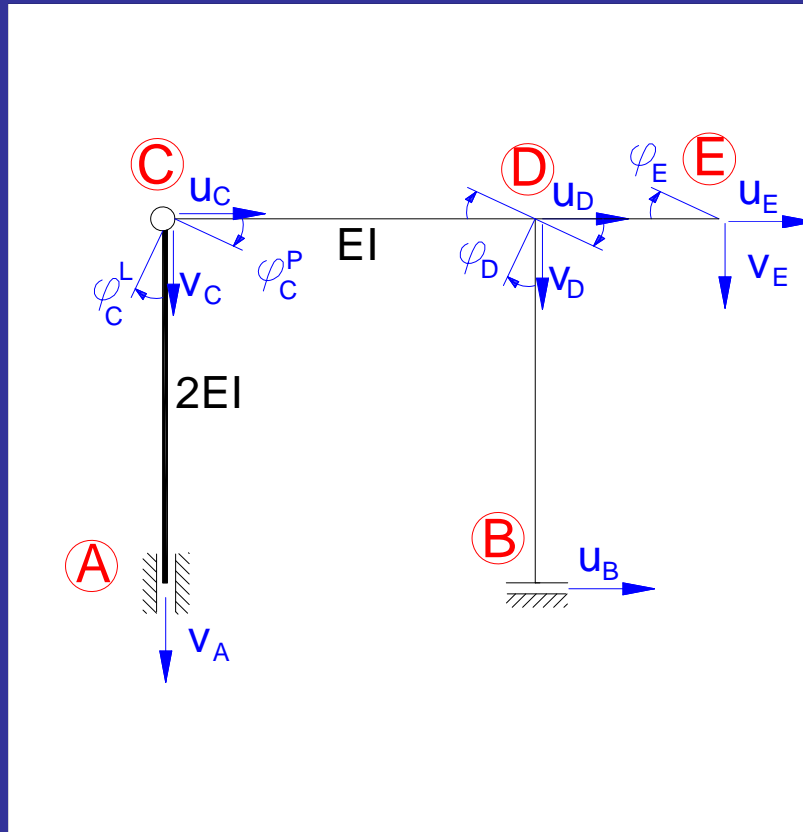


Odkształcona postać ramy:



Założenie $1/3EI=a \rightarrow$

$$v_A = v_C = \frac{160}{EI} = \frac{480}{3EI} = 480a$$

$$u_C = u_D = u_E = -\frac{304}{3EI} = -304a$$

$$u_B = -\frac{352}{3EI} = -352a$$

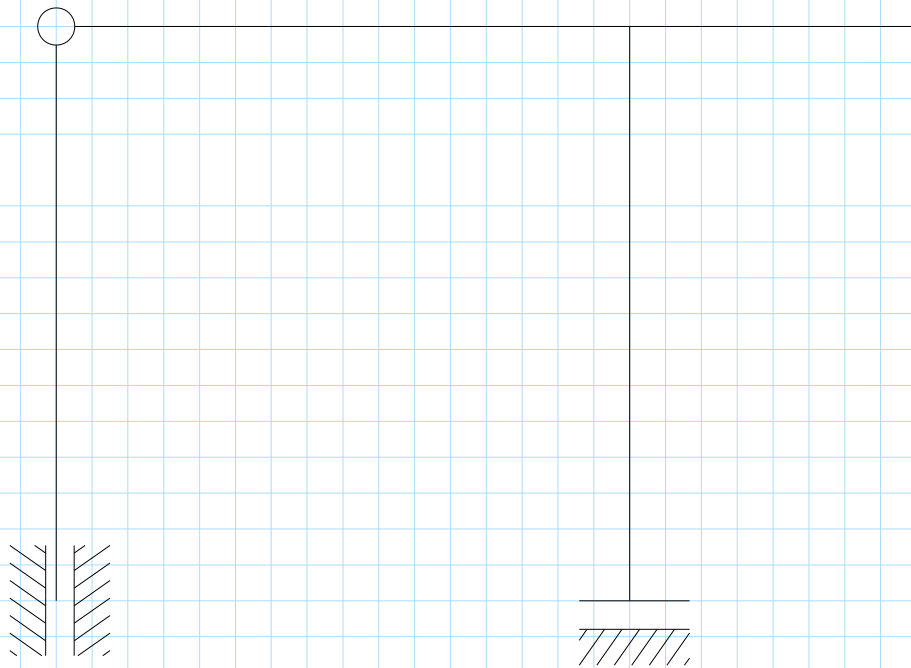
$$v_E = -\frac{4}{EI} = -\frac{12}{3EI} = -12a$$

$$\varphi_C^L = -\frac{40}{EI} = -\frac{120}{3EI} = -120a$$

$$\varphi_C^P = -\frac{56}{EI} = -\frac{168}{3EI} = -168a$$

$$\varphi_D = -\frac{8}{EI} = -\frac{24}{3EI} = -24a$$

$$\varphi_E = \frac{4}{EI} = \frac{12}{3EI} = 12a$$



$$v_A = v_C = 480a$$

$$u_C = u_D = u_E = -304a$$

$$u_B = -352a$$

$$v_E = -12a$$

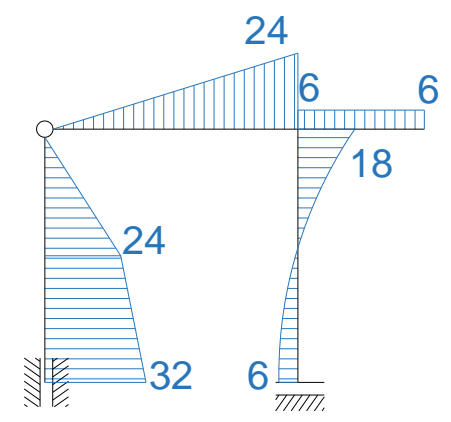
$$\varphi_C^L = -120a$$

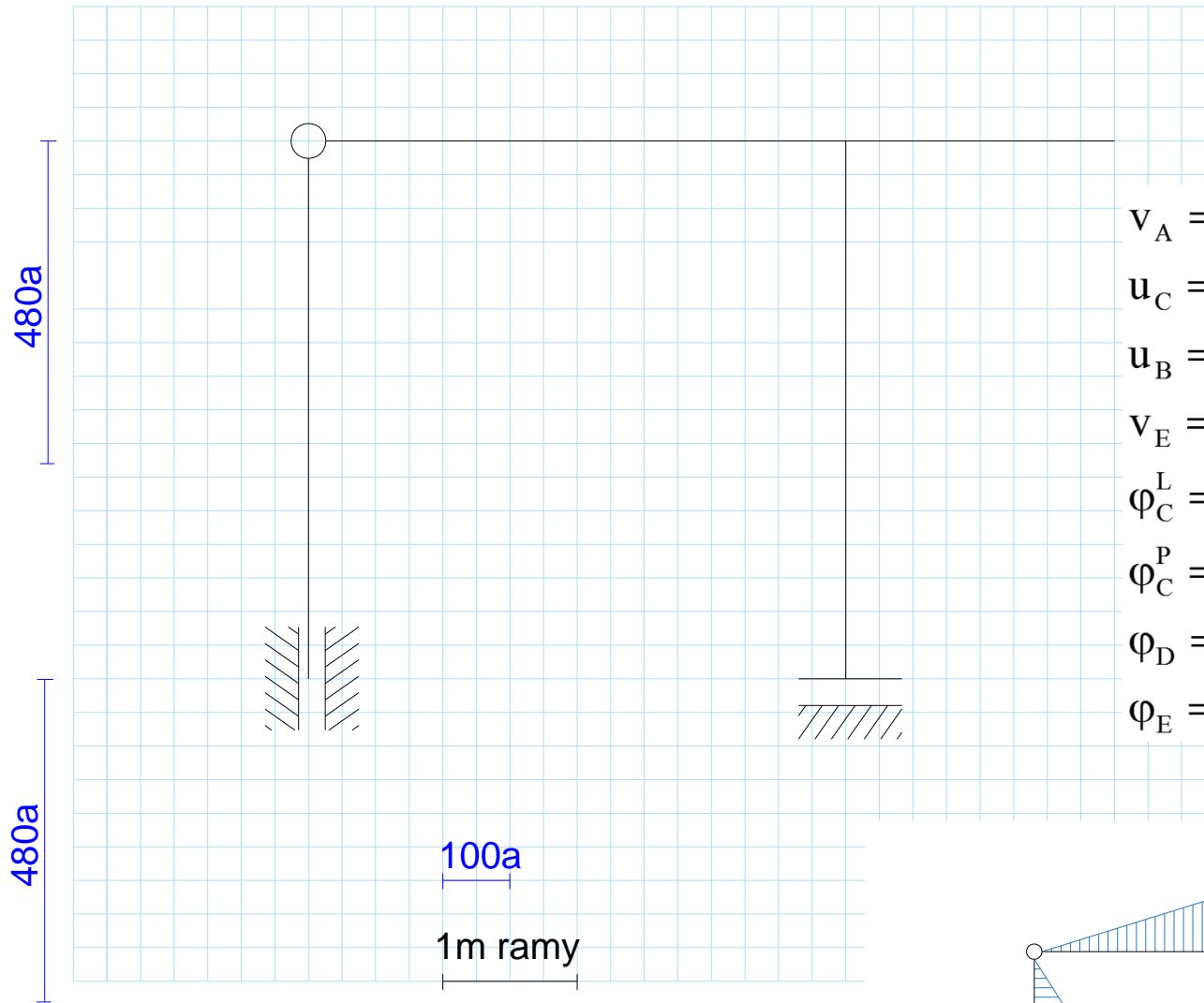
$$\varphi_C^P = -168a$$

$$\varphi_D = -24a$$

$$\varphi_E = 12a$$

100a
1m ramy





$$v_A = v_C = 480a$$

$$u_C = u_D = u_E = -304a$$

$$u_B = -352a$$

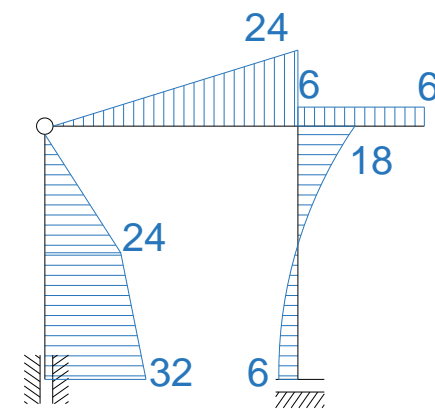
$$v_E = -12a$$

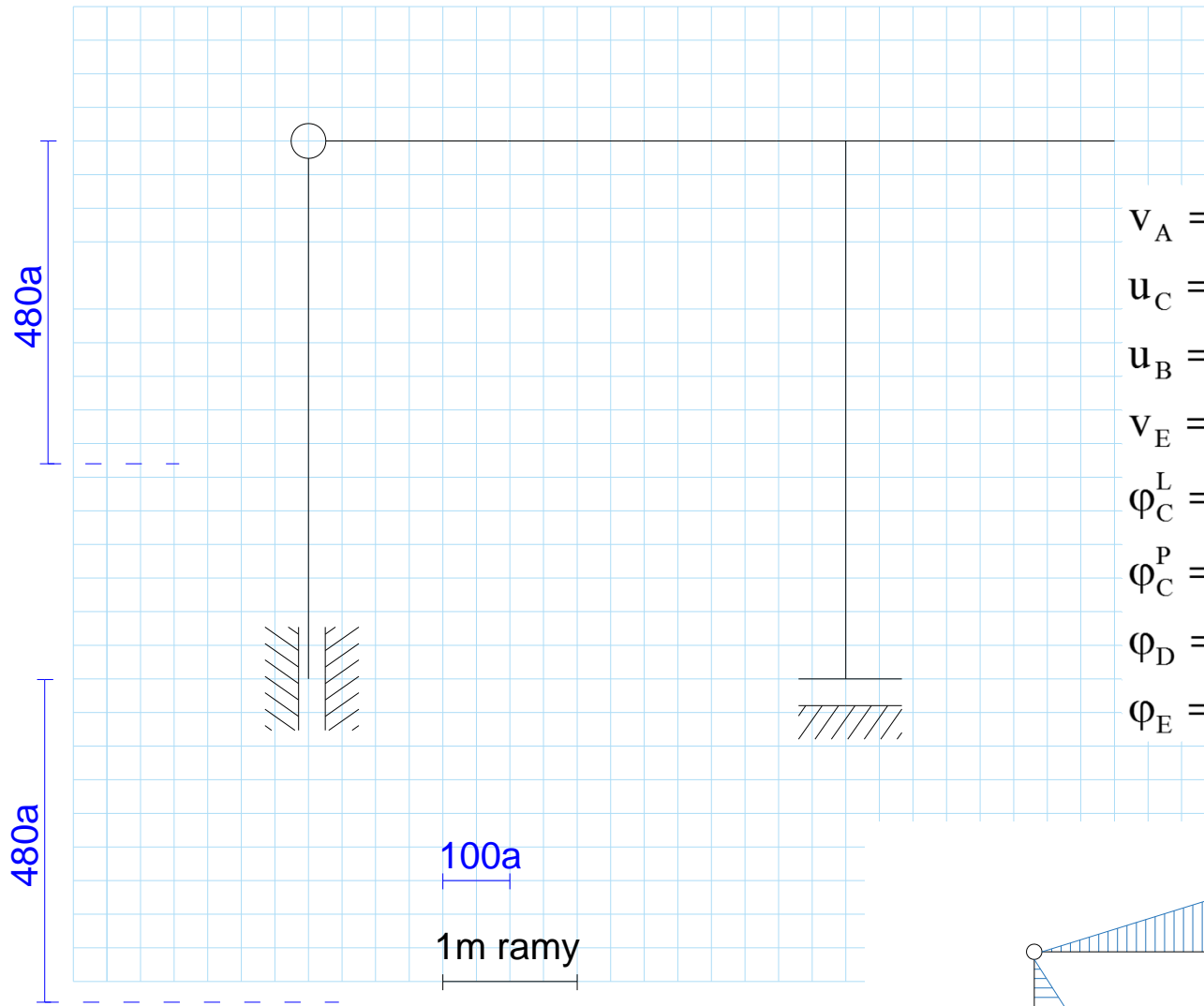
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$$\varphi_C^P = -168a$$

