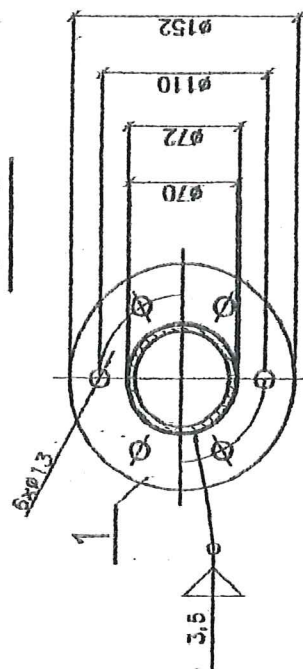
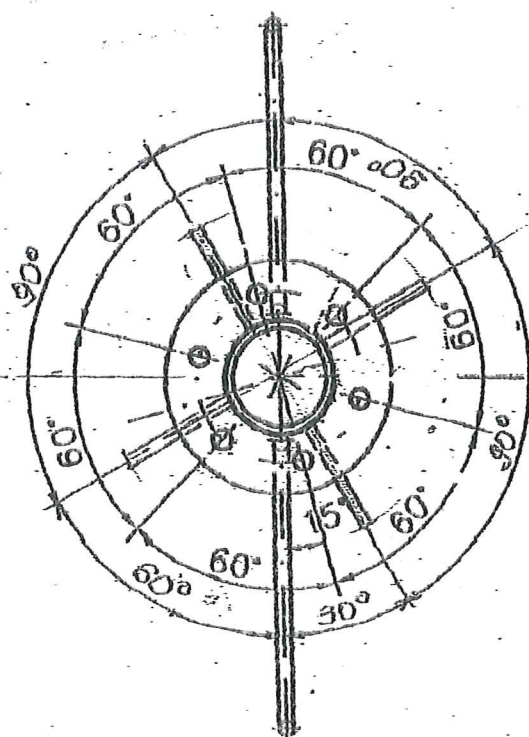
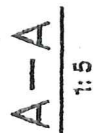


