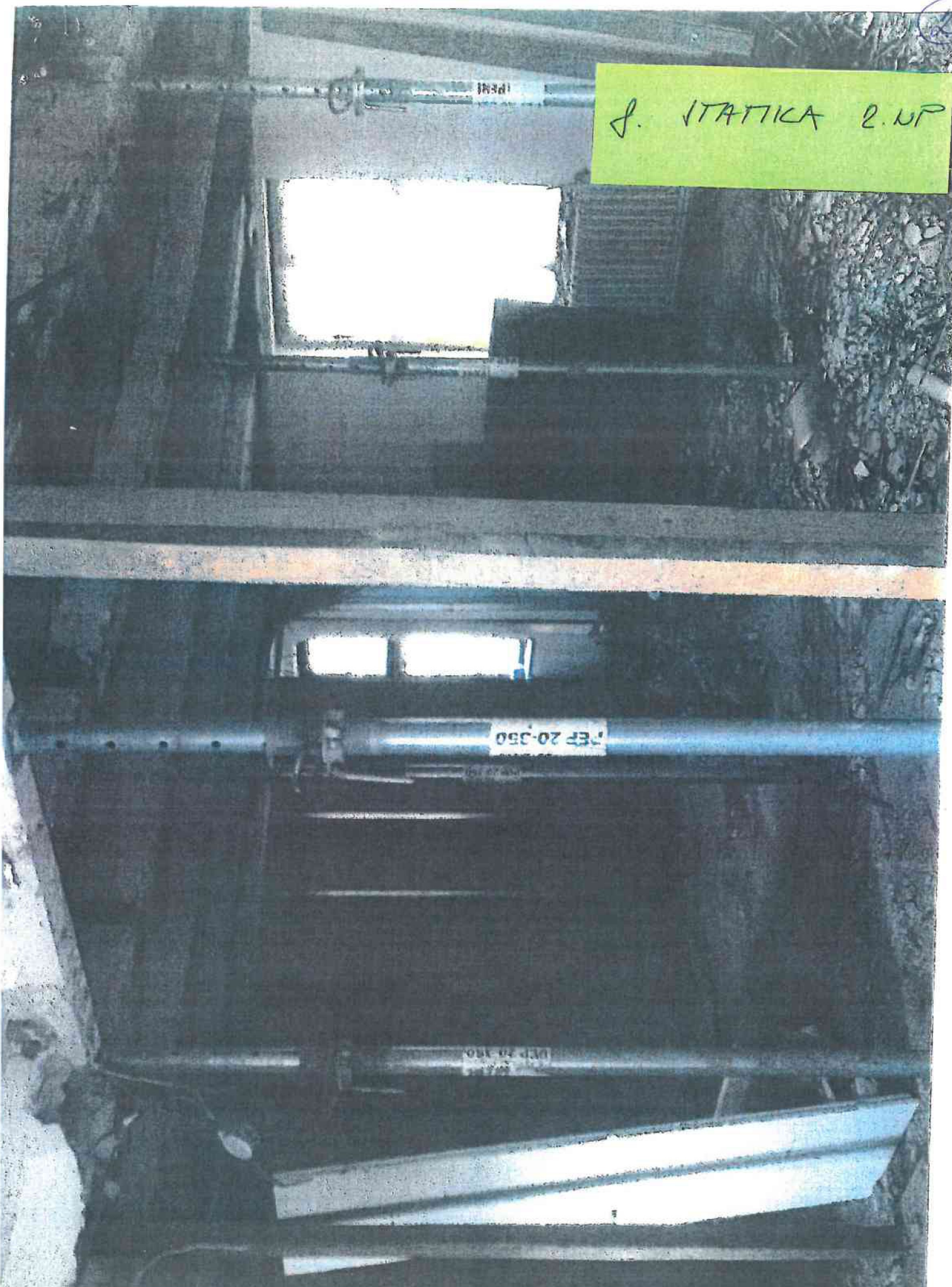


2

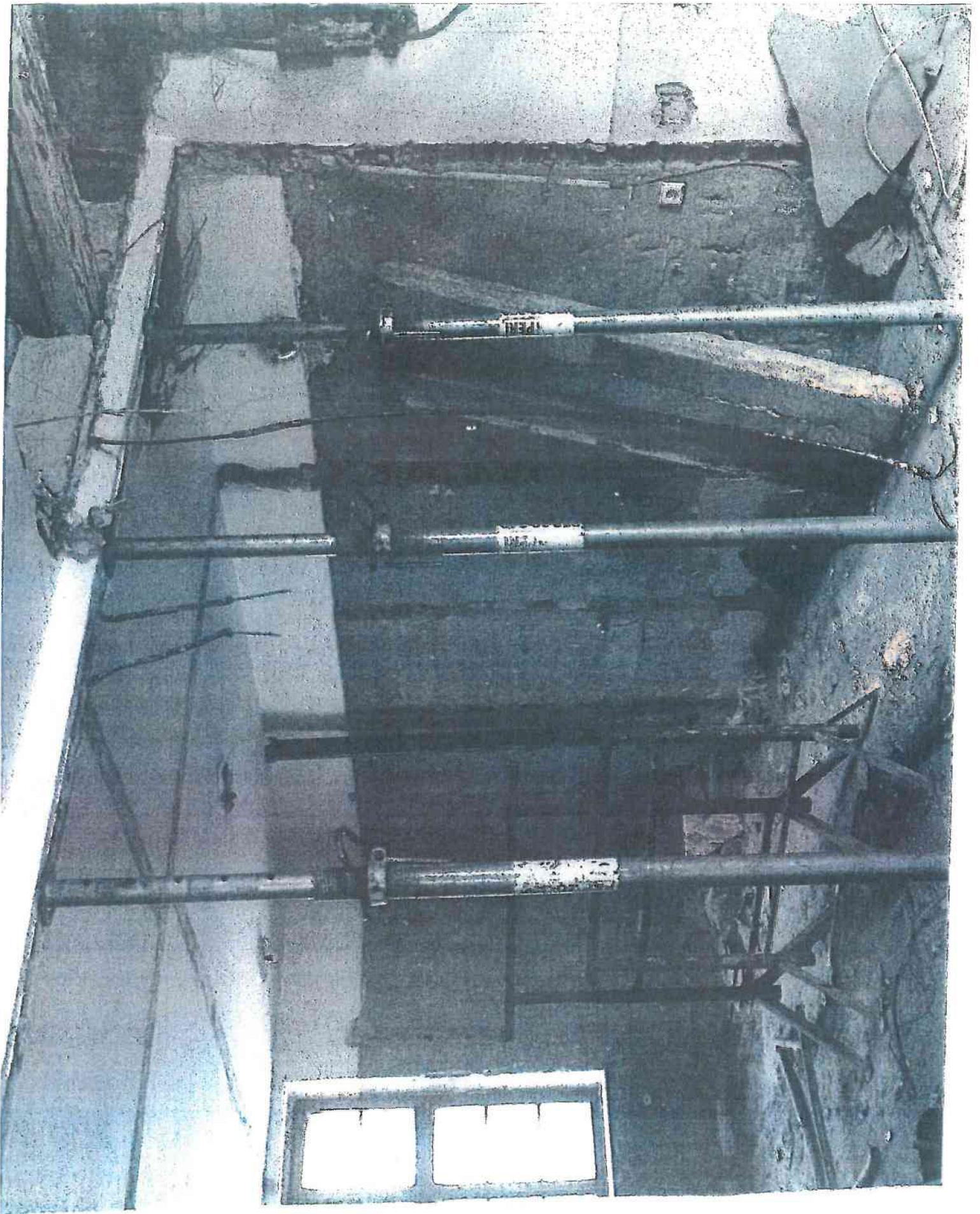
8. STATIKA 2. NP



1000

REP 20-350

REP 20-350

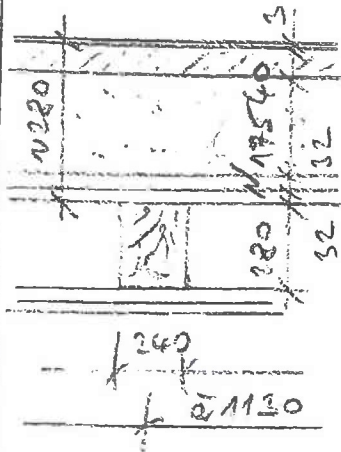




STATIKA STROPŮ NAD 2.NP

23.2.2018

ZESÍLENÍ STROPNÍ KONSTRUKCE NAD 11.N.P. -  
- ČÁST NAJ. SOC. ZÁŘÍKOVNÍ

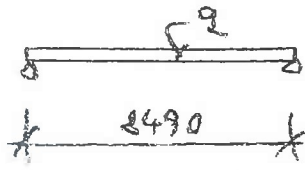


SOUBĚRA A ZATÍŽENÍ STROPU

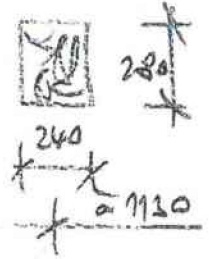
|                          | $g_n$<br>kN/m <sup>2</sup>        | $g_r$<br>kN/m <sup>2</sup> |
|--------------------------|-----------------------------------|----------------------------|
| LIND                     | $0,025 \cdot 16 = 0,4$            | $0,4 \cdot 1,3 = 0,52$     |