$$\varphi_D = -24a$$

$$\varphi_E = 12a$$





$$v_A = v_C = 480a$$

$$u_C = u_D = u_E = -304a$$

$$u_B = -352a$$

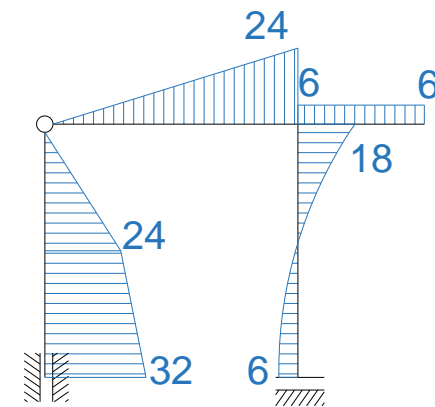
$$v_E = -12a$$

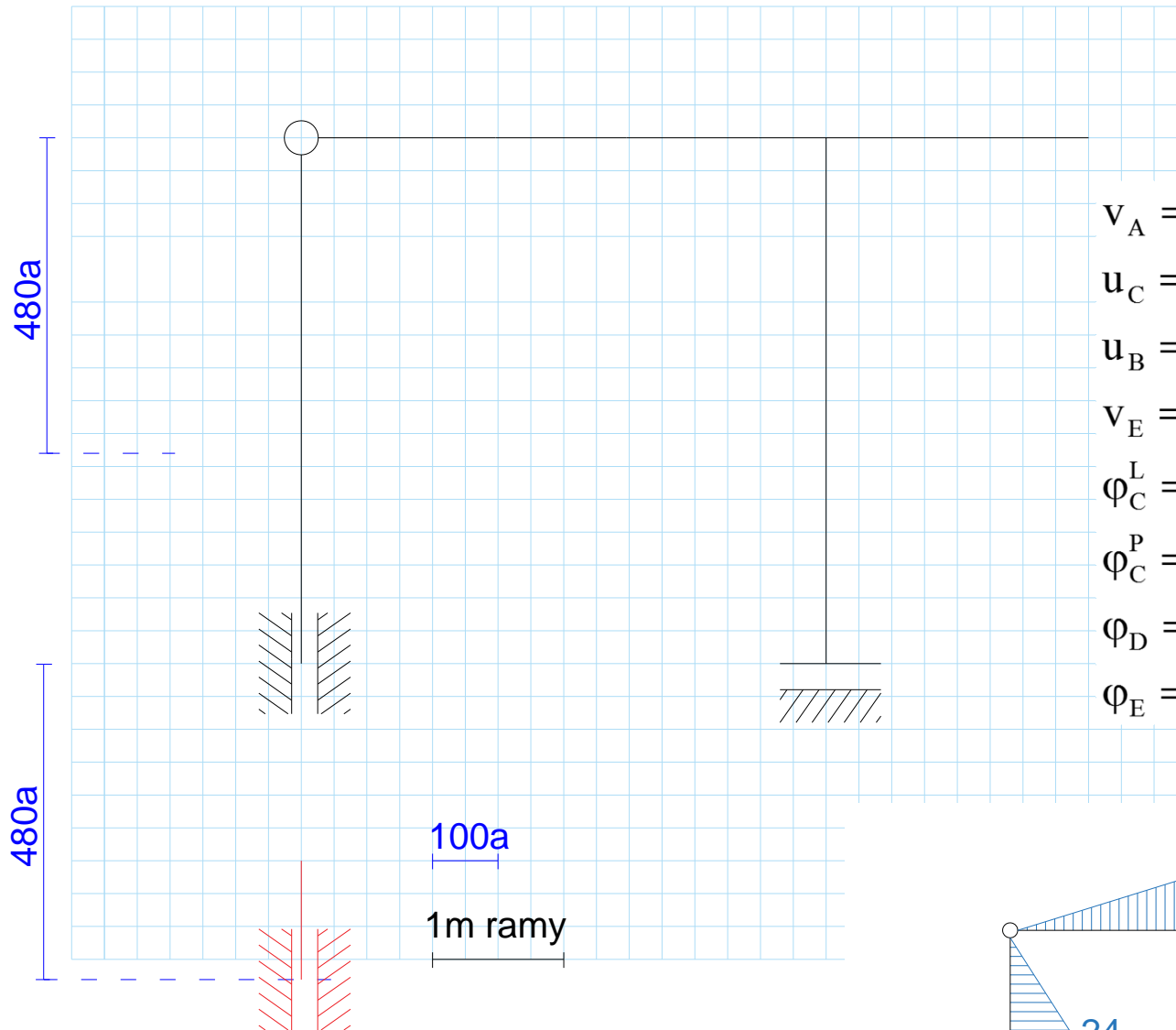
$$\varphi_C^L = -120a$$

$$\varphi_C^P = -168a$$

$$\varphi_D = -24a$$

$$\varphi_E = 12a$$





$$v_A = v_C = 480a$$

$$u_C = u_D = u_E = -304a$$

$$u_B = -352a$$

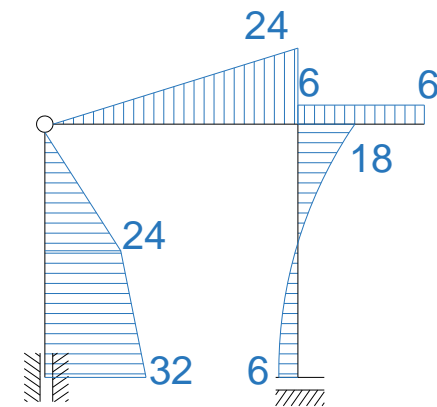
$$v_E = -12a$$

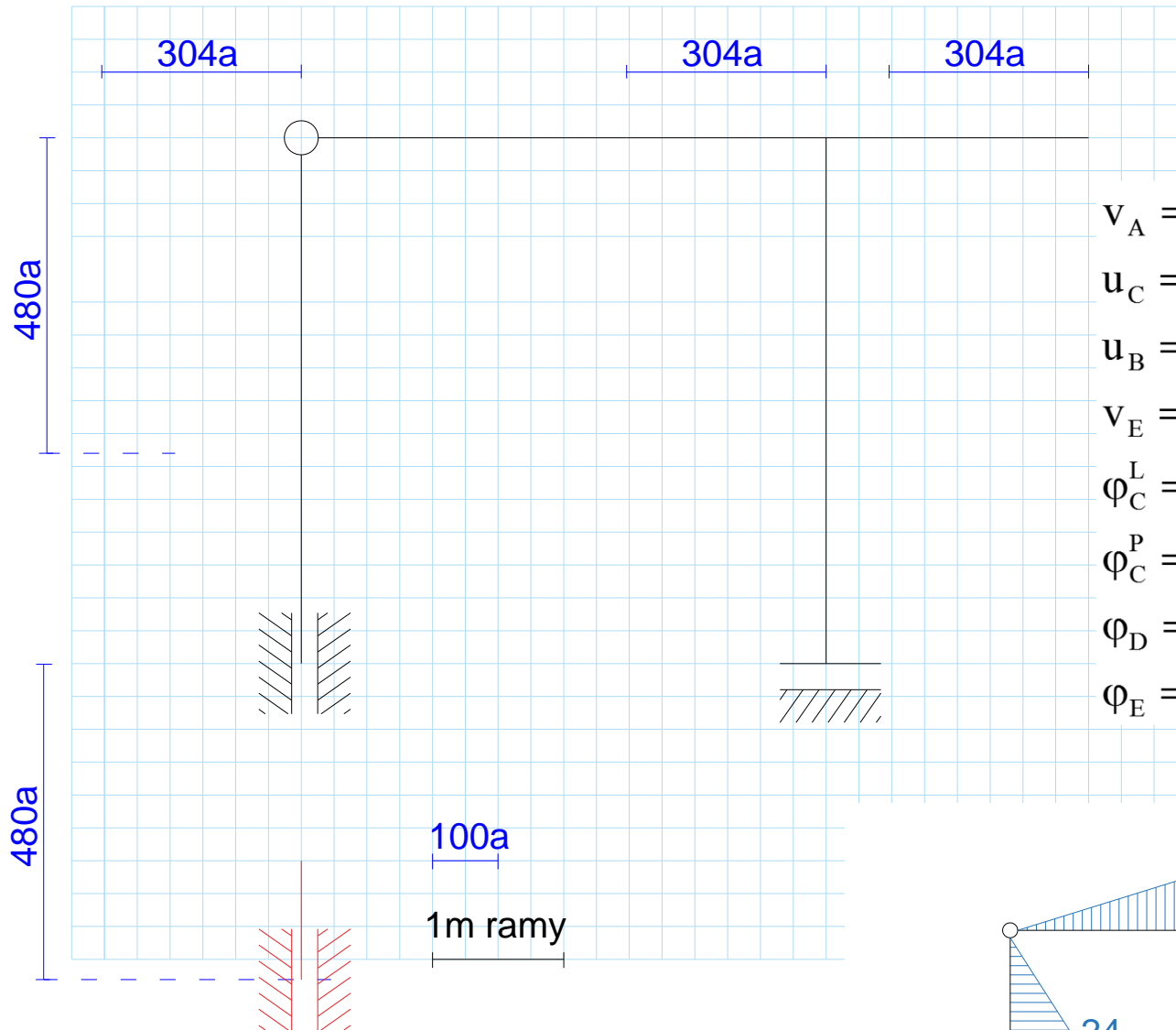
$$\varphi_C^L = -120a$$

$$\varphi_C^P = -168a$$

$$\varphi_D = -24a$$

$$\varphi_E = 12a$$





$$v_A = v_C = 480a$$

$$u_C = u_D = u_E = -304a$$

$$u_B = -352a$$

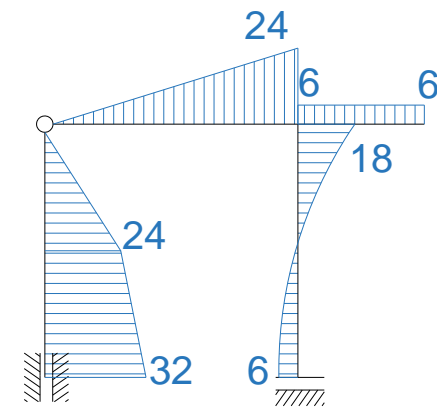
$$v_E = -12a$$

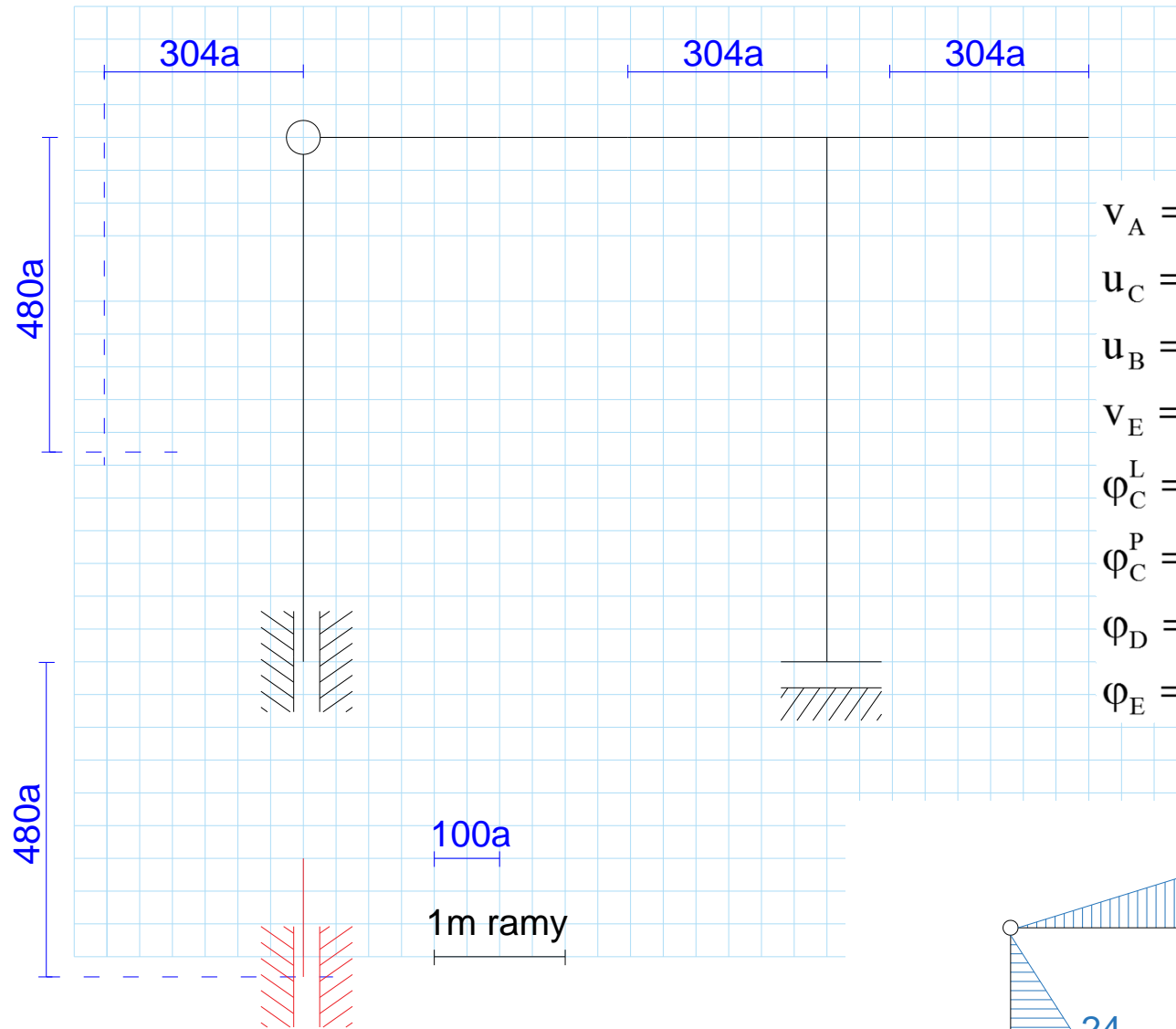
$$\varphi_C^L = -120a$$

$$\varphi_C^P = -168a$$

$$\varphi_D = -24a$$

$$\varphi_E = 12a$$





$$v_A = v_C = 480a$$

$$u_C = u_D = u_E = -304a$$

$$u_B = -352a$$

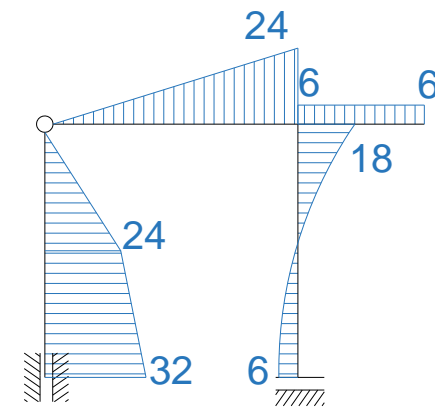
$$v_E = -12a$$

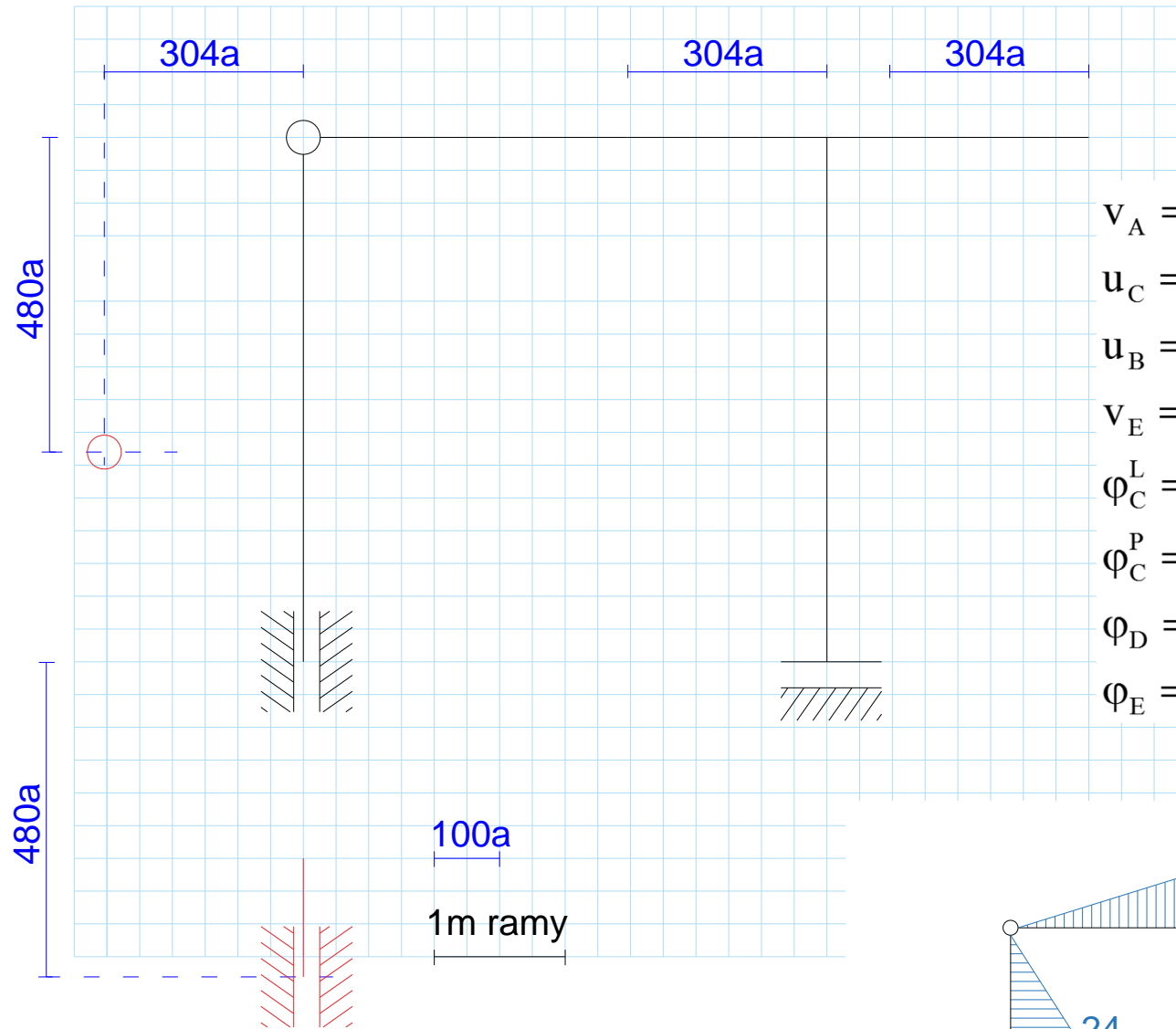
$$\varphi_C^L = -120a$$

$$\varphi_C^P = -168a$$

$$\varphi_D = -24a$$

$$\varphi_E = 12a$$





$$v_A = v_C = 480a$$

$$u_C = u_D = u_E = -304a$$

$$u_B = -352a$$

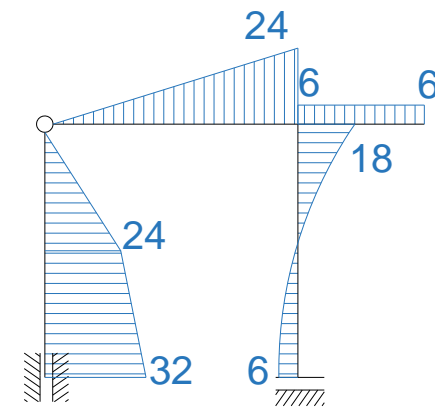
$$v_E = -12a$$

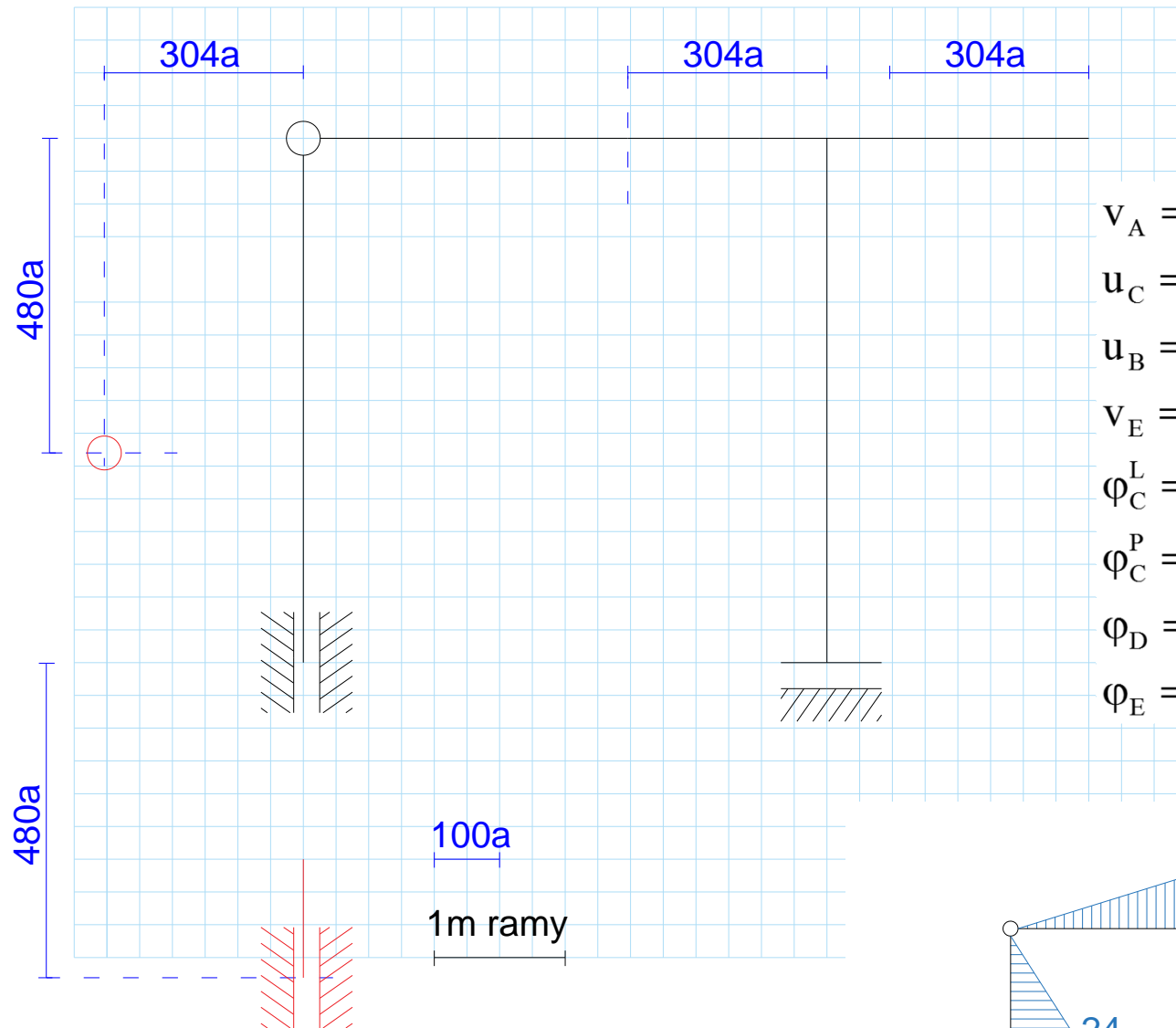
$$\varphi_C^L = -120a$$

$$\varphi_C^P = -168a$$

$$\varphi_D = -24a$$

$$\varphi_E = 12a$$





