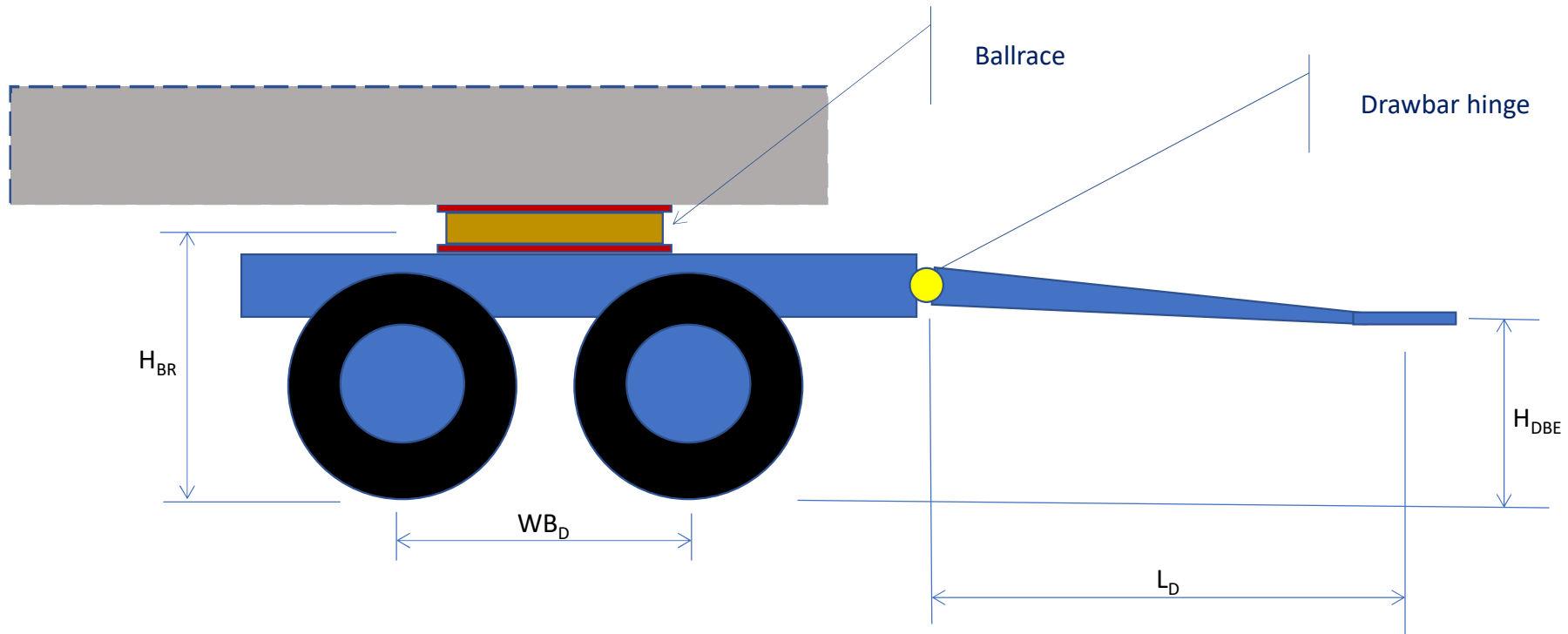
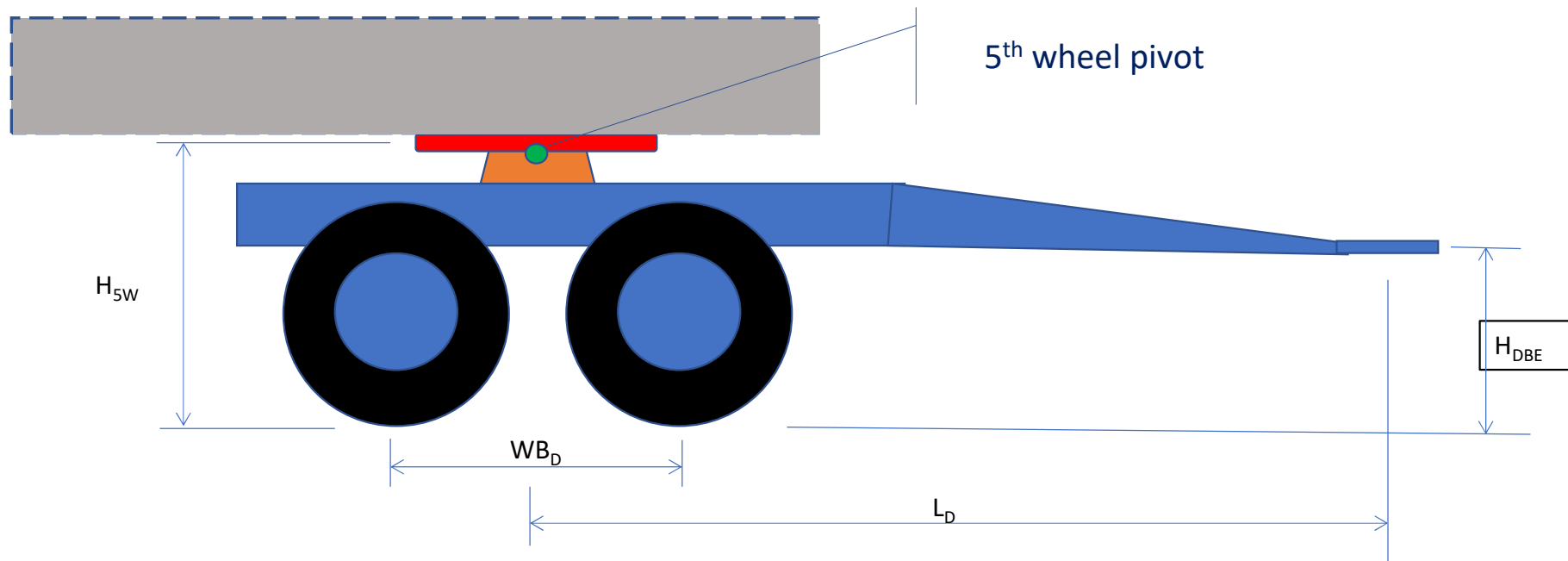


