ברוך ירמולינסקי מהנדסי מבנים בע"מ
Baruch Yarmolinsky Structural Engineers LTD

נספח אי

חישובים סטטיים

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Forces !

1 ✓ 2 ✓
3 ✓

4 ✓
5 ✓
7 ✓
8 ✓

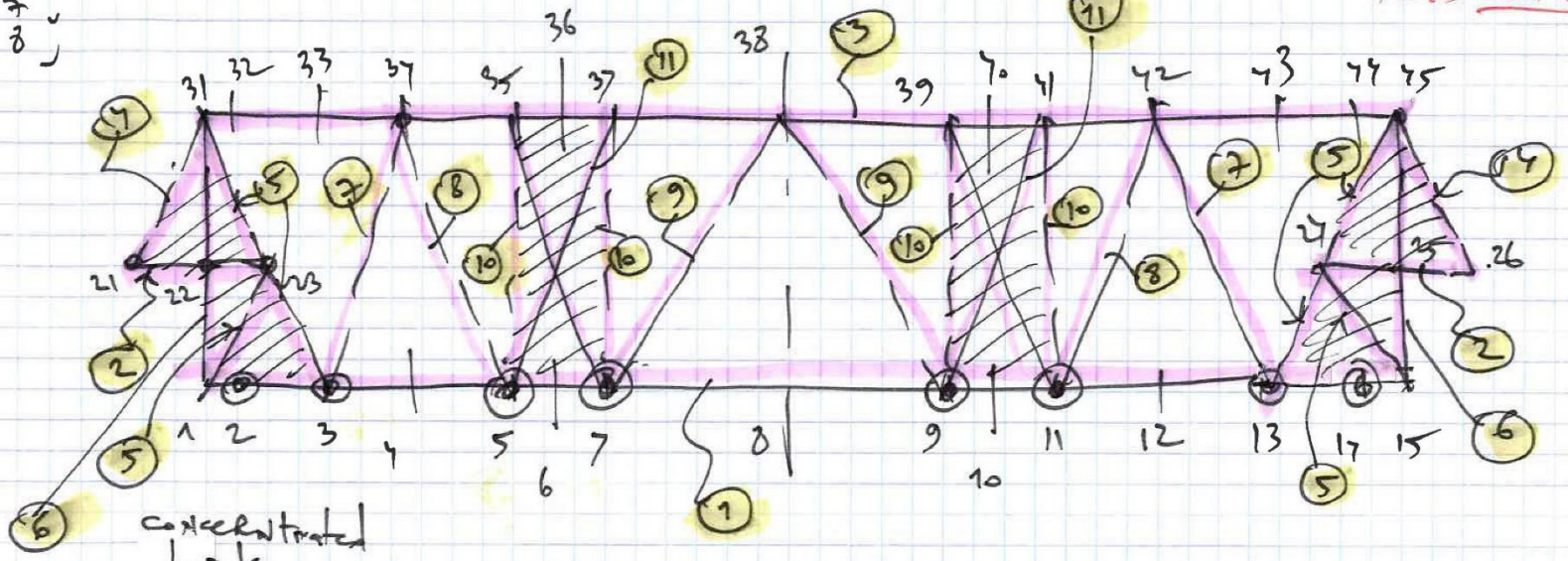
B = 5.2 = 6.0 m

3 trusses .. internal ..