$$v_A = v_C = 480a$$

$$u_C = u_D = u_E = -304a$$

$$u_B = -352a$$

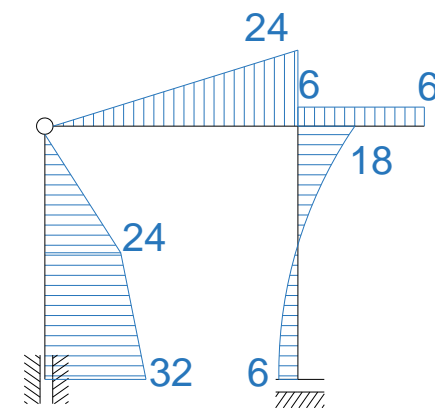
$$v_E = -12a$$

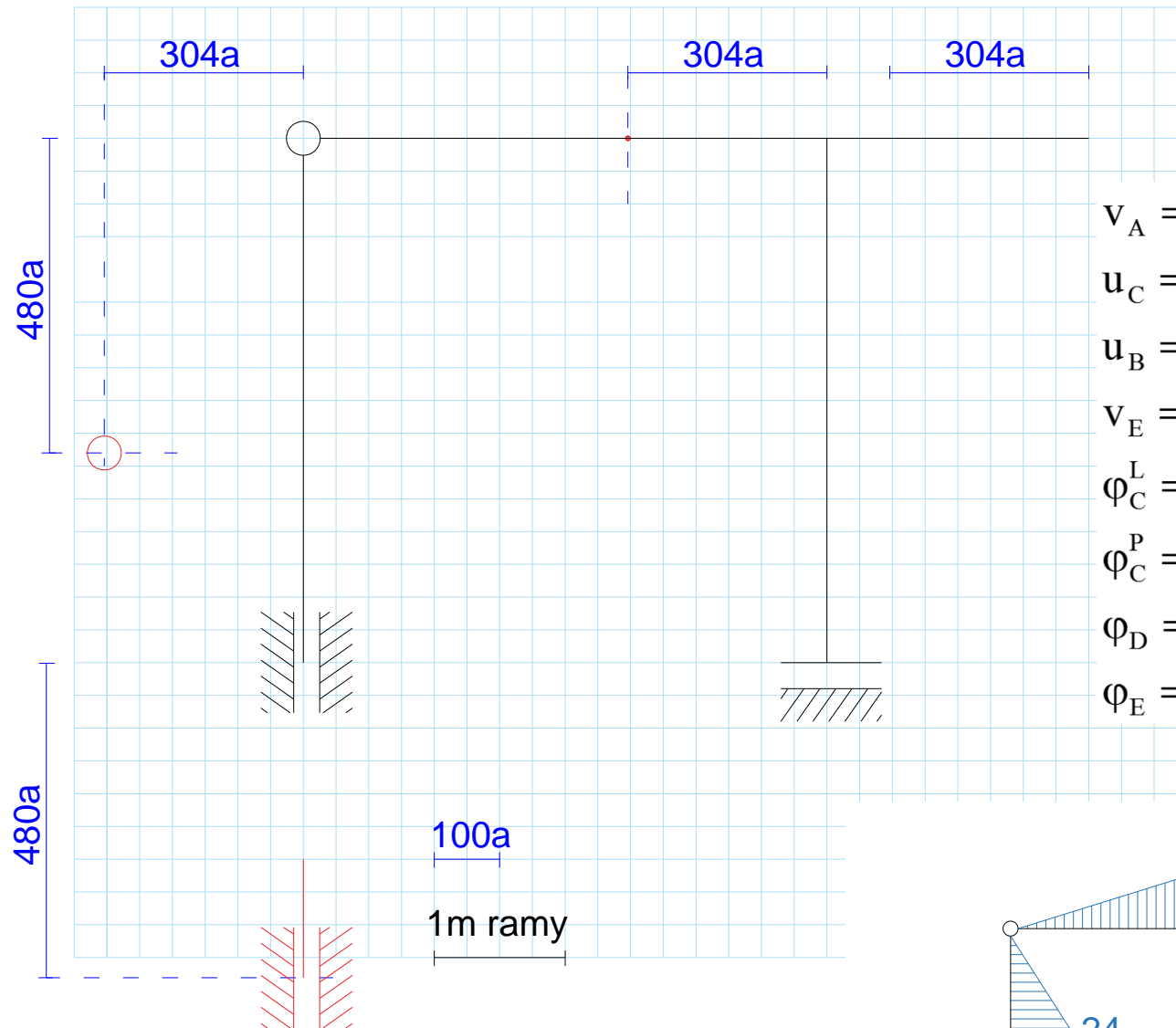
$$\varphi_C^L = -120a$$

$$\varphi_C^P = -168a$$

$$\varphi_D = -24a$$

$$\varphi_E = 12a$$





$$v_A = v_C = 480a$$

$$u_C = u_D = u_E = -304a$$

$$u_B = -352a$$

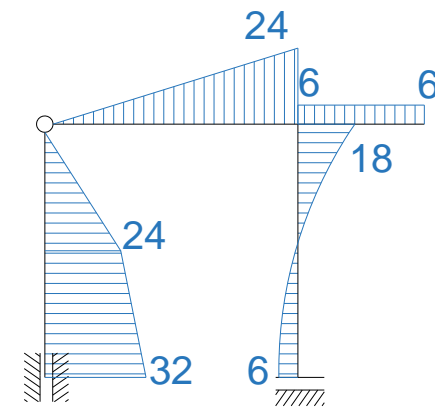
$$v_E = -12a$$

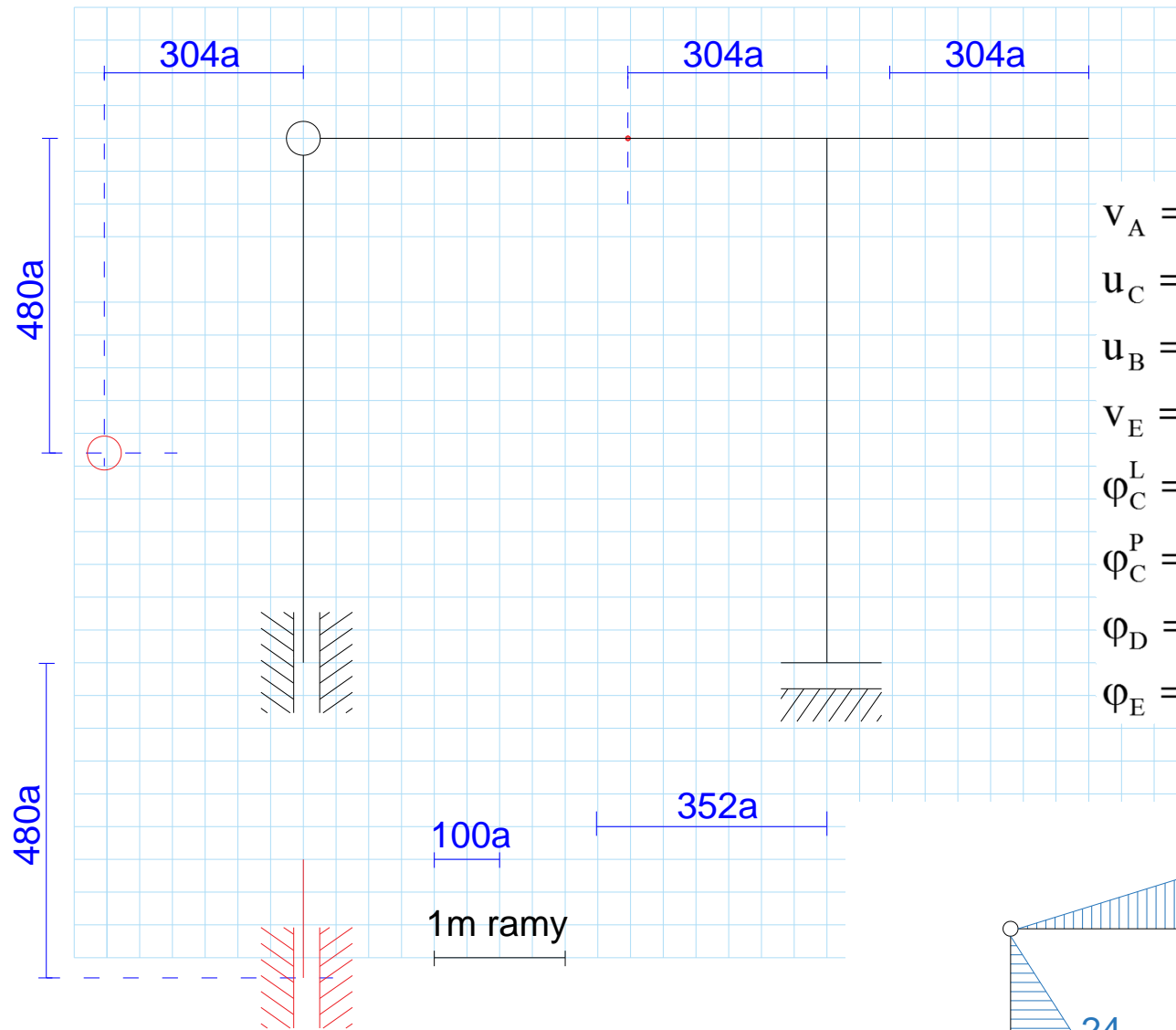
$$\varphi_C^L = -120a$$

$$\varphi_C^P = -168a$$

$$\varphi_D = -24a$$

$$\varphi_E = 12a$$





$$v_A = v_C = 480a$$

$$u_C = u_D = u_E = -304a$$

$$u_B = -352a$$

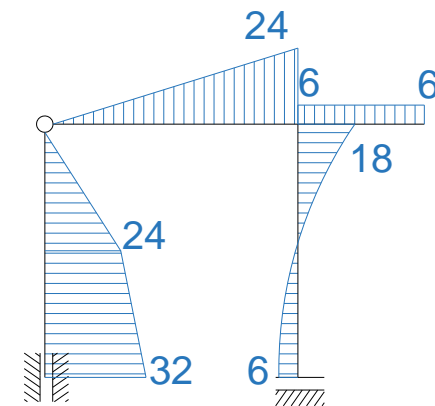
$$v_E = -12a$$

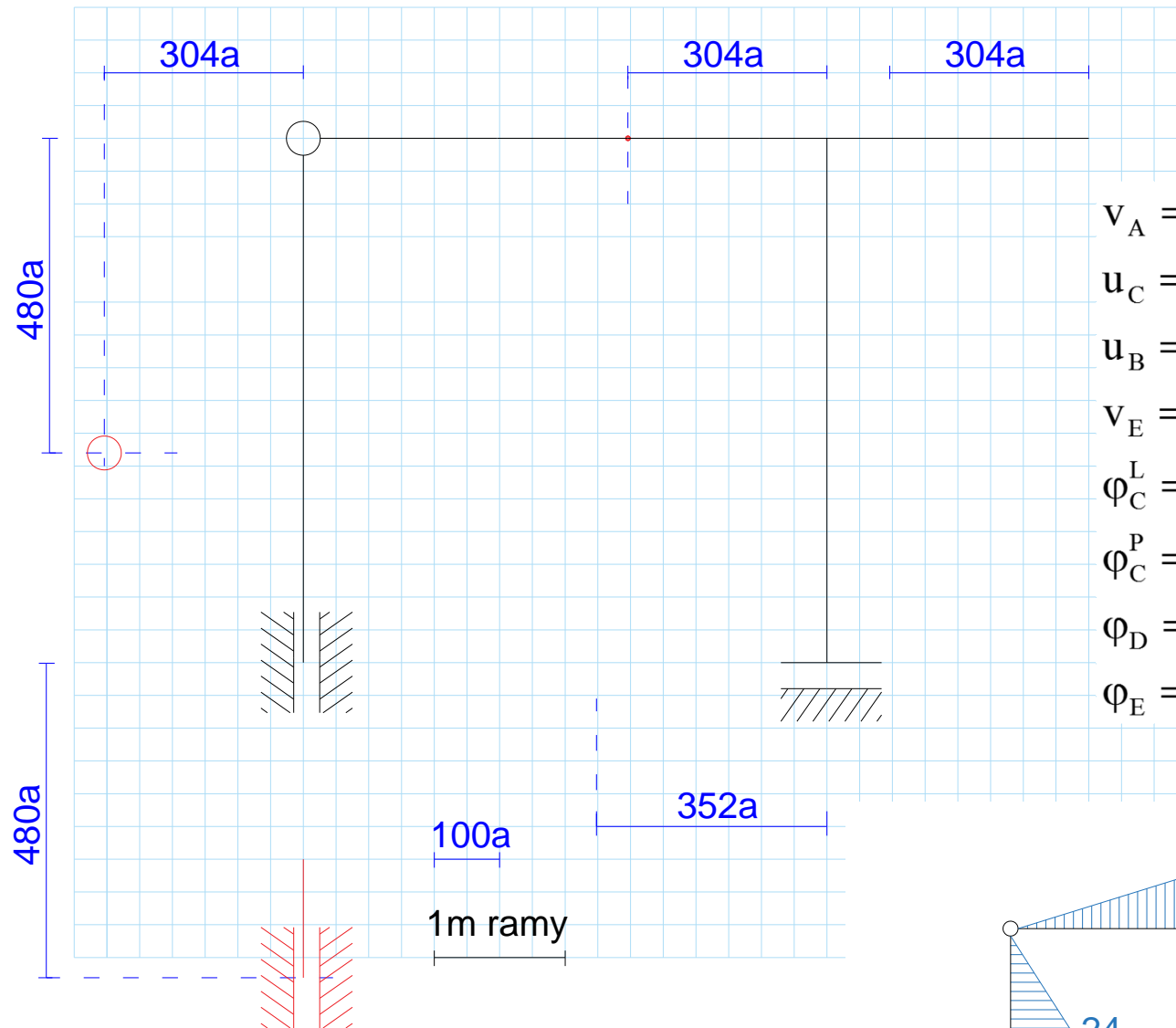
$$\varphi_C^L = -120a$$

$$\varphi_C^P = -168a$$

$$\varphi_D = -24a$$

$$\varphi_E = 12a$$





$$v_A = v_C = 480a$$

$$u_C = u_D = u_E = -304a$$

$$u_B = -352a$$

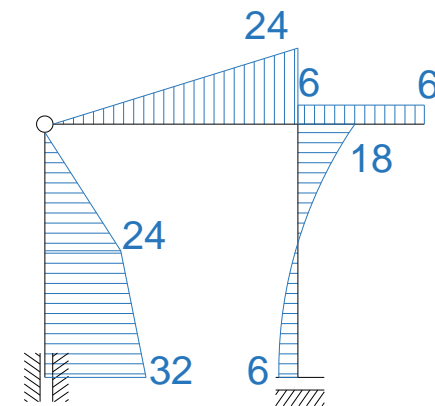
$$v_E = -12a$$

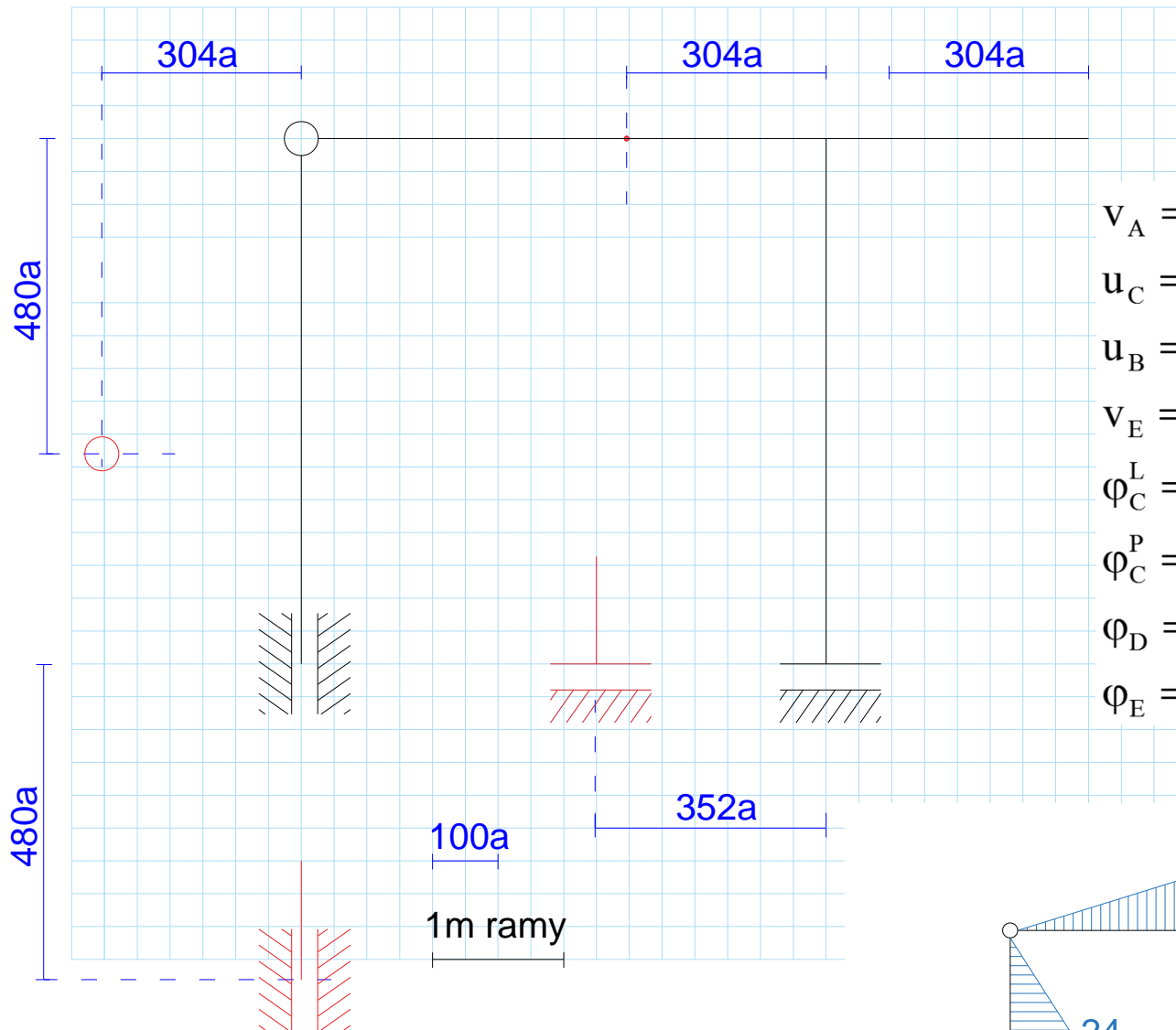
$$\varphi_C^L = -120a$$

$$\varphi_C^P = -168a$$

$$\varphi_D = -24a$$

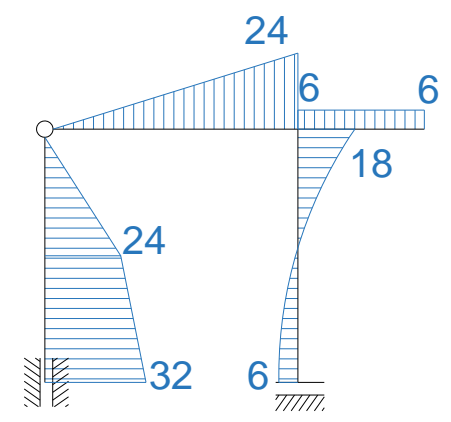
$$\varphi_E = 12a$$

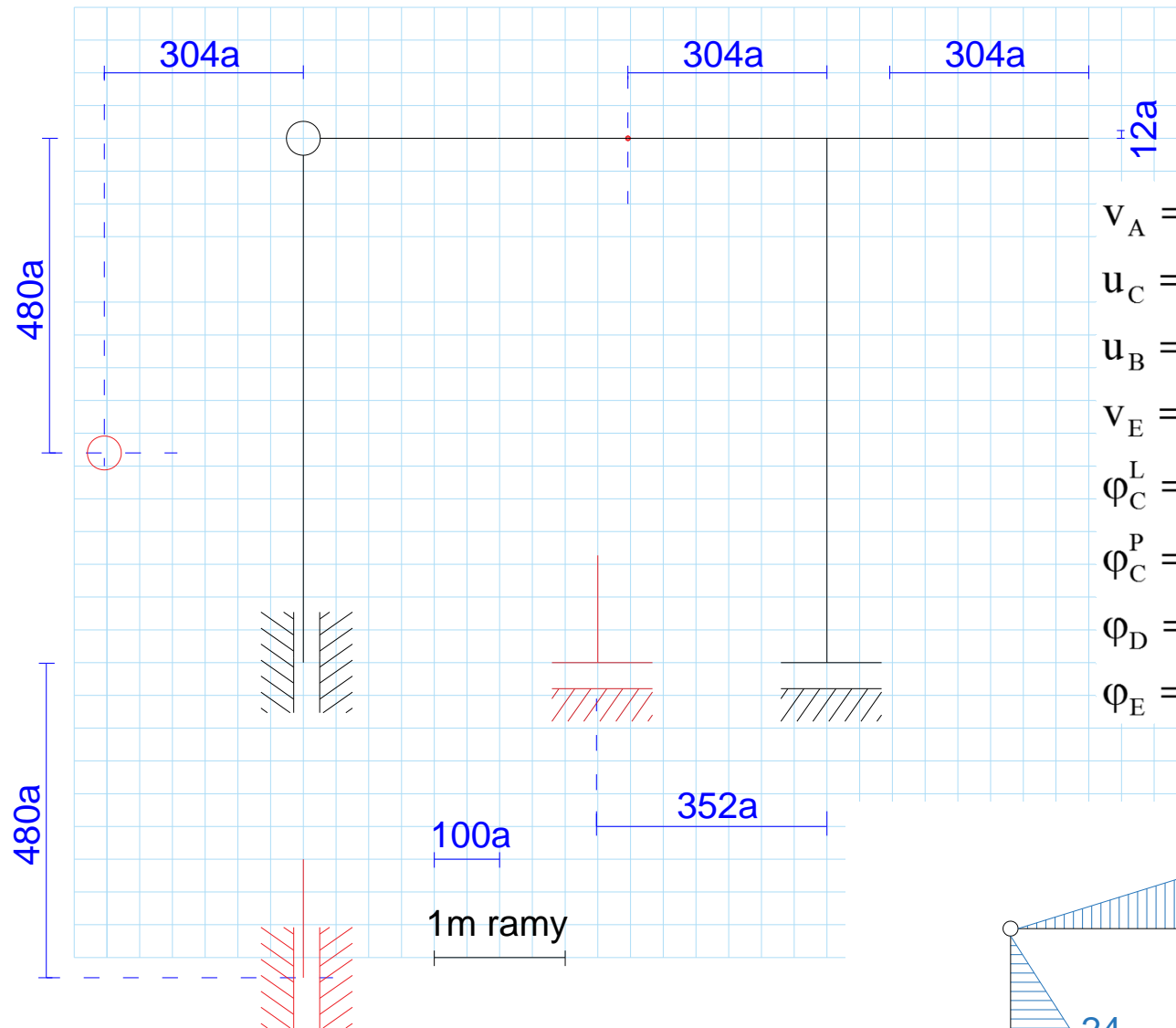




$$\begin{aligned}
 v_A &= v_C = 480a \\
 u_C &= u_D = u_E = -304a \\
 u_B &= -352a \\
 v_E &= -12a \\
 \varphi_C^L &= -120a \\
 \varphi_C^P &= -168a \\
 \varphi_D &= -24a \\
 \varphi_E &= 12a
 \end{aligned}$$

