

Girder Reinforcement Sheet Check List

A. General Sheet Layout

1. Orient Plan views the same as the Girder Layout sheet
2. Place Top Reinforcement at the top of the sheet and Bottom Reinforcement below.
3. If all reinforcement will not fit on one sheet, detail all top reinforcement on a sheet and all bottom reinforcement on another sheet. Each sheet should cover the limits of a girder layout "frame".
4. The Girder Reinforcement sheets should follow the corresponding Girder Layout Sheet, with the bottom reinforcement preceding the top reinforcement.
5. Longitudinal scale: Usually the same scale as the Girder Layout; but, not less than 1 : 100.
6. Transverse scale: Exaggerate sufficiently to show reinforce bars and cut-off number without crowding.
7. Generally, straight bridge or radii of greater than or equal to 300 m \pm with skews 20 $^{\circ}$ \pm or less can be shown with the expanded transverse scale without adverse distortion.
8. On trapezoidal shaped spans, sharp radius curves, and heavy skews, the girder reinforcement should be drawn to true scales both longitudinally and transversely. 1 :50 usually is adequate.

B. Bottom Reinforcement

1. Only a typical exterior and interior bay need be detailed unless the bridge is in the categories listed in General Sheet Layout, Item 8 above.
2. Reference bar cut-offs from centerline span. Identify centerline Hinge span.
3. Use a reference line for trapezoidal spans and dimension the location with respect to one of the bents.
4. Draw main bars as heavy solid lines, and splice bars as lightweight solid lines.
5. Show outside edge of box and centerline girders.
6. For T-Beams show girder outlines and take a section though the girder at the maximum number of bars.
7. Indicate hooks at the ends of continuous reinforcement where applicable. Usually at abutments and supported side of hinges.
8. Show bundle symbol on bars to be bundled together.

C. Top Reinforcement

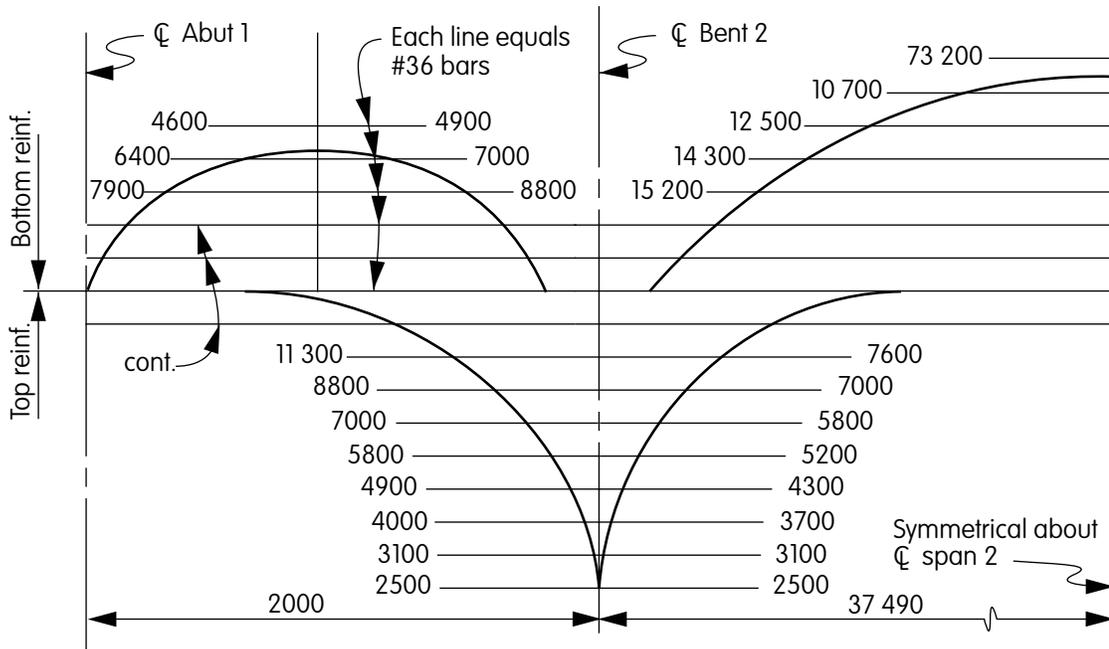
1. Detail only an exterior and interior bay and deck overhang, unless the bridge is in the categories listed in General Sheet Layout, Item 8. above.
2. Reference bar cut-offs from centerline bents.
3. Draw main bars as heavy solid lines, and splice bars as lightweight solid lines.
4. Show edge of deck and centerline girders.
5. Place bars in correct positions satisfy Bridge Standard Plan B0-5, Detail 5-15.
6. Show hooks on main reinforcement where applicable. Usually at the supporting or cantilever side of hinges.
7. Show bundle symbols on bars to be bundled together.