Heavy = Type 1 =

Truss 116

Truss 117a ✓



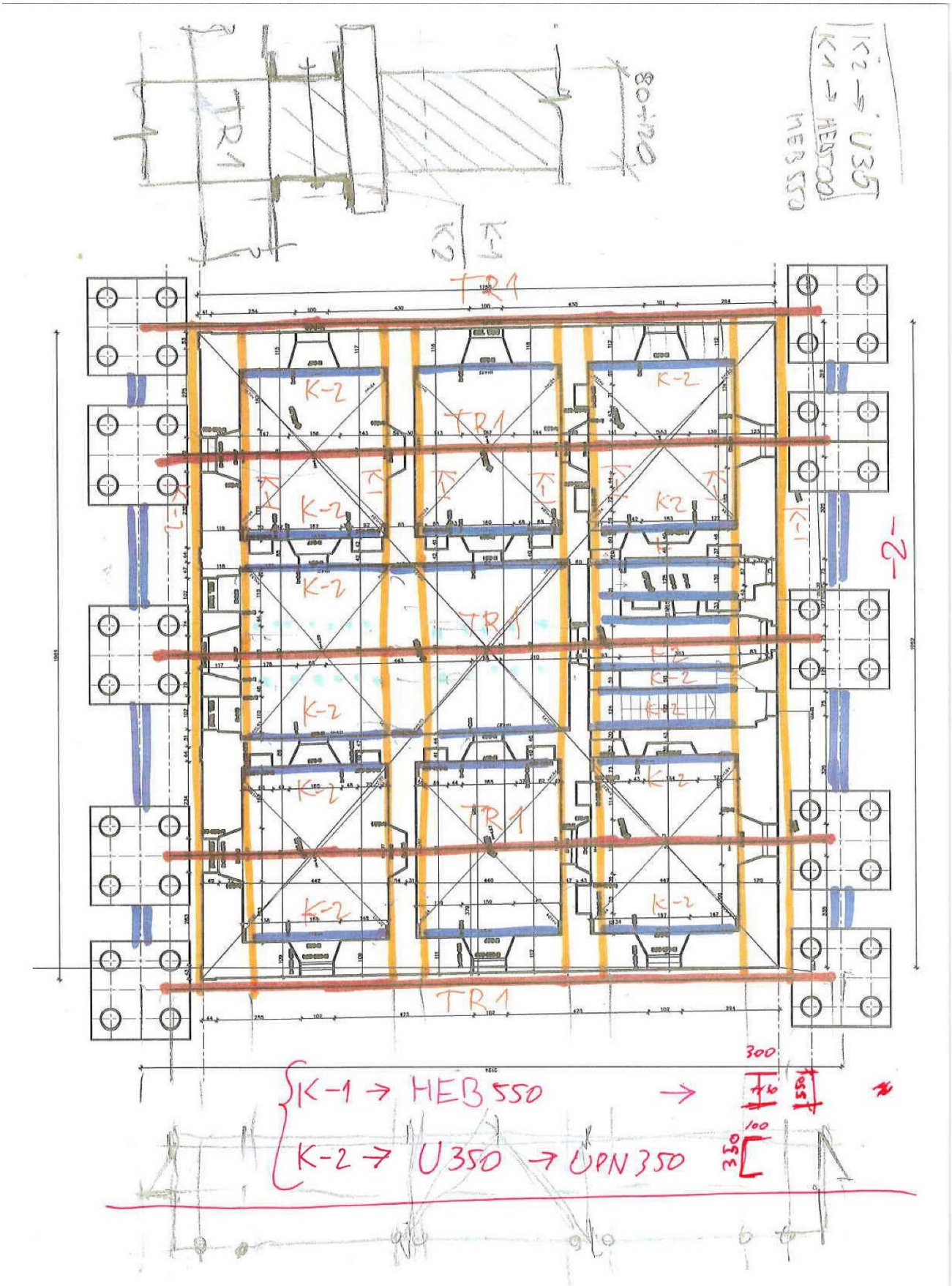
concentrated loads : (·) 2, 3 (·) 5, 7 (·) 9, 11 (·) 13, 14

To take approximately $n_1 = 8$ nodes $N = 5\ (4)$

All loads finally should be applied to trusses

$Q = 3300t \rightarrow n_1 N = 8 \cdot 4 = 32 \longrightarrow \overline{Q} = 110t$ node

27.03.22



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LOAD CARRYING CAPACITY OF CROSS-SECTIONS

Type 1:

$\Sigma A = 270 \times 2 = 540\ cm^2$ $\quad (\Delta A' = 1.2 \times 70 \times 2 = 168\ cm^2)$