SKALA : 1:5  
11.17.02/2.1



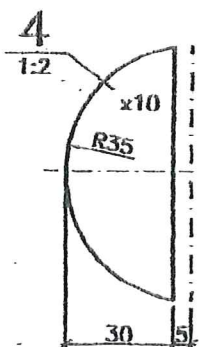
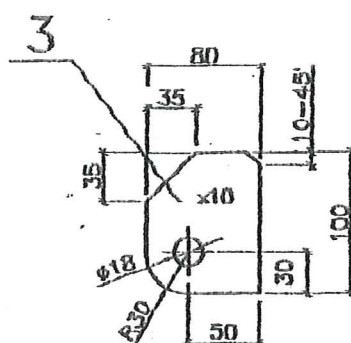
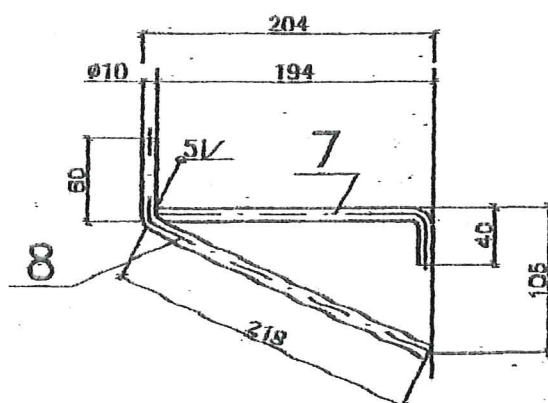
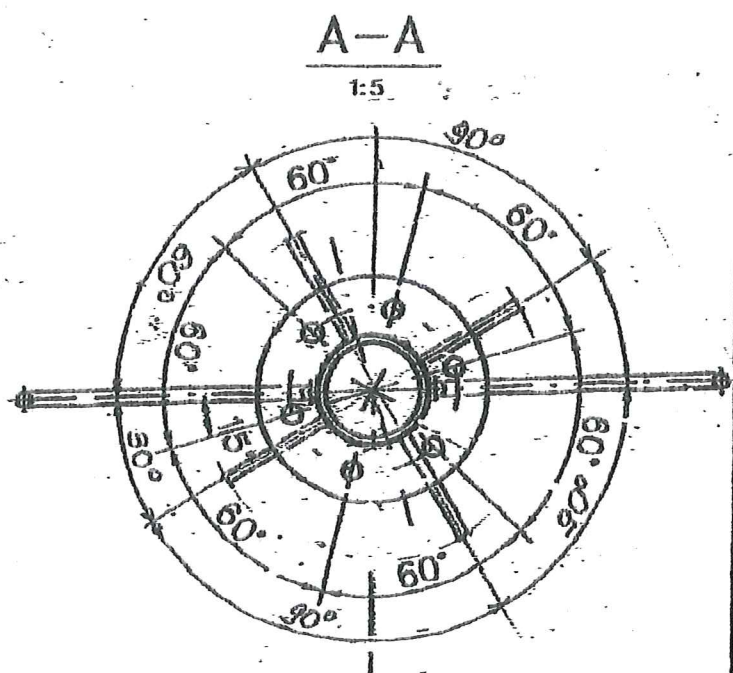
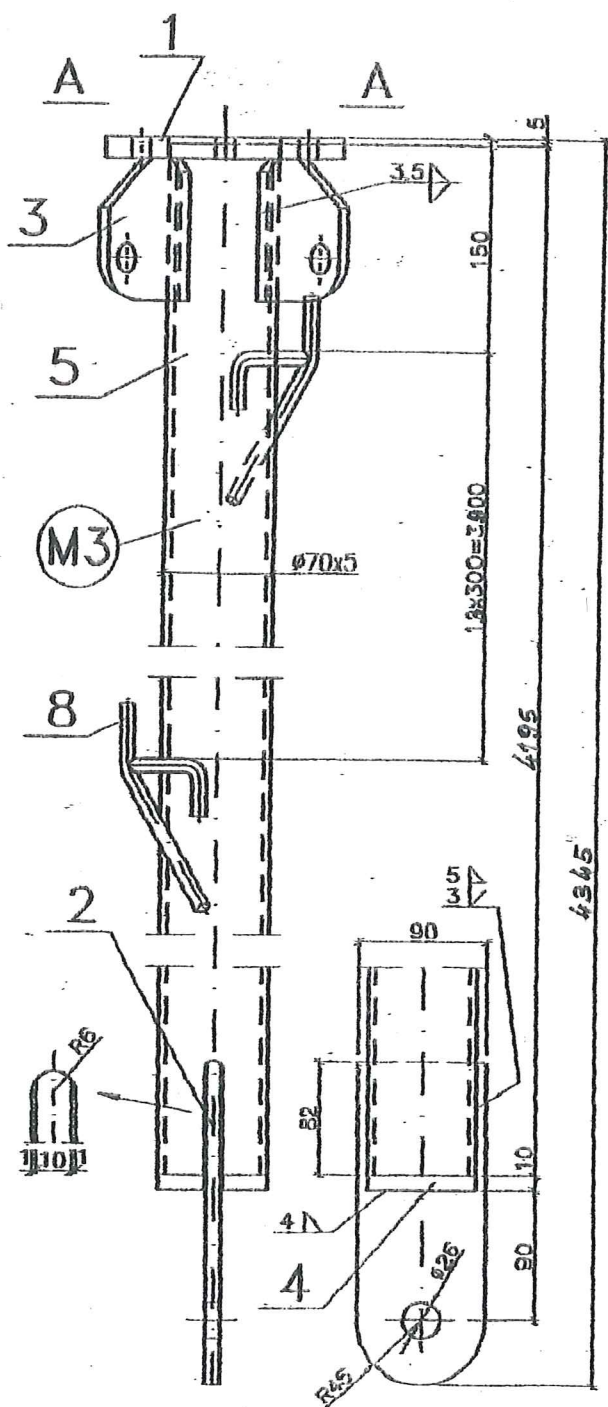
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| PROJEKTOWAŁ                    | DATA:   |
| mgr inż. ANDRZEJ ZYGAN         | 11.2017 |
| Uprawn. bud. Nr 584/84         |         |
| dot. projektowania i red. tek. |         |