| BET. PÁZKOVINA           | $0,04 \cdot 23 = 0,92$            | $0,92 \cdot 1,3 = 1,196$   |
| NAŠYP - STAV. RUM        | $0,175 \cdot 13 = 2,275$          | $2,275 \cdot 1,3 = 2,958$  |
| ZÁKLAD                   | $0,025 \cdot 6 \cdot 1,1 = 0,165$ | $0,165 \cdot 1,1 = 0,182$  |
| RADIČNÍ PODKLAD          |                                   | $= 0,05 \cdot 1,3 = 0,065$ |
| RODNÍČEK, SOK            | $0,015 \cdot 8 = 0,12$            | $0,12 \cdot 1,3 = 0,156$   |
| <b>SMĚLE ZATÍŽENÍ</b>    |                                   | <b>3,62</b>                |
| <b>NAKOBILE ZATÍŽENÍ</b> | <b>3,0 + 1,0</b>                  | <b>= 4,0</b>               |
| <b>CELKOVĚ</b>           |                                   | <b>7,62</b>                |

STROPNÍ PLOŠKA 240/280 mm x 1120 mm

$$g_{tot} = 1,12 \cdot 7,62 + 0,24 \cdot 0,28 \cdot 6 \cdot \frac{1,0}{1,1} = 9,03 \text{ kN/m}^2$$



$$A = \frac{32,32}{49,24} \text{ kN} \quad M = 115,23 \text{ kNm}$$



$$s = 12,9 \text{ cm} \quad f_{p,act} = \frac{849}{350} = 2,425 \text{ cm}$$

$$v = \frac{115,23 \cdot 10^6}{\frac{2}{3} \cdot 24 \cdot 28^3 \cdot 10^6} \cdot \frac{1}{2,425} = 43,22 \text{ MPa} < 12 \text{ MPa}$$

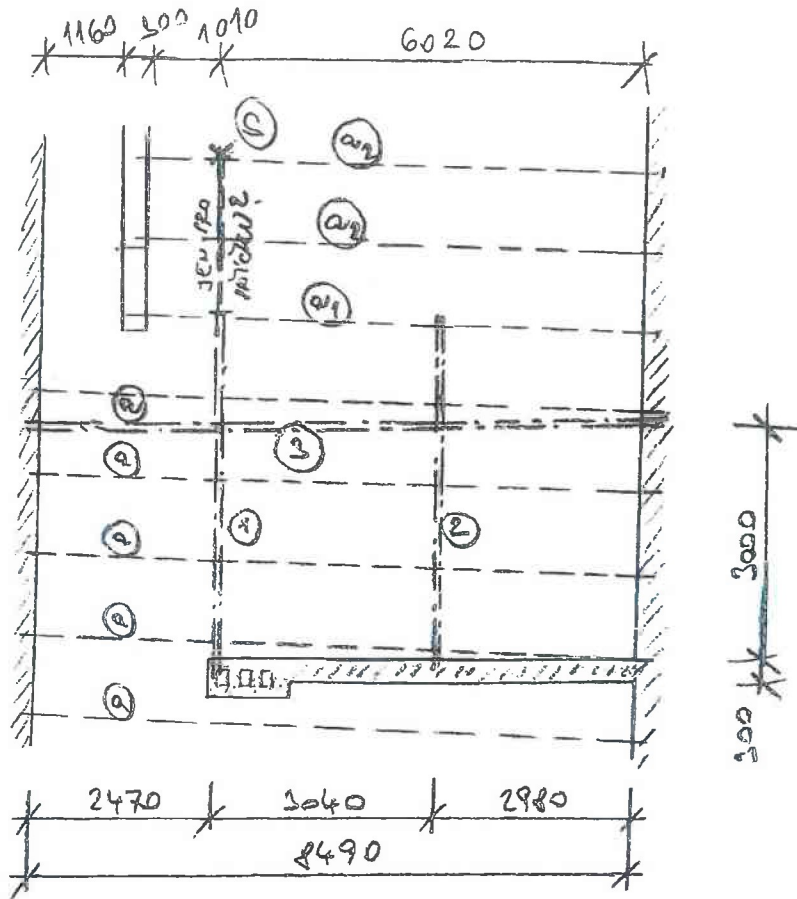
STROPNÍ PLOŠKA NEVYKROUVNĚ, ANIŽE ZESÍLENÍ, PŘEDCHYZENÍ A POD.

