AT-GRADE JUNCTION (CONTINUATION)

CUNSTRUCTION OF T-JUNCTION (CONTINUATION)

❖ Step V. – construction of corner

- **use of step V.** depends on junction type (**the procedure** is shown **for** direction **CB** ⇒ does not apply only for SÚK VI):
  - *SÚK **III** + SÚK **V** ....for turn **CB***
  - *SÚK **IV** .....for turn **CB** (**using** the procedure in **step V.**) and **analogously** for turn **AC***
  - *SÚK VI .....step V. is not used*
- construction of **corner** for turn **CB using** plotting of points **TS, SC, CS** and **ST** according to the calculated elements' parameters (L, R, x, y, … etc.) – plotting of **tangents „T_{CB}“** (see *fig. 1050*) + **dimensions „x“ and „y“** (see *fig. 1060*) + insertion of circular part of **curve with radius „$R_o = R_{CB}$“** (see *fig. 1070*) ⇒ **corner guiding strip** (create transition curve using „spline“ function – see *fig. 1080*)

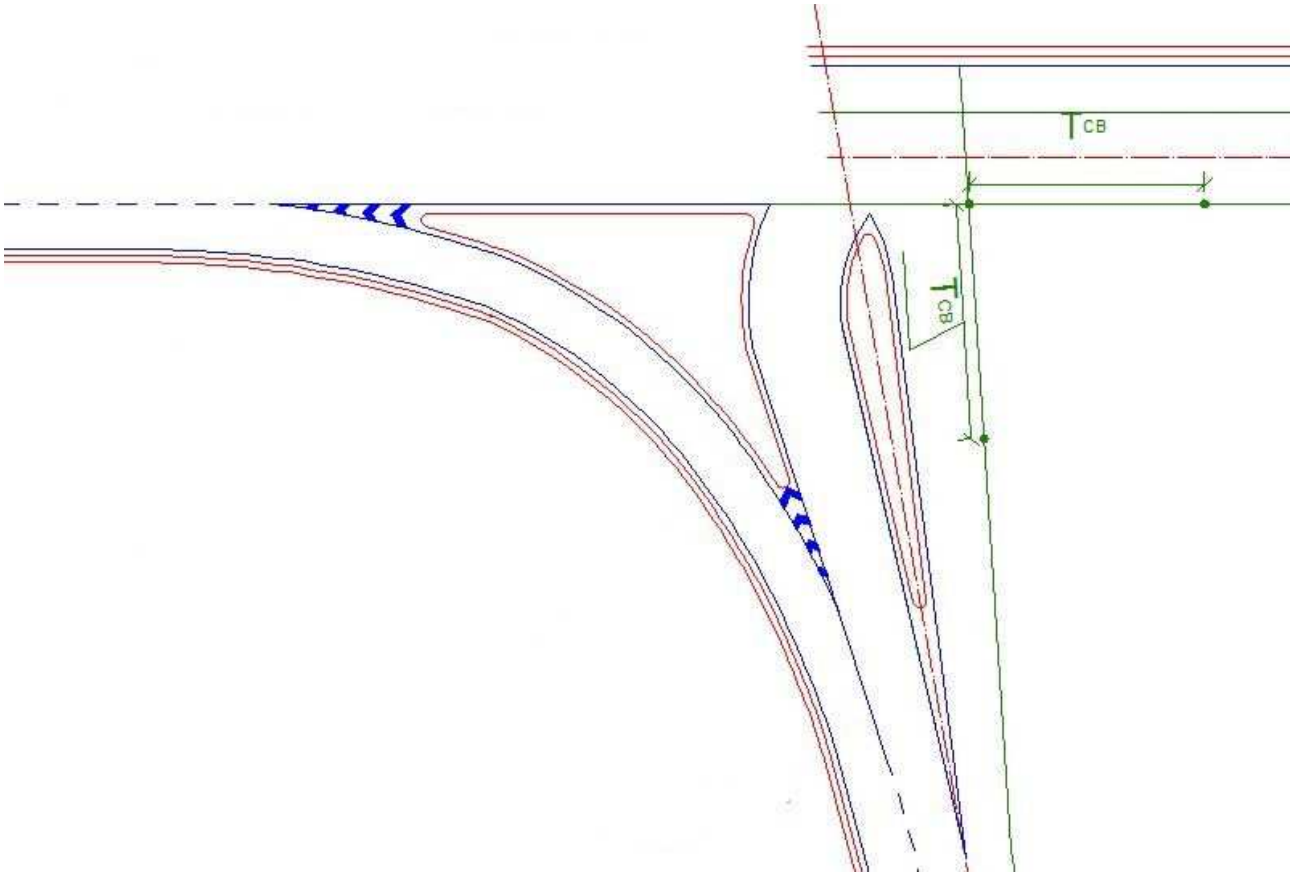

fig. 1050 (plotting of tangents „T_{CB}“ at corner construction for turn CB)