Forward axle group of full trailer



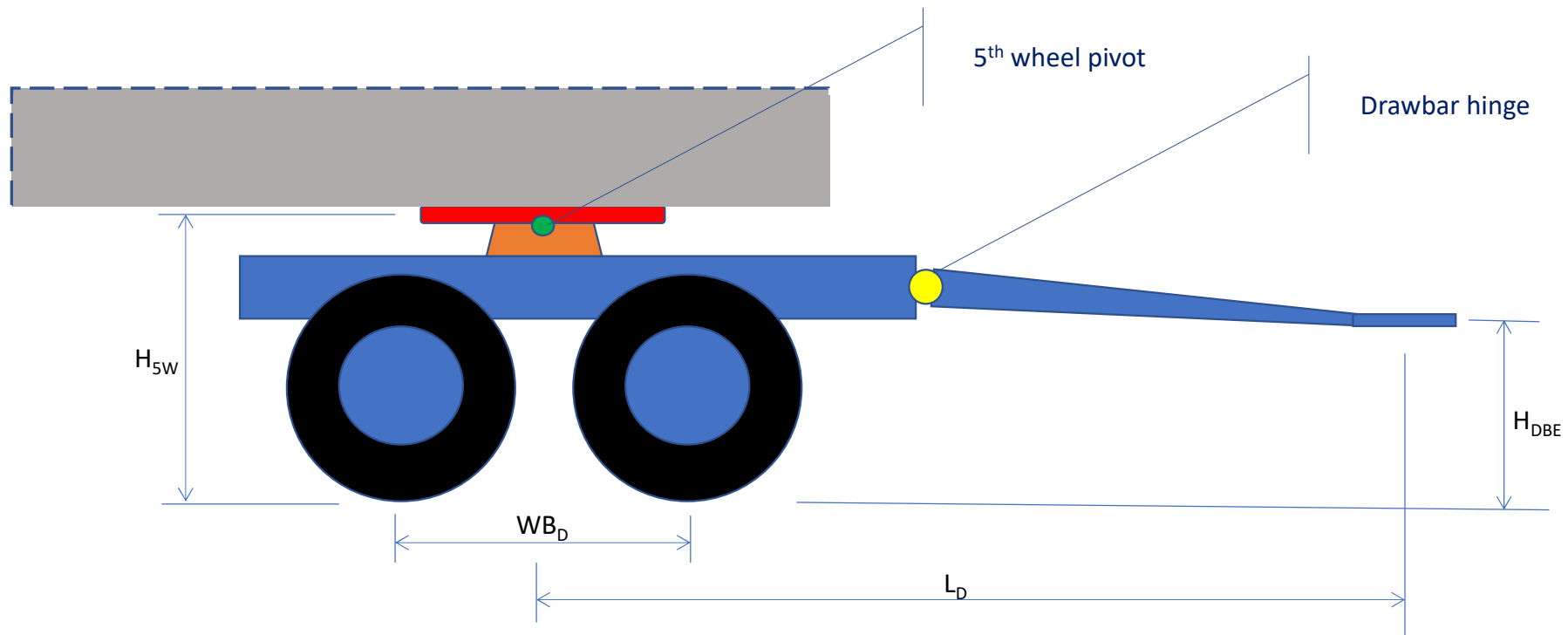
This forward axle group is fully pitching constrained to the trailer frame through the ball race