D. Standard Notes (Use as required)

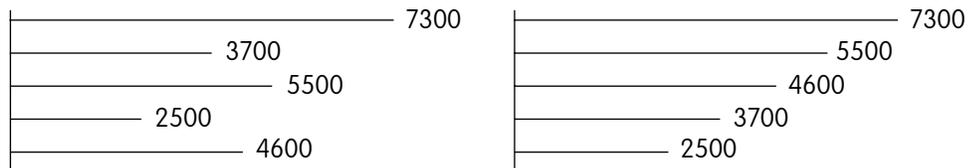
1. All reinforcement #36 unless otherwise noted.
2. Number at ends of bars indicate the distance in millimeters from centerline Span or Reference line for bottom reinforcement and centerline Bent for top reinforcement.
3. Bundle bars shown thus: 
4. In area of varying girder spacing, bars shall be bundled as required to provide 90 mm minimum clearance between bars and bundles of bars.

Box Girder Reinforcement

The designer will ordinarily furnish moment diagrams with the number, size, and lengths of main reinforcement.



The main reinforcement should be placed so that the ends are staggered rather than being progressively shorter.



Correct

Incorrect

Girder Reinforcement Diagram

Bars should be symmetrical about the centerline of bay and the shorter bars should generally be placed nearer the centerline of bay.

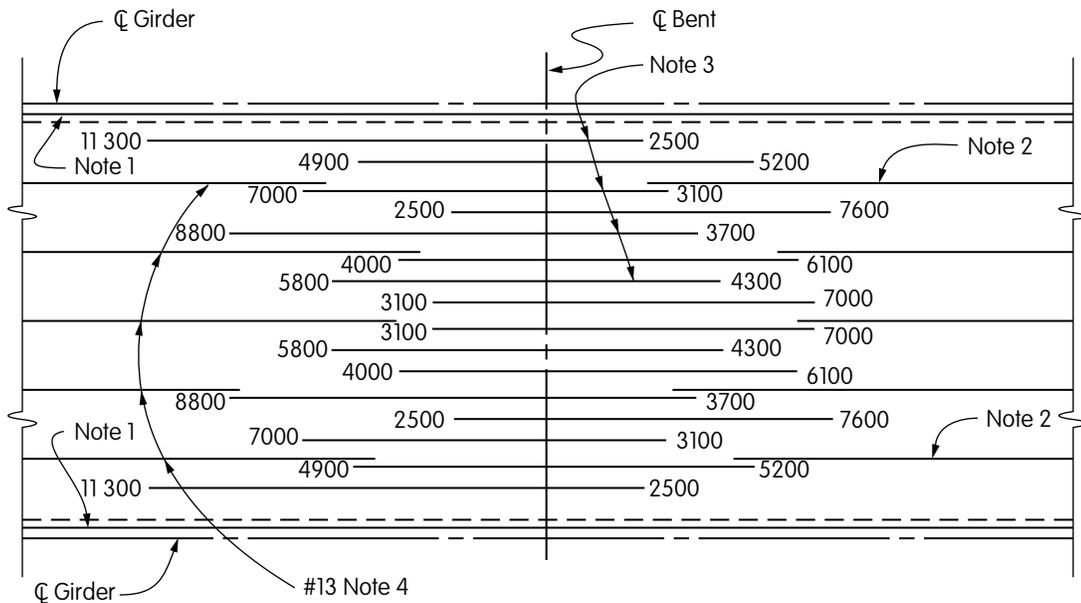
For convenience in these instructions, only an interior girder will be considered. Reinforcement of an exterior girder is similar.