$K_A = \frac{540+168}{540} = 1.31$

$K_J = \frac{342.000 + 68600}{342.000} = \frac{410600}{342.000} = 1.20$

$W'_x = \frac{J}{0.5h'} = \frac{410600}{35} = 11730\ cm^3$ $\quad K_W \sim 1.0$

$[A] = f_y \cdot \Sigma A'_i = 2.25 \cdot (540+168) = 1215 + 378 = 1593\ t$

$[W] = 11400 \cdot 2.25 = 256.5\ tm$

To take preliminary top, bottom joists — Type 1

$\sim N = \pm 950\ t$ $\quad M = \pm 80\ tm$

$\sigma_N = \frac{N\omega}{A} = \frac{950 \cdot 1.2}{(540+168)} = 1.61\ t/cm^2$

here $\omega = 1.2$, for $\lambda = \frac{2000}{60 \cdot 0.29} = \frac{2000}{17.4} \sim 110$

$\sim$: thout bracings $\sim 20\ m$

To have $1 \div 2$ bracings, at least $\lambda \leq 50 \div 60$

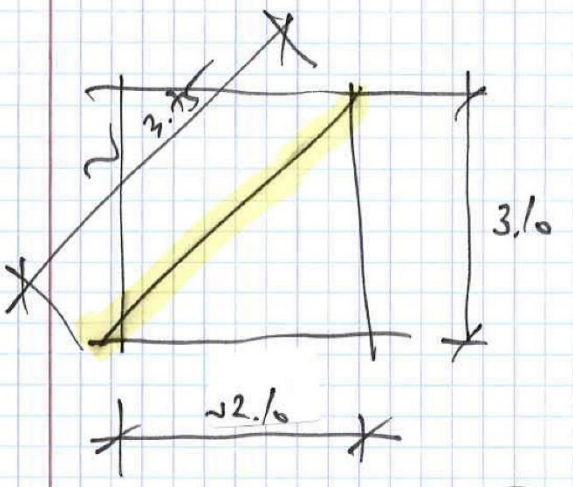
$\sigma_M = \frac{M}{W'_x} = \frac{8000}{11.400} = 0.70\ t/cm^2$

27.03.2020

Type 3

Diagonal loaded elements:

$N \sim 400\,t \pm \qquad M_y = \pm 50\,tm$



$L' = \sqrt{\underbrace{3.10^2}_{9.61} + \underbrace{2.10^2}_{4.41}} = 3.75\,m$

$\lambda = \frac{3.75}{7.49} = \frac{3.75}{7.49} = \sim 50$

NOT CONNECTED 2 PROFILES

$\omega = 1.25$ (FOR $\lambda \sim 50 \div 55$)

$\sigma_N = \frac{N\omega}{A} = \frac{400 \cdot 1.25}{362} = 1.38\,t/cm^2$

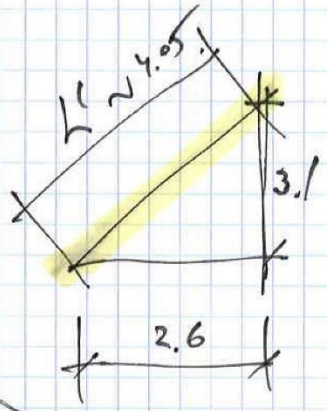
$\sigma_M = \frac{M}{W_y} = \frac{5000}{4800} = 1.07\,t/cm^2$

$\sum \sigma_i = 1.38 + 1.07 = 2.42\,\frac{t}{cm^2}$ ~

BUT BY DISPLACEMENTS:

2 I HEB 450 ÷ 500 B AT LEAST

FOR TYPE (9): SLOWLY LOADED DIAGONAL ELEMENTS



$L' = \sqrt{\underbrace{3.1^2}_{9.61} + \underbrace{2.6^2}_{6.76}} = 4.05\,m$

$\lambda = \frac{405}{7.49} = 54 \qquad \omega = 1.27$

NOT CONNECTED

$N \sim \leq -10\,t$

$M \sim 12\,tm$

24.03.2020

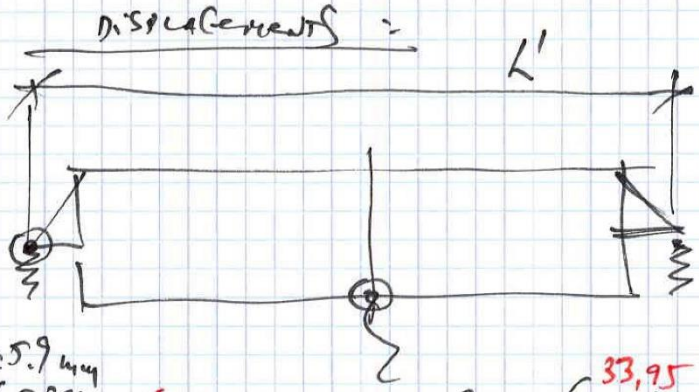
$$\sigma_N = \frac{N\omega}{A} = \frac{10 \cdot 1.27}{362} = 0.07\ t/cm^2$$

$$\sigma_M = \frac{M}{W} = \frac{1200}{4800} = 0.25\ t/cm^2$$

$$\sum \sigma_i = 0.07 + 0.25 = 0.29\ t/cm^2$$

BUT BY DISPLACEMENTS !

DISPLACEMENTS :



$W = 5.9$ mm (5.88)

$\Delta = 33.95 - 5.88$ $W_{max} = 32$ mm (31.97) 33,95

28.07 mm

$\Delta = 31.97 - 5.88 = 26.09$ mm

$$\frac{\Delta}{L'} = \frac{26.09}{20000} = \frac{1}{767}$$!

$\frac{28.07}{20000} = \frac{1}{713}$!

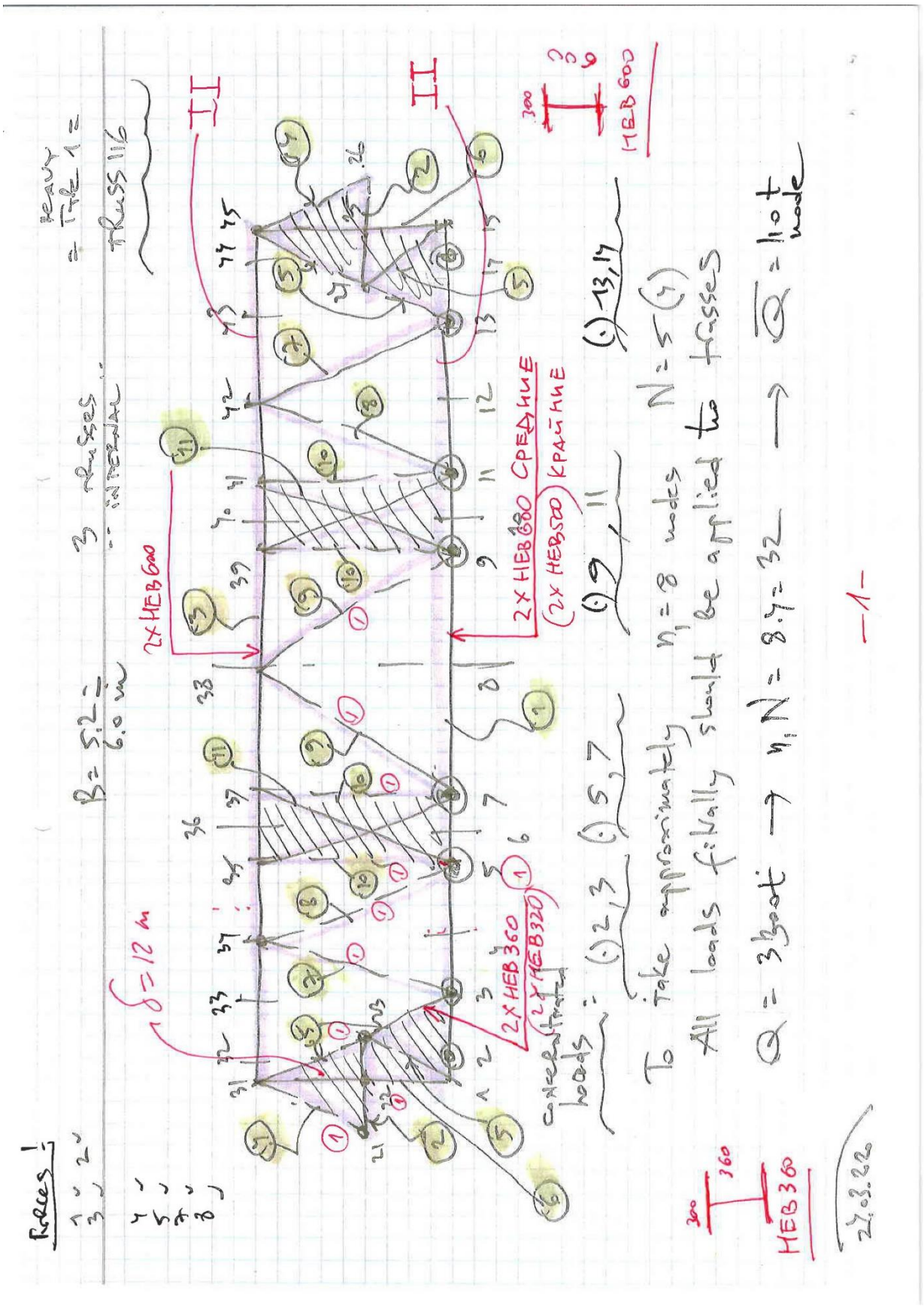
TRY :

