1 G

1.1 Car following

If $\frac{v_y^2 - v_{y-forward}^2}{2a_{max}} < distance_{forward}$,

$$v_{y-forward} = \begin{cases} v_{y-forward} & (car) \\ 0 & (boundary) \end{cases}$$

then for a_y:

$$\frac{(v_y + a_y t)^2 - v_{y-forward}^2}{2a_{max}} = distance_{forward}$$

if $a_y > amax$, then $a_y = amax$, $a_x = 0$.

1.2 Steering

$\delta y_{max} = v_y t$, as $a_y = 0$ when changing direction.
$\delta x_{max} = v_x t + \frac{1}{2} a'_{max} t^2$, and $a'_{max} = min(a_{max}, \frac{v_y - v_x}{t})$, to ensure that the biggest wheel steering angle is $45°$.

$$\forall j, if i \neq j, y_j > y_i - \frac{1}{2} \times length_{type\ i}$$

$$y_j - \frac{1}{2} \times length_{type\ j} \leq y_i + \delta y_{max}$$

$$|y_i - y_j| \leq \delta x_{max} + \frac{1}{2} \times length_{type\ j}$$

Then we search for the range of the angle of deflection σ, so that $\delta l_{ij} > l_{max}$.
We note $\alpha = \sigma_{min}$, and then ensure that $\alpha < 45°$.