22.3.2019

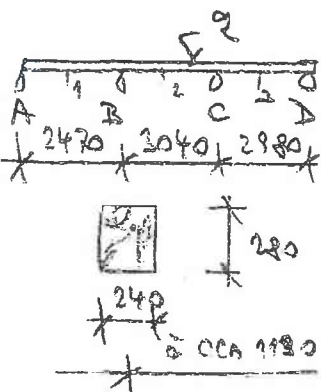
NÁVRAH ROZKRYŠENÍ AUTOMATICKÉ OCELOVÉ  
VLOŽENÝCH PRŮVLAKŮ POD PRÁHOU

2

PRŮŘEZNÉ SCHÉMA



- Ⓐ, Ⓐ<sub>1</sub>, Ⓐ<sub>2</sub>  
PRŮVLAKÉ ŽLÁZKY  
PRÁHOU  
240/300 mm  
z OCA 1120 D7
- Ⓛ, Ⓛ<sub>1</sub>  
DVOUŠKOVÉ OCELOVÉ  
PRŮVLAKY
- Ⓜ PRŮŘEZ OCEL.  
PRŮVLAKU SE VZPĚŘENÍM  
A TAHU
- Ⓢ OCELOVÝ SLOUP



PRŮPOČET SMYKLIČEK PRÁHOU PO PODEPŘENÍ

1. PRÁHOU Ⓐ

$$q = 9,03 \text{ kN/m} = 11,60 \text{ kN/m}$$

$$A = \frac{8,52}{10,96} \text{ kN} \quad B = \frac{76,8}{24,32} \text{ kN} \quad C = \frac{32,26}{29,52} \text{ kN} \quad D = \frac{12,57}{13,58} \text{ kN}$$

$$\lambda_1 = 0,05 \text{ cm} < \lambda_{\text{povr}} = \frac{247}{350} = 0,705 \text{ cm}$$

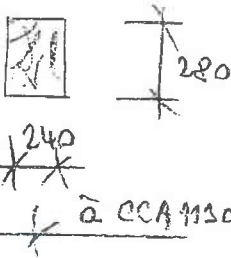
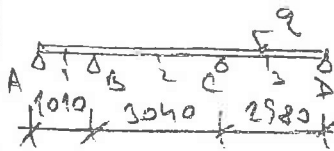
$$\lambda_2 = 0,04 \text{ cm} < \lambda_{\text{povr}} = \frac{304}{350} = 0,868 \text{ cm}$$

$$\lambda_3 = 0,11 \text{ cm} < \lambda_{\text{povr}} = \frac{298}{350} = 0,851 \text{ cm}$$

$$N_1 = 5,12 \text{ kN} \quad N_2 = -4,31 \text{ kN} \quad N_3 = 2,21 \text{ kN}$$

$$N_4 = -11,04 \text{ kN} \quad N_5 = 7,95 \text{ kN}$$

$$\sqrt{\sigma_{\text{max}}} = \frac{11,04 \cdot 10^3}{\frac{24 \cdot 12 \cdot 6^3}{6}} \cdot \frac{1}{0,85} = 4,15 \text{ MPa} < 12 \text{ MPa}$$