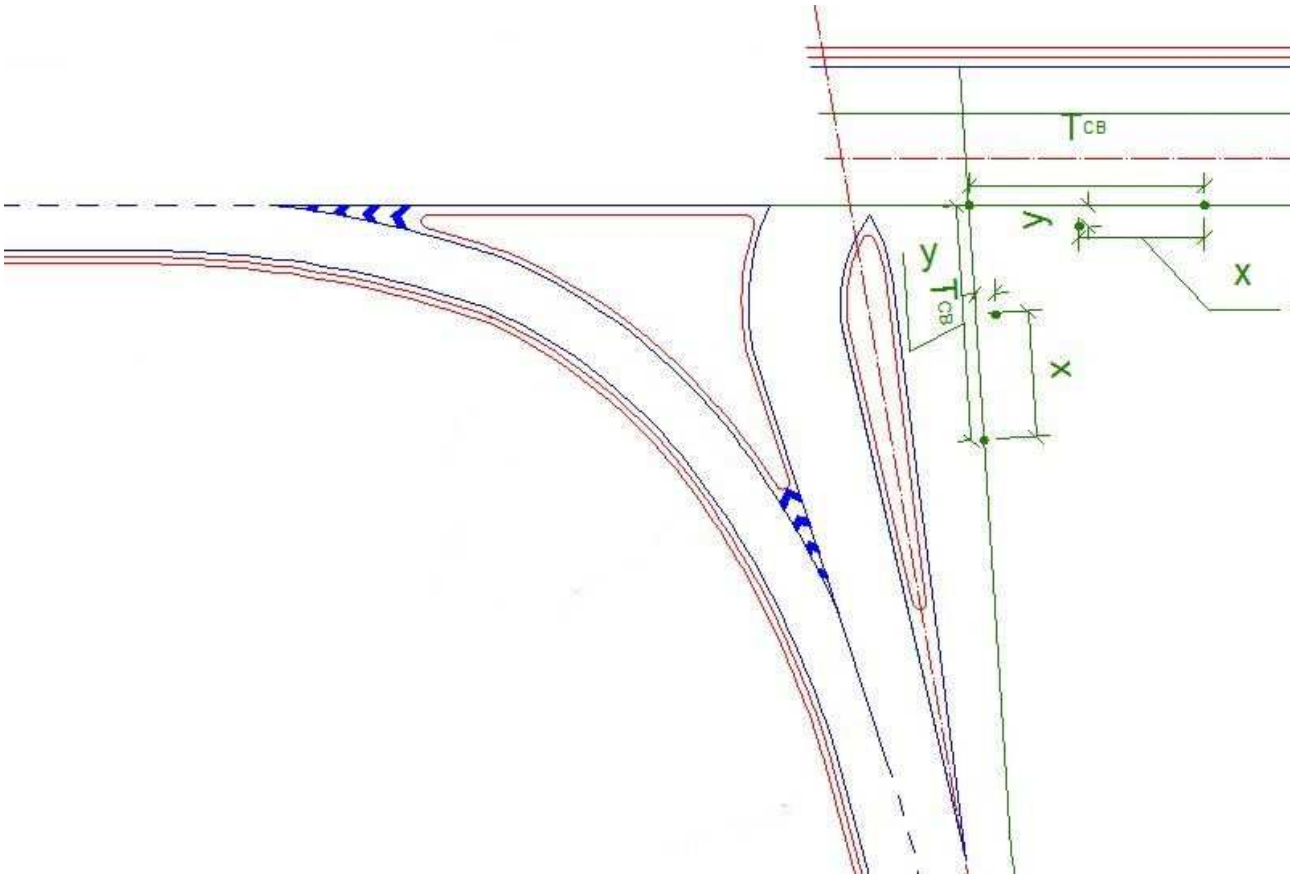

fig. 1060 (dimensions „x“ and „y“ at corner construction for turn CB)

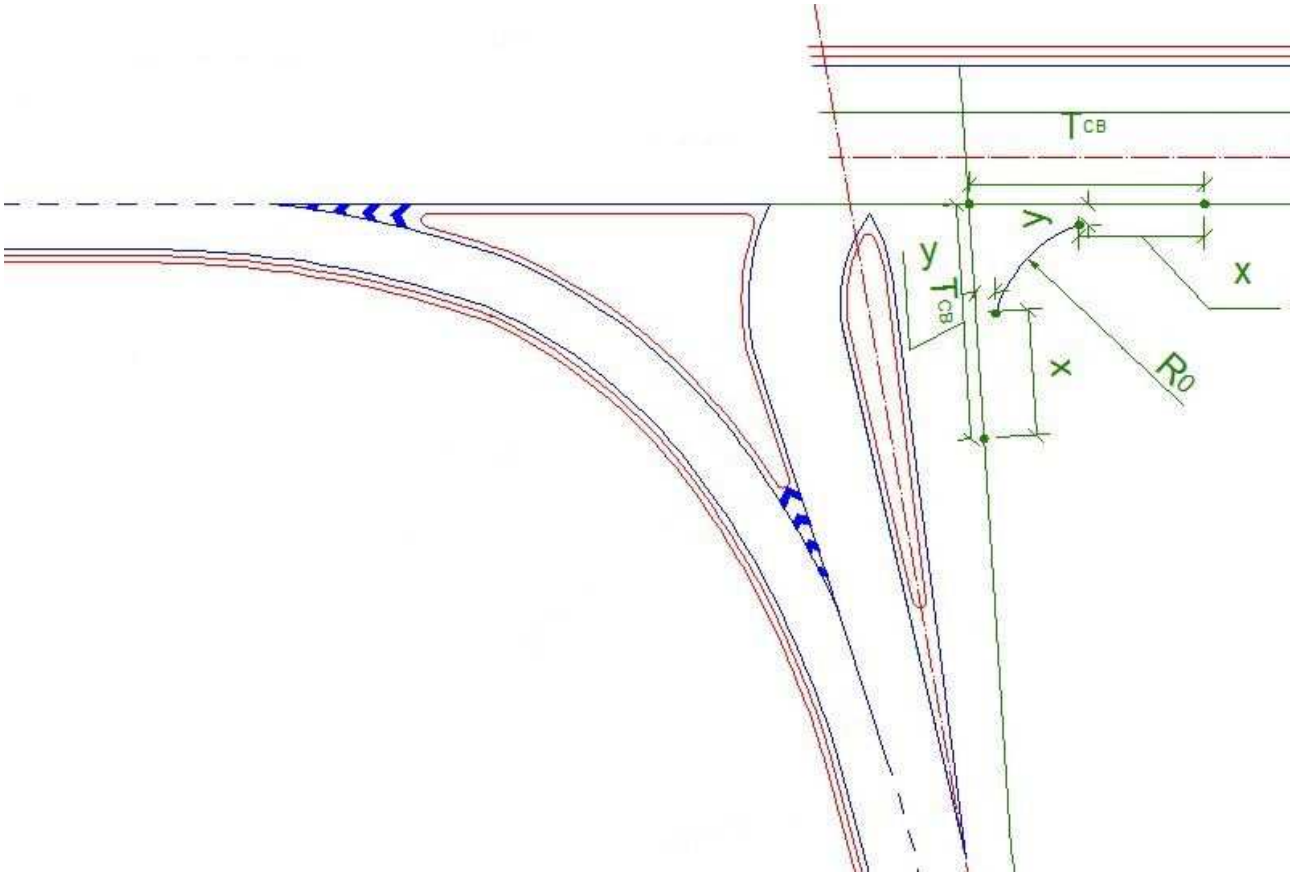

fig. 1070 (insertion of circular part of curve with radius „R_o = R_{CB}“ at corner construction for turn CB)