Tube 4 { (7) 2HE450B 360 B
(8) 2HE450B 360 B

Tube 5 (9) – 2HE270B

TRUSS 116a
TXT

24.03.22



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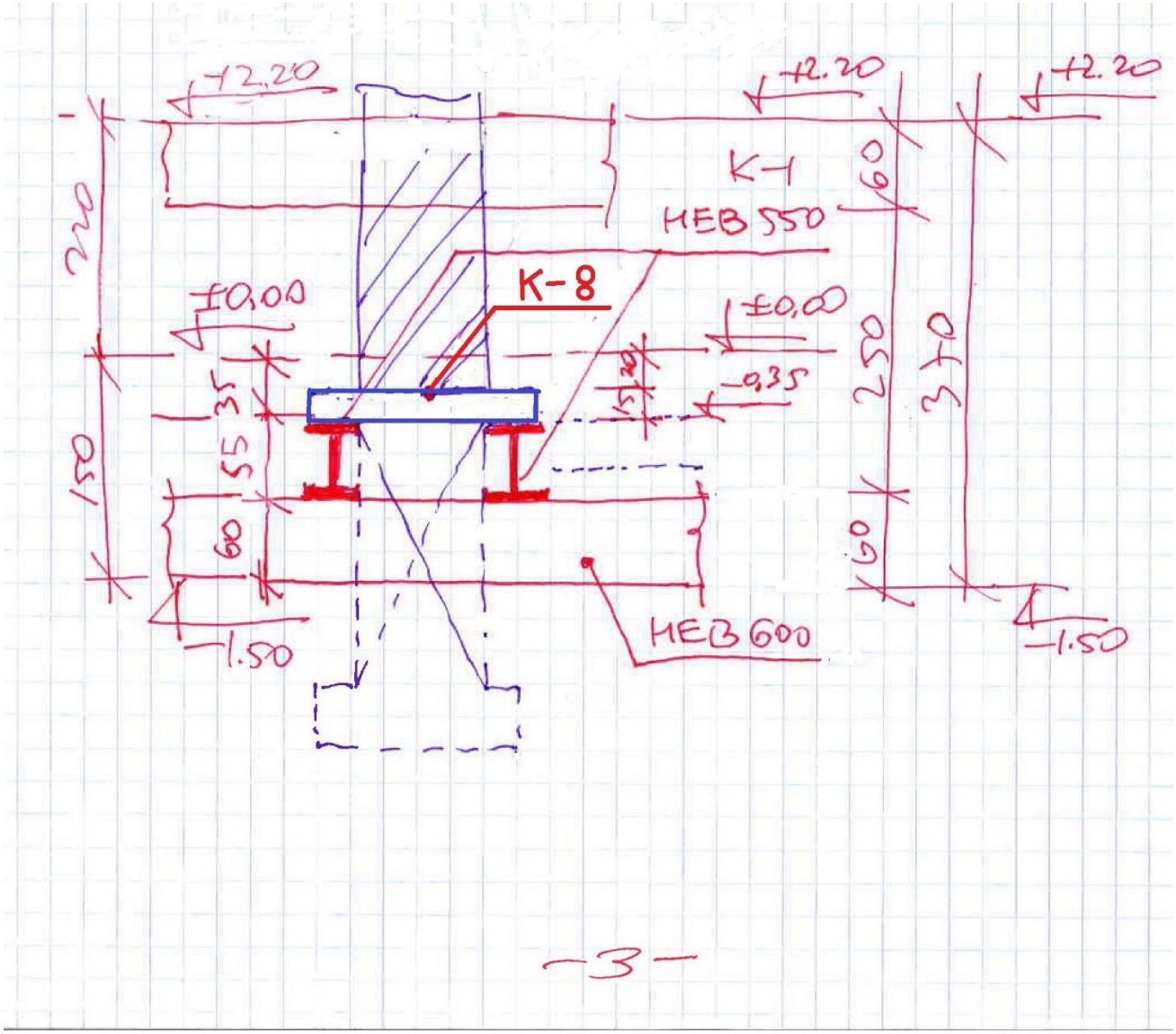