BUDYNEK K. POLICJI MIŁÓWKA

MASZTU H=12m , ELEMENT MASZTU M2

SKALA: 1:5

11.17.02/2.2

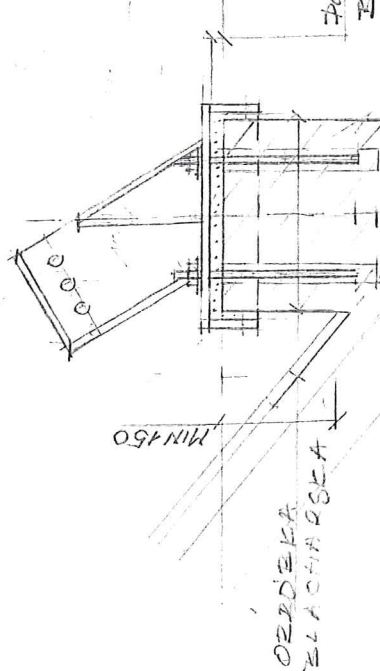


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| PROJEKTOWAŁ                      | mgr inż. ANDRZEJ ZYGAN       | DATA:   |               |
|                                  | Uprawn. bud. Nr 584/84       | 11.2017 |               |
|                                  | dot. projektowania i nadzoru |         |               |
| BUDYNEK K. POLICJI MILÓWKA       |                              |         | SKALA : 1:5   |
| MASZTU H=12m , ELEMENT MASZTU M3 |                              |         | 11.17.02 /2.3 |





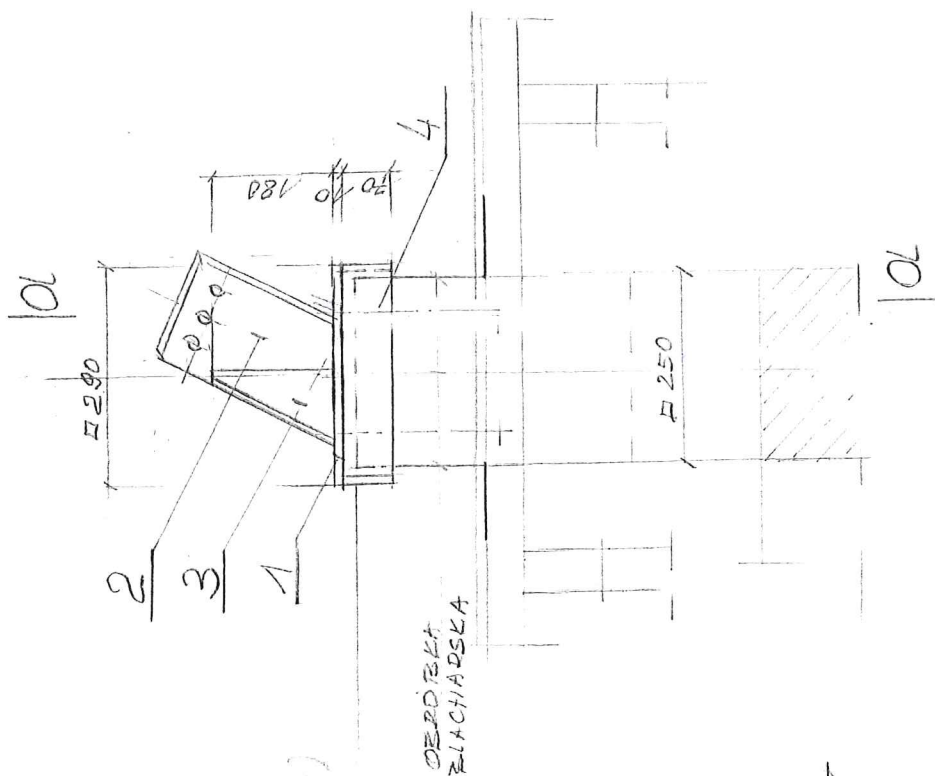
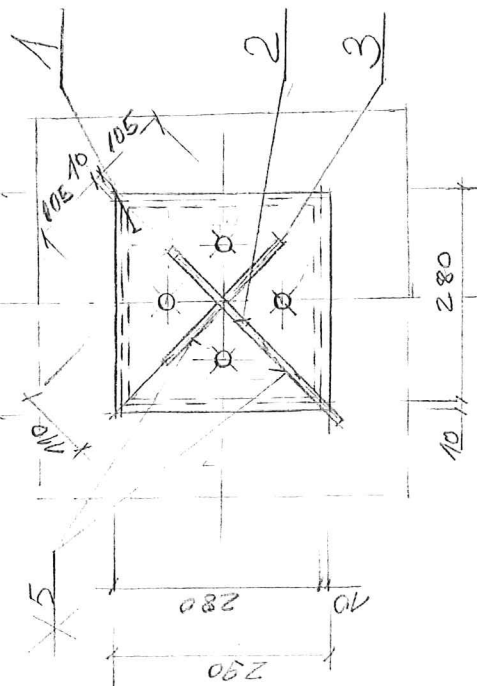
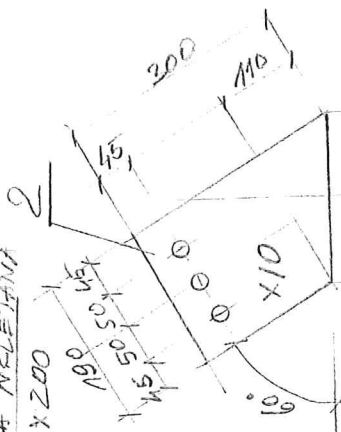
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5.43 (a) (b) (c)  
5.85 (d)