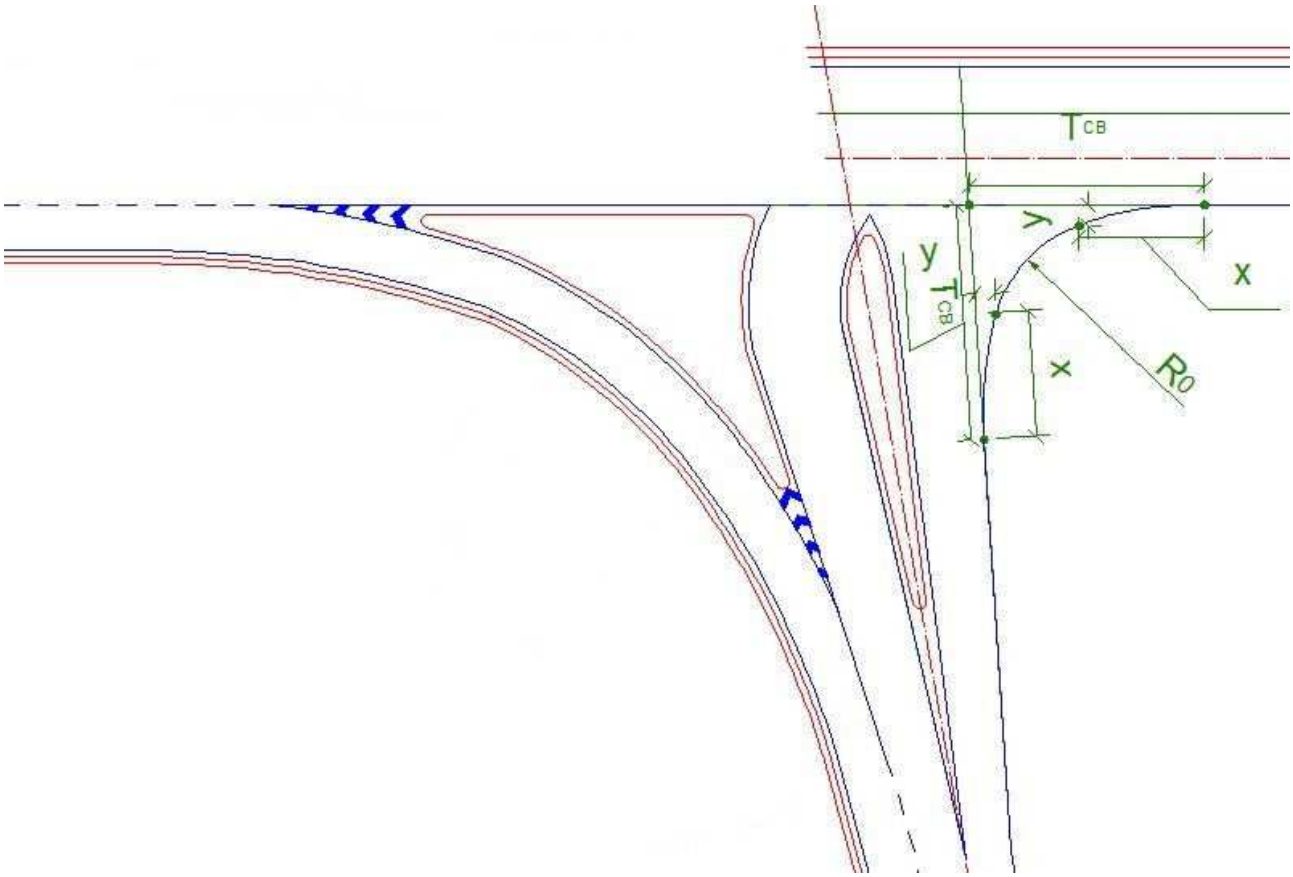

fig. 1080 (corner guiding strip created by insertion of transition curves for turn CB)

- *perform analogously as well for **SÚK VI** for corner for turn **AC** with turn **radius „R_o = R_{AC}“ ⇒ tangents „T_{AC}“ and dimensions „x“ and „y“** of calculated values **for turn AC** are plotted **on red vertical line on the left side** in fig. 0890 and **on the edge between** dimensions **„a_H“ and „a_p“ below** the major road **centerline** (see also fig. 0860) – dimension a_H = a (according to fig. 0560 and fig. 0570) and dimension „a_p“ is not used (see also scheme in fig. 0530 part a))*
- *the procedure is not used for SÚK VI*

❖ **Step VI.**

- Construction of the edge of **protective ghost island** at lane (**AX**) on length „L_r“ (according to *fig. 1090*) – see the principle in *fig. 0650*
  - *is performed **only for** SÚK **V** and SÚK **VI***
  - ***the beginning of** dimension „L_r“ is **at the end of** dimension „T_{CA}“*

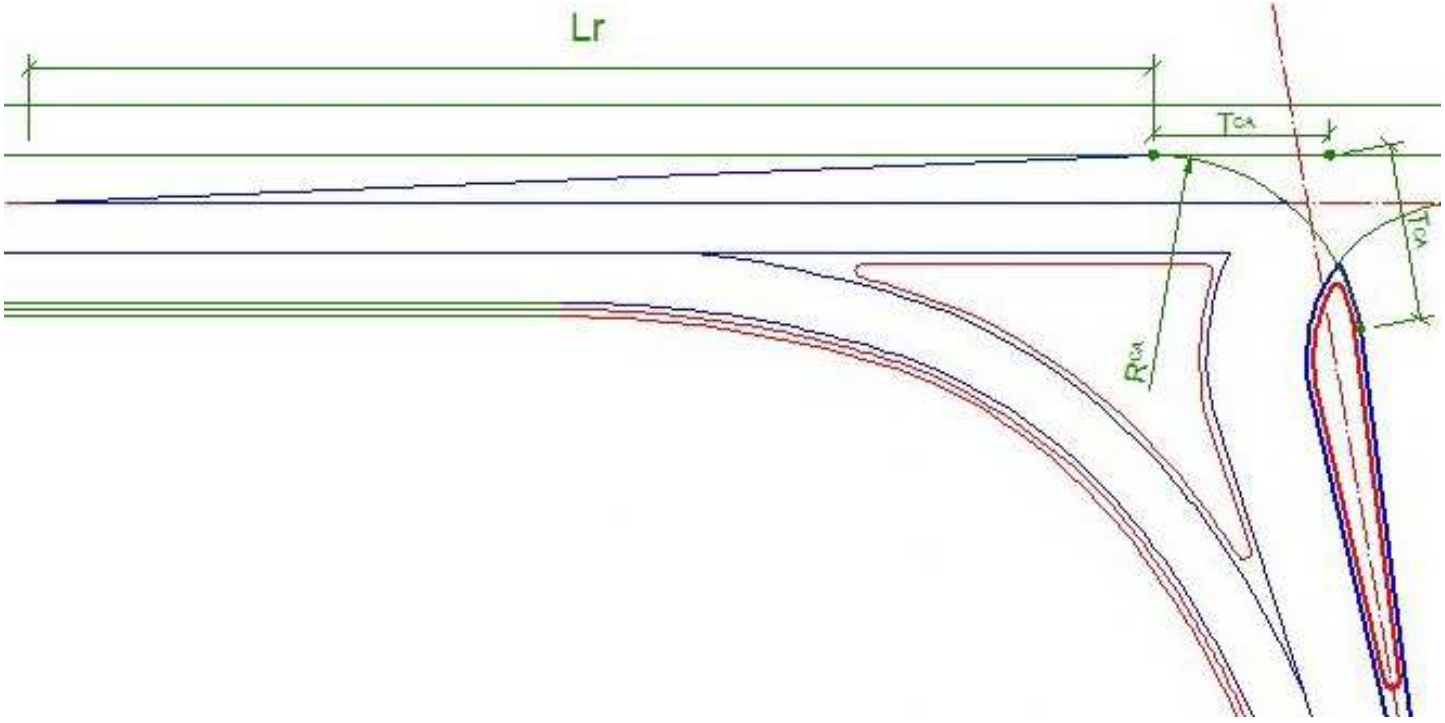

fig. 1090 (shape of protective ghost island at lane AX)

- construction of **right turn diverge lane on major road** (for flow **3**) according to *fig. 0630* and *fig. 1100*
  - *is performed **only for** SÚK **VI***
  - *use calculated dimension **values „L_d“ and „L_v“ for** traffic **flow 3***
  - ***the beginning of** dimension „L_d“ is **on tip of nose** (road marking) **of channelising island** (see fig. 0630 and fig. 1100)*