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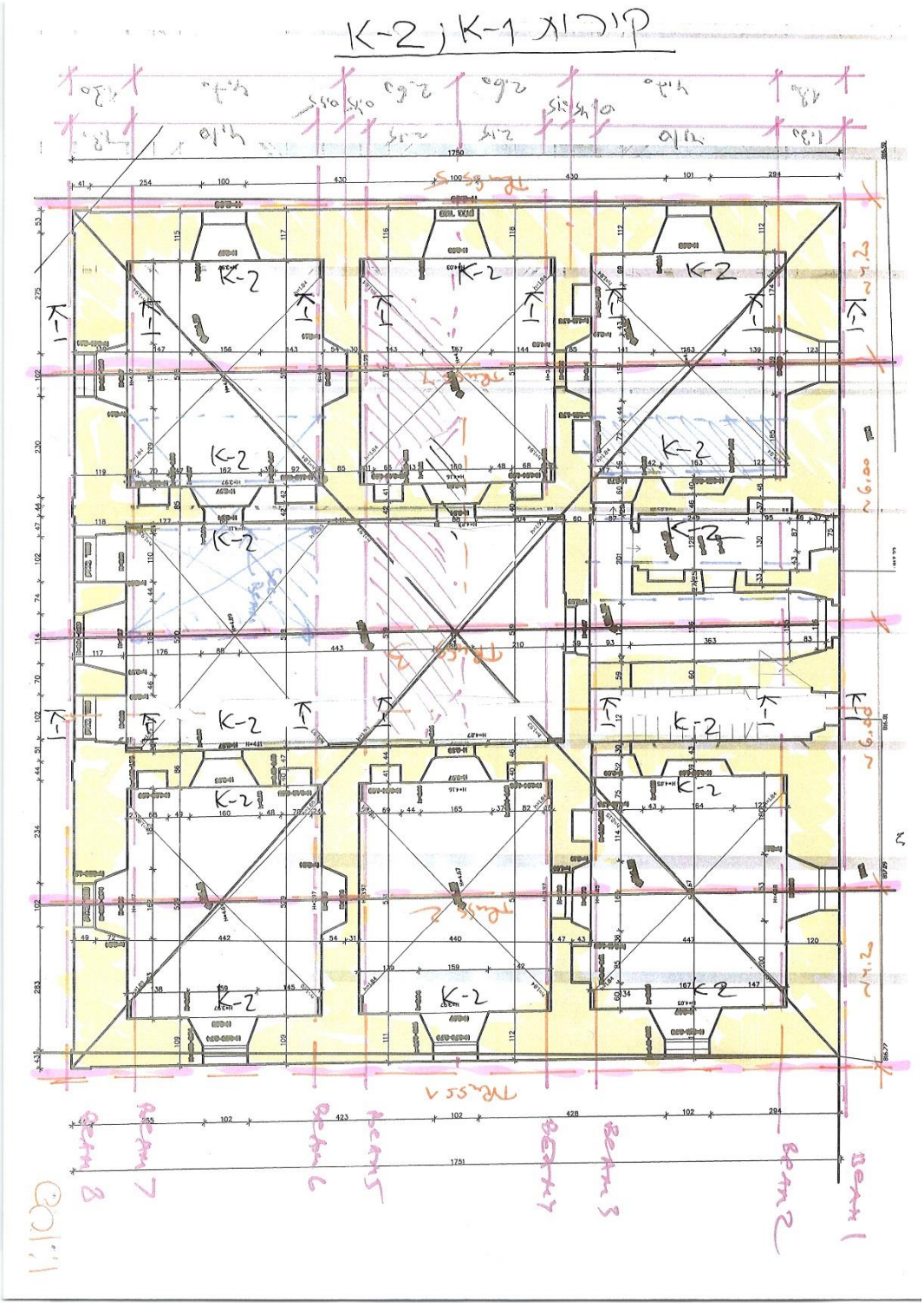