PODLENKA ZOM  
BETON C25/30

5 KOTNA NKEJANA  
412 x 200



|                                    |                              |         |                |
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| PROJEKTOWAŁ                        | mgr inż. ANDRZEJ ZYGAN       | DATA:   | SKALA: 1:5     |
|                                    | Uprawn. bud. Nr 584/84       | 11.2017 |                |
|                                    | dot. projektowanie i nadzoru |         |                |
| BUDYNEK K. POLICJI MILÓWKA         |                              |         | 11.17.02 / 2.5 |
| MASZTU H=12m, KOTWIENIE ODCIĄGÓW K |                              |         |                |





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| WYKAZ MATERIAŁÓW   |                         |       | DATA: 11.2017 | STRONA/ILOŚĆ<br>2/3    |                |       |
| BUDYNEK K.POLICJI W MIŁÓWKA<br>MASZT H = 12m - KONSTRUKCJA STALOWA |                         |       |               | NR RYS<br>11.17.02/2.0 |                |       |
| POZ.   | OPIS I WYMIARY POZYCJI  | ILOŚĆ | MATERIAŁ      | NR NORMY<br>NR RYS.    | CIEŻAR<br>/Kg/ | UWAGI |
| 7  | PODPORA MASZTOWA        | 4     |               | 11.17.02/2.4           |                |       |
| 1  | IP 100 x 100 x 4 - 2775 | 1     | ST3S          |                        | 35,5           |       |
| 2  | IP 60 x 60 x 4 - 2680   | 2     | "             |                        | 36,0           |       |
|  | - 2950                  | 2     | "             |                        | 39,5           |       |
| 3  | IP 60 x 60 x 4 - 400    | 4     | "             |                        | 11,0           |       |
| 4  | HEB 100 - 3650          | 1     | "             |                        | 85,0           |       |
| 5  | BL 10 - 200 x 200       | 6     | "             |                        | 18,5           |       |
| 6  | BL 15 - 140 x 140       | 1     | "             |                        | 2,0            |       |
| 7  | BL 10 - 90 x 140        | 2     | "             |                        | 2,0            |       |
| 8  | BL 10 - 53 x 90         | 4     | "             |                        | 1,5            |       |
| 9  | BL 8 - 45 x 76          | 6     | ST3S          |                        | 1,5            |       |
| 10   | SR 124                  | 1     |               |                        | -              |       |
| 11   | WATER 124-70            | 2     | B.G           |                        | -              |       |
| 12   | PODEKŁADKA Ø 5          | 1     | 5             |                        | -              |       |
| 13   | KOTWA WKLEJANA M12-150  | 16    | -             |                        | -              |       |
| 14   | BL 2 - 400 x 500        | 2     | WFPK, ST.     |                        | 3,5            |       |
|  |                         |       |               | Σ                      | 236,0          | kg    |
| 4  | KOTWIENIE Ø 160 IV      | 4     |               |                        | 88,0           | kg    |
| 1  | BL 10 - 290 x 290       | 1     |               |                        | 7,0            |       |
| 2  | BL 10 - 190 x 300       | 1     |               |                        | 4,5            |       |
| 3  | BL 10 - 105 x 180       | 2     |               |                        | 3,0            |       |
| 4  | BL 10 - 70 x 280        | 4     |               |                        | 6,5            |       |
| 5  | KOTWA WKLEJANA M12-200  | 4     |               |                        | -              |       |
|  |                         |       |               | Σ                      | 22,0           |       |