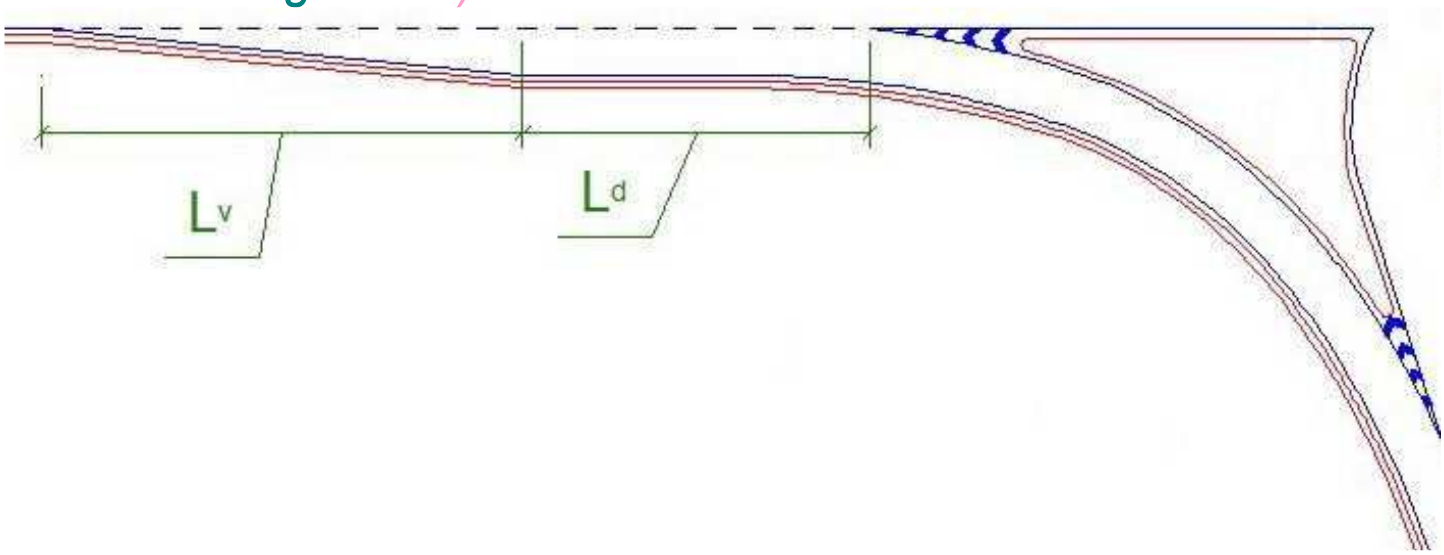

fig. 1100 (dimensions and shape of right turn diverge lane on major road)

- construction of **left turn diverge lane on major road** (for flow **7**) – is performed **only for** SÚK **V** and SÚK **VI**
  - *construction of stop line at the end of dimension „T_{BC}“ – see fig. 1110*

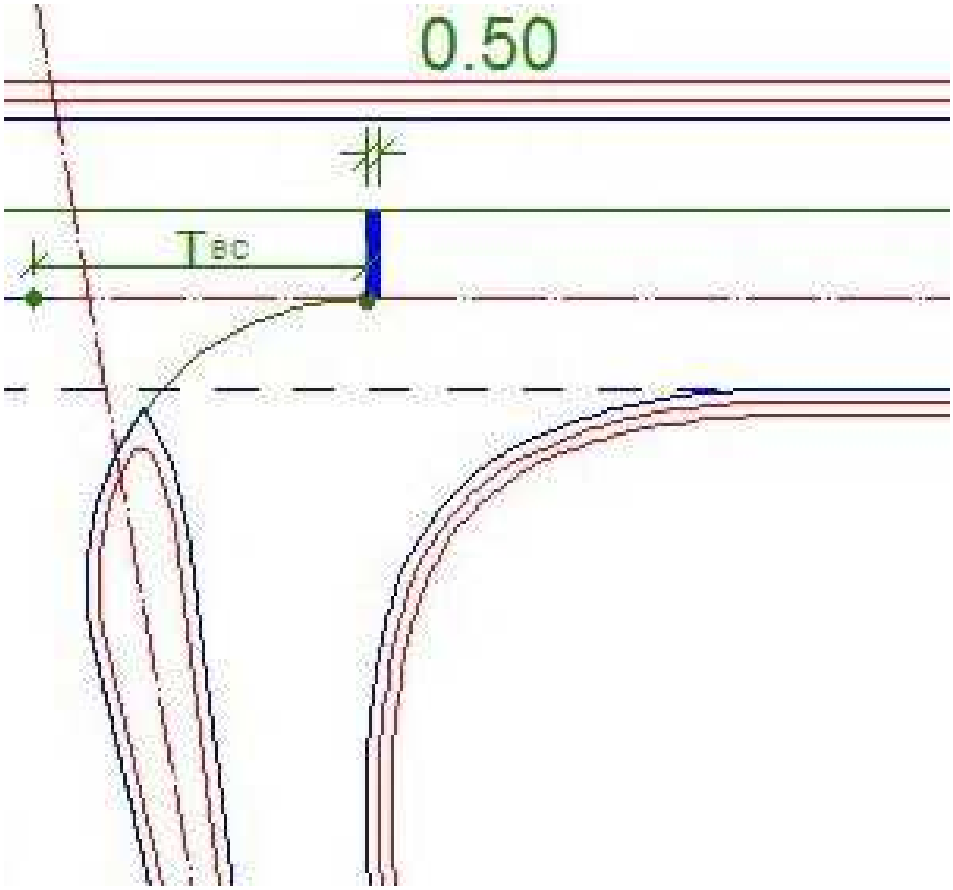

fig. 1110 (stop line position on left turn diverge lane on major road)

- *plotting of dimensions „**L_c**“, „**L_d**“, „**L_v**“ (using values calculated **for** traffic **flow 7**) and „**L_r**“ according to fig. 1120*

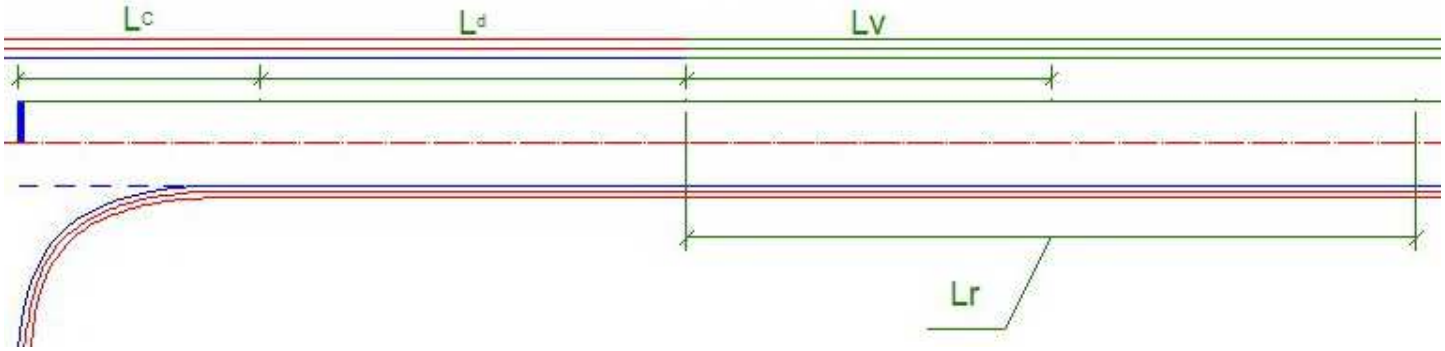

fig. 1120 (dimensions of left turn diverge lane on major road)

- *construction of the edge of **ghost island on the left turn diverge lane** on major road according to fig. 0640 and fig. 1130*

