

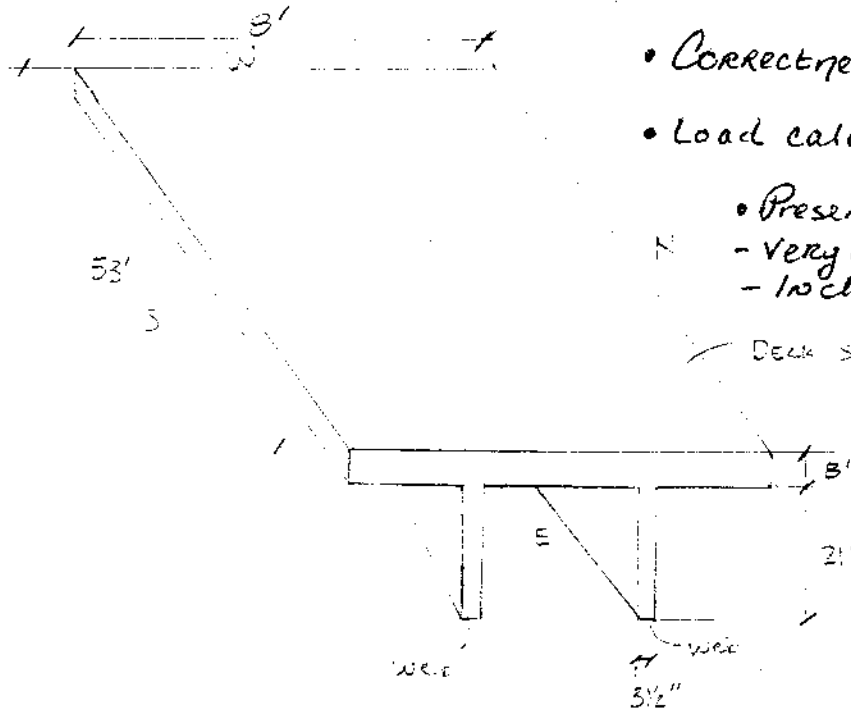
### PROBLEM 12

Estimate the load supported per linear foot by one of the interior double-tee beams running in the E-W direction on the second parking level.

- Inclusion of assumptions, refs, & figures, 4/4
- Validity of assumptions, 4/4 - GOOD

#### Assumptions

- Assume a uniform density for concrete of  $150 \text{ lb/ft}^3$  - Hibbler, p.10 ✓
- Assume walls have a continuous cross-section in the form of a rectangle. OK
- Assume live load data - Hibbler, p.13 -  $50 \text{ psf}$  - uniform distributed over floor ✓
- Dimensions were measured on site to the nearest 1/8" ✓
- Assume entire area of double T beam is within room included ✓

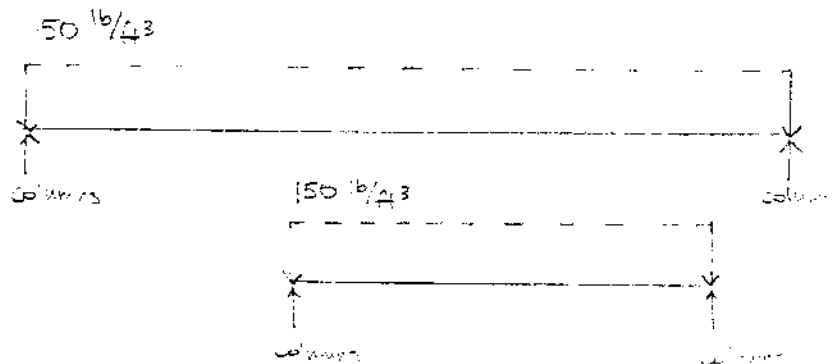


- Correctness of trib. area, 4/4
- Load calculations, 4/4

• Presentation of results, 4/4  
 - Very clear, well-organized.  
 - Inclusion of photographs and tape measure for scale was very helpful & is a realistic representation of what is done in engr. firms.

Overall, excellent job on problem 12.

20/20



North Elevation  
Free End

East Elevation  
Free End

Problem 12 continued...