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(1)

SECONDARY ELEMENTS

TYPE "A" — "BLUE" BEAMS (K-2)

$A' = 2.60 \times 4.40 = 11.44 m^2$ (maximum)

$\overline{Q} = \frac{11.44}{343.0} \times (3300 - 1300) \times 0.80 = 52 t$

(1300 — WEIGHT OF EXTERNAL WALLS; 0.80 — INFLUENCE OF BEAMS TYPE "B")

$\overline{q} = \frac{\overline{Q}}{L'} = \frac{52.0}{4.40} = 11.8 \frac{t}{m}$

$R = \overline{q} \frac{L'}{2} = 11.8 \cdot 2.2 = 26 t$

$M = 11.8 \cdot \frac{4.4^2}{8} = 28.5 tm$

$[W_x] = \frac{2850}{2.5} = 1290 cm^3$!

TO TAKE ADDITIONAL 1-2 SECONDARY BEAM — TYPE "A" (BLUE BEAMS)

FOR TYPE "A" TO TAKE

$\frac{2}{3} \cdot \overline{M} = \frac{2}{3} \cdot 28.5 = \frac{57.0}{3} = 19.0 tm$

$[W_x] = \frac{1900}{2.5} = 845 cm^3$

Σ NP 350 (38.0)

20.2.22

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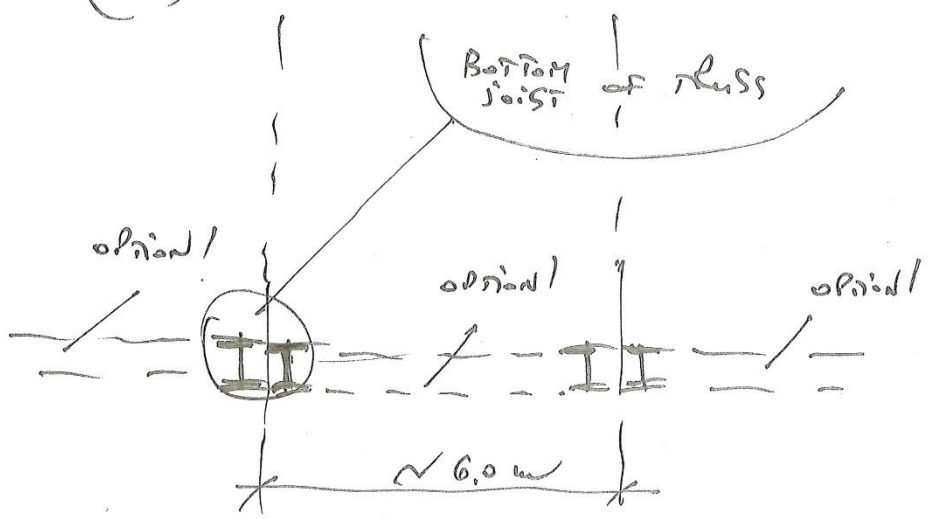
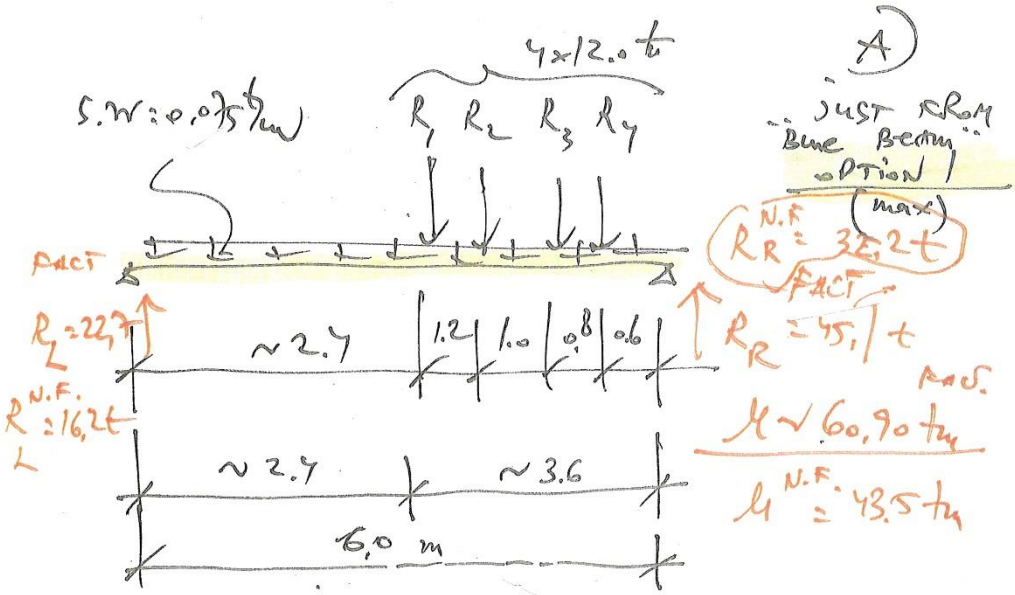