Rigid drawbar dolly with semi-trailer



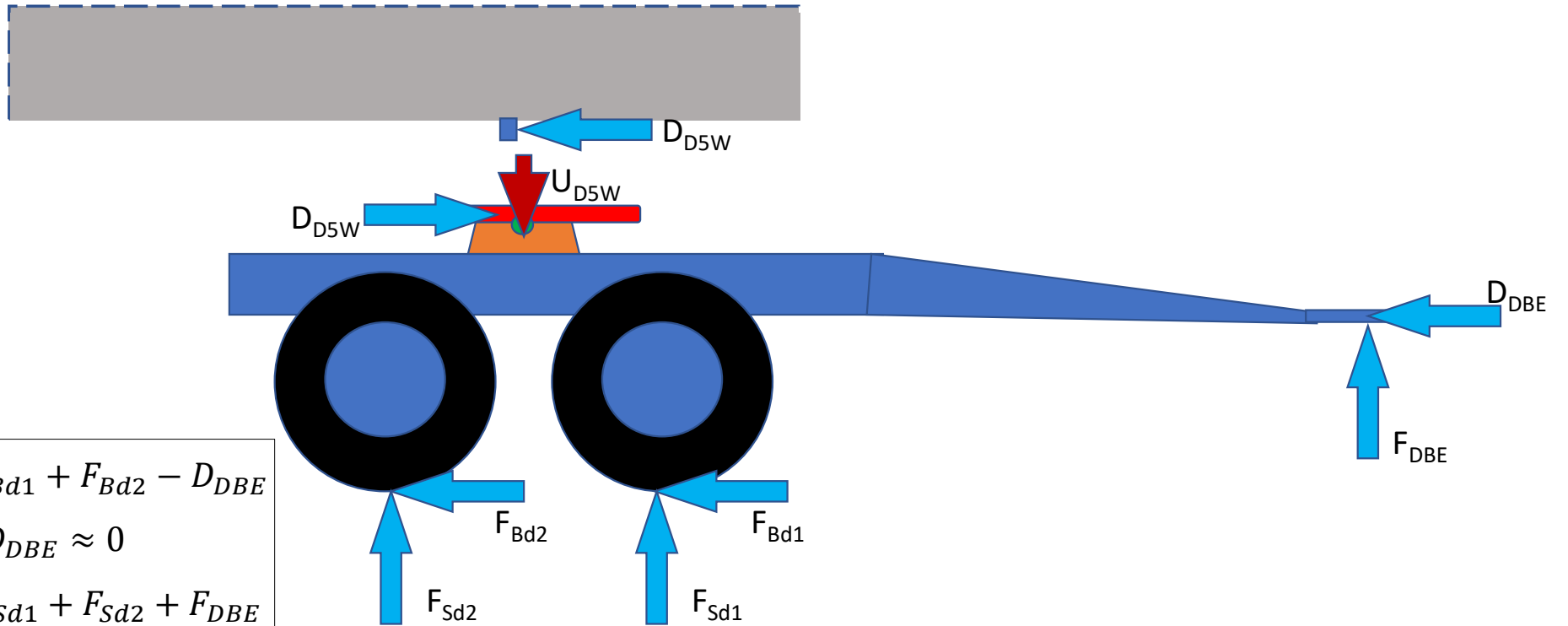
This dolly is partially pitching constrained through the rigid drawbar

Hinged drawbar dolly with semi-trailer



This dolly is with limited pitching constraint thanks to 5th wheel pivot axle, drawbar hinge and a short wheelbase, WB_D .