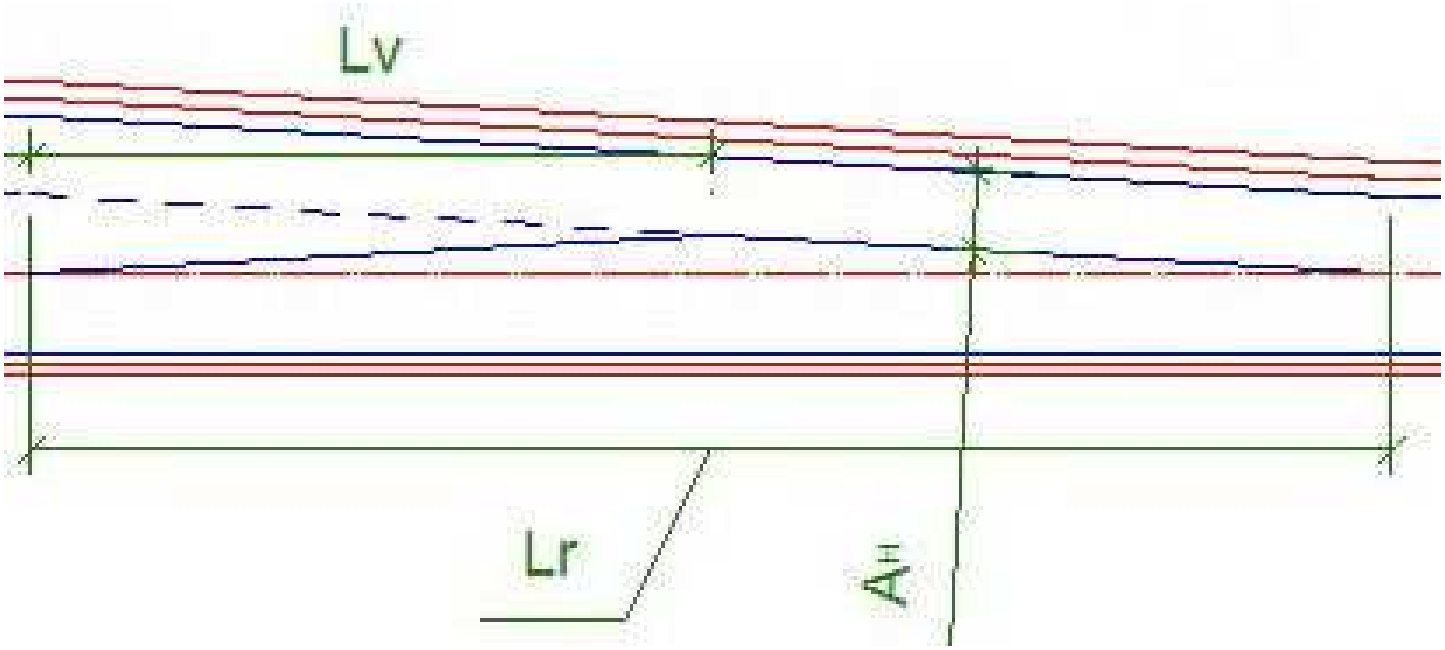

fig. 1130 (dimension of ghost island in left turn diverge lane on major road)

- construction of **merge lane on major road** according to *fig. 1140*
  - *is performed **only for** SÚK **VI***
  - ***the beginning of** dimension „L_a“ is **at the end of transition curve of turn CB***

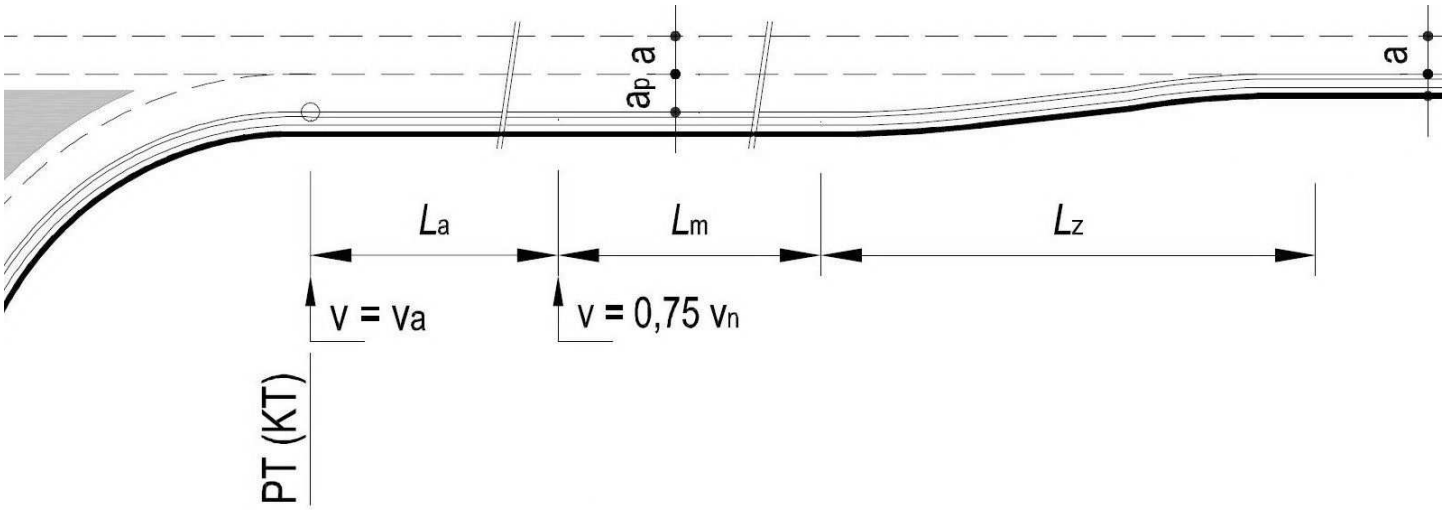

fig. 1140 (dimensions of merge lane on major road)

- **widening** of **lane BA** enables bypassing vehicle which is turning left, perform according to *fig. 1150*

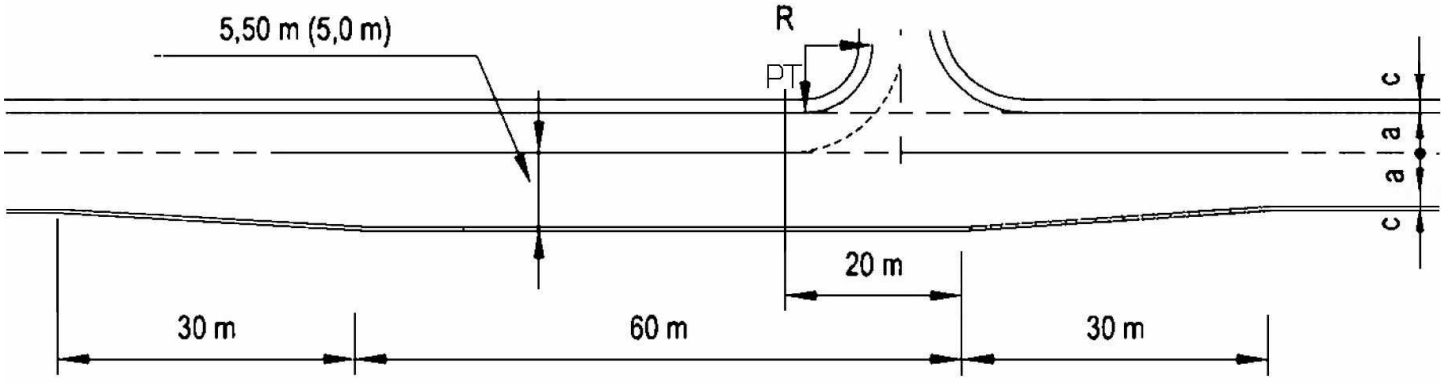

fig. 1150 (lane widening on major road enables bypassing vehicle which is turning left)