Top Girder Reinforcement

It is considered good practice to use as few bar lengths as possible in order to simplify shop detailing, cutting, handing and placing. Also, maximum bar lengths should be kept shorter than 18 m whenever possible. It is usually possible to use many bars of the same length by adding 300 to 600 mm or so to a couple of bars. This condition is usually obtained by combining the longest cutoff on one side of the centerline with the shortest on the opposite side. A few odd length are often required. The lengths for top reinforcement for this example would be as follows:

11 300	8800	7000	5800	4900	4000	3100	2500
2400	3700	3100	4300	5200	5800	7000	7600
13 700	12 500	10 100	10 100	10 100	9800	10 100	10 100

Thus by adding 350 mm to one of the bars, 6 identical length bars are obtained.



Girder Reinforcement Diagram

Notes:

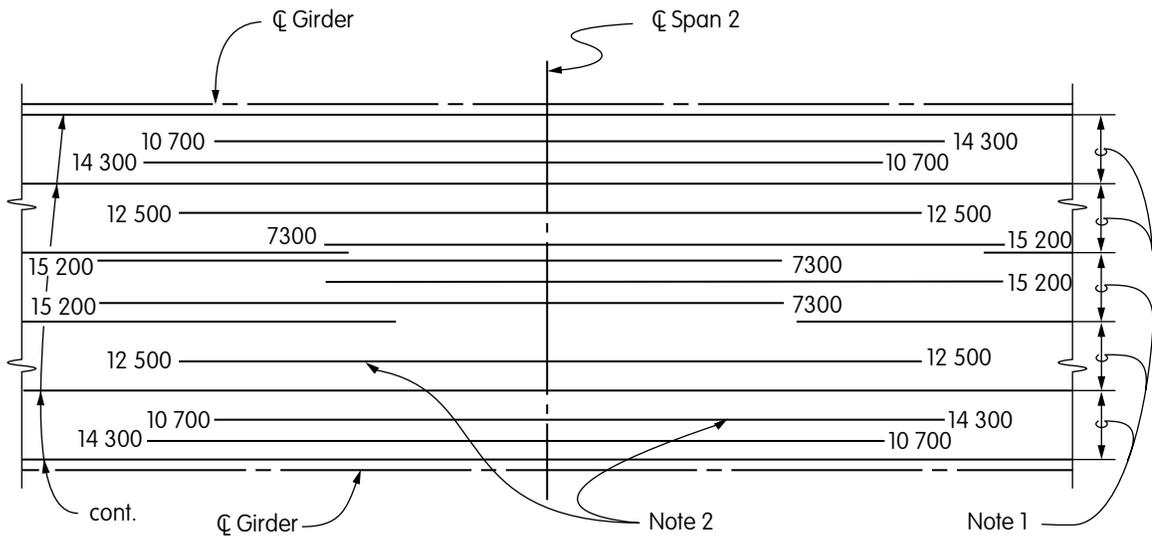
1. Place 2 continuous bars in web at top of stirrup.
2. Place bars under bend of deck reinforcement. Continuous reinforcement should also be placed at the edge of deck slab and adjacent to barrier dowels. See Bridge Standard Plan BO-5, Detail 5-15.
3. Show these bars at approximately equal space.
4. Longitudinal bar spacing shall not exceed 450 mm. Use additional #13 bars lapped with main reinforcement where necessary.

Bottom Girder Reinforcement

The bars in the bottom reinforcement usually are long enough that the contractor must splice them to meet hauling and handling limitations. It is possible to combine lengths advantageously here also. The length in (millimeters) for the middle span for this example would be as follows:

7300	10 700	12 500	14 300	15 200	
15 200	14 300	12 500	10 700	7300	
22 500	22 500	22 500	22 500	22 500	
18 000	18 000	18 000	18 000	18 000	Usual length limitation
4500	7000	7000	7000	4500	net length needed plus
					splice length

Thus by combining lengths some similarity can be obtained and splices can be staggered away from maximum moment.



