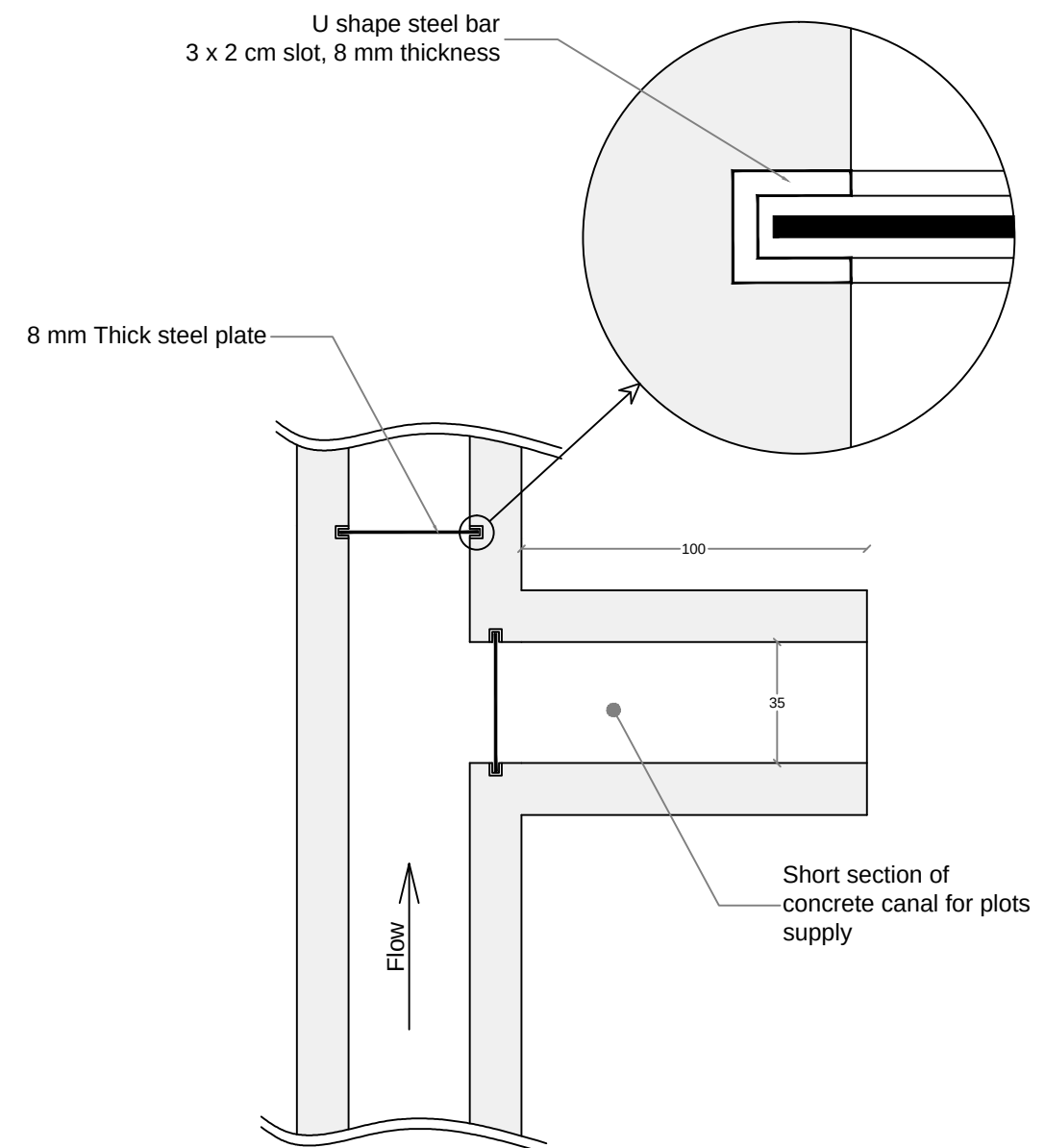




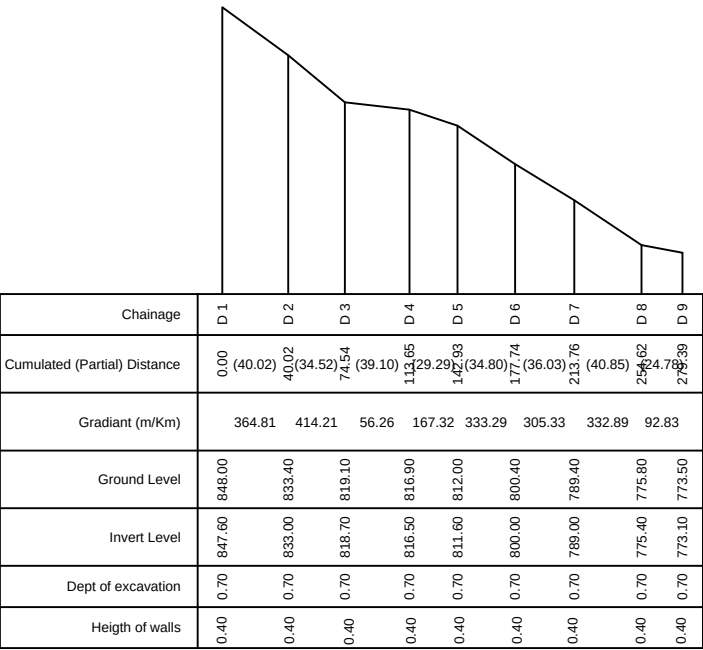
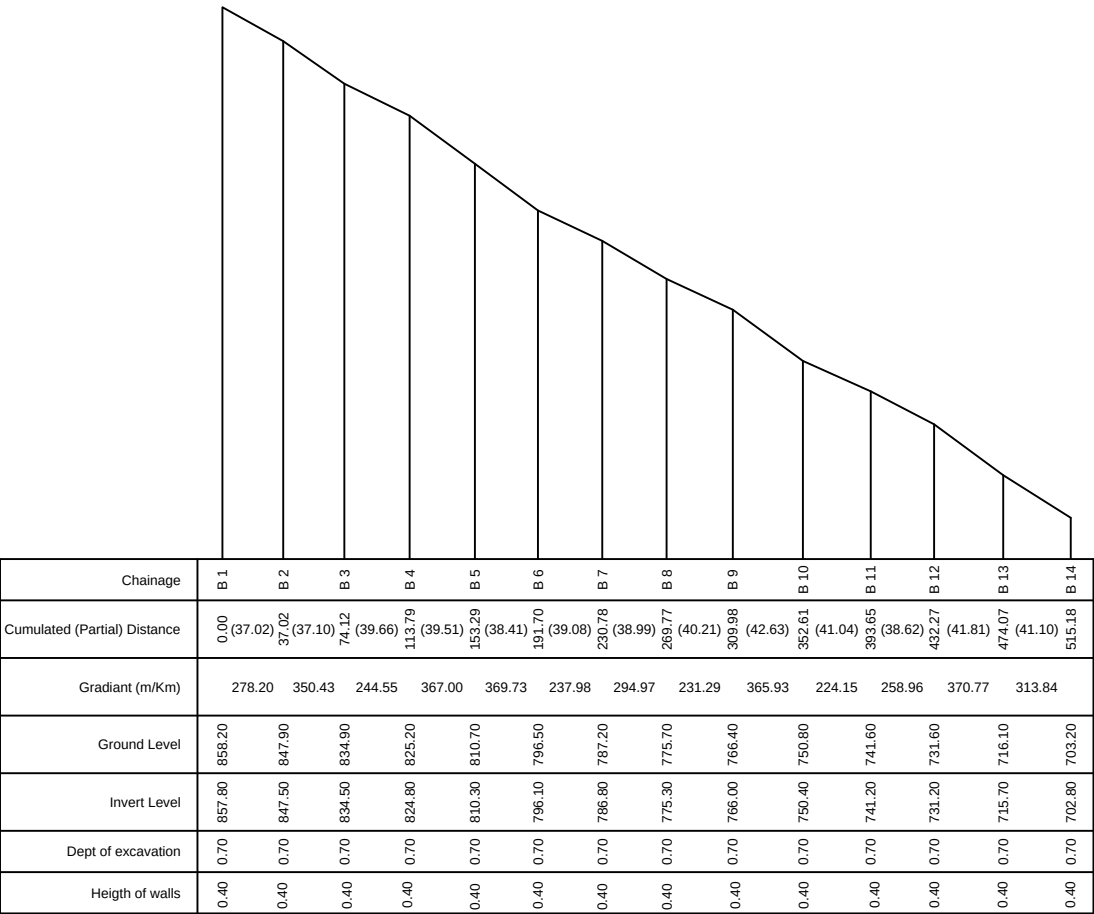
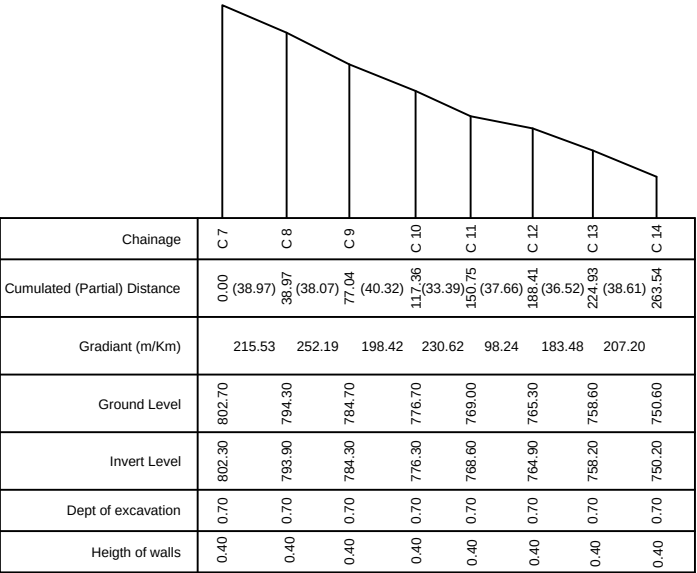
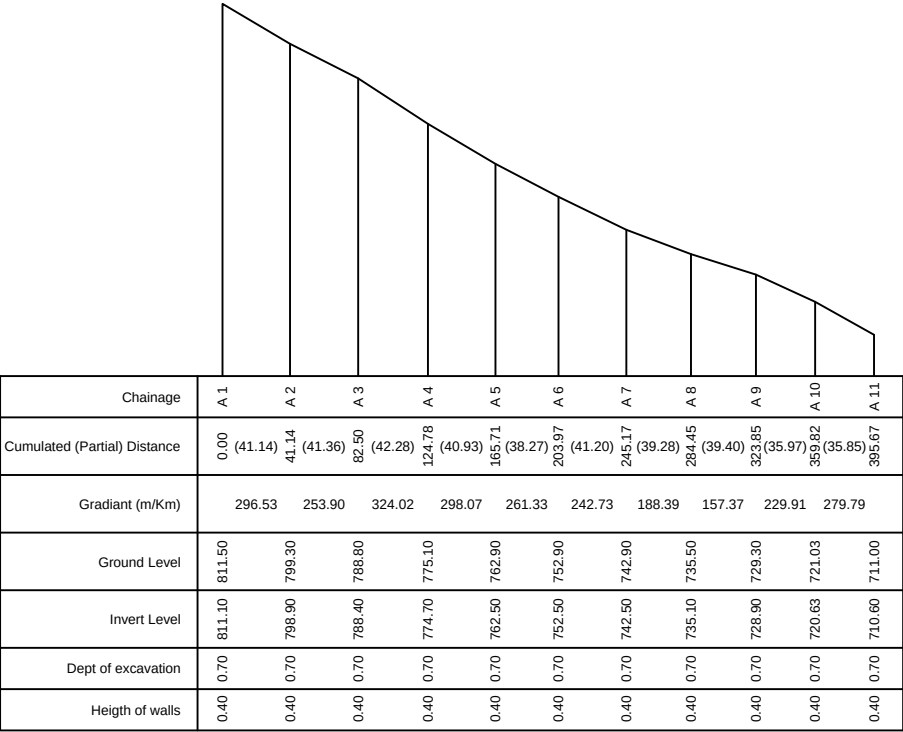
**Canal Typical Cross Section for wall height  $\leq 60$  cm**



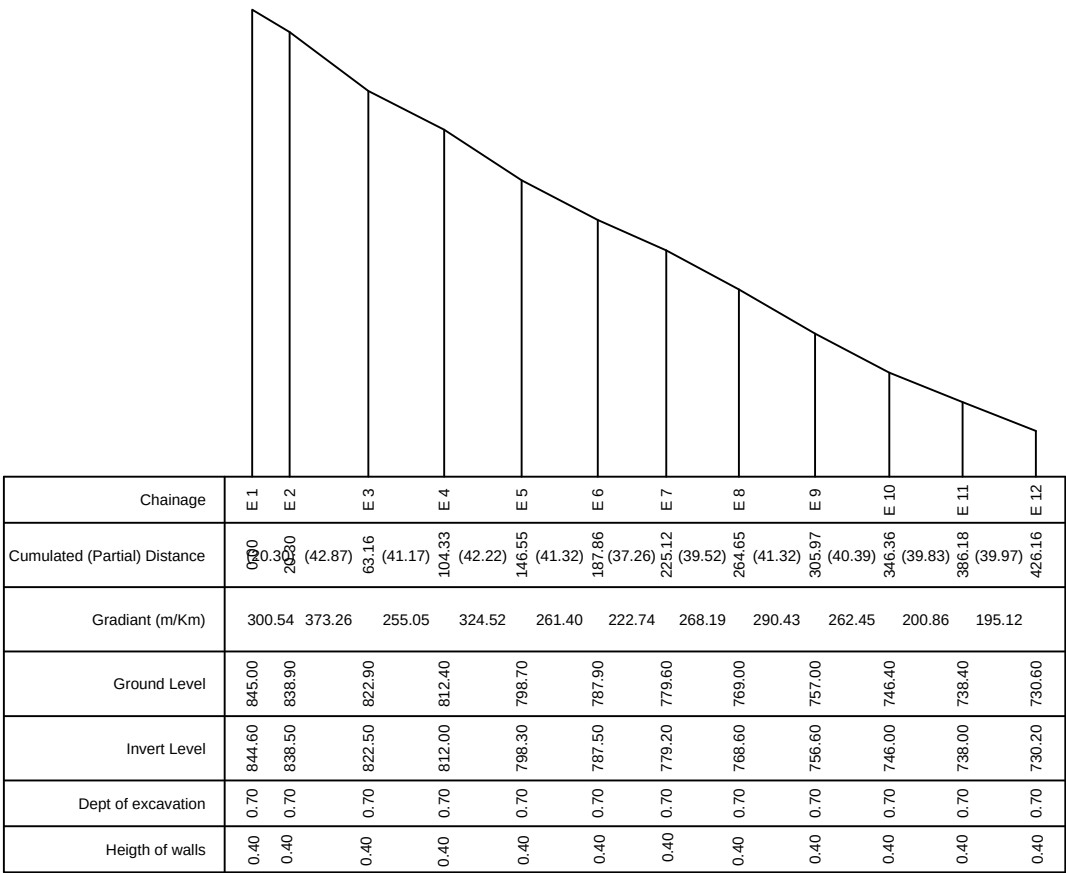
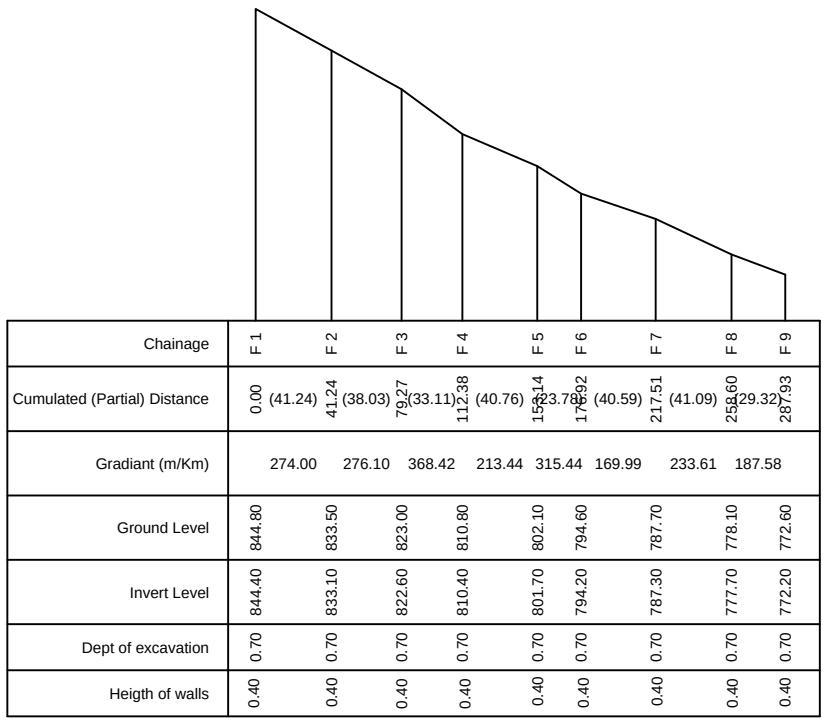
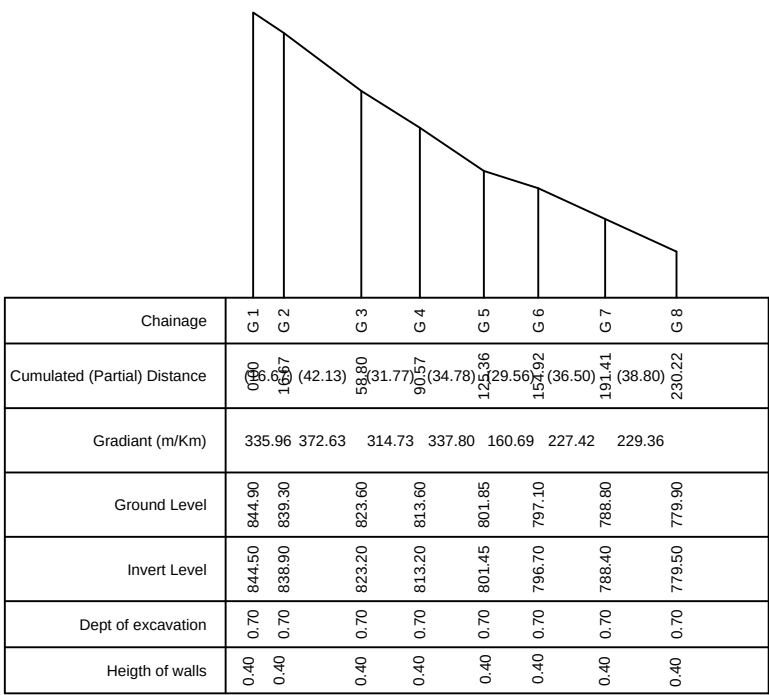
**Canal Typical Cross Section for wall height  $> 60$  cm**

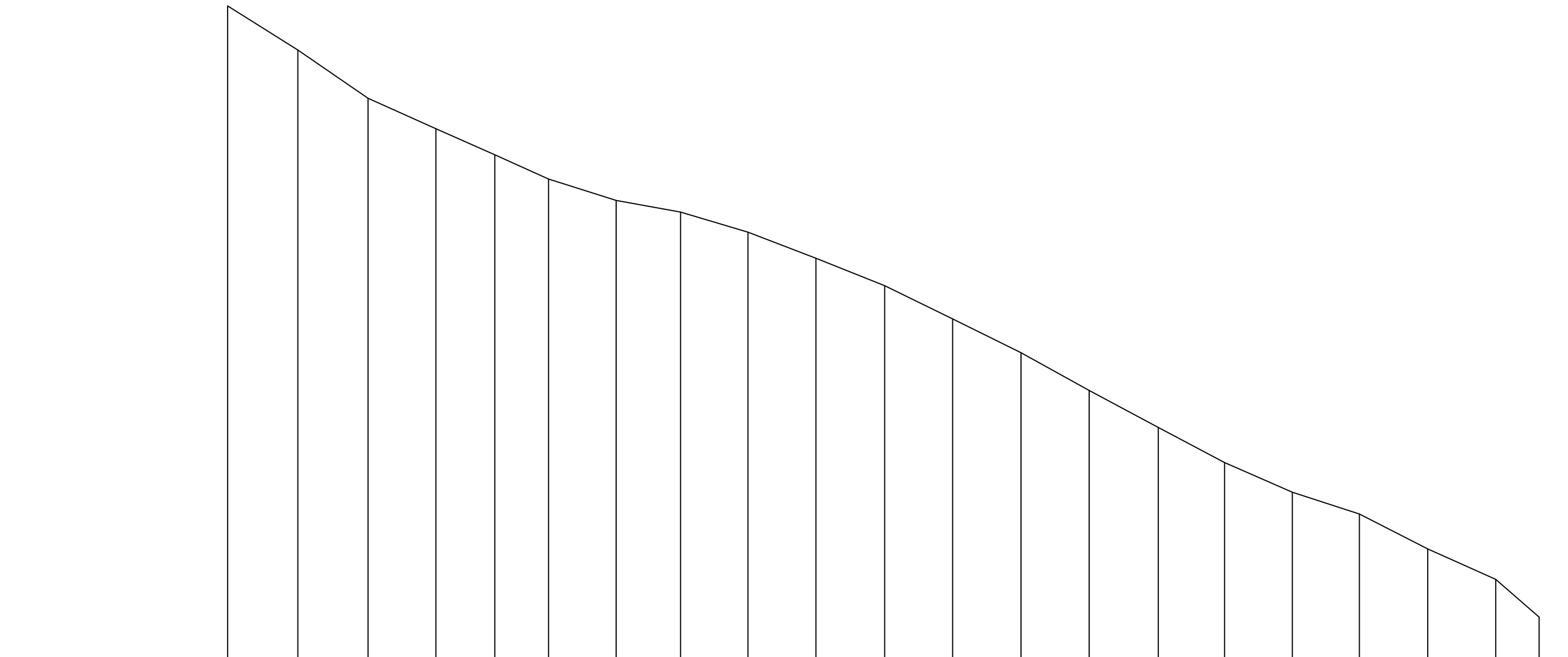


**Sluice Gate Typical Arrangement  
(PlanView)**