2. TRAŽN (a1)

$A = 0 \text{ kN}$   $B = 28,59 \text{ kN}$   $C = 53,11 \text{ kN}$   $D = 19,88 \text{ kN}$   
28,59 42,27 13,87

$\delta_2 = 2,08 \text{ cm}$   $\delta_{\text{povr}} = 2,862 \text{ cm}$

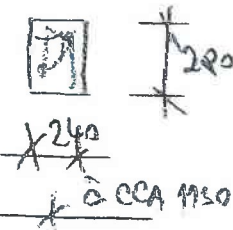
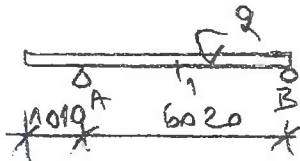
$\delta_3 = 0,14 \text{ cm}$   $\delta_{\text{povr}} = 2,851 \text{ cm}$

$M_1 = -1,54 \text{ kNm}$   $M_2 = -6,14 \text{ kNm}$   $M_3 = 4,95 \text{ kNm}$

$M_C = -12,09 \text{ kNm}$   $M_3 = 8,01 \text{ kNm}$

$\sigma_{\text{max}} = \frac{12,09 \cdot 10^3}{\frac{1}{6} \cdot 24 \cdot 28^2 \cdot 10^6} \cdot \frac{1}{985} = 4,54 \text{ MPa} < 12 \text{ MPa}$

3. TRAŽN (a2)



$A = 38,72 \text{ kN}$   $B = 27,59 \text{ kN}$   
49,44 35,23

$\delta_2 = 2,25 \text{ cm}$   $\delta_{\text{povr}} = \frac{101}{250} \cdot 2 = 0,808 \text{ cm}$

$\delta_1 = 4,67 \text{ cm}$   $\delta_{\text{povr}} = \frac{602}{350} = 1,72 \text{ cm}$

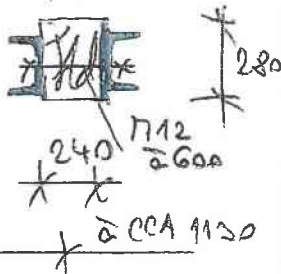
$M_A = -6,14 \text{ kNm}$   $M_1 = 51,53 \text{ kNm}$

$\sigma_{\text{max}} = \frac{51,53 \cdot 10^3}{\frac{1}{6} \cdot 24 \cdot 28^2 \cdot 10^6} \cdot \frac{1}{985} = 19,4 \text{ MPa} > 12 \text{ MPa}$

NUTNÉ ZMĚŘENÍ TRÁŽN, NA PR. OCEL. NĚJEDNĚKOU -  
 BŮDE ZKŮŠENO V RÁMCI DALŠÍ ETAPY

NAVRH 2x C 200

2x C 200



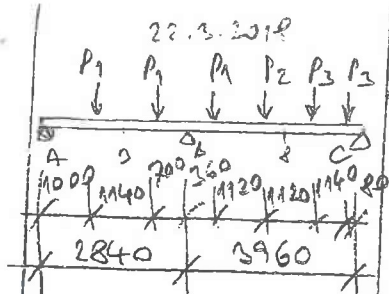
POSOBN  $A = 49,82 \text{ kN}$   $B = 29,09 \text{ kN}$   
51,70 36,85

$\delta_1 = 1,86 \text{ cm}$   $\delta_{\text{povr}} = 1,72 \text{ cm}$

$M_1 = 53,89 \text{ kNm}$

$\sigma = \frac{53,89 \cdot 10^3}{2 \cdot 191 \cdot 10^6} = 141,1 \text{ MPa} < 200 \text{ MPa}$

- $F_1 = 322 \text{ cm}^2$
- $W_1 = 191 \text{ cm}^3$
- $I_1 = 1910 \text{ cm}^4$
- $G_1 = 25,3 \text{ kg/m}$