Rigid drawbar dolly with semi-trailer



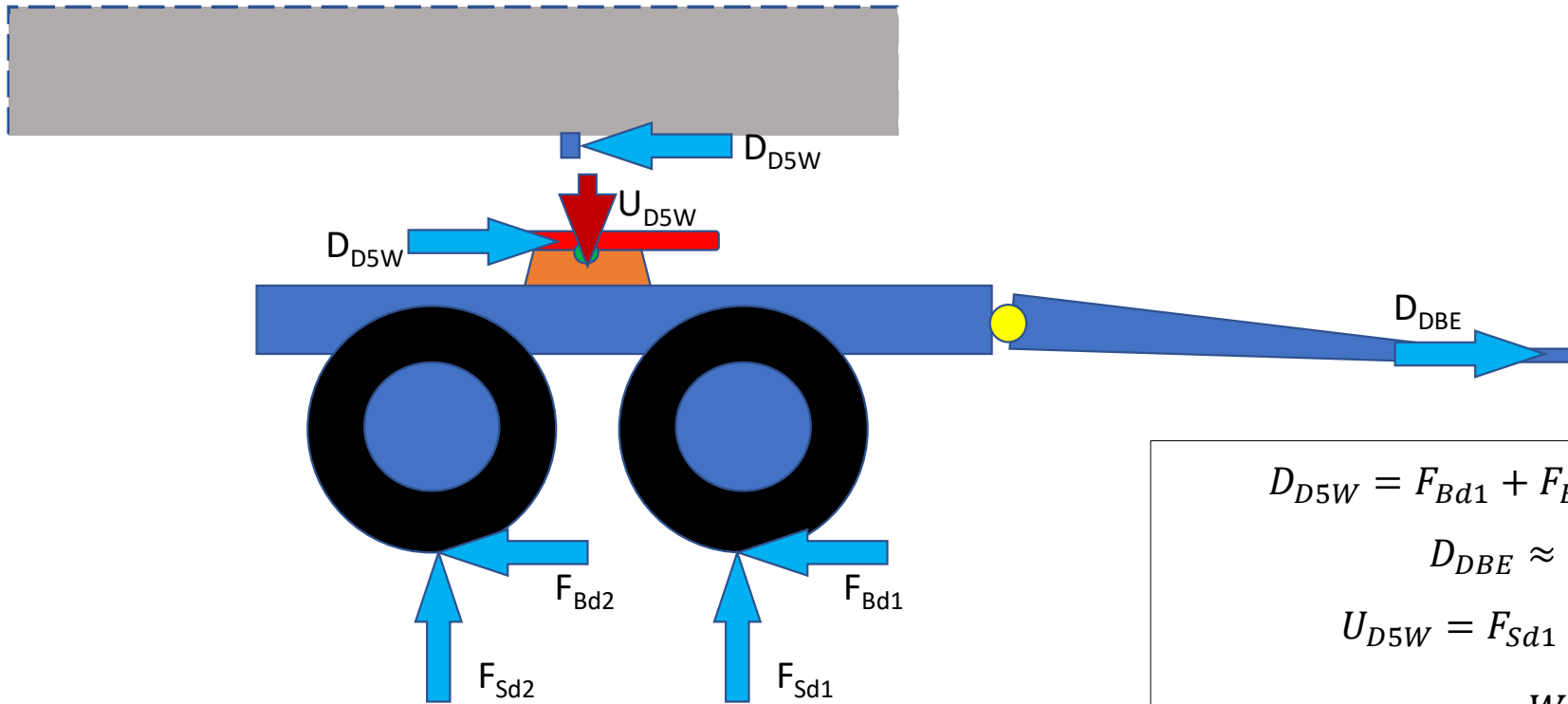
$$D_{D5W} = F_{Bd1} + F_{Bd2} - D_{DBE}$$