|                              |        |               |               |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |
|------------------------------|--------|---------------|---------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|
| Chainage                     | H 1    | H 2           | H 3           | H 4            | H 5            | H 6            | H 7            | H 8            | H 9            | H 10           | H 11           | H 12           | H 13           | H 14           | H 15           | H 16           | H 17           | H 18           | H 19           | H 20           | H 21           |
| Cumulated (Partial) Distance | 0.00   | (42.08) 42.08 | (42.07) 84.15 | (40.66) 124.81 | (35.40) 160.21 | (32.10) 192.31 | (40.51) 232.81 | (38.59) 271.40 | (40.45) 311.85 | (40.74) 352.59 | (41.08) 393.68 | (40.73) 434.41 | (41.05) 475.46 | (40.76) 516.22 | (41.49) 557.71 | (39.68) 597.39 | (40.63) 638.02 | (40.12) 678.15 | (41.03) 719.18 | (40.73) 759.91 | (45.85) 785.76 |
| Gradiant (m/Km)              |        | 313.70        | 344.68        | 223.82         | 220.33         | 227.40         | 158.00         | 90.69          | 148.34         | 191.45         | 199.59         | 245.52         | 246.06         | 277.22         | 267.54         | 264.59         | 219.03         | 162.00         | 255.88         | 223.45         | 435.63         |
| Ground Level                 | 836.30 | 823.10        | 808.60        | 799.50         | 791.70         | 784.40         | 778.00         | 774.50         | 768.50         | 760.70         | 752.50         | 742.50         | 732.40         | 721.10         | 710.00         | 699.50         | 690.60         | 684.10         | 673.60         | 664.50         | 653.20         |
| Invert Level                 | 835.90 | 822.70        | 808.20        | 799.10         | 791.30         | 784.00         | 777.60         | 774.10         | 768.10         | 760.30         | 752.10         | 742.10         | 732.00         | 720.70         | 709.60         | 699.10         | 690.20         | 683.70         | 673.20         | 664.10         | 652.80         |
| 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           | 0.70           | 0.70           | 0.70           | 0.70           | 0.70           | 0.70           | 0.70           | 0.70           | 0.70           | 0.70           |
| Heigth of walls              | 0.40   | 0.40          | 0.40          | 0.40           | 0.40           | 0.40           | 0.40           | 0.40           | 0.40           | 0.40           | 0.40           | 0.40           | 0.40           | 0.40           | 0.40           | 0.40           | 0.40           | 0.40           | 0.40           | 0.40           | 0.40           |