100a
352a
1m ramy





$$v_A = v_C = 480a$$

$$u_C = u_D = u_E = -304a$$

$$u_B = -352a$$

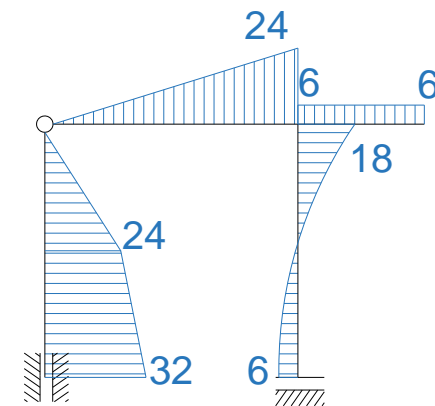
$$v_E = -12a$$

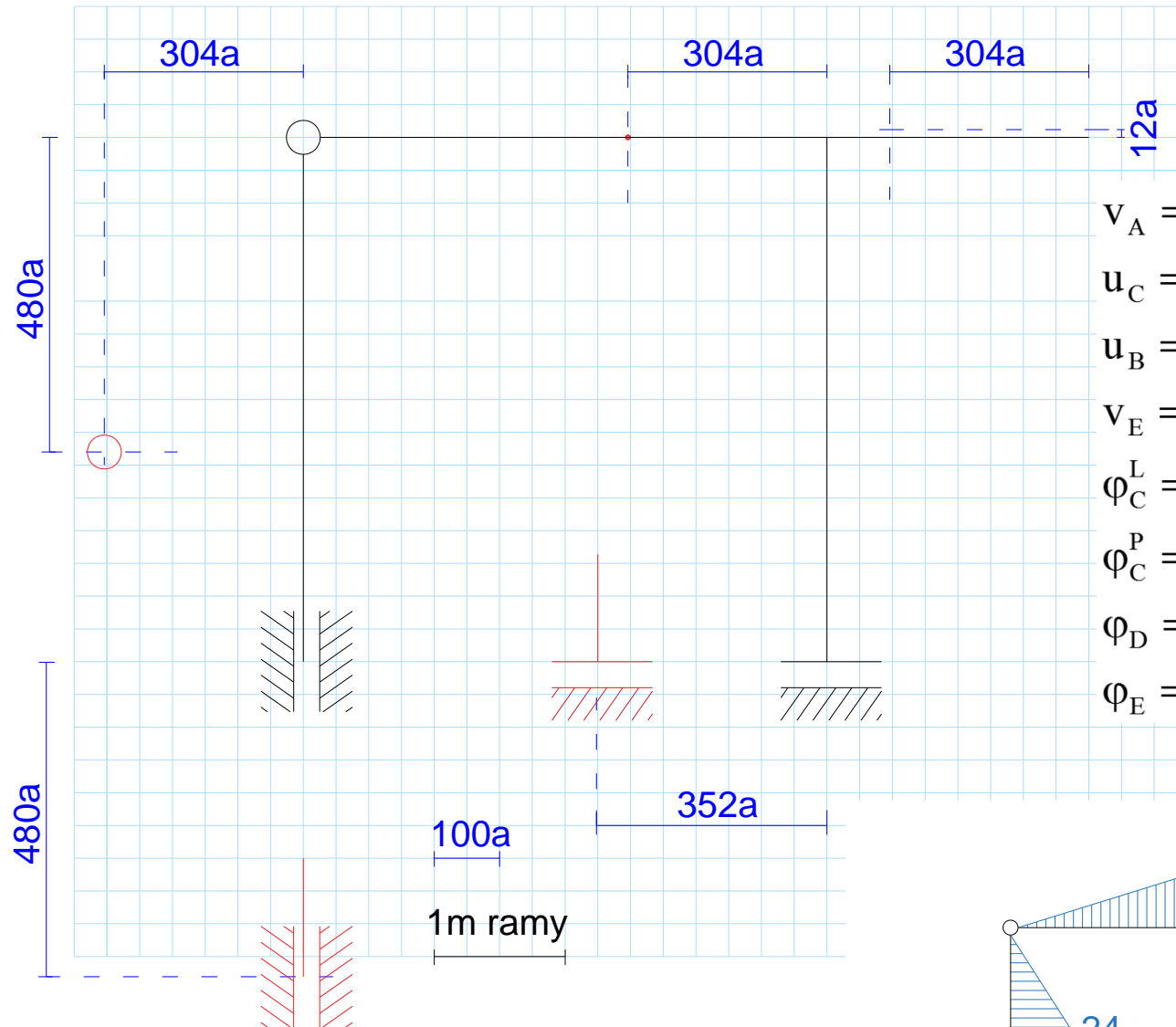
$$\varphi_C^L = -120a$$

$$\varphi_C^P = -168a$$

$$\varphi_D = -24a$$

$$\varphi_E = 12a$$





$$v_A = v_C = 480a$$

$$u_C = u_D = u_E = -304a$$

$$u_B = -352a$$

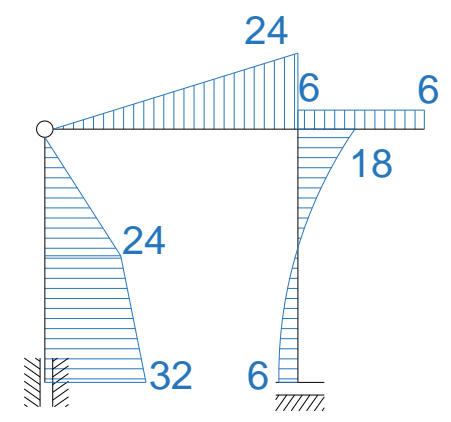
$$v_E = -12a$$

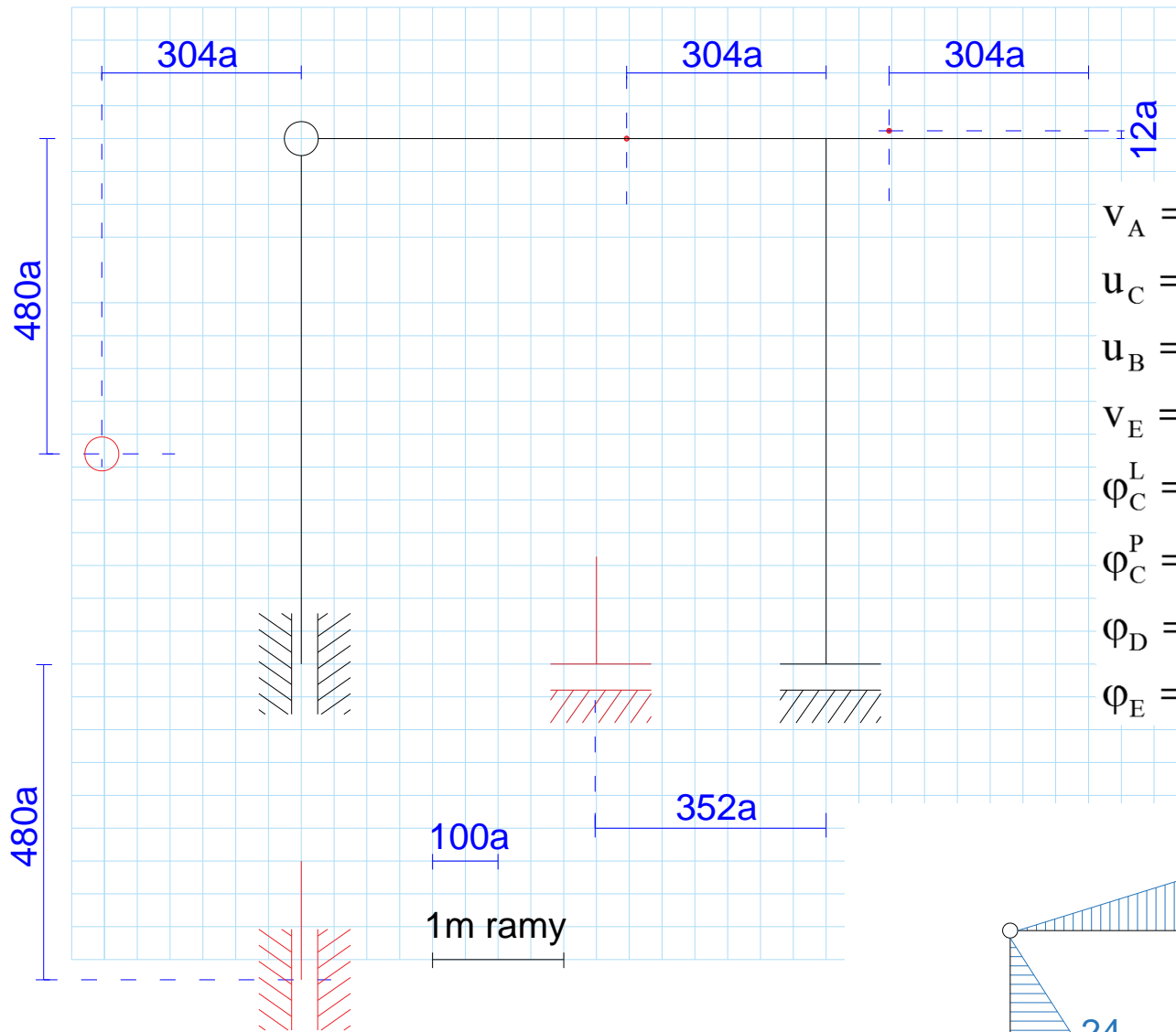
$$\varphi_C^L = -120a$$

$$\varphi_C^P = -168a$$

$$\varphi_D = -24a$$

$$\varphi_E = 12a$$





$$v_A = v_C = 480a$$

$$u_C = u_D = u_E = -304a$$

$$u_B = -352a$$

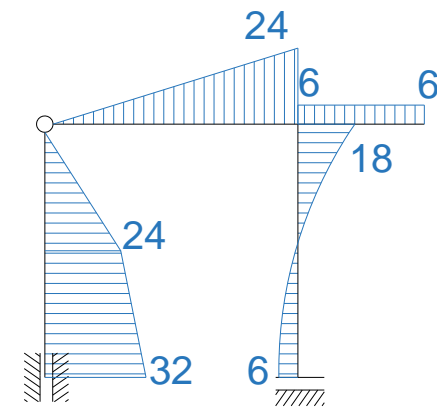
$$v_E = -12a$$

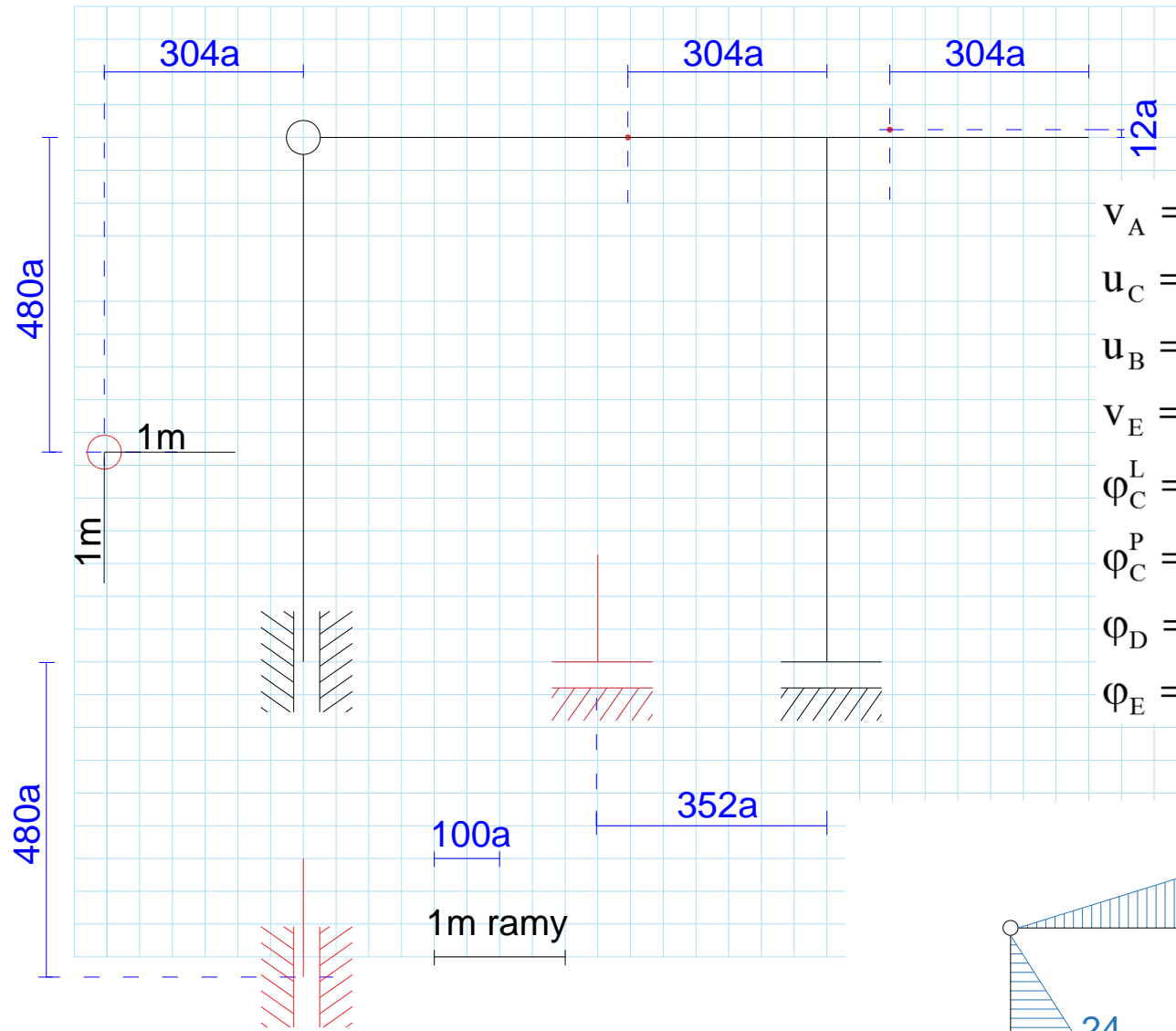
$$\varphi_C^L = -120a$$

$$\varphi_C^P = -168a$$

$$\varphi_D = -24a$$

$$\varphi_E = 12a$$





$$v_A = v_C = 480a$$

$$u_C = u_D = u_E = -304a$$

$$u_B = -352a$$

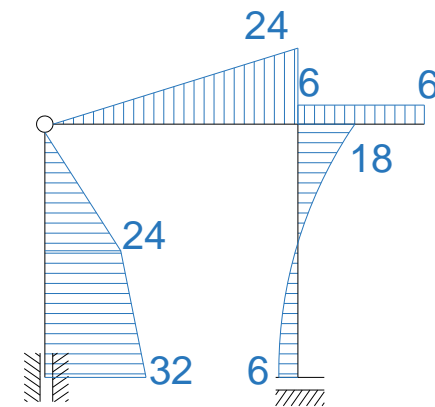
$$v_E = -12a$$

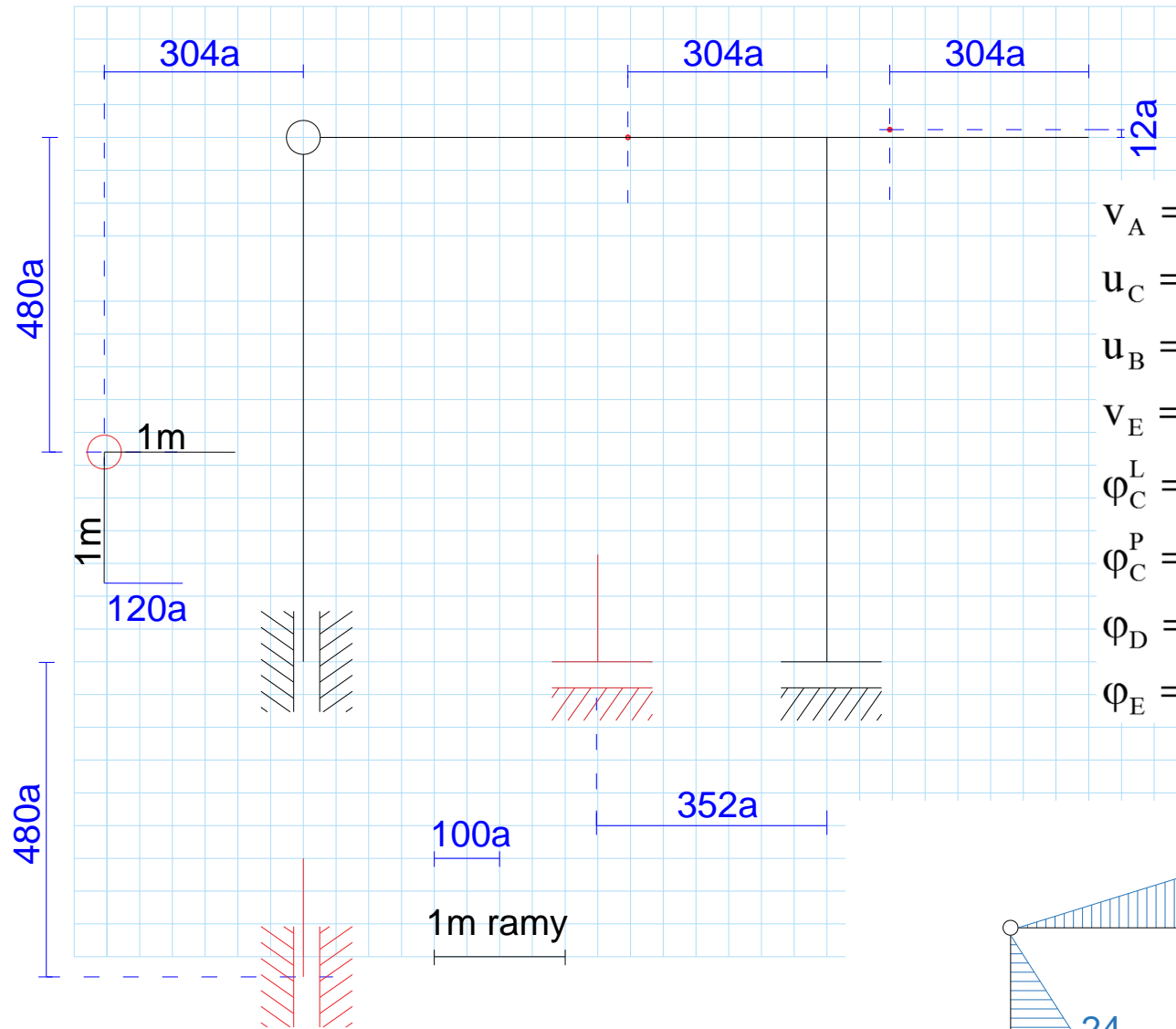
$$\phi_C^L = -120a$$

$$\phi_C^P = -168a$$

$$\phi_D = -24a$$

$$\phi_E = 12a$$





$$v_A = v_C = 480a$$

$$u_C = u_D = u_E = -304a$$

$$u_B = -352a$$

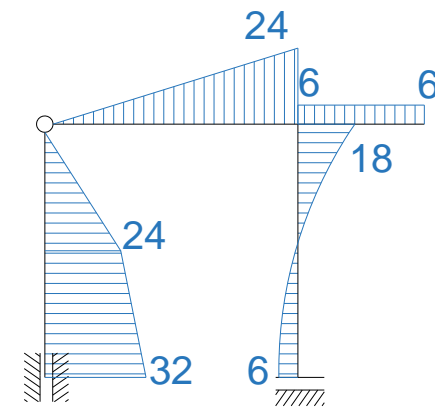
$$v_E = -12a$$

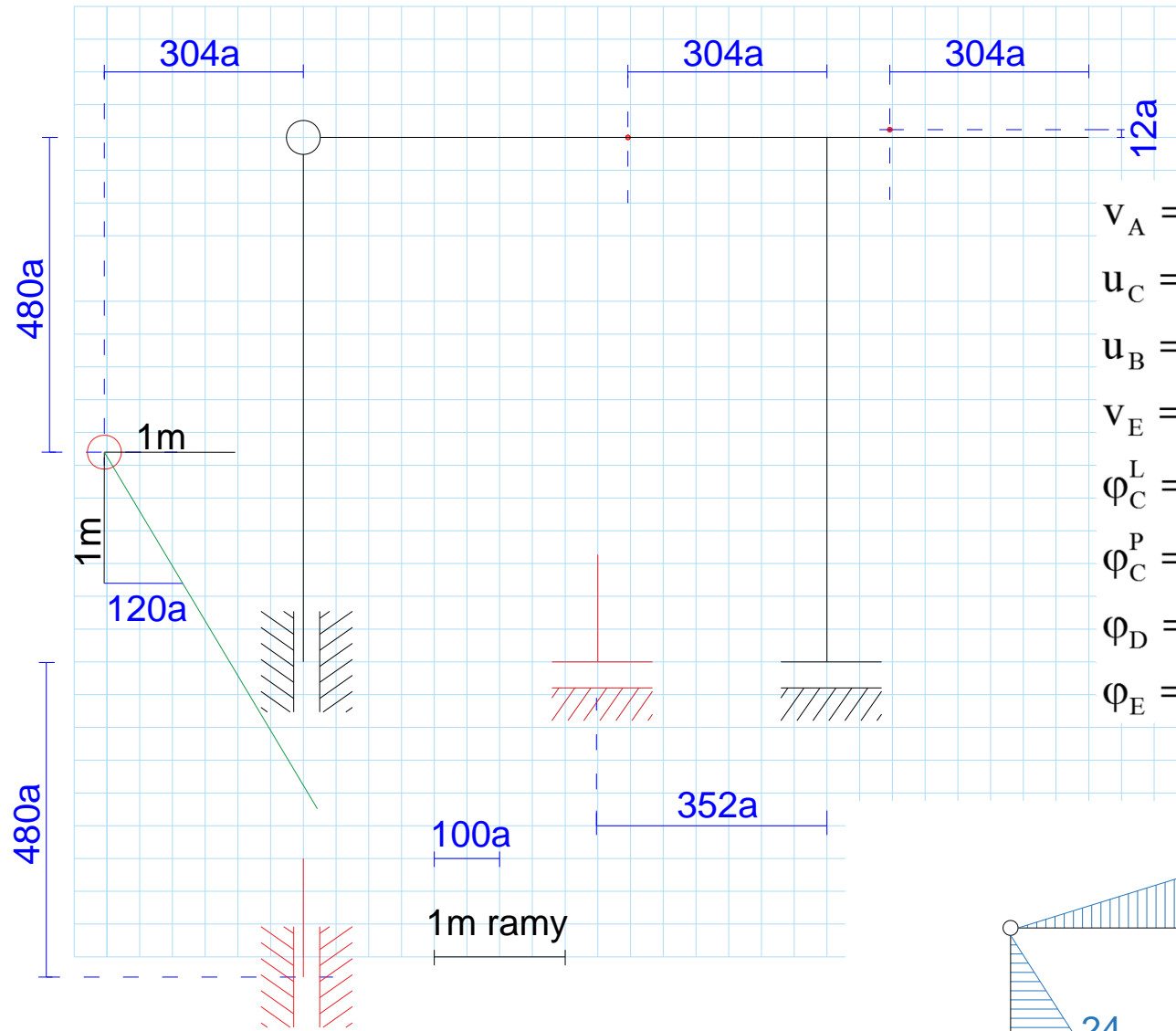
$$\phi_C^L = -120a$$

$$\phi_C^P = -168a$$

$$\phi_D = -24a$$

$$\phi_E = 12a$$





$$v_A = v_C = 480a$$

$$u_C = u_D = u_E = -304a$$

$$u_B = -352a$$

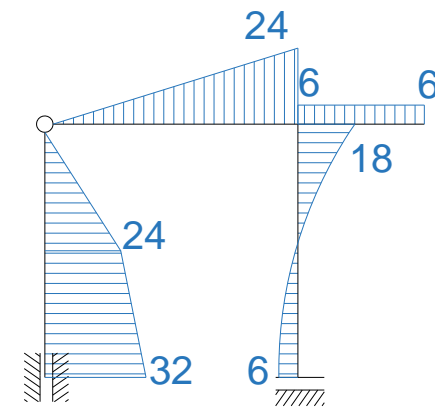
$$v_E = -12a$$

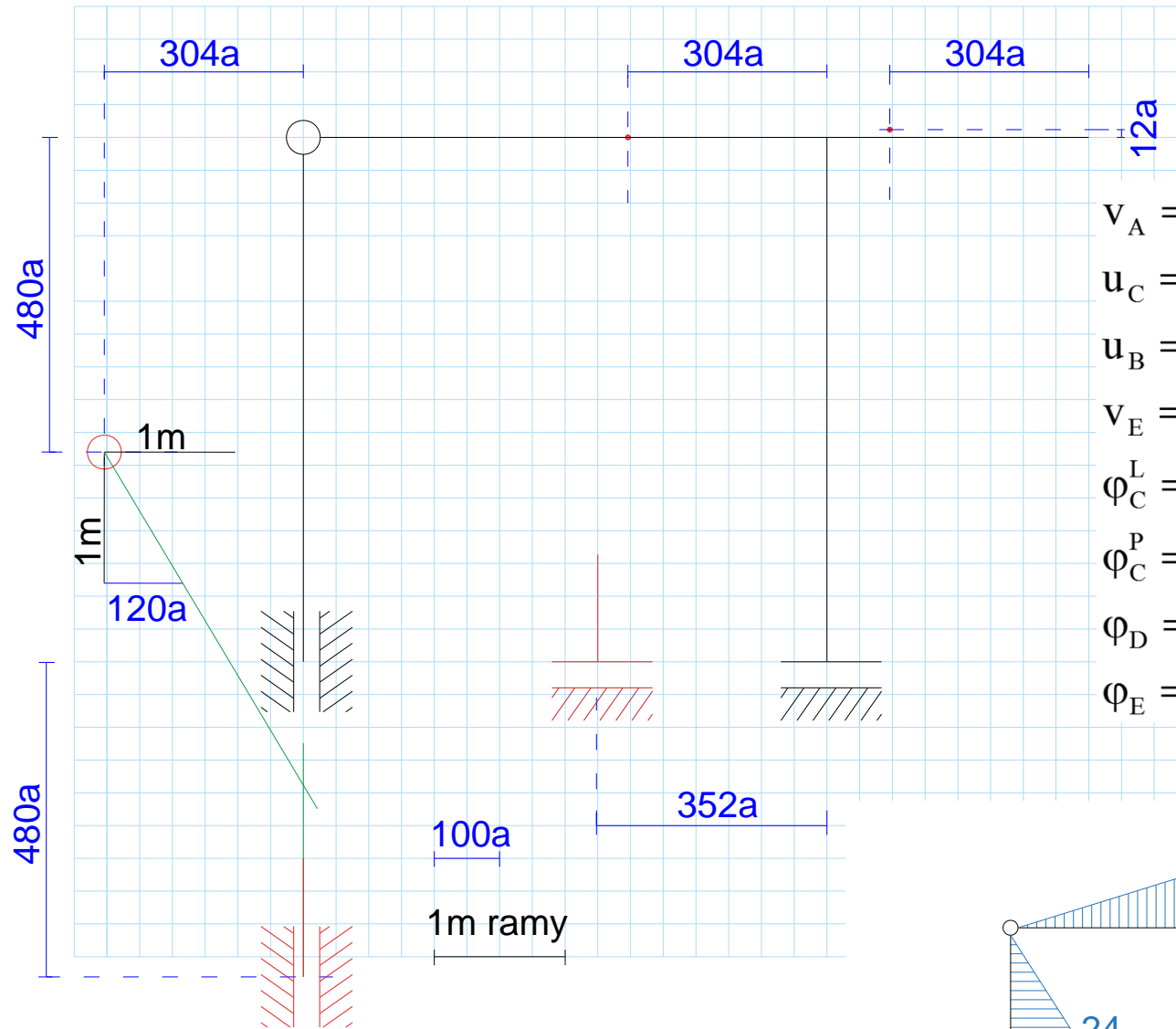
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$$\varphi_C^P = -168a$$