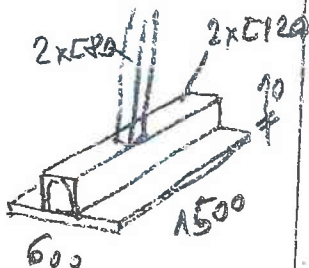


II 2x I 120

$F_1 = 279 \text{ cm}^2$   
 $W_1 = 161 \text{ cm}^3$   
 $J_1 = 1450 \text{ cm}^4$   
 $G_1 = 21,9 \text{ kgfm}^{-1}$

□ 2x C 80

$F = 22 \text{ cm}^2$   
 $g_y = 3,1 \text{ cm}$



PRŮVLAK ①

$P_1 = 26,8 \text{ kN}$   $P_2 = 22,53 \text{ kN}$   $P_3 = 40,82 \text{ kN}$   
 $34,43$   $28,51$   $51,70 \text{ kN}$   
 $A = 9,7 \text{ kN}$   $B = 11,33 \text{ kN}$   $C = 66,32 \text{ kN}$   
 $12,52$   $142,04$   $83,92 \text{ kN}$

$\delta_1 = 0,07 \text{ cm}$   $l_{\text{povr}} = \frac{284}{400} = 0,71 \text{ cm}$

$\delta_2 = 0,85 \text{ cm}$   $l_{\text{povr}} = \frac{396}{400} = 0,99 \text{ cm}$

$M_1 = 12,28 \text{ kNm}$   $M_B = -53,84 \text{ kNm}$   $M_2 = 54,74 \text{ kNm}$

$\sigma_{\text{ax}} = \frac{54,74 \cdot 10^3}{2 \cdot 161 \cdot 10^6} = 170 \text{ MPa} < 210 \text{ MPa}$

PRÁVÝ SLOUPEK (V NOVÉM PŘÍČE)

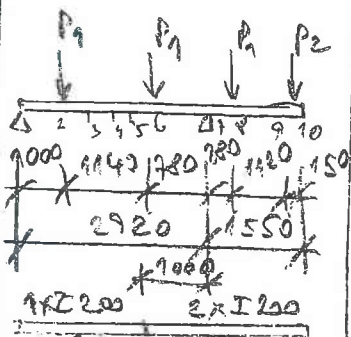
$P = 83,92 \text{ kN}$

$\lambda = \frac{240}{210} = 1,14 \Rightarrow \varphi = 0,986$

$\sigma = \frac{83,92 \cdot 10^3}{22 \cdot 10^4 \cdot 0,986} = 426 \text{ MPa} < 210 \text{ MPa}$

POD SLOUPKEM BUDE POD PODLAŽKOU NA  
 MÁŠYNU VLEČENÝ OCELOVÝ ROZMĚŘEC  
 BODKA - PLOCHA 600x1500/10 MM S VÝŠKOU  
 2x C 120

PRŮVLAK ②



I 1x I 200 II 2x I 200

$F_1 = 33,5 \text{ cm}^2$   
 $W_1 = 214 \text{ cm}^3$   
 $J_1 = 2140 \text{ cm}^4$   
 $G_1 = 26,3 \text{ kgfm}^{-1}$

$P_1 = 30,76 \text{ kN}$   $P_2 = 33,11 \text{ kN}$   
 $39,52$   $42,27 \text{ kN}$

$A = 9,81 \text{ kN}$   $B = 117,37 \text{ kN}$   $M_B = 12,56 \text{ kNm}$   $M_C = 72,94 \text{ kNm}$   
 $12,7$   $159,10$

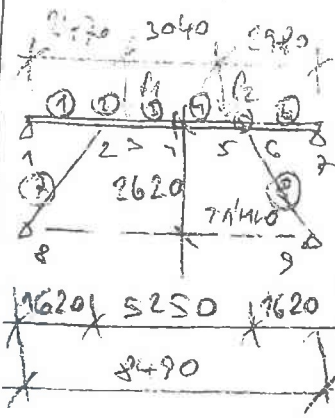
$\delta_k = 0,05 \text{ cm}$   $l_{\text{povr}} = \frac{155}{400} \cdot 2 = 0,775 \text{ cm}$

$\delta_c = 0,84 \text{ cm}$   $l_{\text{povr}} = \frac{292}{400} = 0,73 \text{ cm}$