Total dead load:

Concrete slab:	$53' \times 8' \times 8/12'$	$(150 \text{ lb}/\text{ft}^3) = 42400 \text{ lb}$
2 concrete webs:	$53' \times 3/2/12' \times 2/12'$	$(150 \text{ lb}/\text{ft}^3) = 4058 \text{ lb}$
	$53' \times 3/2/12' \times 2/12'$	$(150 \text{ lb}/\text{ft}^3) = 4058 \text{ lb}$

$$\text{Total} = 50516 \text{ lb} = 50.516 \text{ kip}$$

E-W running length is 53'

$$50516 \text{ lb} \times \frac{1}{53'} = 953 \text{ lb/lineal ft.}$$

Dead load supported by each double "T" beam is 953 lb per lineal foot ✓

Live load will be calculated over top surface of beam.

Area of Beam  $A = 53' \times 8' = 424 \text{ ft}^2$   
 live load =  $50 \text{ lb}/\text{ft}^2$

$$\text{Total live load} = 50 \text{ lb}/\text{ft}^2 (424 \text{ ft}^2) = 21200 \text{ lb} \checkmark$$

E-W running length is 53'

$$21200 \text{ lb} \times \frac{1}{53'} = 400 \text{ lb/lineal ft} \checkmark$$

Live load supported by each double "T" beam is 400 lb per lineal foot ✓

Total load supported by each double "T" beam

$$953 + 400 = 1353 \text{ lb/lineal foot} \checkmark$$

Estimated total load supported by each double "T" beam is 1353 lb/lineal foot. ✓

Very good.