$$D_{DBE} \approx 0$$

$$U_{D5W} = F_{Sd1} + F_{Sd2} + F_{DBE}$$

$$F_{DBE} \approx \frac{D_{D5W} * H_{5W}}{H_{DBE}}$$

Hinged drawbar dolly with semi-trailer



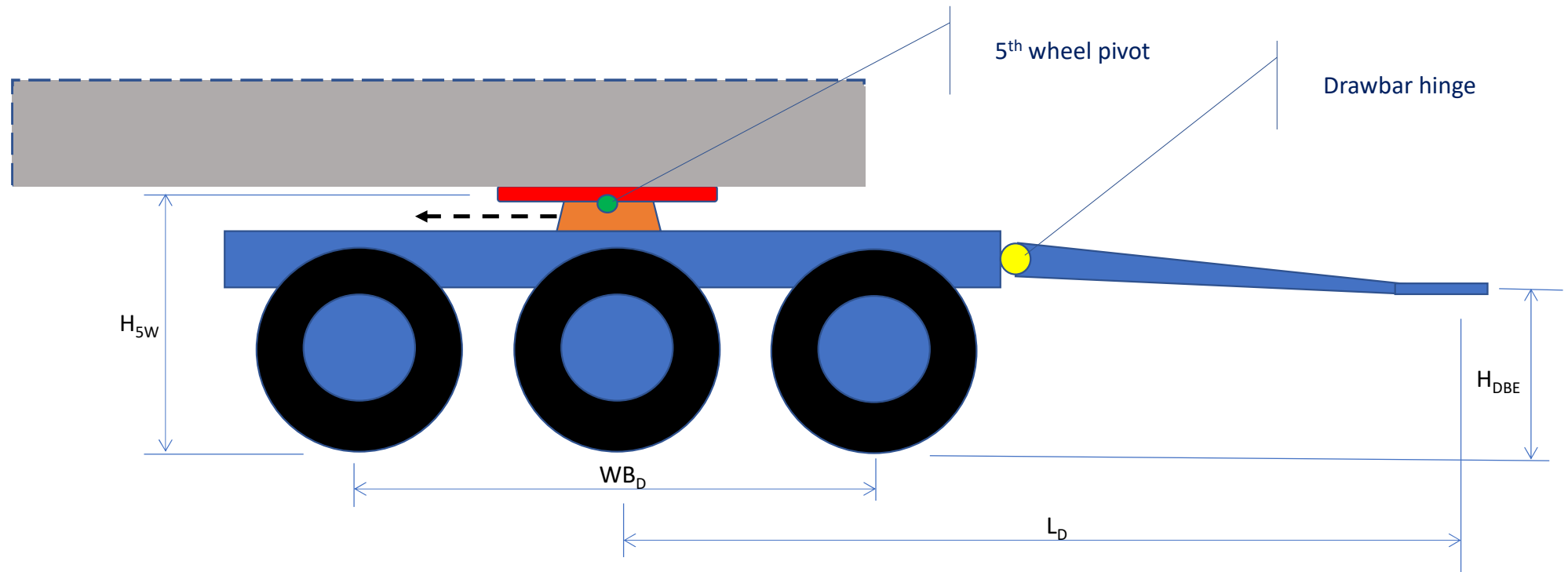
$$D_{D5W} = F_{Bd1} + F_{Bd2} - D_{DBE}$$