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| WYKAZ MATERIAŁÓW   |                            |       | DATA: 11.2017 |                        | STRONA/ILOŚĆ<br>3/3 |       |
| BUDYNEK K.POLICJI W MIŁÓWKA<br>MASZT H = 12m - KONSTRUKCJA STAŁOWA |                            |       |               | NR RYS<br>11.17.02/2.0 |                     |       |
| POZ.   | OPIS, WYMIARY              | ILOŚĆ | MAT.          | NR NORMY<br>LUB RYS.   | CIEŻAR              | UWAGI |
| 2  | Lina T6 x 19 + A ø6,3 (oc) |       |               | PN-M-80207             |                     | (oc)  |
|  | Dł=(12 + 15 + 18 ) m       | 4     |               |                        |                     |       |
| 3  | Szklą B 0,65               | 24    |               | PN-M-89184             |                     | (oc)  |
| 4  | Kausza ø6                  | 24    |               | PN-M-80247             |                     | (oc)  |
| 5  | Zaciski linowe ø6,5        | 120   |               | PN-M-80244             |                     | (oc)  |
| 6  | Śr. napin. otwarta M10     | 12    |               | PN-M-82269             |                     | (oc)  |
|  |                            |       |               |                        |                     |       |
| 1  | ELEMENTY ZŁĄCZNE           |       |               |                        |                     |       |
|  | Śruba M12 – 50 (oc)        | 24    | (6.6)         | PN-M-82101             |                     | (oc)  |
|  | Nakrętka M12 (oc)          | 24    | (6)           | PN-M-82144             |                     | (oc)  |
|  | Podkładka ø13 (oc)         | 24    |               | PN-M-82005             |                     | (oc)  |
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## D. OBLICZENIA STRANDUJĄCE:

DO PROJEKTU NR 11.17.02 MASZT ANTENOWY H=12m  
NA BUDYNKU K. POLICJI W MIŁOŃCE

### 1. OBCIĄŻENIA

- CIĘŻAR WŁASNY MASZTU 100 daN

- CIĘŻAR FODSTAWY 50 daN

- CIĘŻAR KOTWIENI 40 daN

- CIĘŻAR ANTEN 40 daN

- CIĘŻAR OBLODZENIA 30 daN

- OBCIĄŻENIE CHARAKTERYSTYCZNE  $p_k = q_k \cdot c_e \cdot c \cdot \beta$

- CIŚNIENIE WĘDRÓWNIATRU STREFA III  $q_k = 300 \text{ Pa}$

- WSPÓŁCZYNNIK EKSTROZYCJI ZAKREŚLOWA A NYS. 30m  $c_e = 1,4$

- WSPÓŁCZYNNIK AERODYNAMICZNY  $c = 1,3$

- WSPÓŁCZYNNIK WOPYŁÓW WIATRU  $\beta = 2,1$

$$p_k = 300 \cdot 1,4 \cdot 1,3 \cdot 2,1 = 1200 \text{ Pa} = 120 \text{ daN/m}^2$$

- WNIERZCHNIA MASZTU

KONSTRUKCJA:  $13 \times 907 = 991 \text{ m}^2$ , SZCZEBLE  $44 \times 9012 \times 95 = 0,27 \text{ m}^2$

ANTENY  $4 \times 2,5 \times 9032 = 0,32$ , LINY  $\frac{1}{2} \times 9007 \times 13 \times 12 = 0,55$