$\sigma_1 = \frac{12,56 \cdot 10^3}{214 \cdot 10^6} = 59 \text{ MPa} < 210 \text{ MPa}$

$\sigma_C = \frac{72,94 \cdot 10^3}{2 \cdot 214 \cdot 10^6} = 165,8 \text{ MPa} < 210 \text{ MPa}$

22. 2. 2018



## II 2xI240

$$F_1 = 46,1 \text{ cm}^2$$

$$W_1 = 354 \text{ cm}^3$$

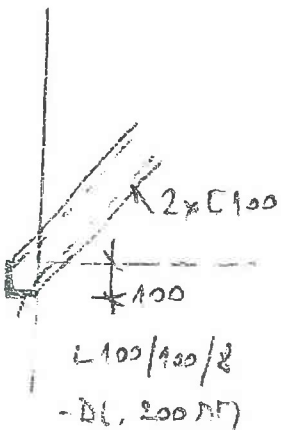
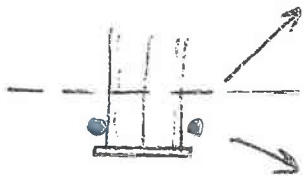
$$I_1 = 4250 \text{ cm}^4$$

$$G_1 = 362 \text{ kg/cm}$$



$$F = 27 \text{ cm}^2$$

$$i = 2,75 \text{ cm}$$



## Hlavní nosník DE UZPĚKATÍ

5

$$P_1 = 141,22 \text{ kN} \quad P_2 = 142,04 \text{ kN}$$

$$A_1 = 53,97 \text{ kN} \quad A_2 = 62,65 \text{ kN} \quad A_3 = 21,47 \text{ kN} \quad A_4 = 21,47 \text{ kN}$$

$$T = 130,53 \text{ kN}$$

$$\gamma_4 = 0,94 \text{ cm} < \gamma_{\text{dop}} = \frac{525}{600} = 1,31 \text{ cm}$$

$$N_{\text{pr.}} = 112,22 \text{ kN} \quad N_{\text{pr.}} = -130,53 \text{ kN}$$

$$V_{\text{pr.}} = 0,15 \text{ kN} \quad V_{\text{pr.}} = -242,51 \text{ kN}$$

$$\sigma_{\text{pr.}} = \frac{112,22 \cdot 10^3}{2 \cdot 354 \cdot 10^4} + \frac{130,53 \cdot 10^3}{2 \cdot 46,1 \cdot 10^4} = 172,66 \text{ MPa} < 200 \text{ MPa}$$

$$\tau_{\text{pr.}} = \frac{0,15 \cdot 10^3}{2 \cdot 41,2 \cdot 10^4} + \frac{242,51 \cdot 10^3}{77 \cdot 10^4 \cdot 0,75} = 129,6 \text{ MPa} < 200 \text{ MPa}$$

$$\lambda = \frac{202}{2,75} = 82,1 \Rightarrow \varphi = 0,75$$

## TAHLO V IOBLAŽE

2x  $\phi 22$  (Klasický profil -  $\phi E 22-10216$ )

$$N_a = 2 \cdot 68,42 = 136,85 \text{ kN} > T = 130,53 \text{ kN}$$

NEBO

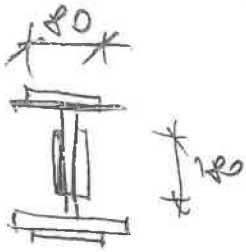
2x  $\phi R 16$  (PROFILOVANÝ  $\phi R 16-10505$ )

$$N_a = 2 \cdot 90,47 = 180,94 \text{ kN} > T = 130,53 \text{ kN}$$

22. 2. 2018



СПОД МОСМ'КІВ I 240

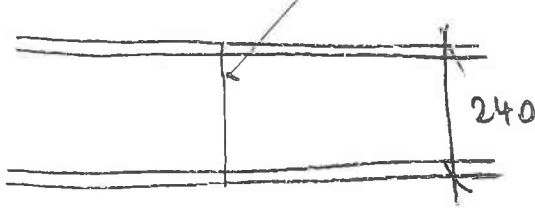


$F = 46,1 \text{ cm}^2$      $G = 36,2 \text{ kg/m}$   
 $J = 4250$   
 $W = 554$