$$D_{DBE} \approx 0$$

$$U_{D5W} = F_{Sd1} + F_{Sd2}$$

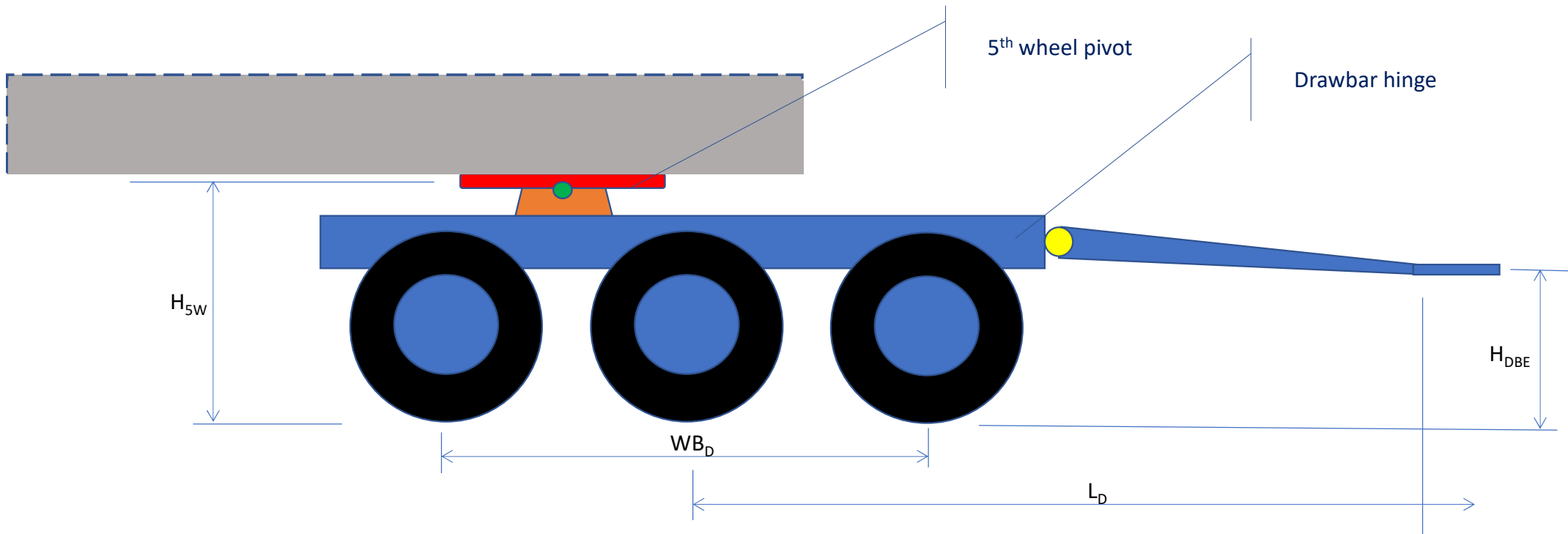
$$D_{D5W} * H_{5W} \approx F_{Sd1} * \frac{WB_D}{2} - F_{Sd2} * \frac{WB_D}{2}$$

Hinged three axle drawbar dolly with semi-trailer



This dolly is with some pitching constraint due to long wheelbase, WB_D .
Moving the 5th some distance aft could balance a braking pitching moment.

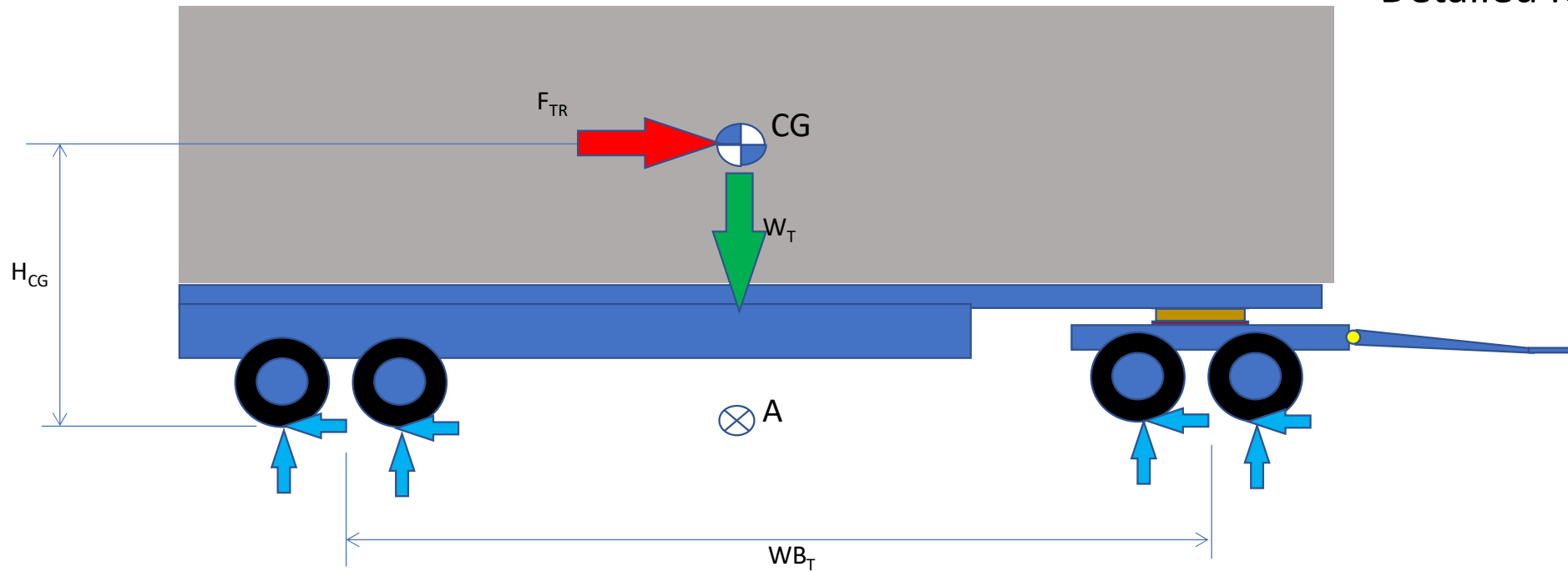
Hinged three axle drawbar dolly with semi-trailer