$$A = 991 + 0,27 + 0,32 + 0,55 = 2,05 \text{ m}^2$$

### 2. OBCIĄŻENIE OBLICZENIOWE

- WSPÓŁCZYNNIK OBCIĄŻENIA  $\gamma = 1,5$

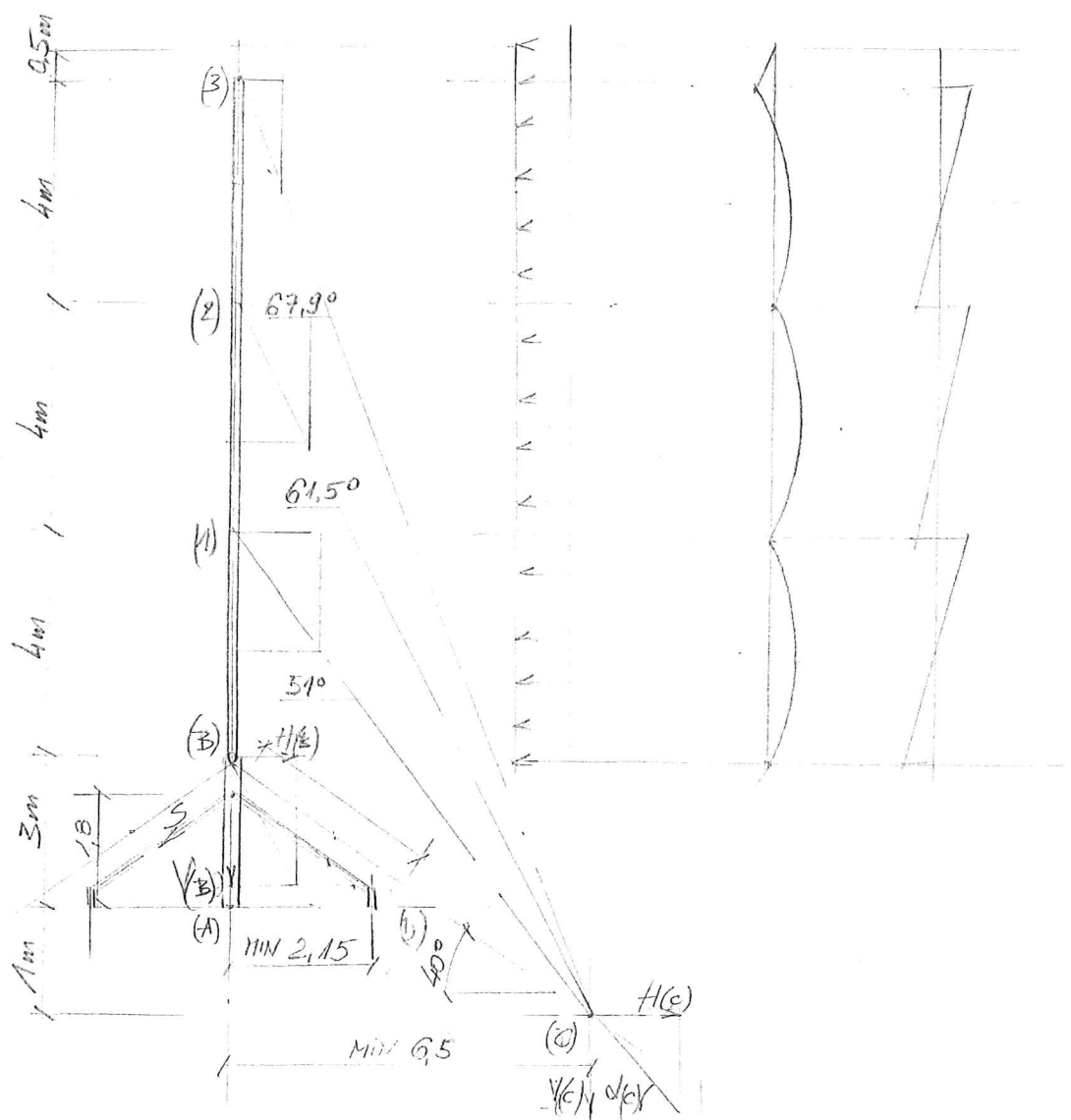
- WSPÓŁCZYNNIK OBLODZENIA  $\xi = 1,2$  (ZAKREŚŁO)

$$p_o = 120 \times 1,5 \times 1,2 = 216 \text{ daN/m}^2$$

$$Q_o = 216 \cdot 2,05 = 442,8 \text{ daN}$$

mgr Inż. ANDRZEJ ZYGAN  
Uprawn. bud. Nr 58334  
dot. projektowania i nadzoru

### 3.0 PRZYDETY SCHEMAT OBCIĄŻENI



-PRZYDETO ZODZIAŁ NASTU YIA 3 BELKI POWNOMIERNIE OBCIĄŻONE  
OBCIĄŻENIEM  $q_0$ , ZODZIELONE PRZEBUDOWO N MIEJSCACH  
ZODZARCIA OBCIĄŻENI

$$\alpha_{(1)} = 51^\circ \quad \alpha_{(2)} = 61.5^\circ \quad \alpha_{(3)} = 67.9^\circ$$

$$M_{(3)} = \frac{442.8 \cdot 0.5}{12.5} \cdot \frac{50}{2} = 442.8 \text{ daNm}$$

$$M_{(3-2)} = \frac{442.8 \cdot 4}{8 \cdot 12.5} \cdot 400 = 7084.8 = M_{(2-1)} = M_{(1-3)}$$

$$H_{(3)} = \frac{442.8 \cdot 4.5}{12.5 \cdot 2} \left(1 + \frac{0.5}{4}\right) = 90 \text{ daN}$$

$$H_{(2)} = \frac{442.8 \cdot 4.5}{12.5 \cdot 2} \left(1 - \frac{0.5}{4}\right) + \frac{442.8 \cdot 4}{12.5 \cdot 2} = 144 \text{ daN}$$