$$\varphi_D = -24a$$

$$\varphi_E = 12a$$





$$v_A = v_C = 480a$$

$$u_C = u_D = u_E = -304a$$

$$u_B = -352a$$

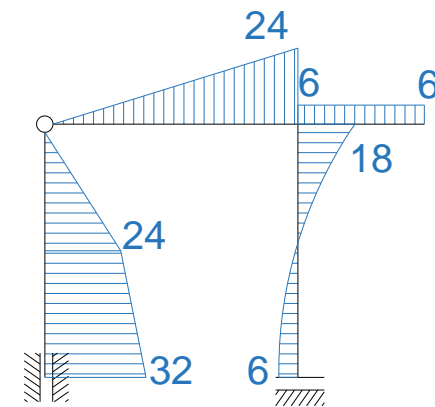
$$v_E = -12a$$

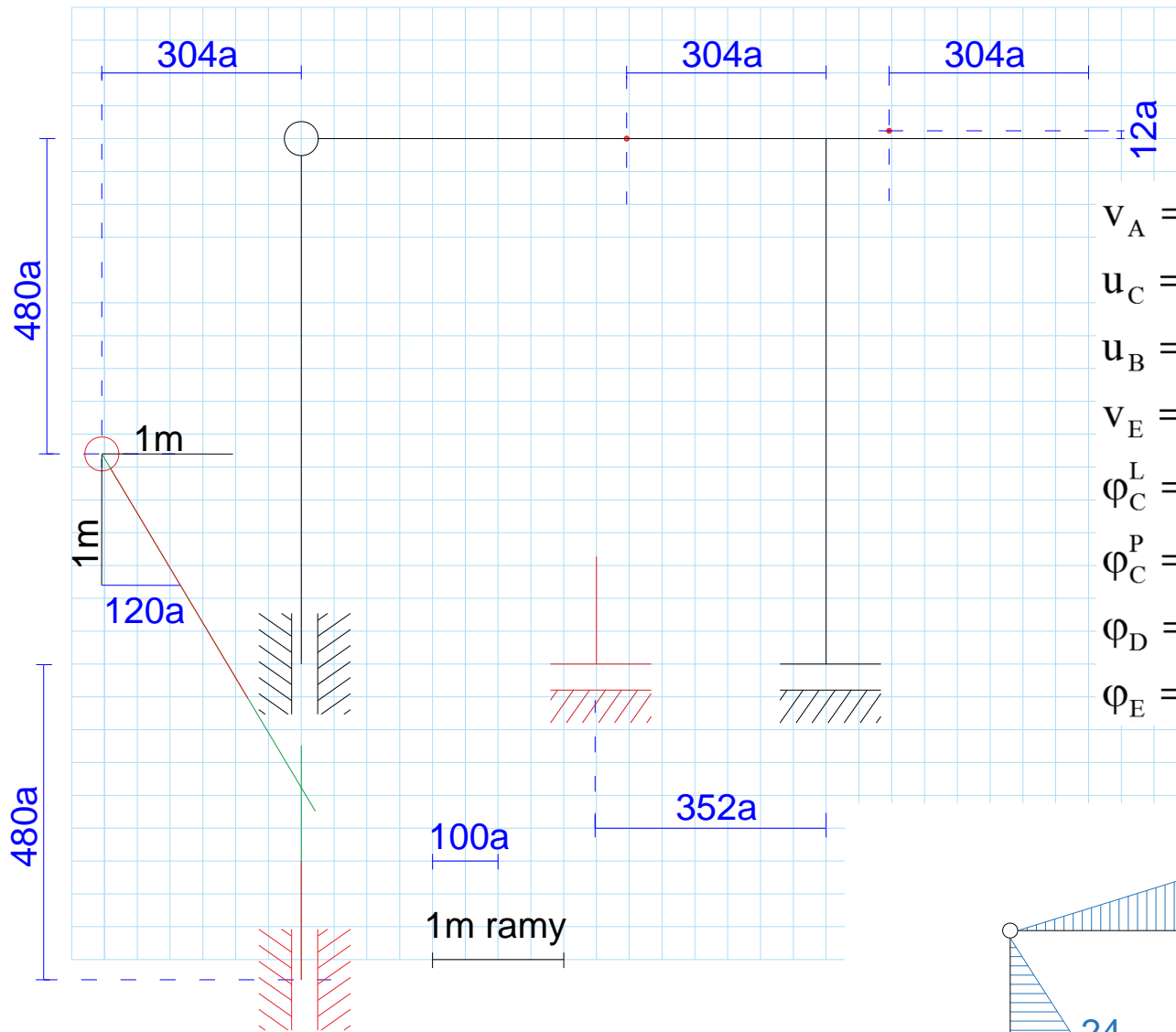
$$\phi_C^L = -120a$$

$$\phi_C^P = -168a$$

$$\phi_D = -24a$$

$$\phi_E = 12a$$





$$v_A = v_C = 480a$$

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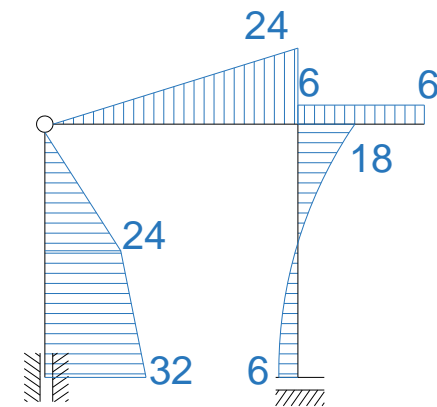
$$v_E = -12a$$