PERSPECTIVE OF UNDERNEATH OF BEAM

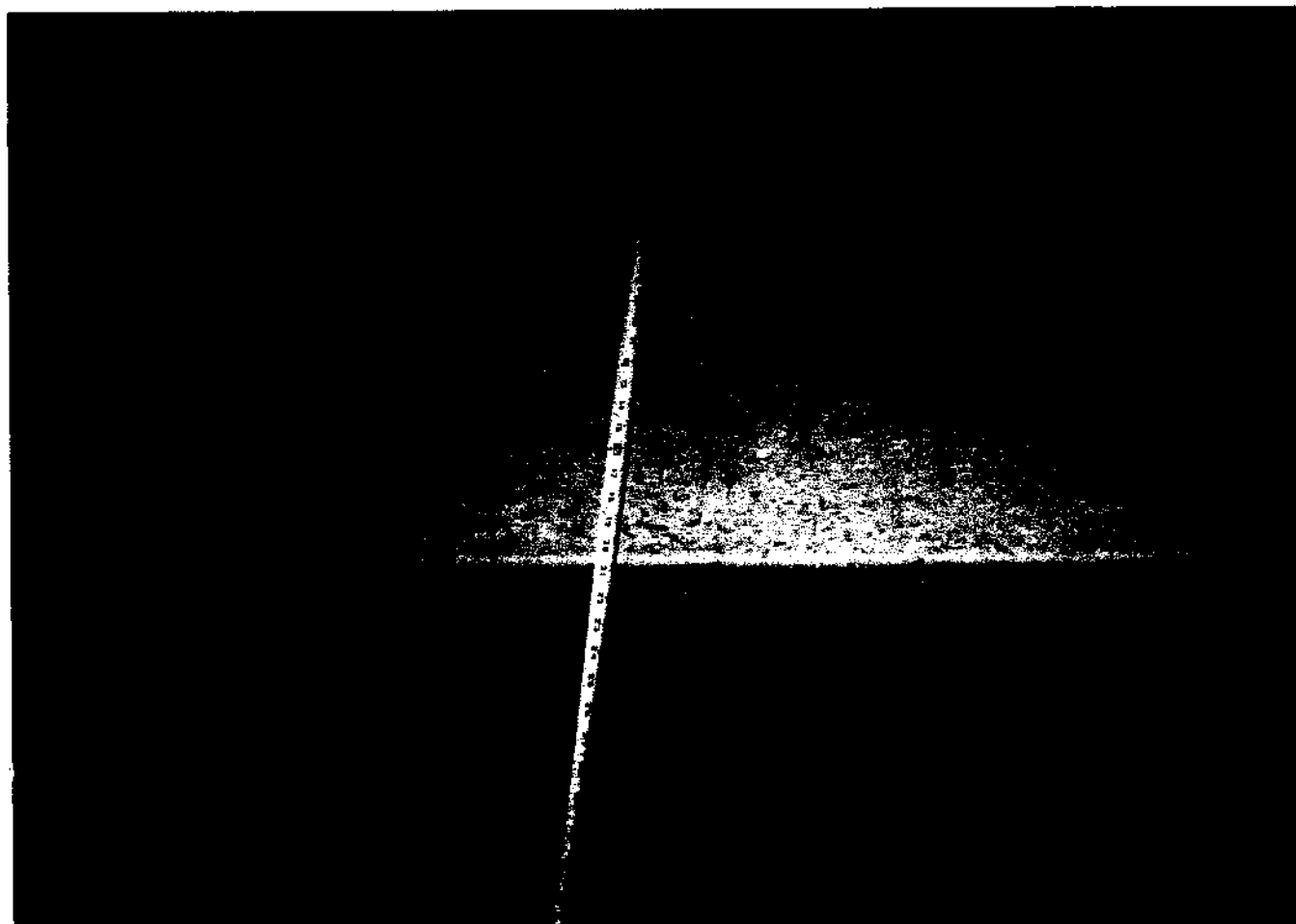
3/5



THICKNESS OF SLAB

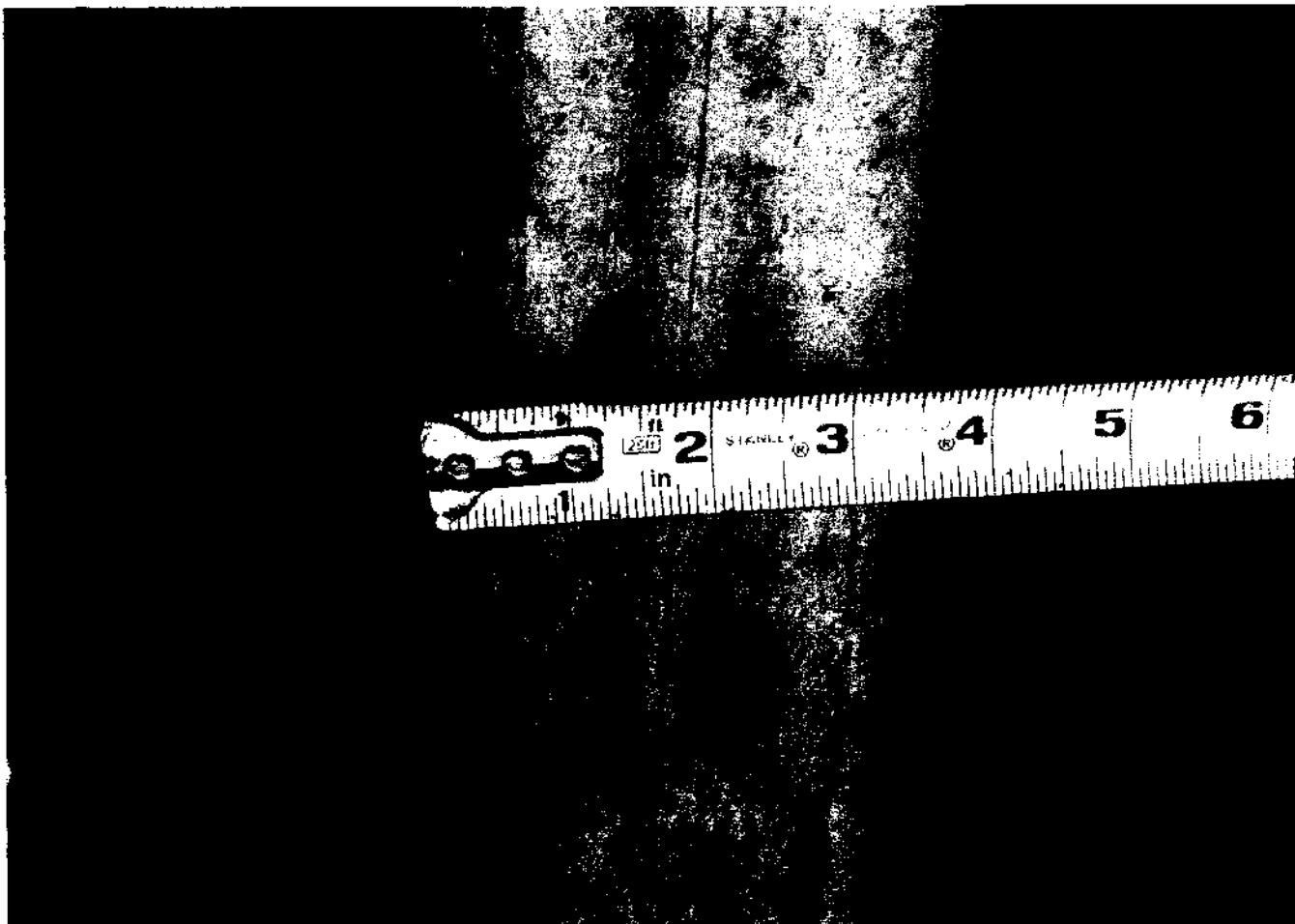