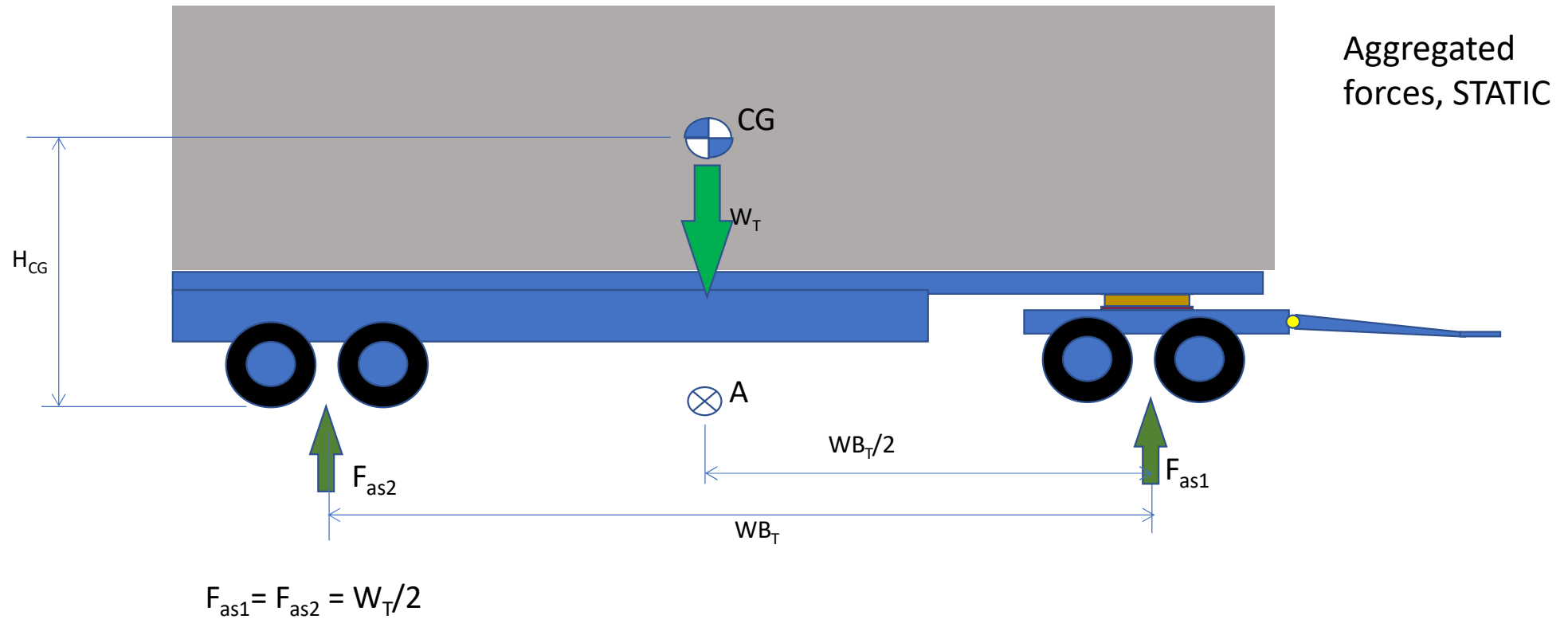
This dolly is with some pitching constraint due to long wheelbase, WB_D .
Moving the 5th some distance aft could balance a braking pitching moment.