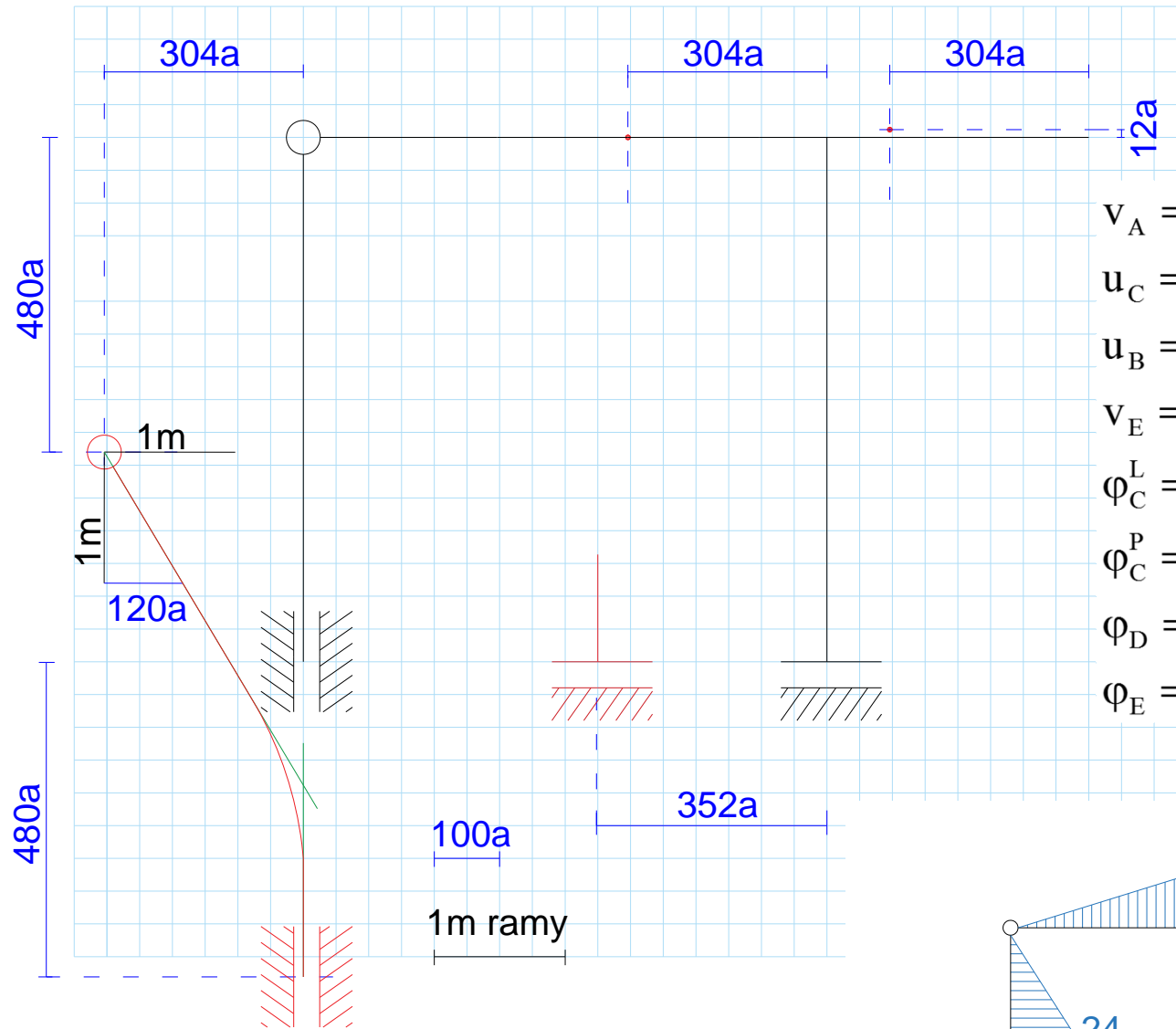
$$\phi_C^L = -120a$$

$$\phi_C^P = -168a$$

$$\phi_D = -24a$$

$$\phi_E = 12a$$





$$v_A = v_C = 480a$$

$$u_C = u_D = u_E = -304a$$

$$u_B = -352a$$

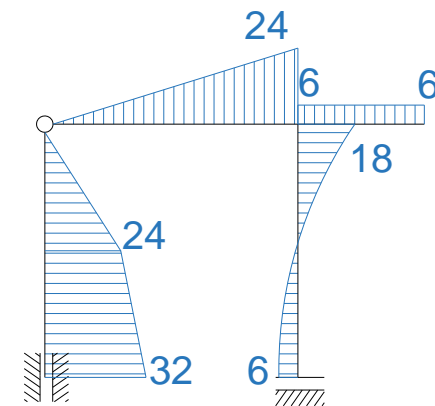
$$v_E = -12a$$

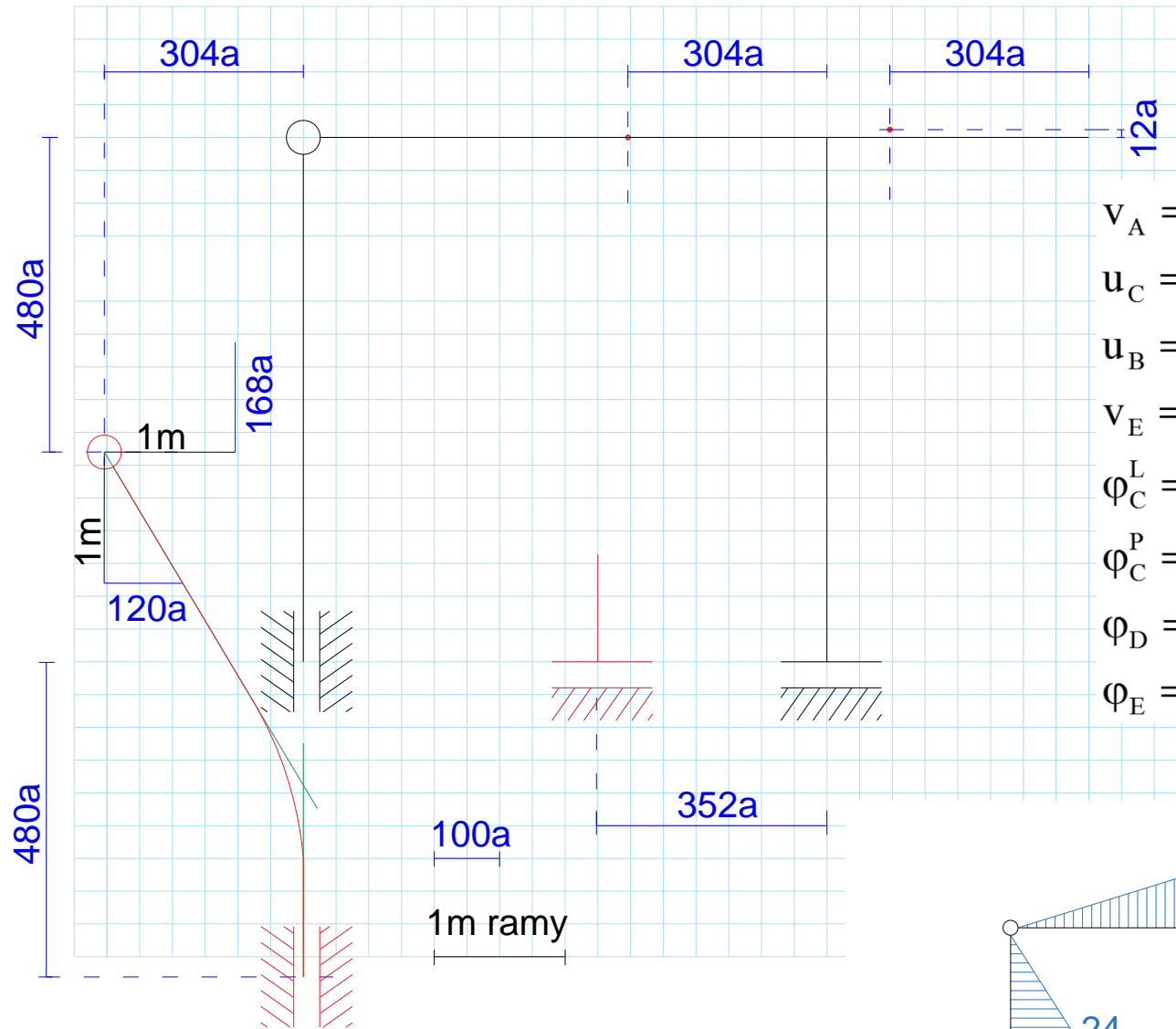
$$\varphi_C^L = -120a$$

$$\varphi_C^P = -168a$$

$$\varphi_D = -24a$$

$$\varphi_E = 12a$$





$$v_A = v_C = 480a$$

$$u_C = u_D = u_E = -304a$$

$$u_B = -352a$$

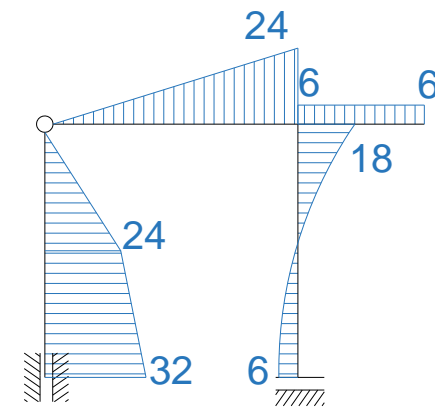
$$v_E = -12a$$

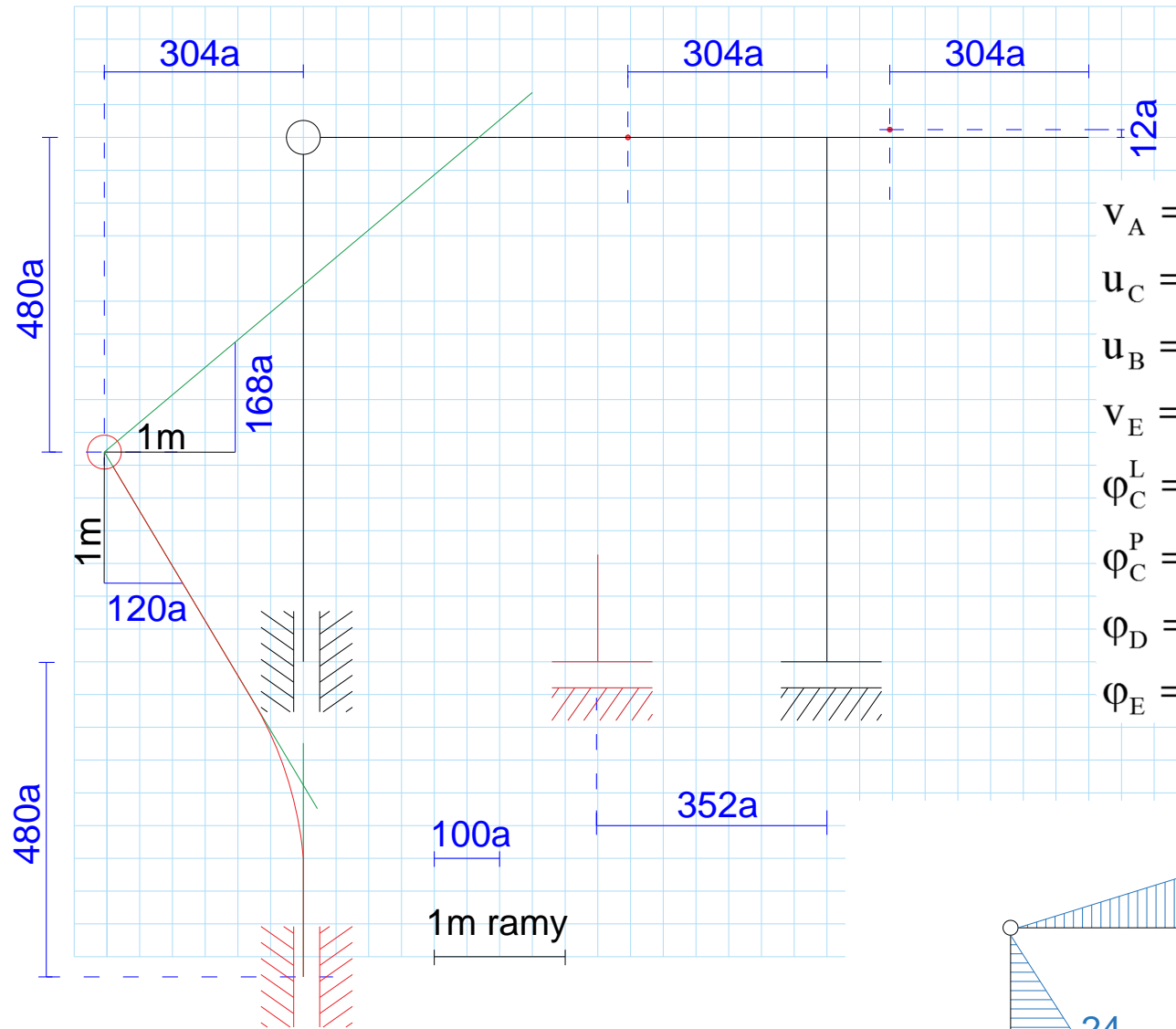
$$\phi_C^L = -120a$$

$$\phi_C^P = -168a$$

$$\phi_D = -24a$$

$$\phi_E = 12a$$





$$v_A = v_C = 480a$$

$$u_C = u_D = u_E = -304a$$

$$u_B = -352a$$

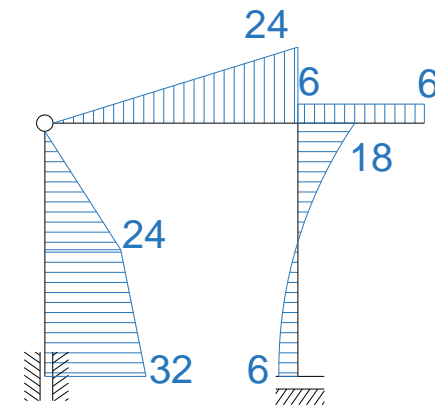
$$v_E = -12a$$

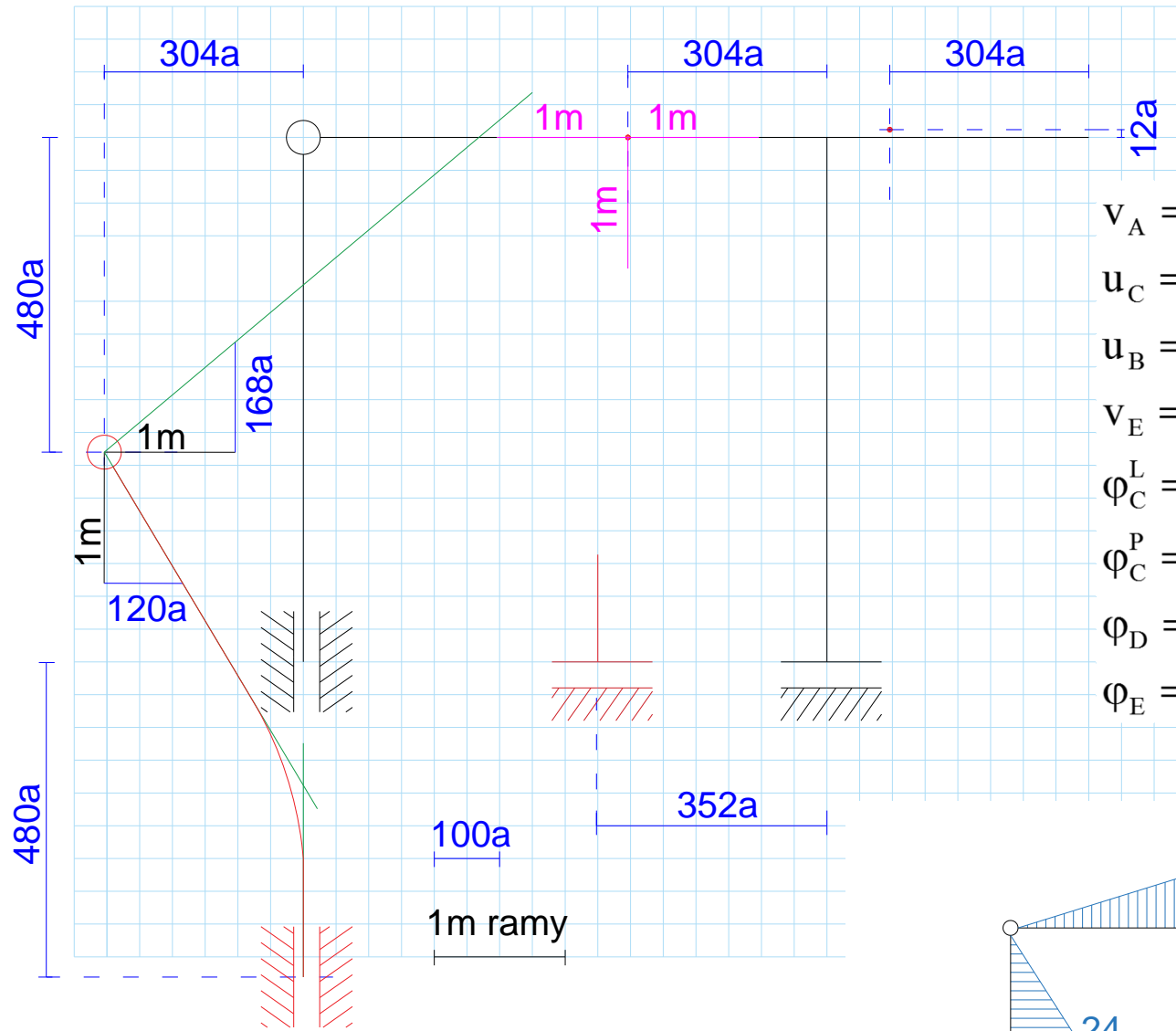
$$\varphi_C^L = -120a$$

$$\varphi_C^P = -168a$$

$$\varphi_D = -24a$$

$$\varphi_E = 12a$$





$$v_A = v_C = 480a$$

$$u_C = u_D = u_E = -304a$$

$$u_B = -352a$$

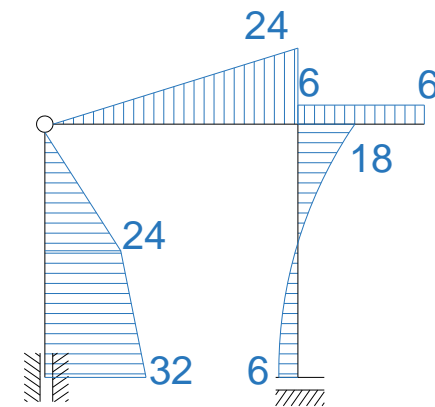
$$v_E = -12a$$

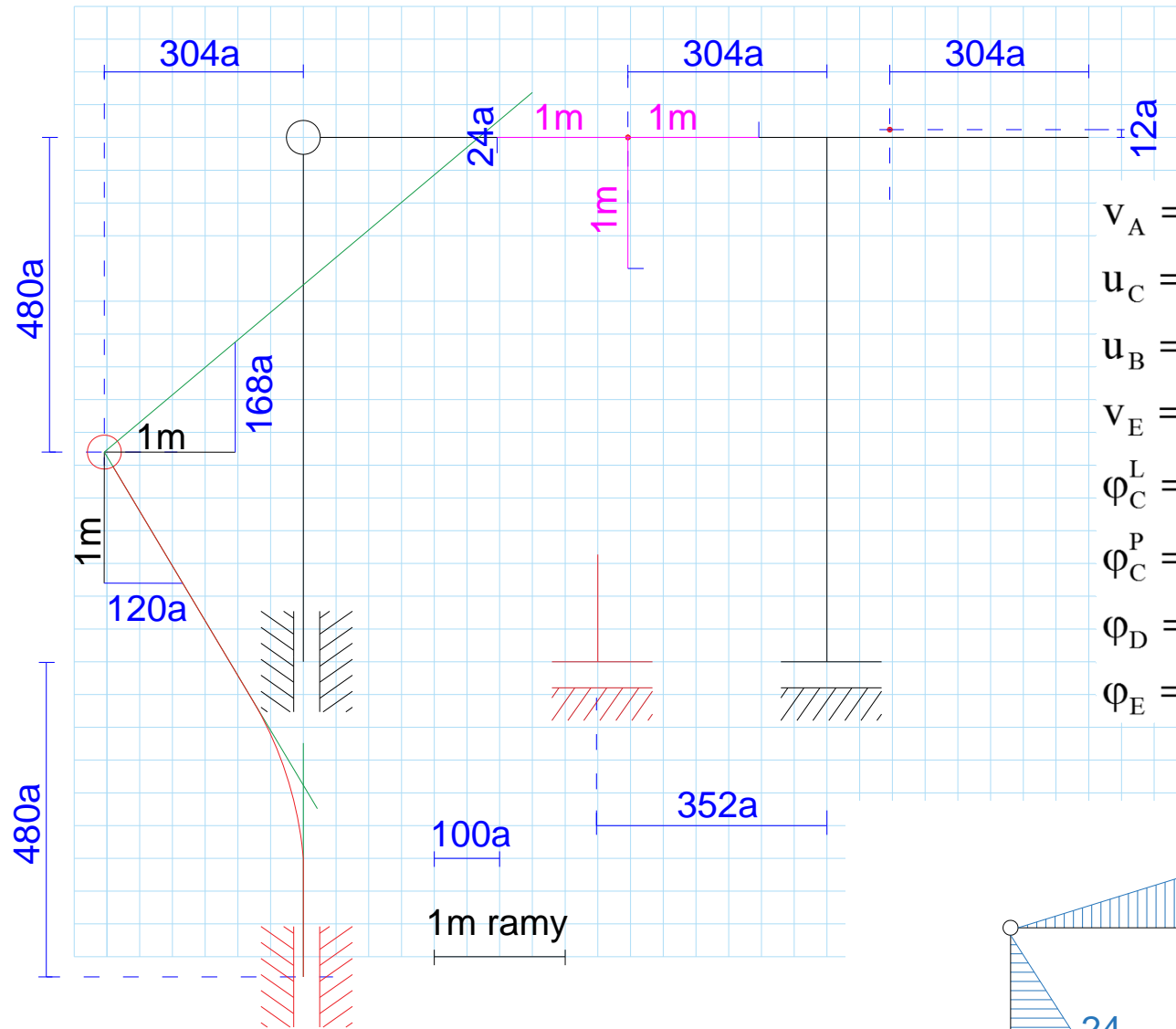
$$\varphi_C^L = -120a$$

$$\varphi_C^P = -168a$$

$$\varphi_D = -24a$$

$$\varphi_E = 12a$$





$$v_A = v_C = 480a$$

$$u_C = u_D = u_E = -304a$$

$$u_B = -352a$$

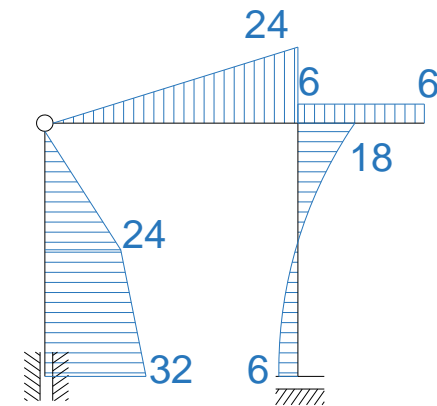
$$v_E = -12a$$

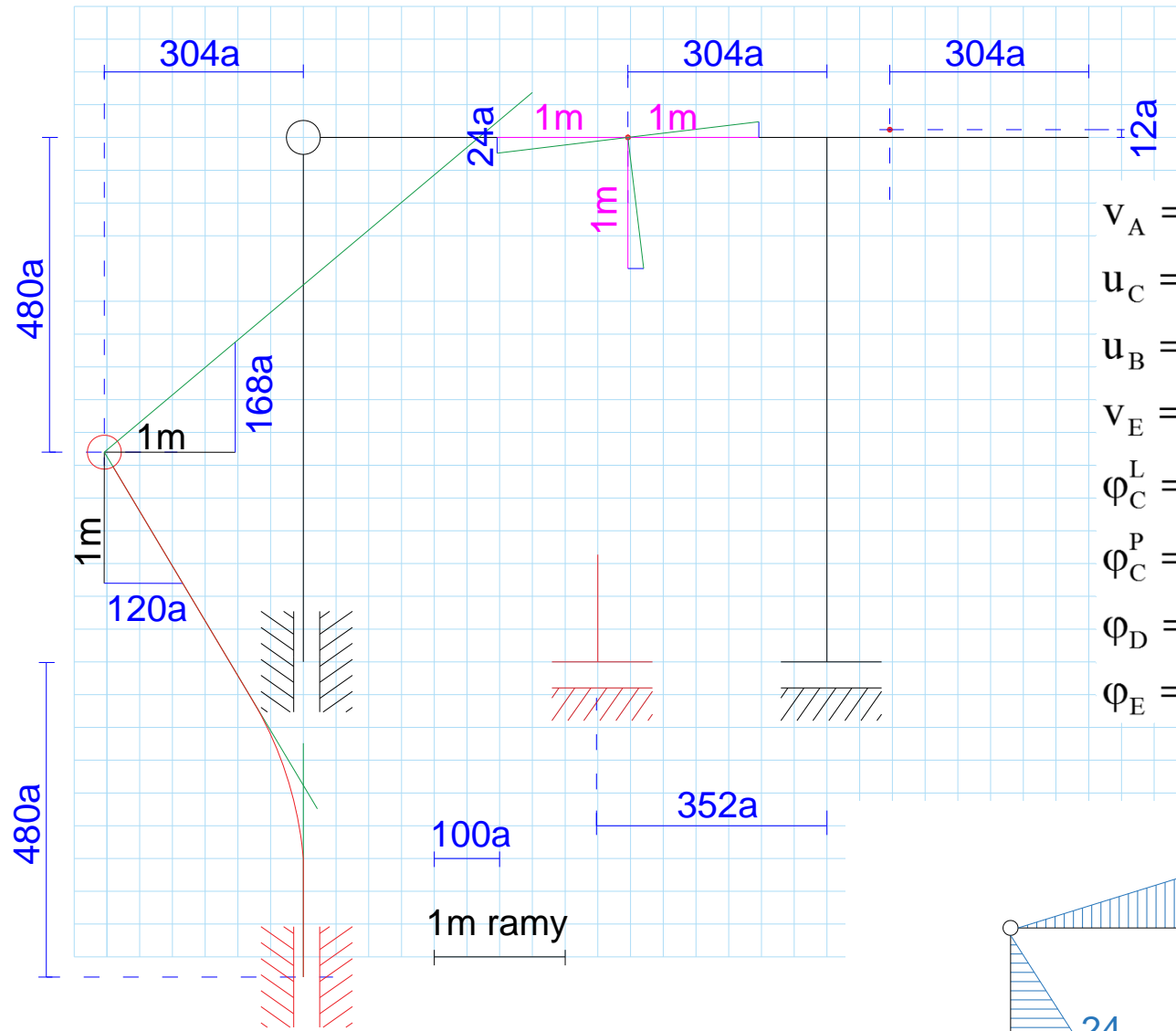
$$\varphi_C^L = -120a$$

$$\varphi_C^P = -168a$$

$$\varphi_D = -24a$$

$$\varphi_E = 12a$$





$$v_A = v_C = 480a$$

$$u_C = u_D = u_E = -304a$$

$$u_B = -352a$$

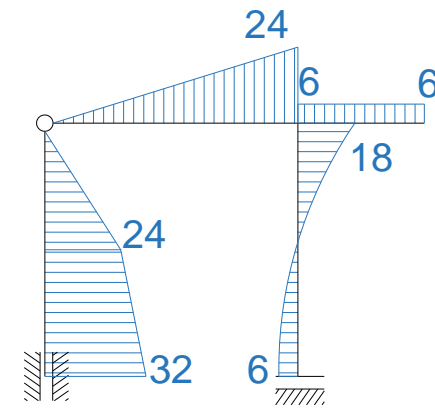
$$v_E = -12a$$

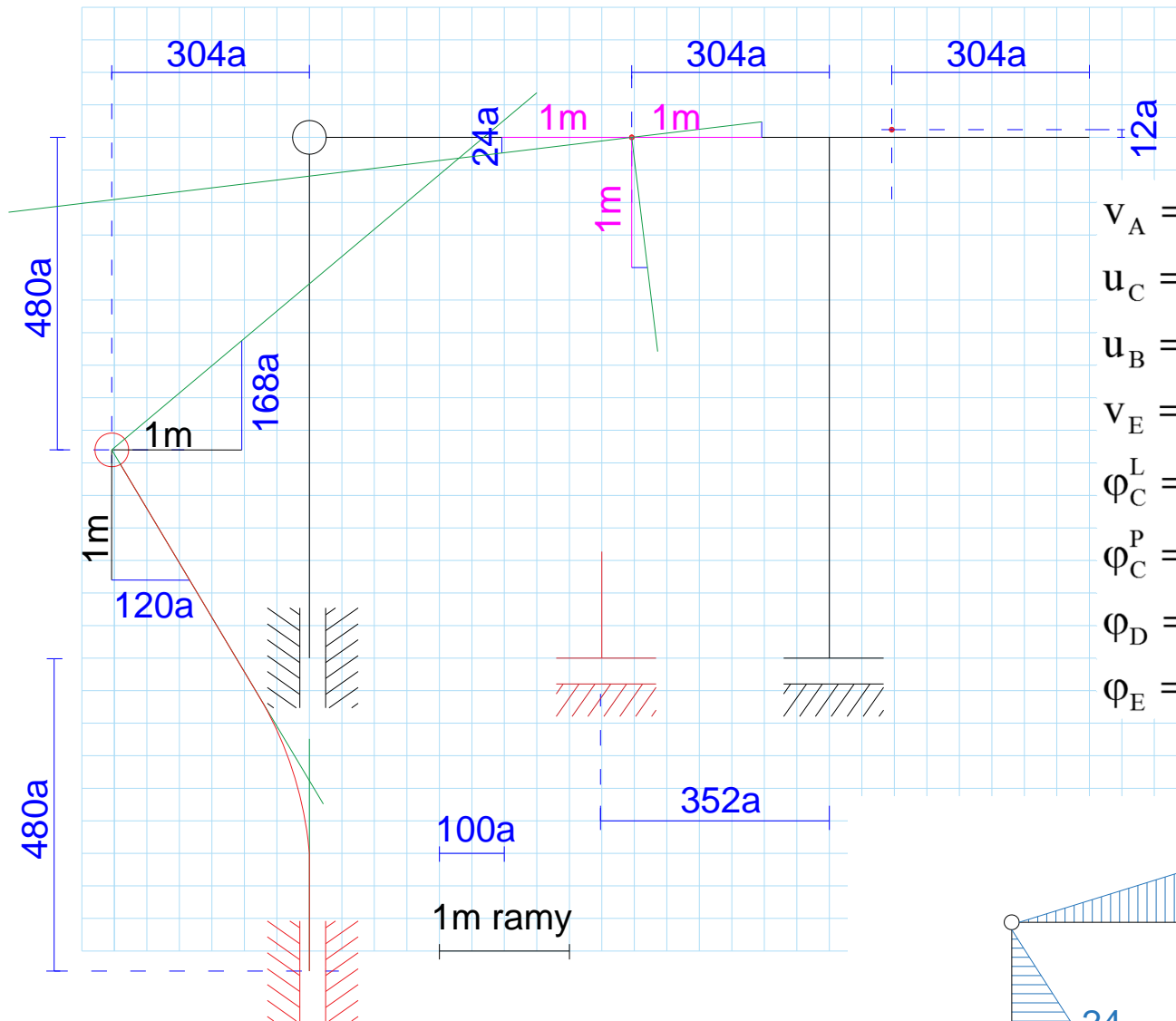
$$\phi_C^L = -120a$$