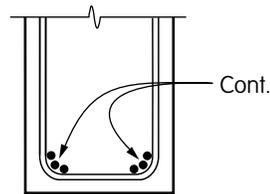
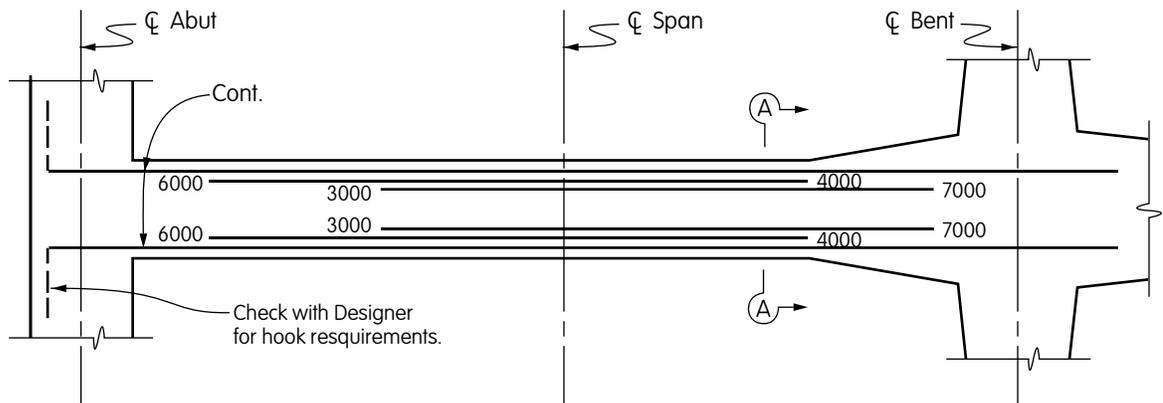
Girder Reinforcement Diagram

Notes:

1. Place continuous or other bars in the position required for maximum spacing of nominal reinforcing. This eliminates having a nominal bar paralleling and close to a main bar. Minimum longitudinal reinforcement, #19 @ 450
2. Probable splice locations. Do not show on plans. Note staggering achieved.

T-Beam Girder Reinforcement

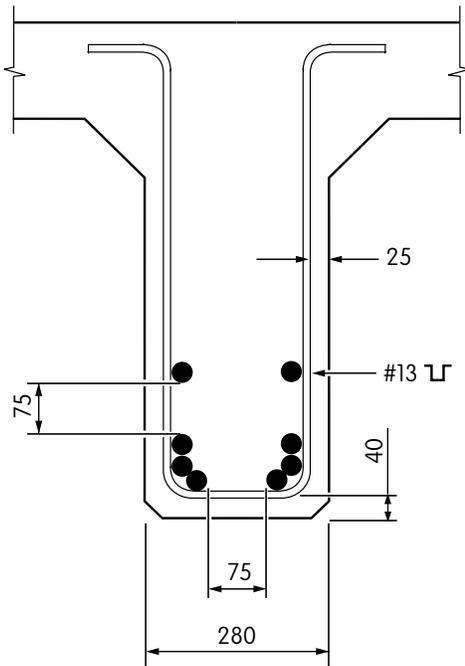
- ✓ Top Reinforcement shall be detailed similar to Box Girders.
- ✓ Bottom Reinforcement shall be treated similar to Box Girder. Reinforcement shall be detailed by the girder as shown below.



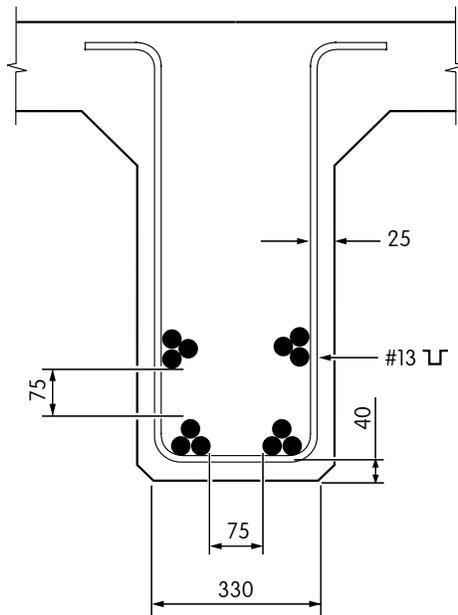
Section A-A

Girder Reinforcement Diagram

Layout of No. 36 Bars in Stem of T-Beam



No. of Bars	*X
2	75 mm
4	95 mm
6	115 mm
8	145 mm



No. of Bars	*X
2	75 mm
4	95 mm
6	115 mm
8	145 mm

Bar Layout Diagram

*Note: "X" = distance from bottom of stem to c.g. of #36 bars.