PROJECT IN PRESTRESSED CONCRETE / 4TH GRADE

Post-tensioned Prestressed beams having the following data as shown in table below. All with low relaxation strands having the given profile.

- Determine max Flexural stresses and at the ends of the member. Check them with the allowable limits
- Determine the flexural strength of the section and check it with the applied moment.
- Determine the shear strength of the section and check it with the applied shear.

- Calculate losses due to slip, elastic shortening, friction, creep, shrinkage, and relaxation. Express your results in tabular form both numerically and as percentages of initial prestress P_i.

- Calculate deflections and compare with allowable values.

Creep effects may be assumed to occur under the combination of prestress force plus self-weight. The beam is prestressed when the concrete is aged **7** days. Anchorage slip = **6.3 mm**, coefficient of strand friction = **0.20**, coefficient of wobble friction = **0.0033.**, w_c = **24 kN/m³.**

Group* number	Section	Span (m)	A_{ps} No. - size	Grade (f_{pu}) MPa	e_{mid} /e_{ends} mm/mm profile	P_i (kN)	f'_c MPa	Live load KN/m
1	I - beam type I	20	18-12.7	1720	200 / 0 parabolic	2250	35	11
2	I - beam type II	24	24 – 12.7	1860	250 / 0 parabolic	3300	42	9
3	Bulb T type BT- 1350	30	30 – 12.7	1860	550 / 0 parabolic	4100	49	8
4	Box	24	24 – 12.7	1860	210 / 210 straight	3300	49	10
5	Double T	18	34 – 9.8	1720	360 / 360 straight	2350	42	12

*each section is assigned to a group according to the number of the group and You can find your group number on the last page of this file.

I – beams
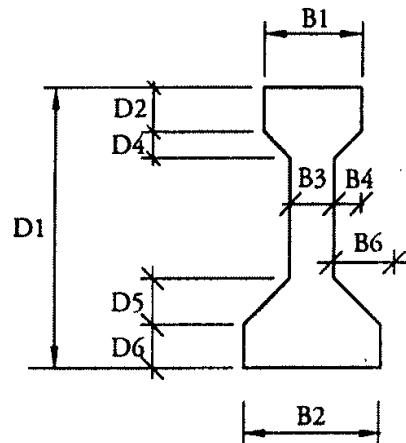
Dimensions (mm)

Type	D1	D2	D3	D4	D5	D6	B1	B2	B3	B4	B5	B6
I	700	100	0.0	75	125	125	300	400	150	75	0.0	125
II	900	150	0.0	75	150	150	300	450	150	75	0.0	150

Properties

Type	Area mm^2	y_{bottom} mm	Inertia mm^4
I	172,500	320	8.89×10^9
II	230,650	400	2.00×10^{10}

Bulb Tees
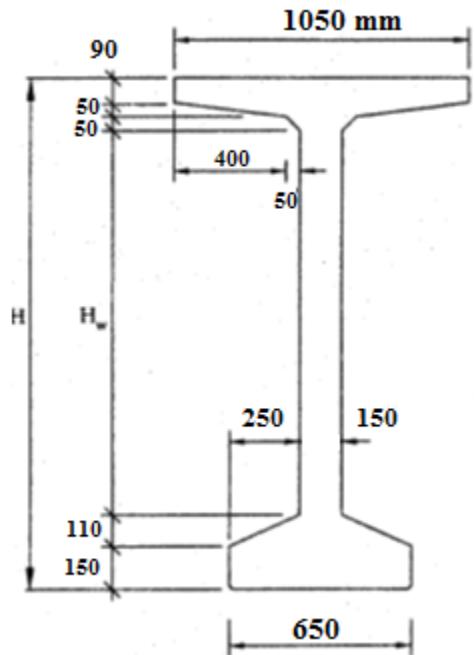
Properties

Type	H mm	H_w mm	Area mm^2	Inertia $mm^4 \times 10^{11}$	y_{bottom} mm
BT-1350	1350	900	412,000	1.05	700