$$H_{(1)} = \frac{442.8 \cdot 4}{12.5 \cdot 2} \cdot 2 = 142 \text{ daN}$$

$$H_{(3)} = \frac{442.8 \cdot 4}{12.5 \cdot 2} = 71 \text{ daN}$$

mgr Inż. ANDRZEJ ZYGAN  
Uprawn. bud. Nr 584/84  
opł. projektowania i nadzoru

- MOMENT HORYZONTALNY  $M_H = 15000 \text{ daNcm}$

$$S_{(3)} = \frac{H_{(3)}}{\cos \alpha_3} = \frac{90}{\cos 67,9} = 239,2 \text{ daN} \quad V_{(3)} = H_{(3)} \cdot \tan \alpha_3 = 90 \cdot \tan 67,9 = 221,6 \text{ daN}$$

$$S_{(2)} = \frac{H_{(2)}}{\cos 61,5} = 295,5 \text{ daN} \quad V_{(2)} = H_{(2)} \cdot \tan 61,5 = 259,7 \text{ daN}$$

$$S_{(1)} = \frac{H_{(1)}}{\cos 51} = 225,6 \text{ daN} \quad V_{(1)} = H_{(1)} \cdot \tan 51 = 175,3 \text{ daN}$$

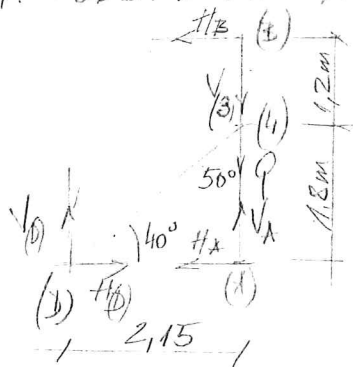
$$V_{(B)} = \sum Q + \sum V = (100 + 40 + 40 + 30) + (221,6 + 259,7 + 175,3) = 210 + 656,6 = 866,6 \text{ daN}$$

$$H_{(C)} = 90 + 141 + 142 = 373 \text{ daN}$$

$$V_{(C)} = 221,6 + 259,7 + 175,3 = 656,6 \text{ daN}$$

$$\frac{V_C}{H_C} = \tan \angle_c = \frac{656,6}{373} = 1,76 \quad \angle_c = 60,4^\circ$$

4. PODSTAWA HARTU



$$H_{(B)} = 71 \text{ daN} \quad V_{(B)} = 866,6 \text{ daN} \quad Q = 50 \text{ daN}$$

$$H_{(A)} = \frac{71 \cdot 1,2}{1,8} = 47,3 \text{ daN}$$

$$H_{(D)} = H_{(B)} + H_{(A)} = 71 + 47,3 = 118,3 \text{ daN} = H_{(D)}$$

$$S = \frac{118,3}{\cos 40^\circ} = 154,4 \text{ daN}$$

$$V_{(A)} = 866,6 + 50 = 916,6 \text{ daN}$$

$$V_{(D)} = \sqrt{154,4^2 - 118,3^2} = 99,2 \text{ daN}$$

$$M_{(H)} = 71 \cdot 1,20 = 85,20 \text{ daNcm}$$

5. PRZEKROJE ELEMENTÓW HARTU

$$M_{HART} = M_H = 15000 \text{ daNcm}$$

$$\text{MATERIAŁ R35 ŻELAZO } \phi 30 \times 5 \quad f_d = 2100 \text{ daN/cm}^2$$

$$f_{ds} = 0,6 \cdot 2100 = 1260 \text{ daN/cm}^2 \quad N = 15,5 \text{ cm}^2 \quad J = 54,2 \text{ cm}^4 \quad A = 10,2 \text{ cm}^2$$

$$\frac{15000}{15,5 \cdot 1260} = 0,77 < 1,0 \quad \text{N.H.S.}$$

$$\text{POLECENIE WOLNIFOROWNE } \phi 152 / \phi 170 \text{ ŚRUB 6-H12}$$

$$KL 5,2(5) \quad R_{yk} = 3000 \text{ daN/cm}^2 \quad J = 4 \cdot 0,843 \cdot (1160530)^{3/2} = 306,0 \text{ cm}^4$$

$$N = \frac{306}{1160530} = 38,2 \quad t \geq 12 \text{ mm} \rightarrow \text{PRZYJMU}$$

$$\frac{15000}{28,2 \cdot 3000} = 0,09 < 1,0 \quad \text{N.H.S.}$$

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- ŚCIENKA A-B  $\square 100 \times 100 \times 4$   $\lambda = 14,95 \text{ cm}^2$   $N = 45,27 \text{ cm}^3$

$J = 226,35 \text{ cm}^4$  MATERIAŁ SI35  $\sigma = 2150 \text{ daN/cm}^2$

$$\frac{85 \times 0}{45,27 \times 130} = 0,18 < 1,0 \text{ N.N.S.} \quad y_L = \frac{420}{300} = 0,24 \text{ cm}$$

$$\frac{71 \cdot 170^3}{3 \cdot 226,35 \cdot 1,10^3} = 0,086 < y_L = 0,24 \text{ N.N.S.}$$