$$\phi_C^P = -168a$$

$$\phi_D = -24a$$

$$\phi_E = 12a$$





$$v_A = v_C = 480a$$

$$u_C = u_D = u_E = -304a$$

$$u_B = -352a$$

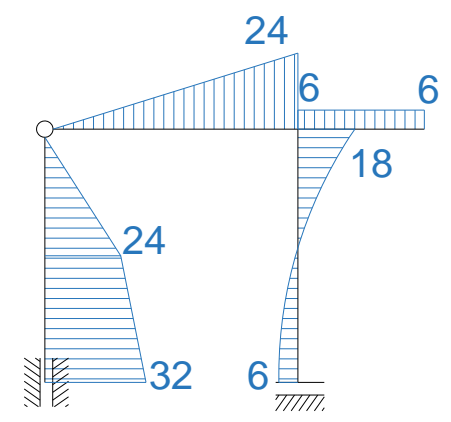
$$v_E = -12a$$

$$\varphi_C^L = -120a$$

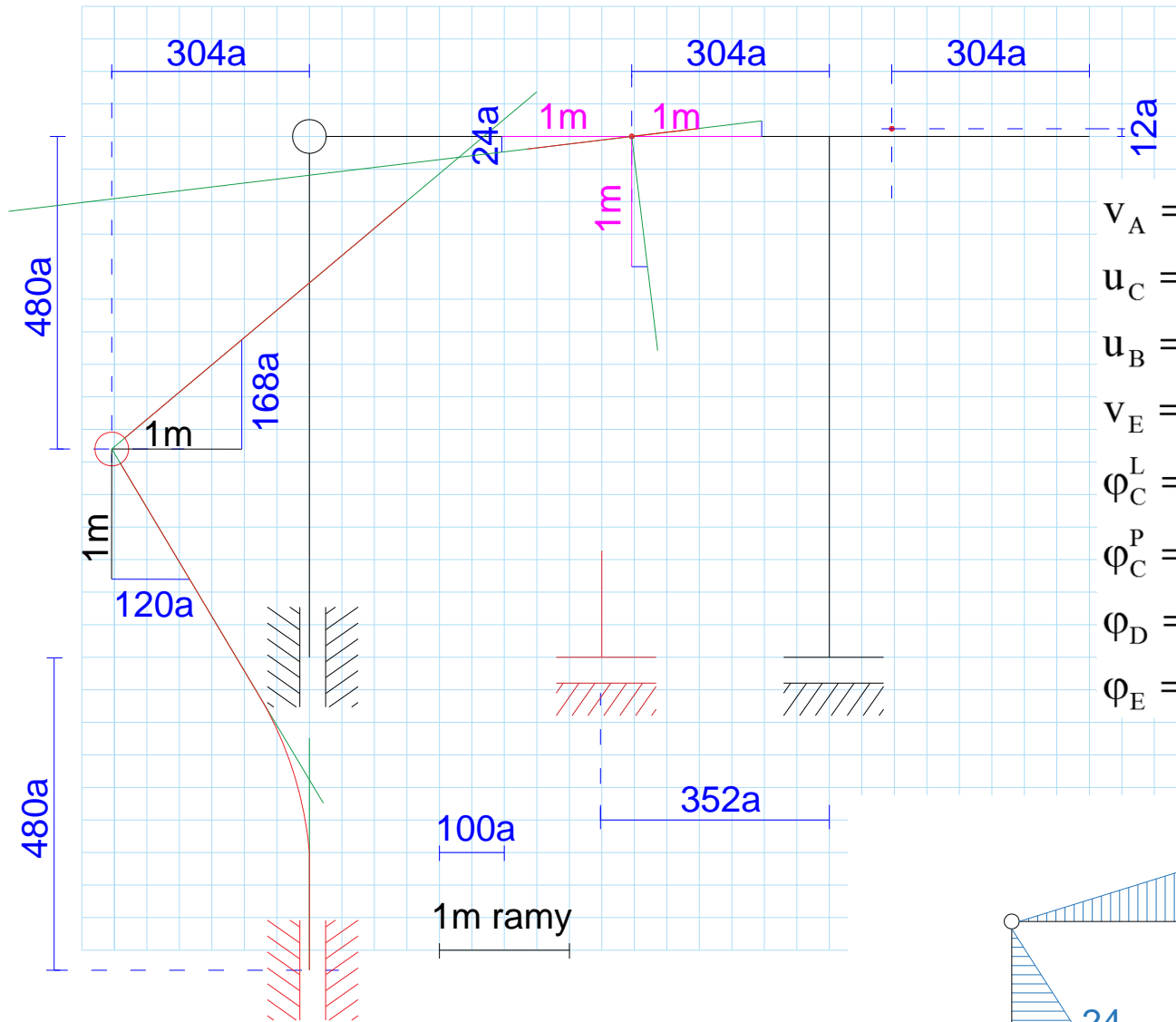
$$\varphi_C^P = -168a$$

$$\varphi_D = -24a$$

$$\varphi_E = 12a$$



1m ramy



$$v_A = v_C = 480a$$

$$u_C = u_D = u_E = -304a$$

$$u_B = -352a$$

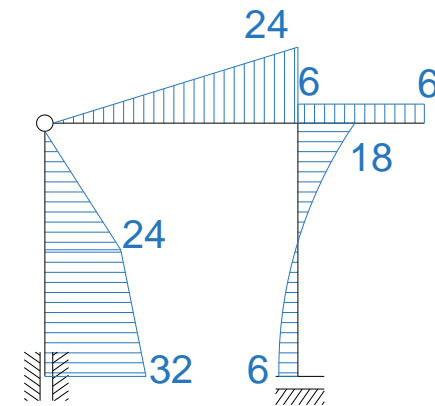
$$v_E = -12a$$

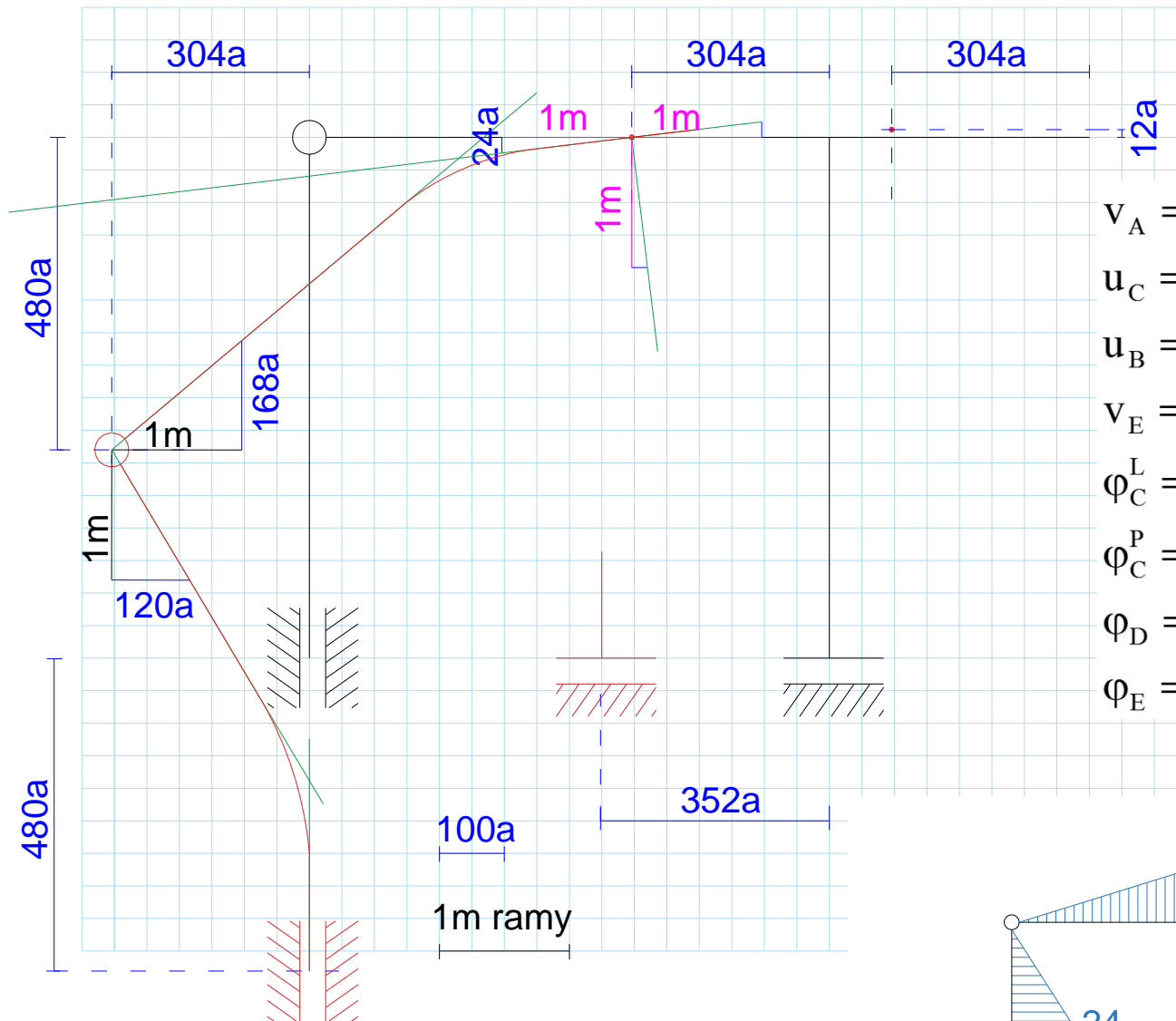
$$\varphi_C^L = -120a$$

$$\varphi_C^P = -168a$$

$$\varphi_D = -24a$$

$$\varphi_E = 12a$$





$$v_A = v_C = 480a$$

$$u_C = u_D = u_E = -304a$$

$$u_B = -352a$$

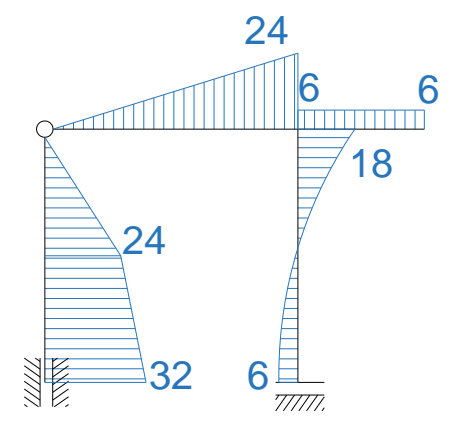
$$v_E = -12a$$

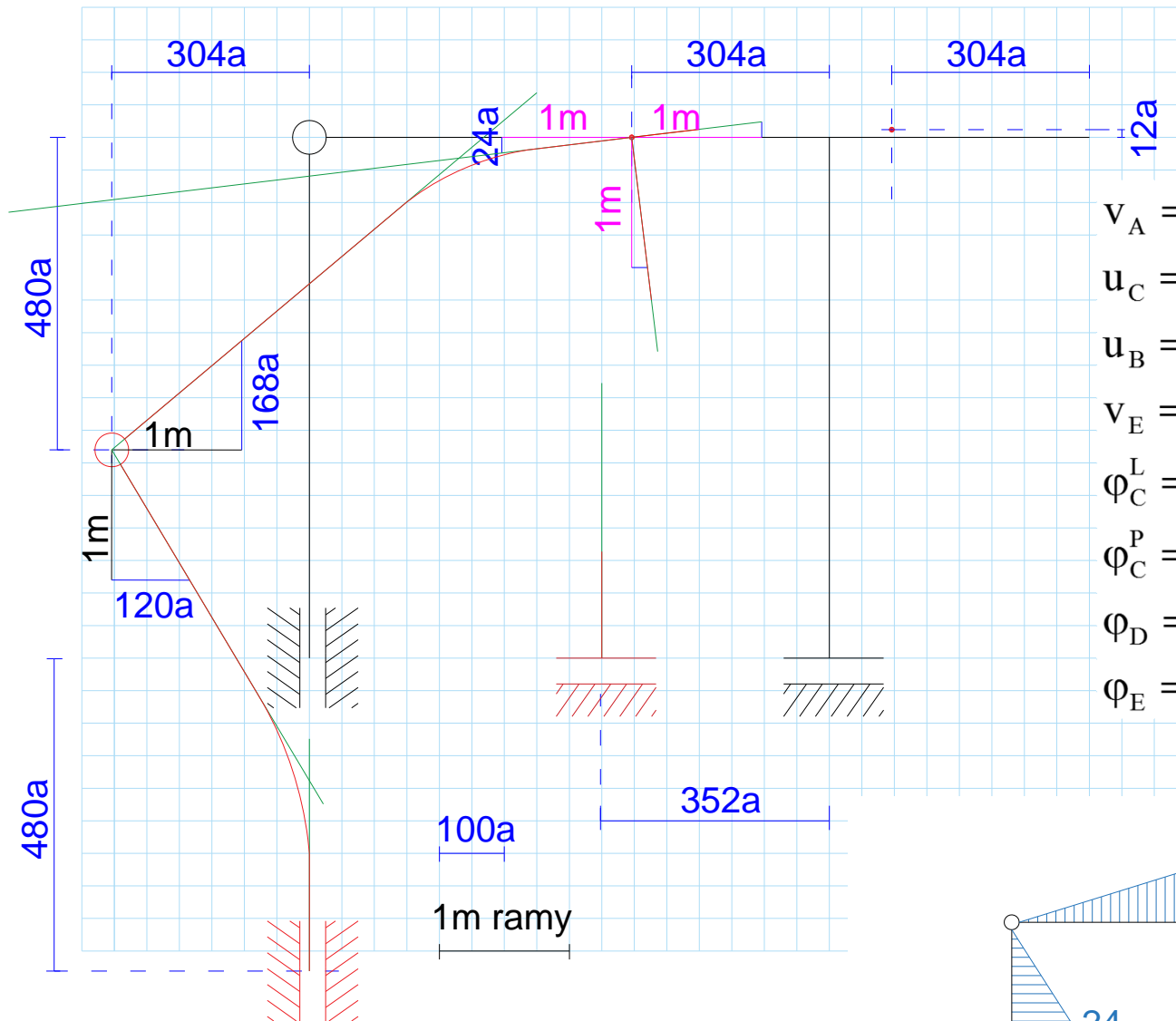
$$\varphi_C^L = -120a$$

$$\varphi_C^P = -168a$$

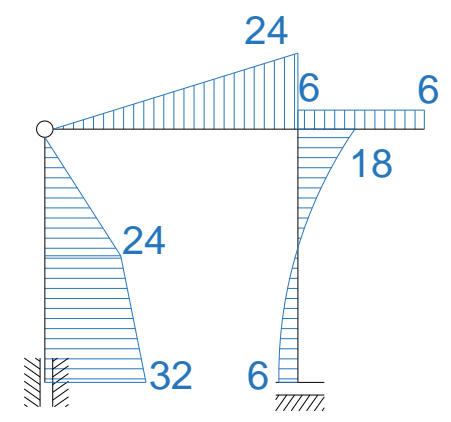
$$\varphi_D = -24a$$

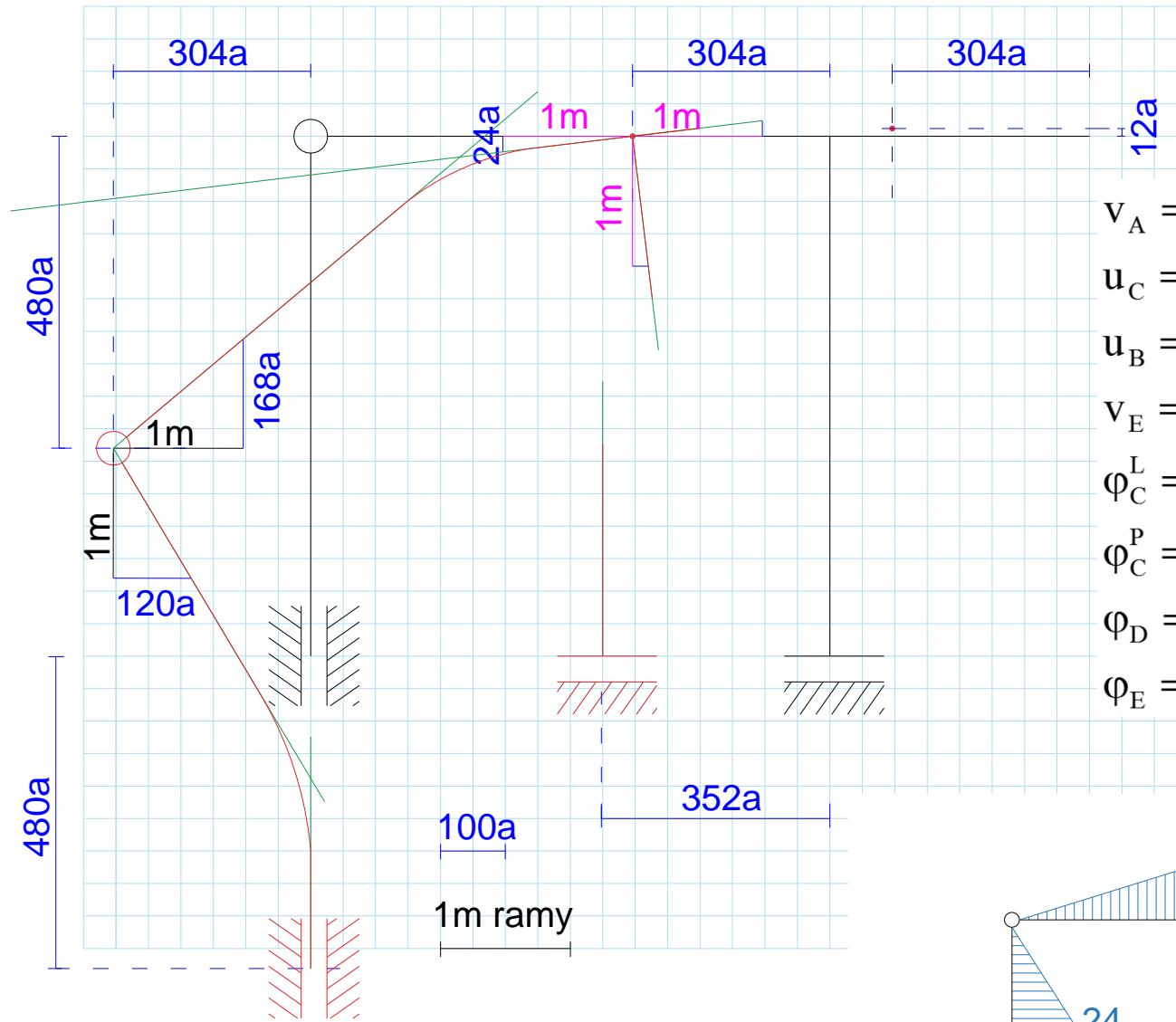
$$\varphi_E = 12a$$





- $v_A = v_C = 480a$
- $u_C = u_D = u_E = -304a$
- $u_B = -352a$
- $v_E = -12a$
- $\varphi_C^L = -120a$
- $\varphi_C^P = -168a$
- $\varphi_D = -24a$
- $\varphi_E = 12a$





$$v_A = v_C = 480a$$

$$u_C = u_D = u_E = -304a$$

$$u_B = -352a$$

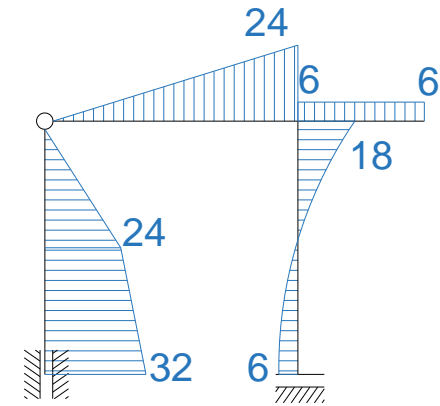
$$v_E = -12a$$

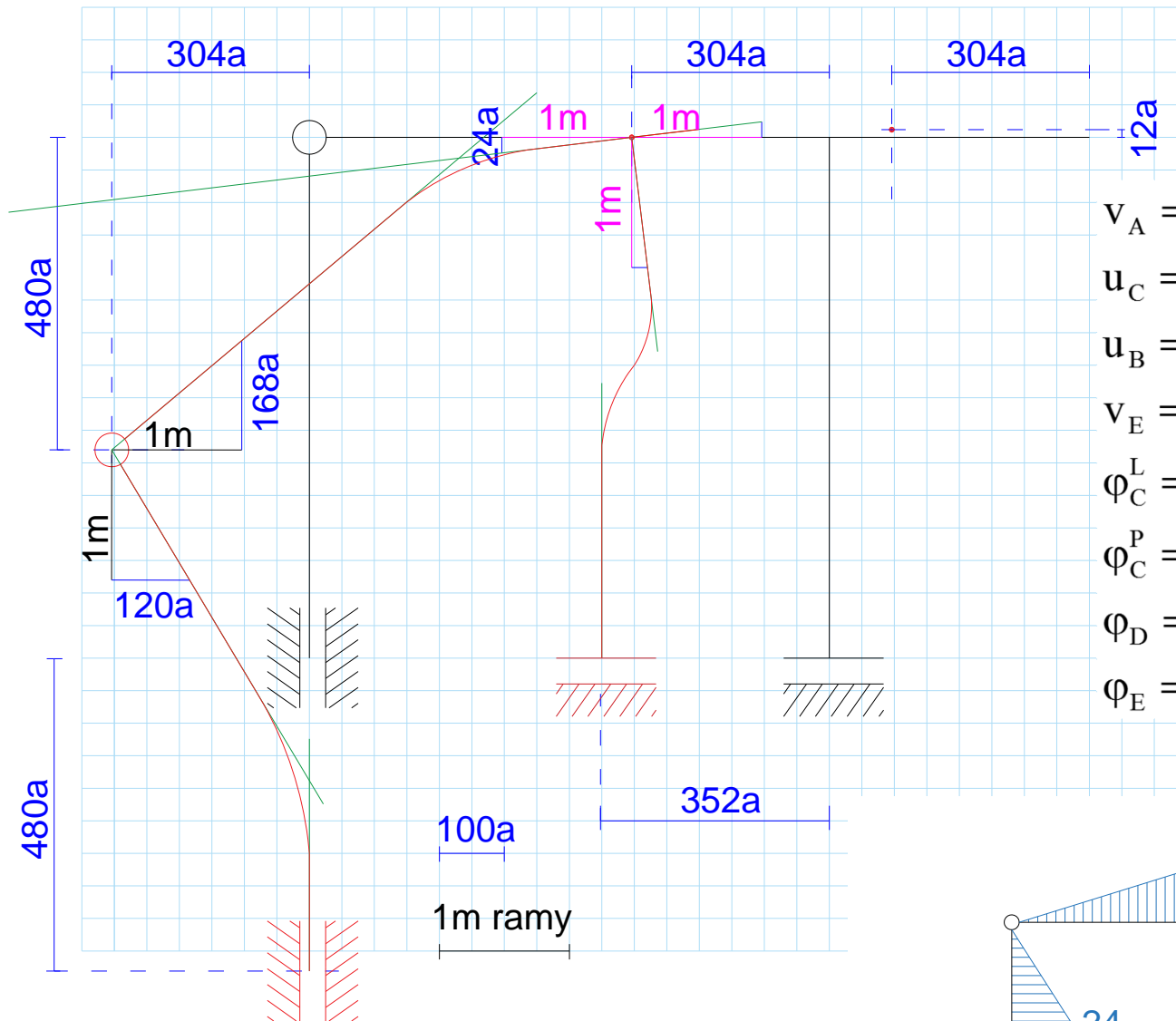
$$\phi_C^L = -120a$$

$$\phi_C^P = -168a$$

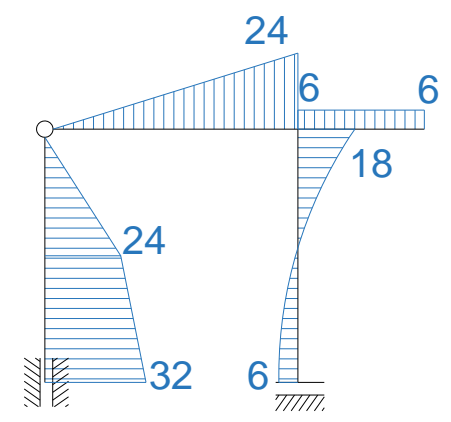
$$\phi_D = -24a$$

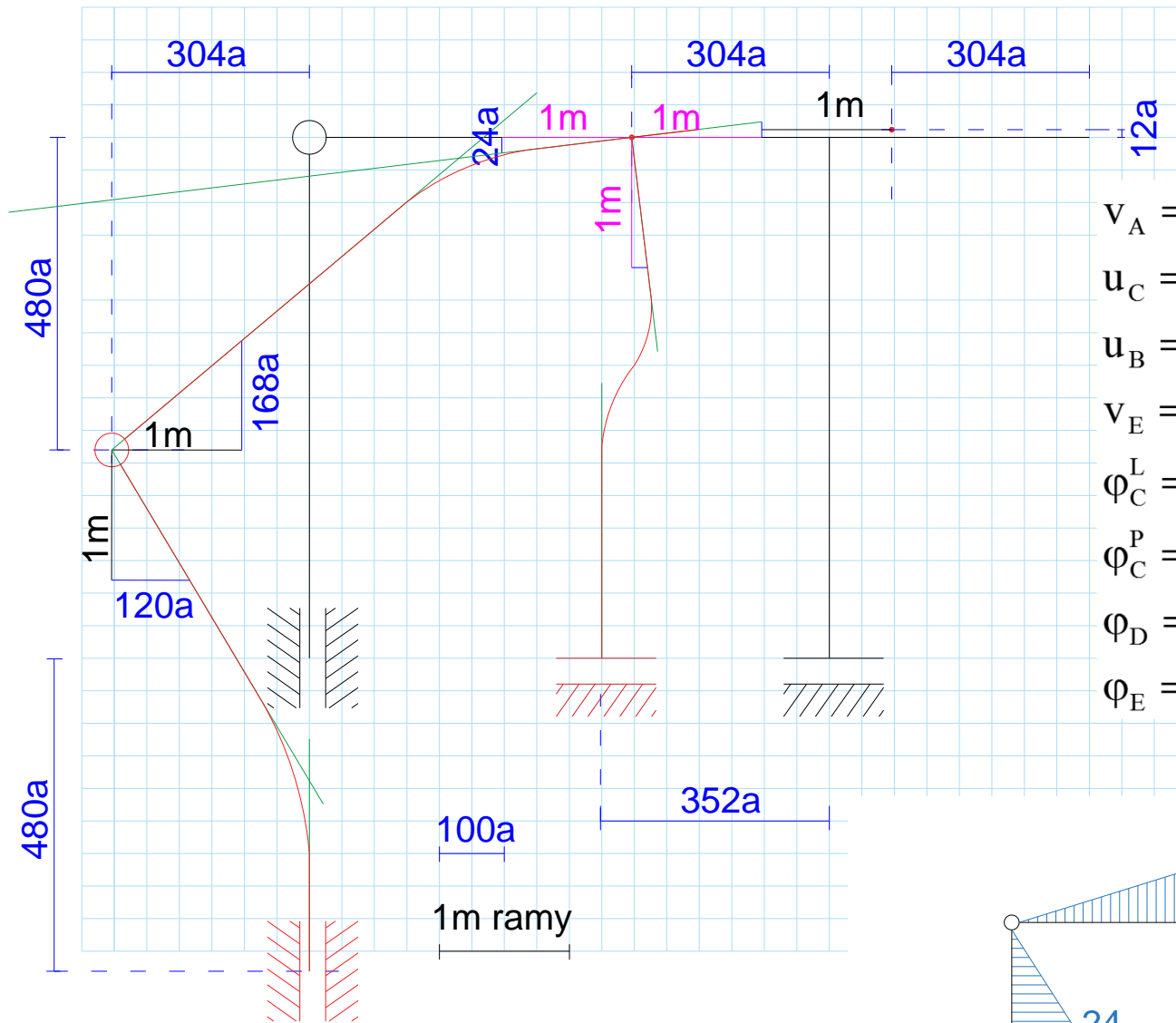
$$\phi_E = 12a$$





- $v_A = v_C = 480a$
- $u_C = u_D = u_E = -304a$
- $u_B = -352a$
- $v_E = -12a$
- $\varphi_C^L = -120a$
- $\varphi_C^P = -168a$
- $\varphi_D = -24a$
- $\varphi_E = 12a$