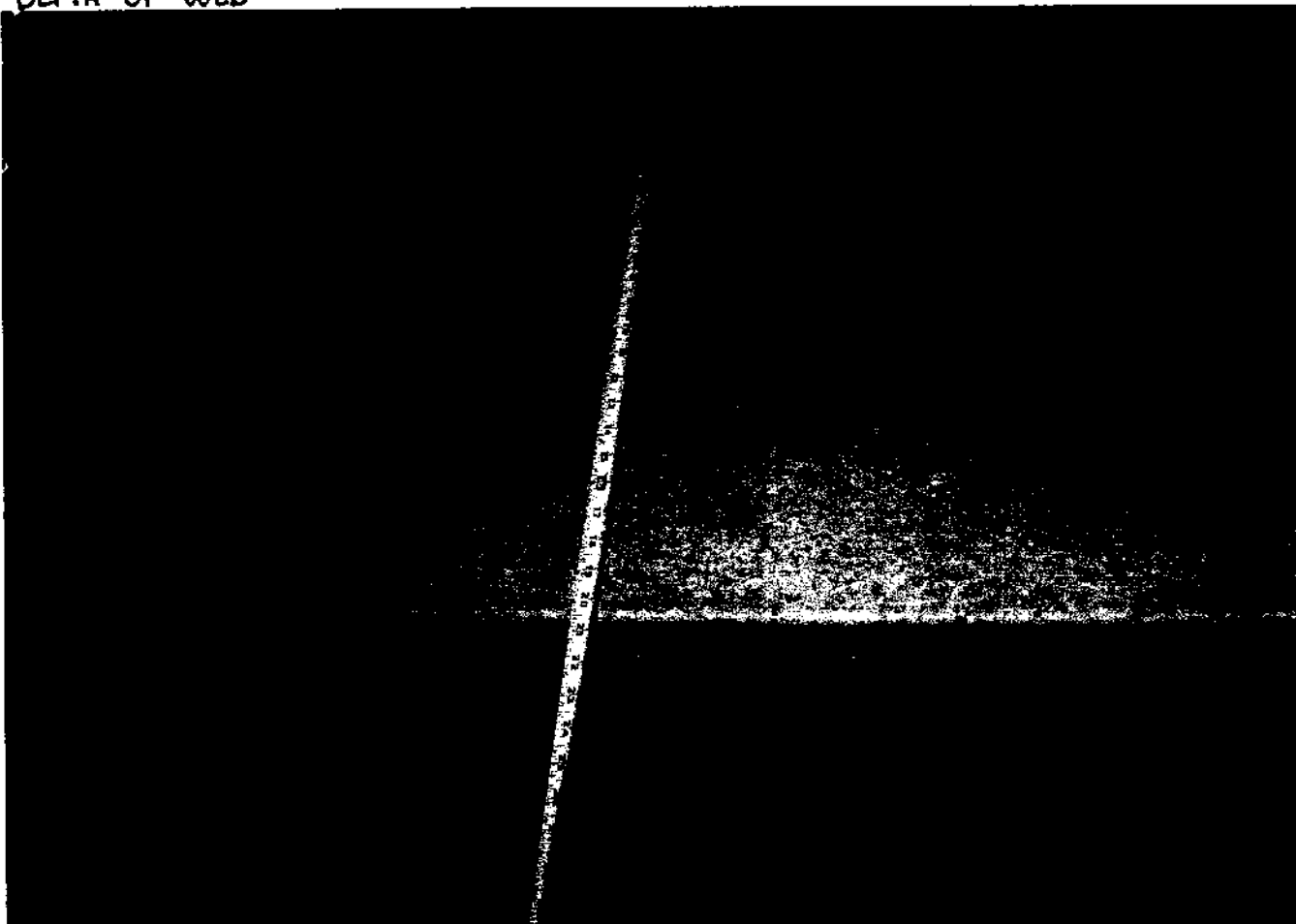
WIDTH OF BEAM

4/E



DEPTH OF WEB

DEPTH OF WEB



THICKNESS OF WEB