Box Girders

*BOX* (**1200×1000**): $A = 510{,}000$ mm^2, $I = 6.6 \times 10^{10}$ mm^4, $y_b = 490$ mm, $y_t = 510$ mm
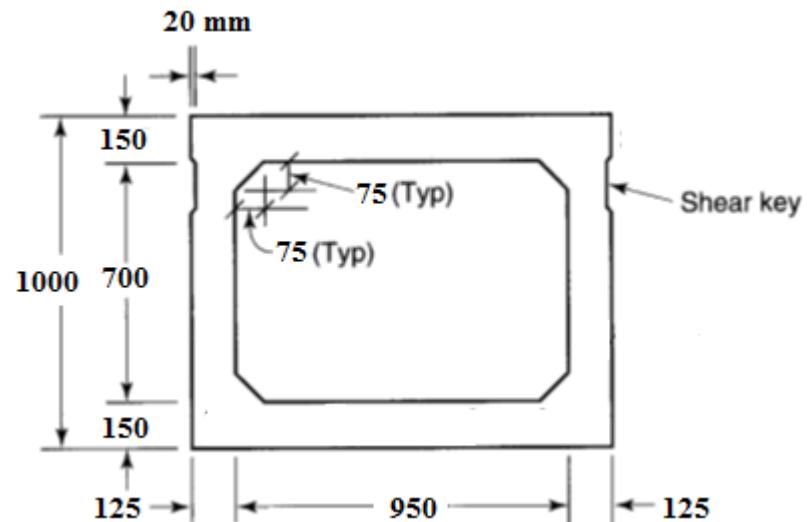
Fig.: Box

Double Tees
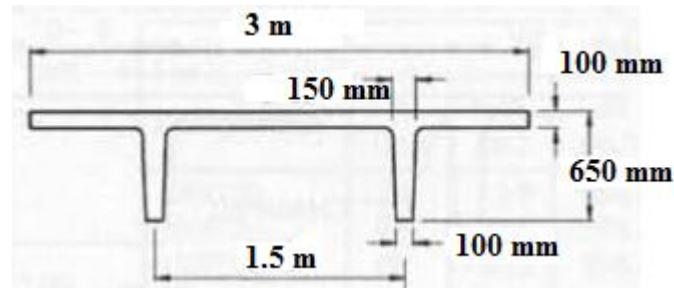
Fig. : Double Tee

Double Tee: $A = 430{,}650$ mm^2, $I = 1.2 \times 10^{10}$ mm^4, $y_b = 510$ mm, $y_t = 140$ mm

<u>Requirements</u>

This is a teamwork. Each group (*consists of 5 members*) shall be assigned to one of the 5 projects listed above.

Your report shall include the following

1. Description of the problem
2. Procedure of the solution
3. Calculations
4. Sketches drawn clearly and appropriately
5. Tabulation of your results
6. Conclusions

Deliverables:

1. Soft and printed matters are required
2. Prepare a PowerPoint file for presentation and discussions.

Deadline 30/4/2019

Weight of report and presentation is 20 pts.

Group names

Group number	Section	members
1	I - beam type I	1-Aram Hawro Khoshnaw 2-Ayman Ali Ahmed 3-Muhamad Sherzad Ali 4-Sabr Abdulrahman Osman 5-Peshniar Muhsen Abdulrahman
2	I - beam type II	1-Soma Azad Omer 2-Abdulqadir Faez Abdul-Jabbar 3-Nihayat Tofiq Sdiq 4-Asia Osman Hassan
3	Bulb T type BT- 1350	1-Jwanro Abdalla Khdir 2-Zhiwar Hassan Abdullah 3-Soran Azeez Ahmed 4-Dara Husen abdulkereem 5-Omed Dewary Ali
4	Box	1-Hunar Kurdo 2-Haval Kawa 3-Marden Husen Salih 4-Hawzhen Kocher Said 5-Safa Faisal Kareemkhan
5	Double T	1-Ahmed Dlshad 2-Hawkar Jamshid Salim Ibrahim 3-Bana Kurdo Azez 4-Aya Ameer Qadir 5-Tara Krmanj Ezzat Suleman