$$v_A = v_C = 480a$$

$$u_C = u_D = u_E = -304a$$

$$u_B = -352a$$

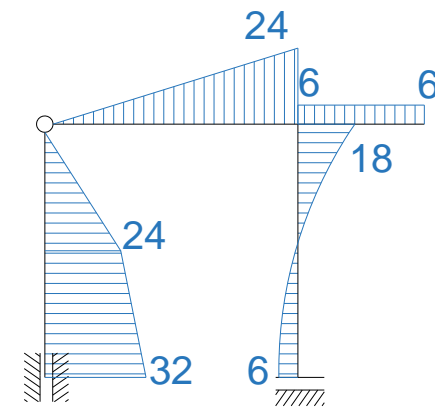
$$v_E = -12a$$

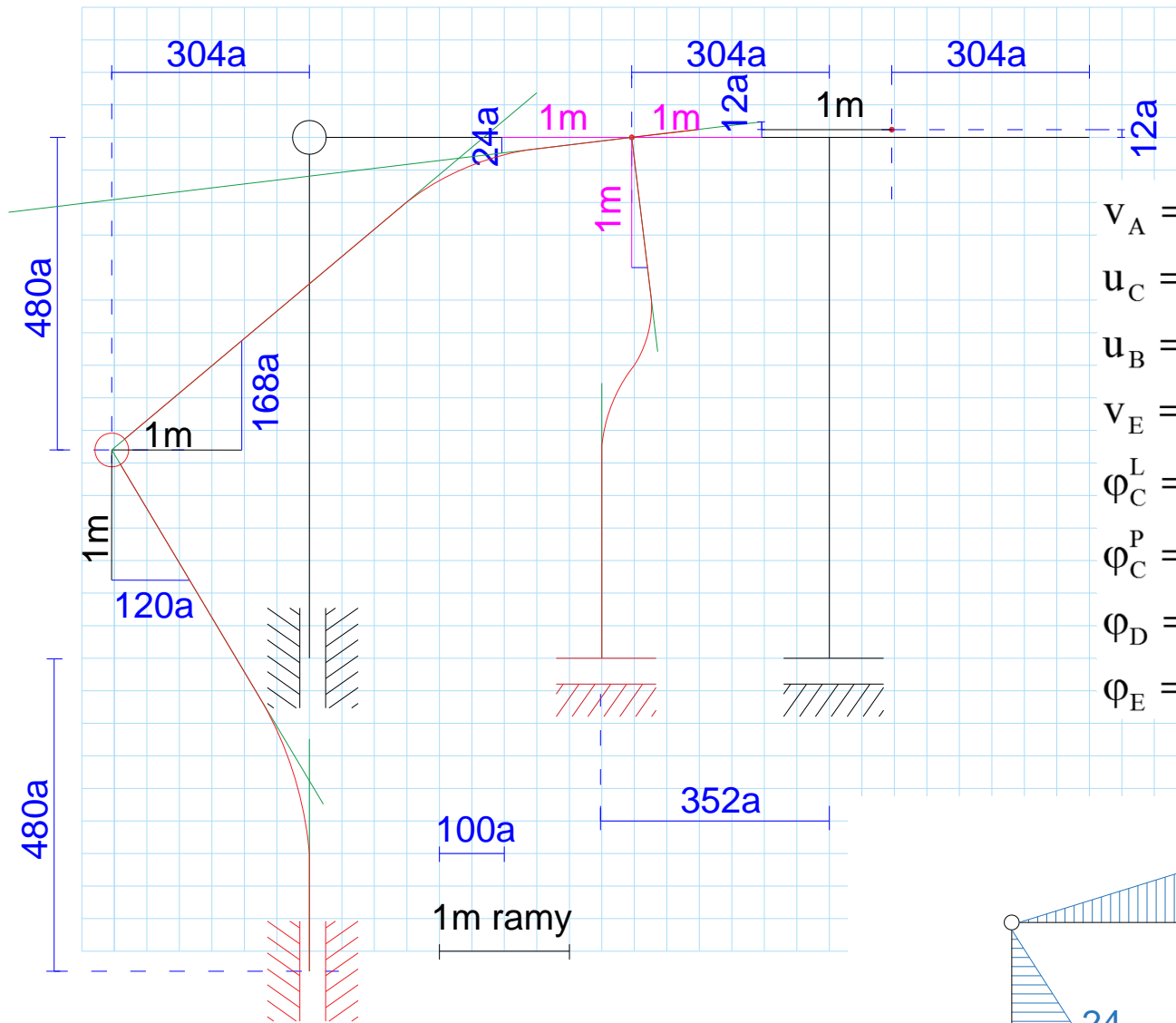
$$\phi_C^L = -120a$$

$$\phi_C^P = -168a$$

$$\phi_D = -24a$$

$$\phi_E = 12a$$





$$v_A = v_C = 480a$$

$$u_C = u_D = u_E = -304a$$

$$u_B = -352a$$

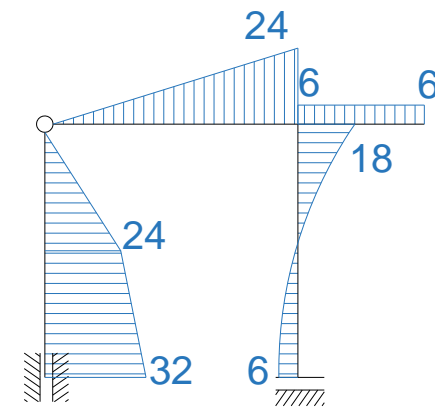
$$v_E = -12a$$

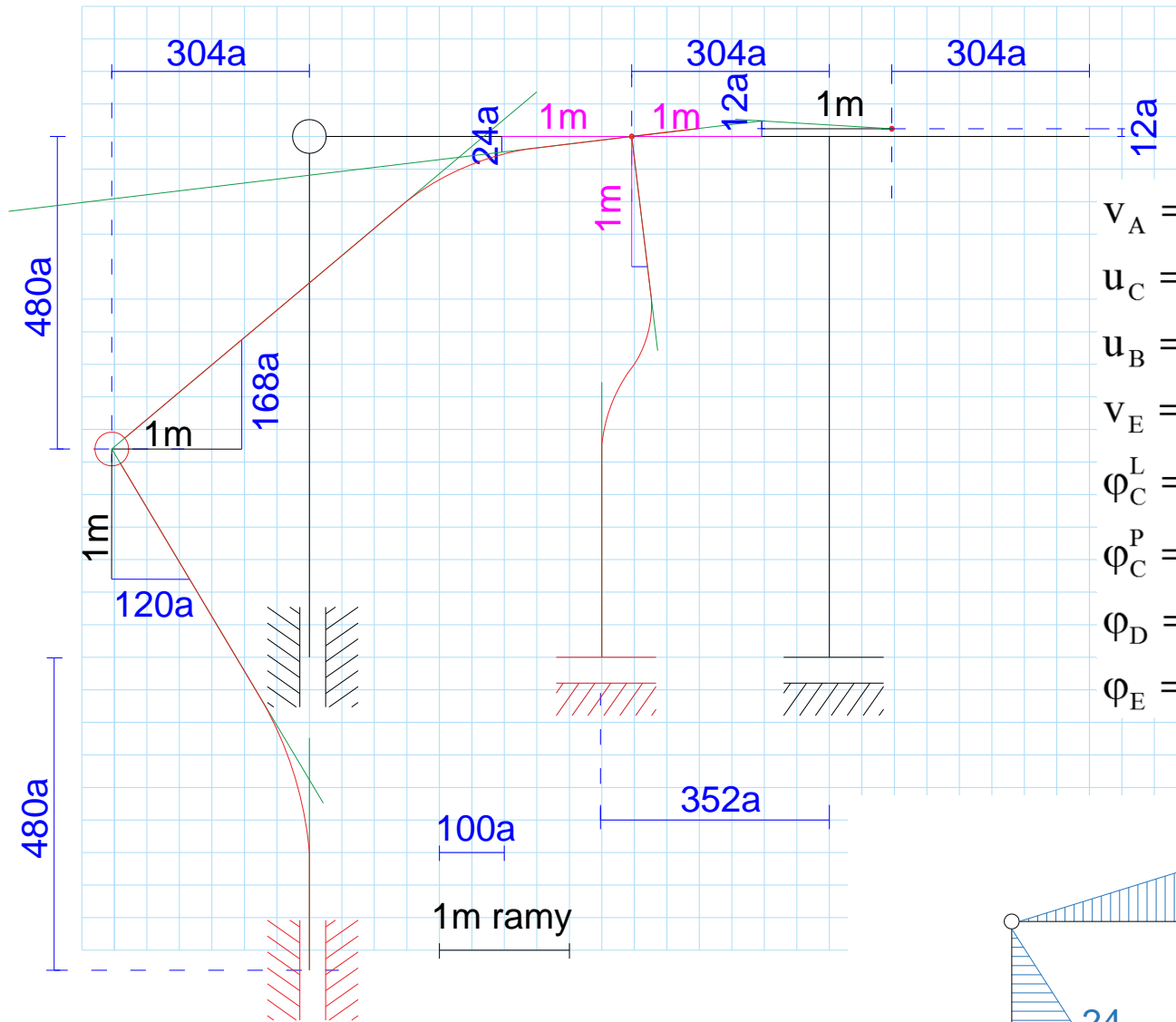
$$\varphi_C^L = -120a$$

$$\varphi_C^P = -168a$$

$$\varphi_D = -24a$$

$$\varphi_E = 12a$$





$$v_A = v_C = 480a$$

$$u_C = u_D = u_E = -304a$$

$$u_B = -352a$$

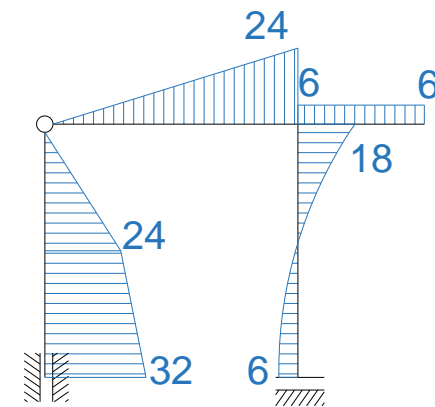
$$v_E = -12a$$

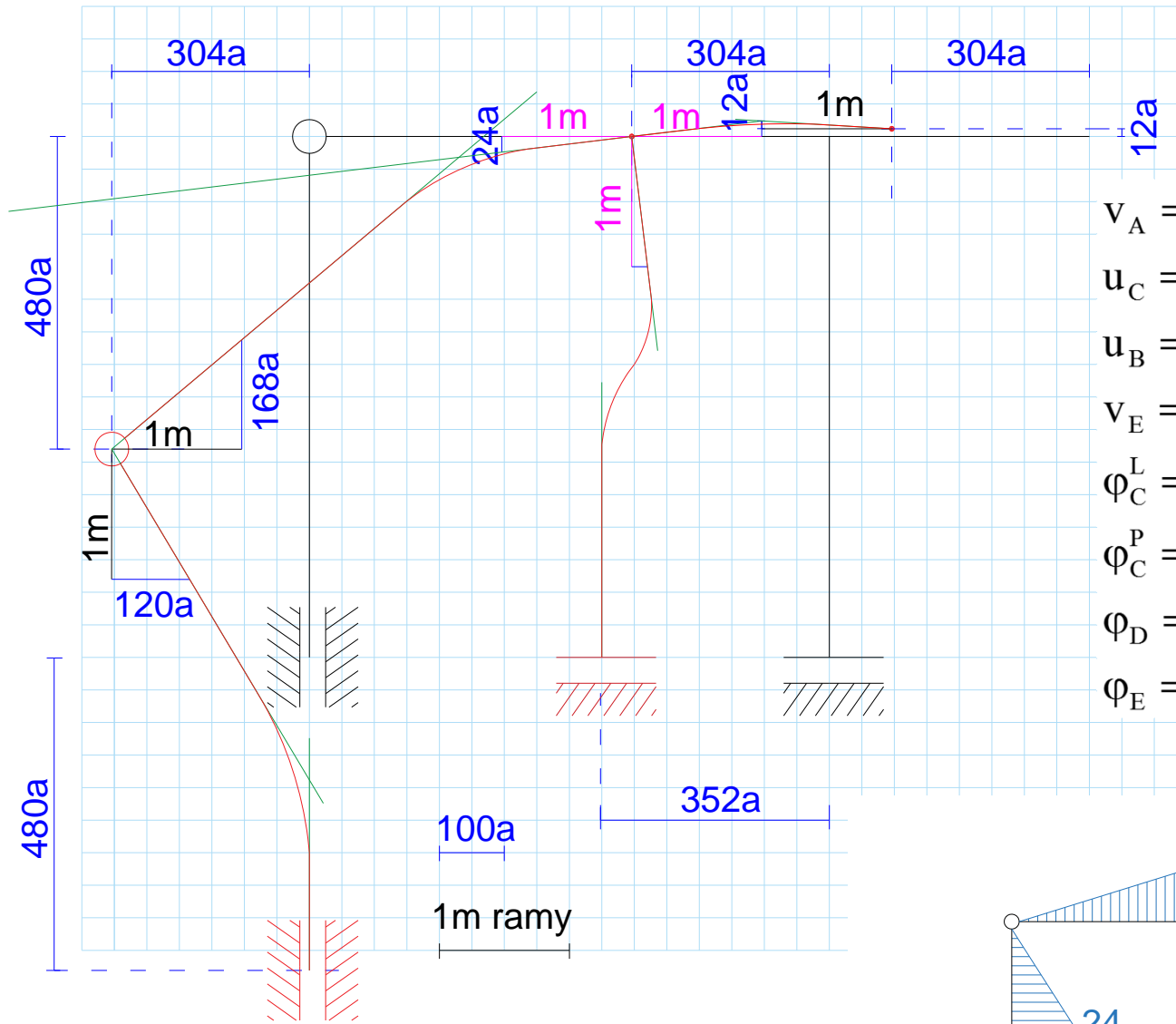
$$\varphi_C^L = -120a$$

$$\varphi_C^P = -168a$$

$$\varphi_D = -24a$$

$$\varphi_E = 12a$$





$$v_A = v_C = 480a$$

$$u_C = u_D = u_E = -304a$$

$$u_B = -352a$$

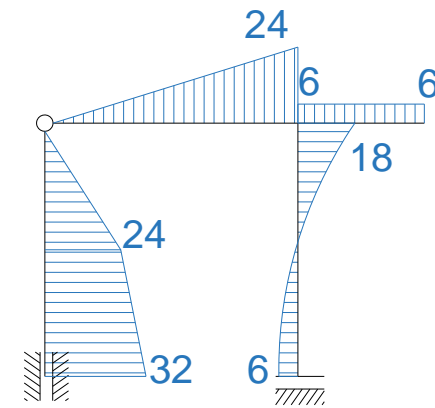
$$v_E = -12a$$

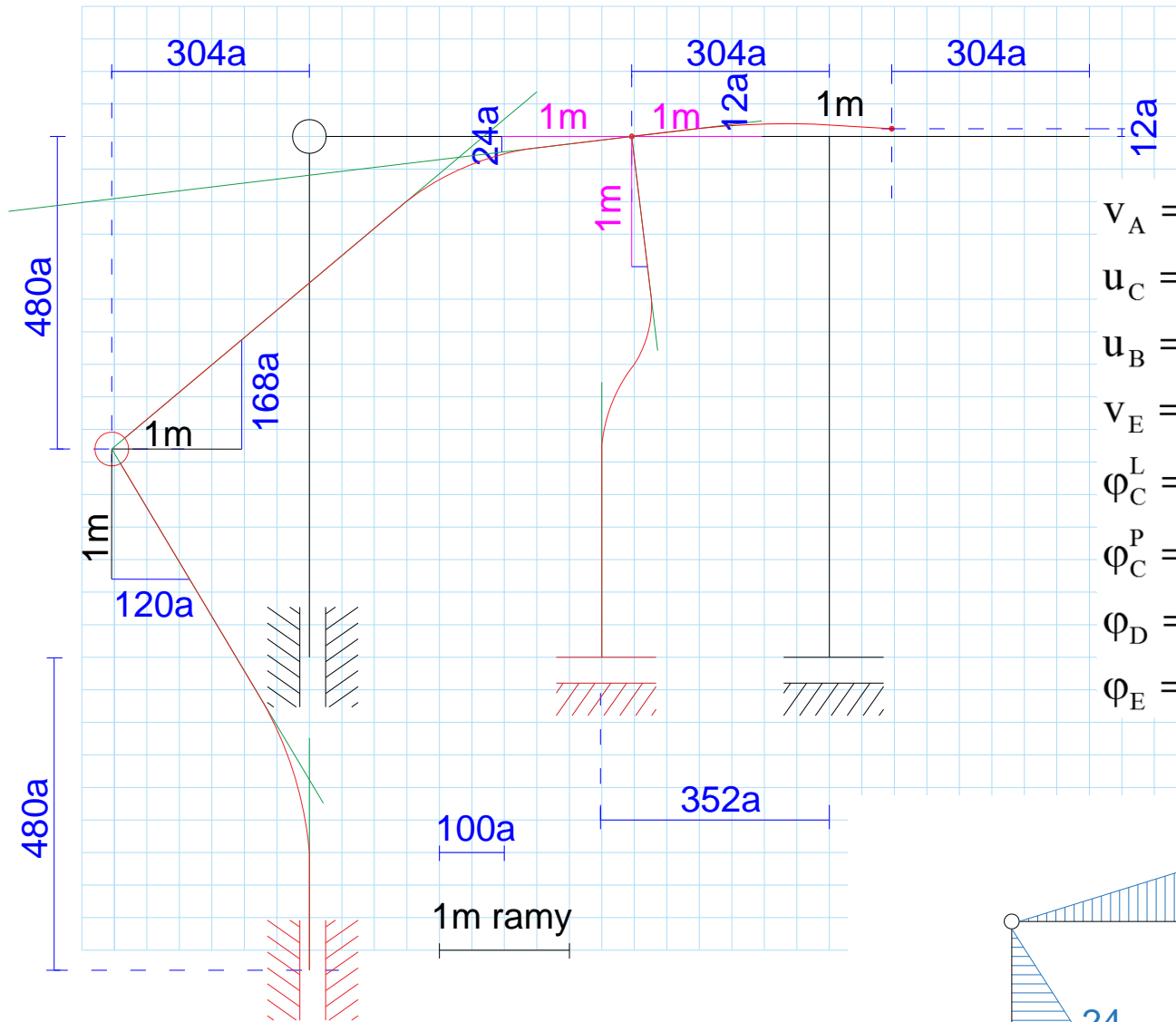
$$\varphi_C^L = -120a$$

$$\varphi_C^P = -168a$$

$$\varphi_D = -24a$$

$$\varphi_E = 12a$$





$$v_A = v_C = 480a$$

$$u_C = u_D = u_E = -304a$$

$$u_B = -352a$$

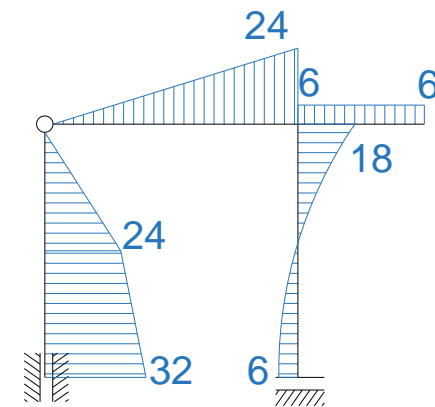
$$v_E = -12a$$

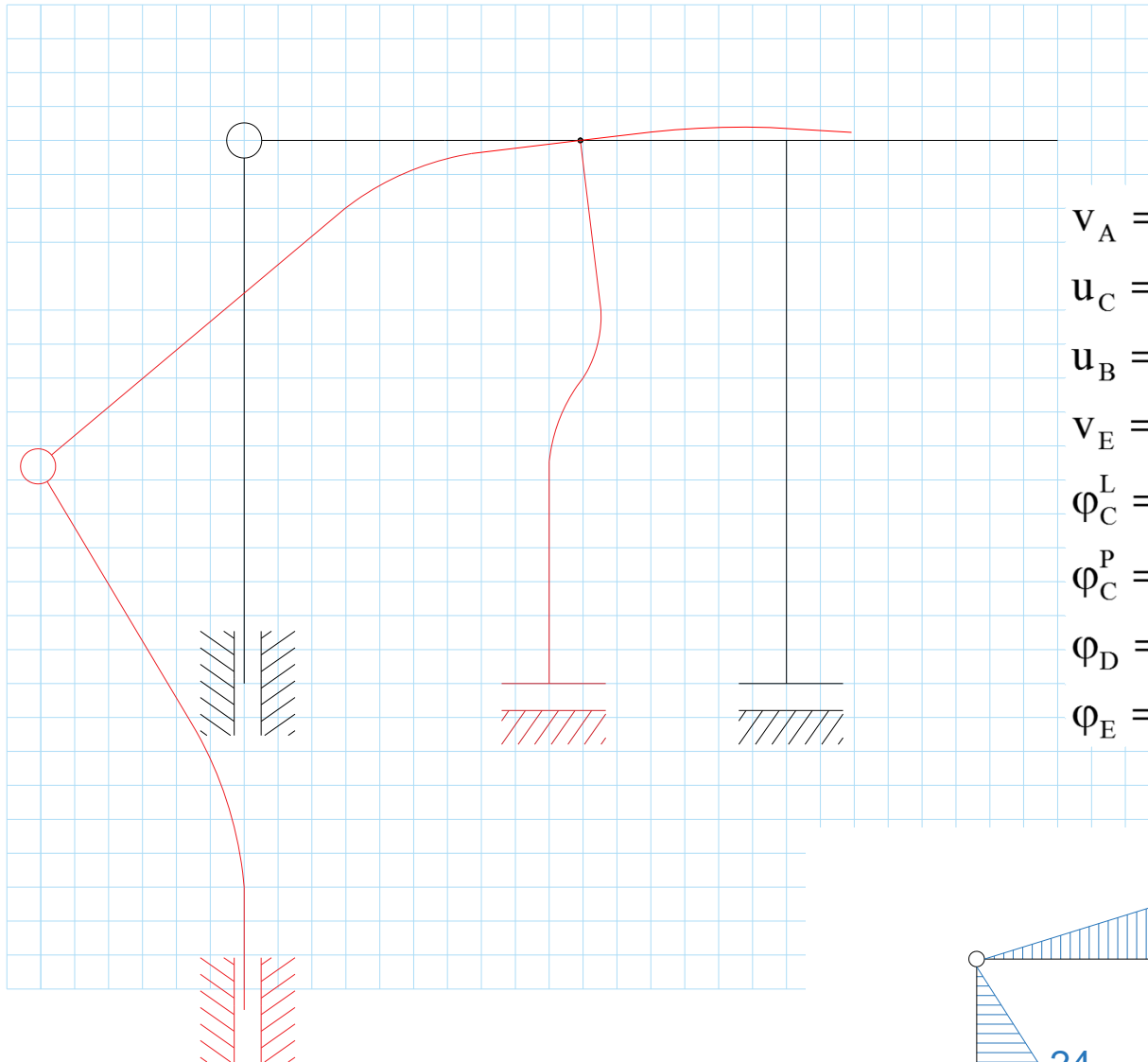
$$\phi_C^L = -120a$$

$$\phi_C^P = -168a$$

$$\phi_D = -24a$$

$$\phi_E = 12a$$





$$v_A = v_C = 480a$$

$$u_C = u_D = u_E = -304a$$

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$$\varphi_C^L = -120a$$

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$$\varphi_D = -24a$$

$$\varphi_E = 12a$$