- KŁOZYSTWAŁEC B-D  $l = 2800$   $S = 154,4 \text{ daN}$

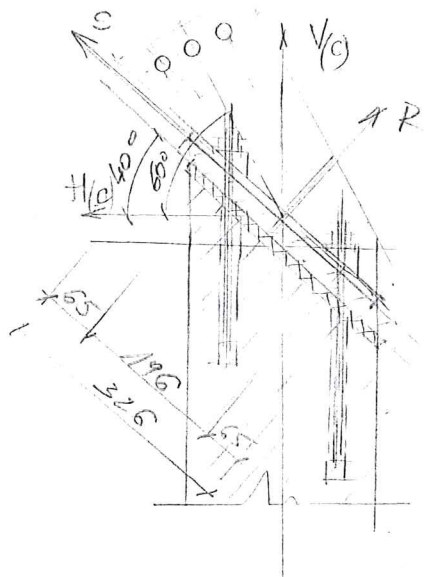
$\square 50 \times 50 \times 4$   $A = 8,55 \text{ cm}^2$   $i = 2,26$   $\lambda = \frac{2800}{2,26} = 1238$   $N = 14,52 \text{ cm}^3$

$\lambda / \lambda_p = 1238 / 112 = 11,1$   $m_n = 2,42$   $\text{MATERIAL SI35}$

$$\frac{154,4 \cdot 2,42}{8,55 \cdot 2150} = 0,02 < 1,0 \text{ N.N.S.}$$

KONTROLA ODCIĄG (C)  $V_{(C)} = 656,6 \text{ daN}$   $H_{(C)} = 373 \text{ daN}$

$$S_C = \sqrt{656,6^2 + 373^2} = 755 \text{ daN}$$



$$F = 656,6 \cdot \cos 40^\circ + 373,3 \cdot \sin 50^\circ = 263 < S_R$$

$$S = 656,6 \sin 40^\circ + 373,3 \cdot \sin 50^\circ = 407,8 < S_S$$

PP270, 10 KONTROLA KŁOZYSTWAŁEC - 200 S214

$$S_S = 1540 \text{ daN}$$

$$S_R = 1960 \text{ daN}$$

KONTROLA HORIZONTALNA ŚCIENKA (A)  $H_{(A)} = 47,3 \text{ daN}$   $L = 3500$

$$M = \frac{916,6 \cdot 350}{4} = 80202,5 \quad \sigma_1 = \frac{80202,5}{45,27} = 1771,6 < R$$

$$M = \frac{47,3 \cdot 350}{4} = 4138,7 \quad \sigma_2 = \frac{4138,7}{45,27} = 91,4 < R$$

$$\frac{80202,5}{45,27 \cdot 2150} + \frac{4138,7}{45,27 \cdot 2150} = 0,88 < 1,0 \text{ N.N.S.}$$

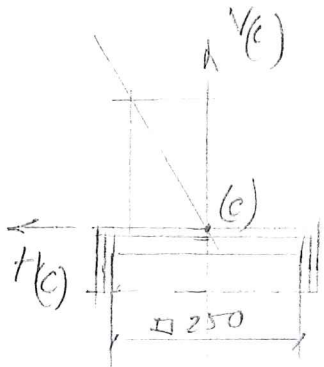
- ZGIĘCIENIE KRZYŻOWYCA

$$M = 154,4 \cdot 40 \cdot \cos 40^\circ = 4731 \text{ daNcm}$$

$$\frac{4731}{14,52 \cdot 2150} = 0,15 < 1,0 \text{ N.N.S.}$$

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KOTWIENIE ALUMINIUM C II  $V(c) = 656,6 \text{ daN}$   $H(c) = 373 \text{ daN}$



$\alpha_c = 50,4^\circ$   $\text{dla } A = 1 \cdot (4,5 - 1) = 3,5 \text{ cm}^2$

$R = V_c = 656,6 \text{ daN} < 4 \cdot 1960 \text{ daN}$

$S = H_c = 373 \text{ daN} < 4 \cdot 1840 \text{ daN}$

$\text{dla } 10 \text{ BLACHY (c)} \quad S_R = S_{MAX} = 295,5 \text{ daN}$

$\frac{295,5 \cdot 1,5}{3,5 \cdot 12150} = 1,06 < 1,0 \quad \text{N N S}$

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