Load transfer with a braking full trailer

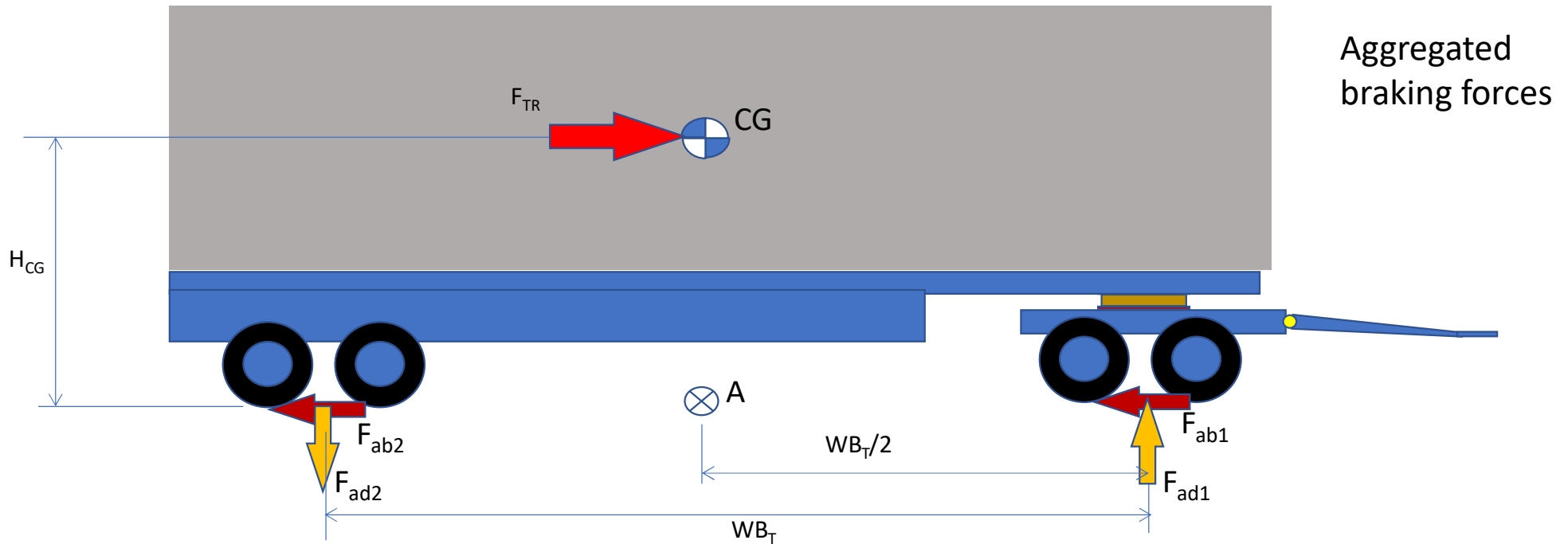
Detailed forces



Load transfer with a braking full trailer



Load transfer with a braking full trailer



Moment equation around point A:

$$W_T = g \cdot M_T ; F_{TR} = r \cdot M_T = F_{ab1} + F_{ab2} ; F_{TR} \cdot H_{CG} = F_{ad1} \cdot WB_T/2 + F_{ad2} \cdot WB_T/2 \quad F_{ad} = F_{ad1} = F_{ad2}$$

$$F_{ad} = F_{TR} \cdot H_{CG} / WB_T \quad \text{With retardation } r = 0,6 \cdot g ; M_T = 20 \text{ tonnes} ; WB_T = 8 \text{ m} ; H_{CG} = 2 \text{ m}$$

$$F_{ad} = 30 \text{ kN} \quad \text{This represents a load transfer of 30 kN}$$