Type "B" (K-1) "Red" Beams (Between Trusses) (2)





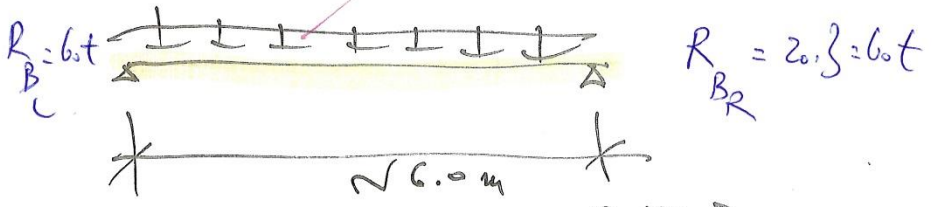
$R' =$ To take $R_1 \sim R_2 \sim R_3 = R_4 = 26.0 \cdot \frac{1.20}{2.60} = 12.0\,t$

20.03.2020

(3)

B) FROM INTERNAL WALLS

min
$q = 16.2\ t/m\ [20.0\ t/m]$



without 0.8

$A_0' = 0.50(4.20)\cdot(6.00)\cdot 0.80 = 10.1\ m^2\ [12.6]$

↑ influence of beams type "A"

TOTAL =

$\bar{Q} = \frac{12.6}{343.0} \times 3300 = \underline{121\ t}$

min $\bar{Q} = \frac{10.1}{343.0} \times 3300 = \underline{97.2\ t}$

$[\bar{q} = \frac{121}{6.0} = 20\ t/m \rightarrow]$ $q_{min} = 16.2\ t/m$

$M_2 = \frac{qL^2}{8} = 16.2 \cdot \frac{6.0^2}{8} = \underline{72.9\ tm}$

TOTAL : $\Sigma M = M_1 + M_2 = 43.5 + 72.9 = \underline{116.4\ tm}$

$[W] = \frac{\Sigma M}{f_y} = \frac{116.40\ tcm}{2.25\ t/cm^2} = \underline{5170\ cm^3}$

To take ~ I HE 550 B

$\Sigma R = 45.1 \cdot 2 + 60 \cdot 2 = 90 + 120 = \underline{210\ t}$

(20.03.2[illegible])