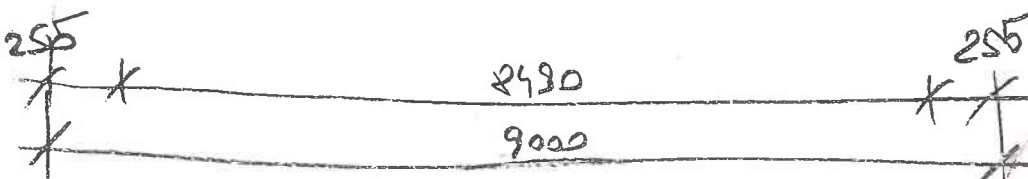
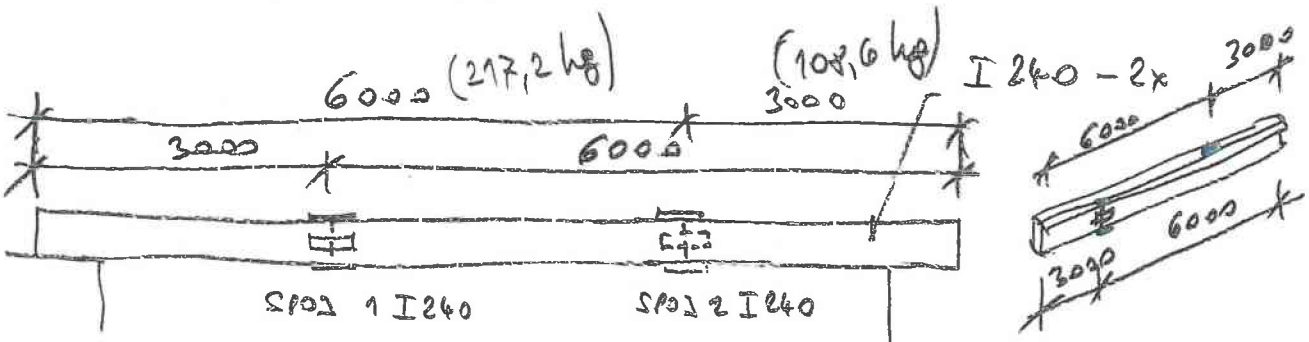
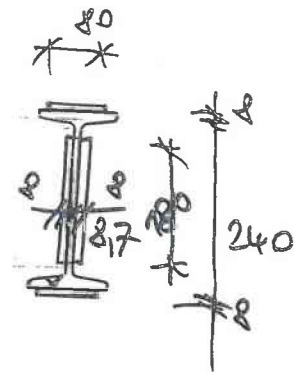
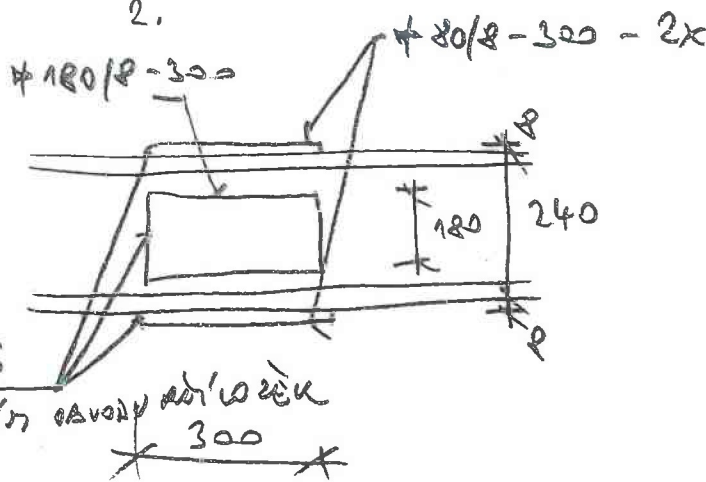
$F = 2 \cdot 8 \cdot 0,8 + 2 \cdot 18 \cdot 0,8 = 41,6$

$J = \frac{1}{12} 0,8 \cdot 12^3 + \frac{1}{12} 8 \cdot 28^3 \cdot 2 + 8 \cdot 28 \cdot 2 \cdot 13,5^2 = 2357,6$

1.  $\nabla 5$  по центрі осей



2.



22.3.2018