- *is performed* ***only for*** *SÚK* ***IV***
- ***the beginning of*** *dimension „20 m“ is* ***at the end of transition curve of turn CB*** *= point PT in fig. 1150 (the end of dimension „T_{CB}“ – see fig. 1080)*

❖ **Step VII.**

- plotting of **hard shoulder edges** („**c + v**“ from outer lane edges) **and (soft) shoulder** („**e + 0,25**“ from hard shoulder) – see *fig. 1160, fig. 1170* a *fig. 1180*

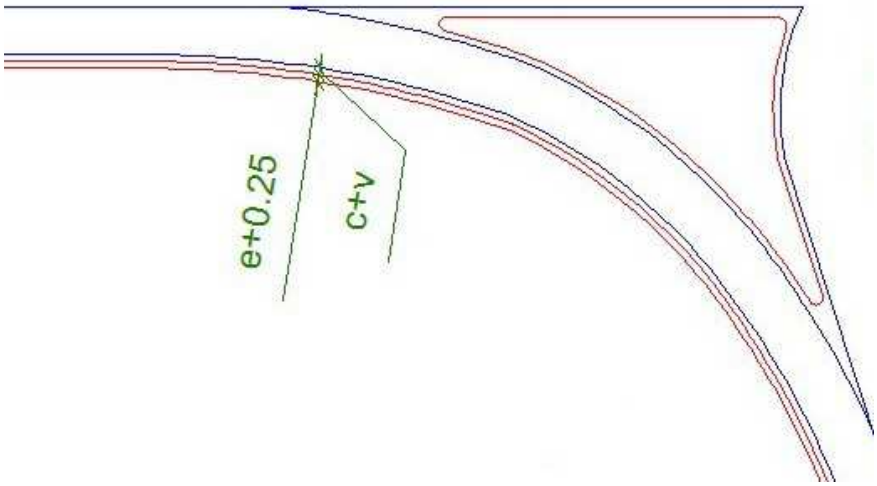

fig. 1160 (edges of soft and hard shoulders between lanes AX and CX)

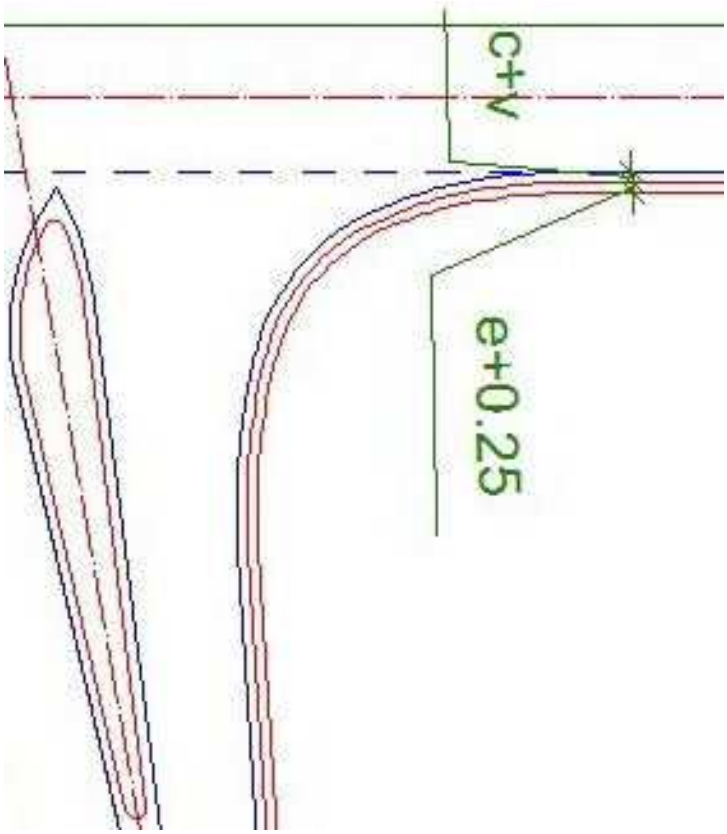

fig. 1170 (edges of soft and hard shoulders between lanes BX and CX)

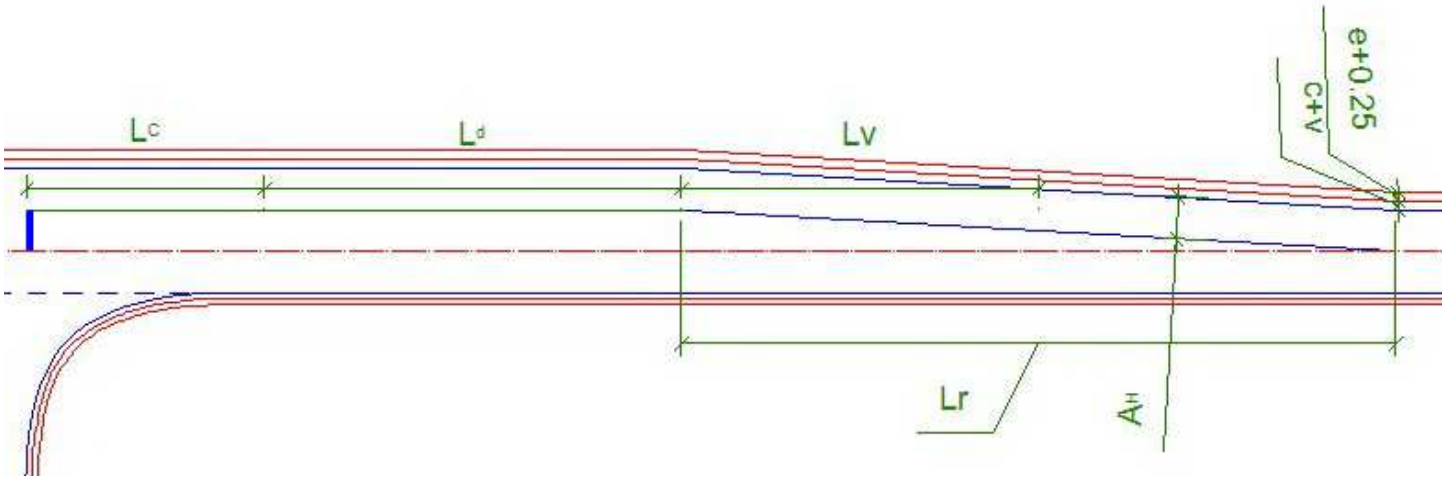

fig. 1180 (edges of soft and hard shoulders along lane in direction BA)

- ***for all** types (**SÚK**) of at-grade junctions*
- ***difference** of various values „**c + v**“ **on major** road **and minor** road is carried out by „spline“ function **within transition curves** (of curves AC and CB) **of the adjacent major** road*

ROAD MARKING

use **in conjunction with traffic signs** ⇒ **traffic signs** have decisive significance (**in case of** eventual **conflict**)

Construction of ghost islands:

- line **width** = **0,5 m**
- line **inclination** – in the flow direction
- separation of traffic flows in the **same direction** (see *fig. 1190)* – application:
  - *is not used for SÚK IV*
  - ***edges of channelising islands*** *(see fig. 1200)*

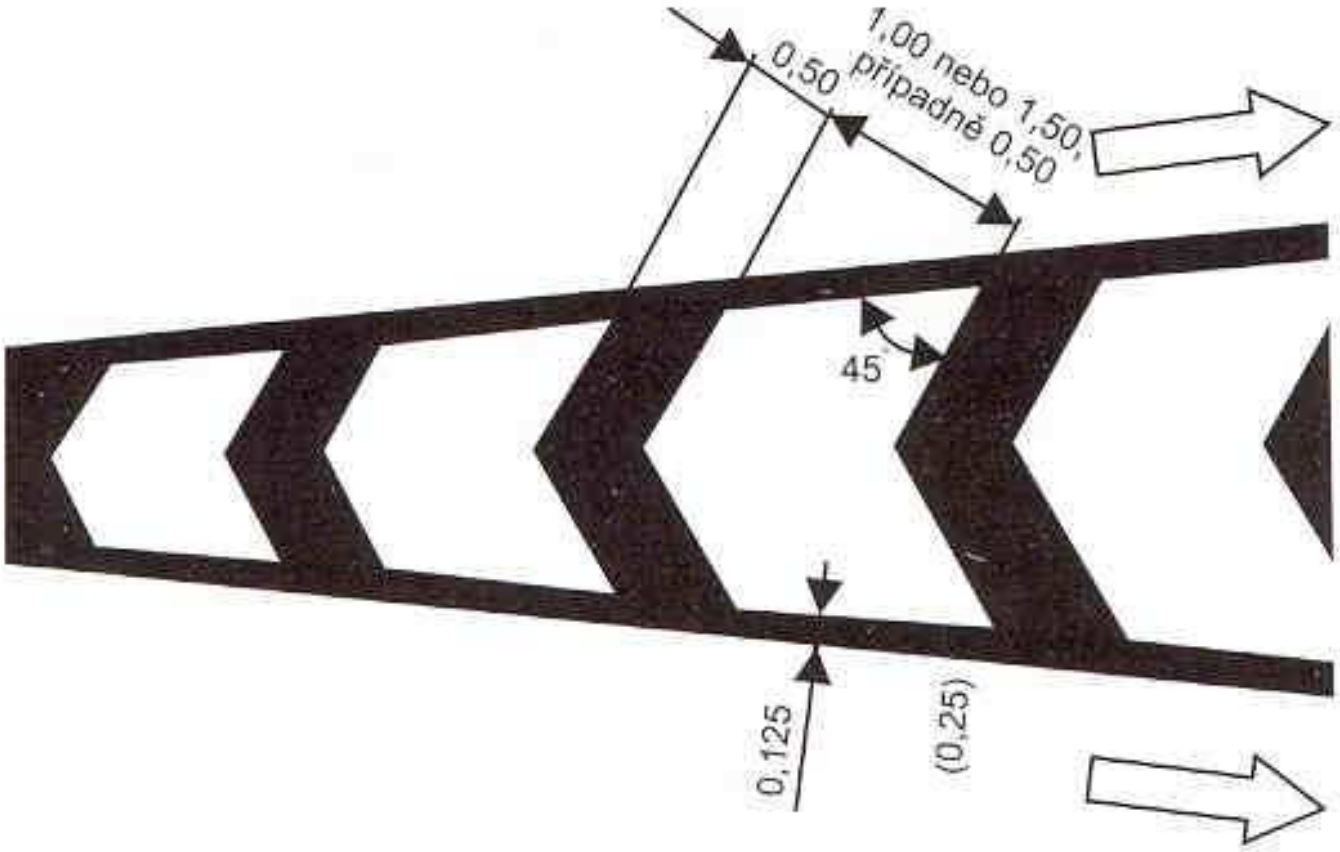

fig. 1190 (arrangement and dimension of ghost island between traffic flows in the same direction)

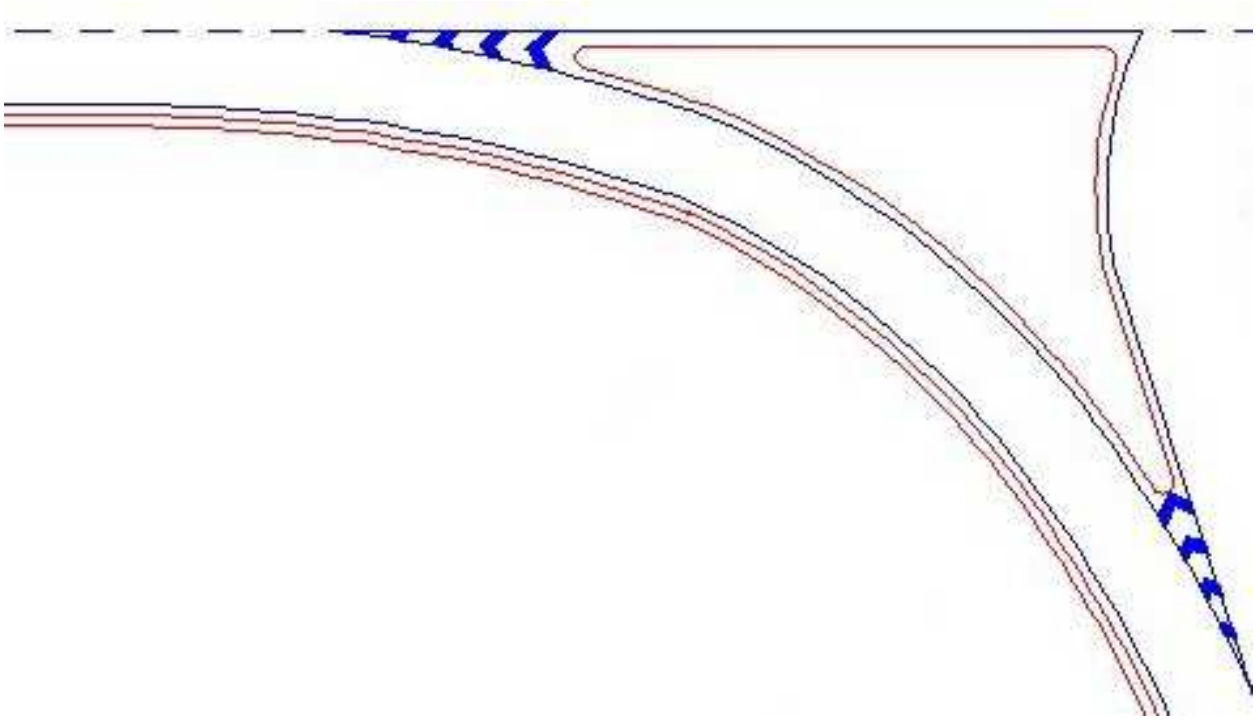

fig. 1200 (ghosts between traffic flows in the same direction at the edges of channelising island)

- separation of traffic flows in the **opposite direction** (see *fig. 1210*) – application:

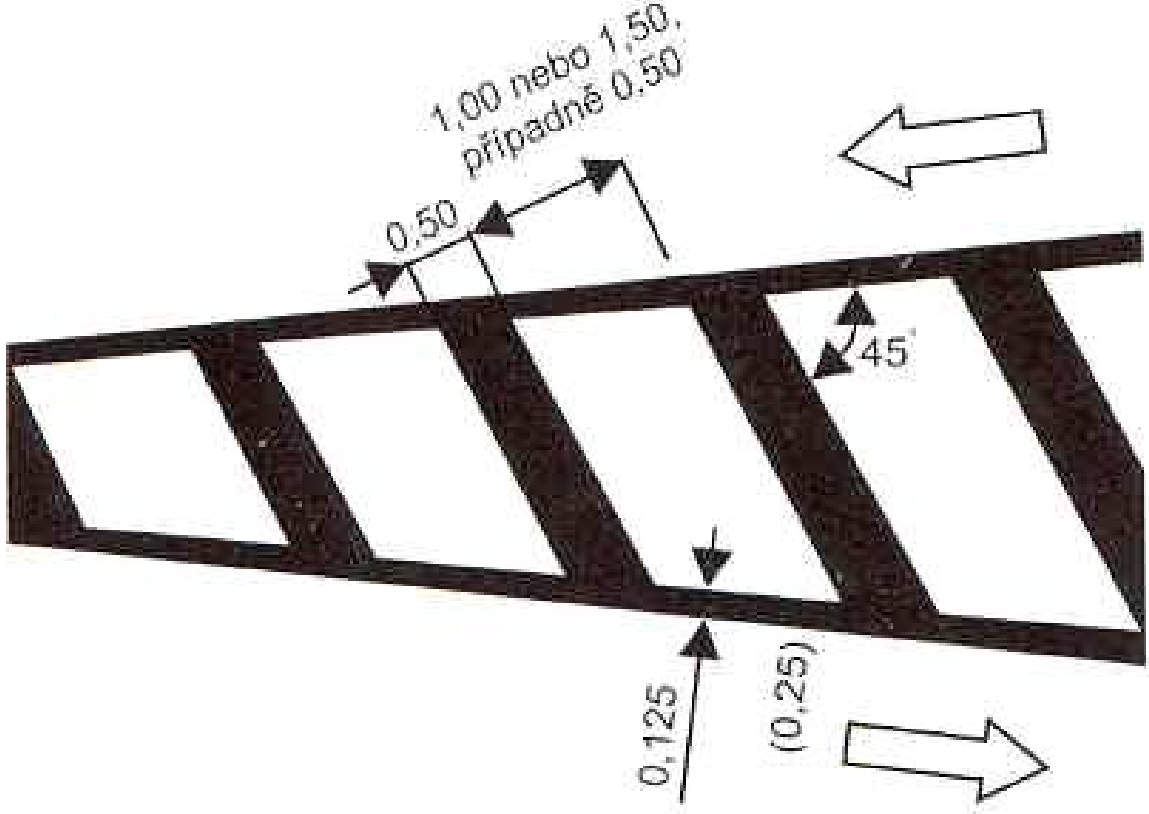

fig. 1210 (arrangement and dimension of ghost island between traffic flows in the opposite direction)

- *SÚK **III** + SÚK **IV** ...use it **instead of splitter island on minor road** according to the principle in fig. 1210*
- *SÚK **V** + SÚK **VI**....use it **on the lane AX** (**shape** of ghost islands is also **bounded** by outer enveloping curve for **left turn** in direction **BC** – see fig. 1220)*

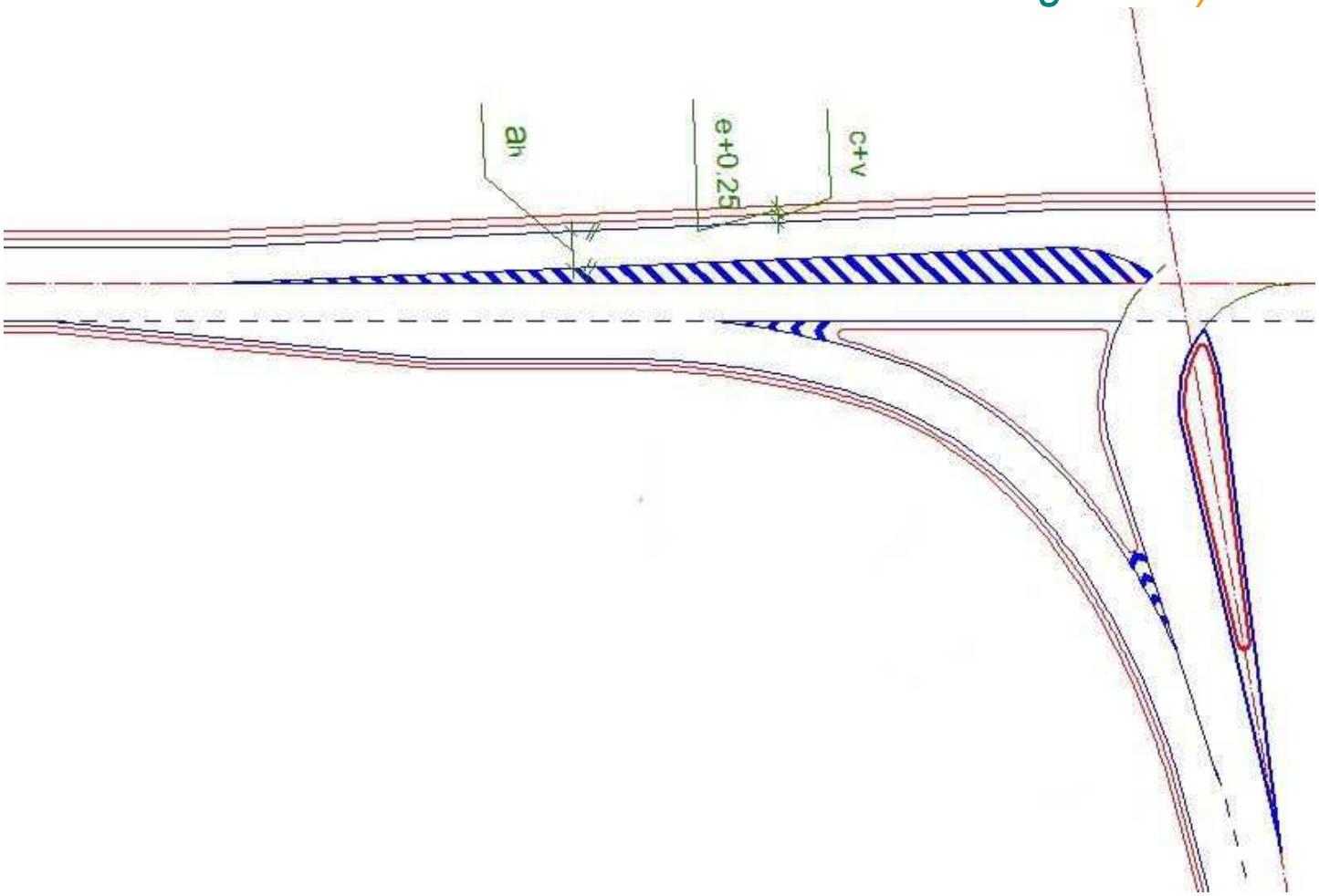

fig. 1220 (ghost island between traffic flown in the opposite direction merge lane AX)

- *SÚK **V** + SÚK **VI**....use of **lane BX** – see fig. 1230*

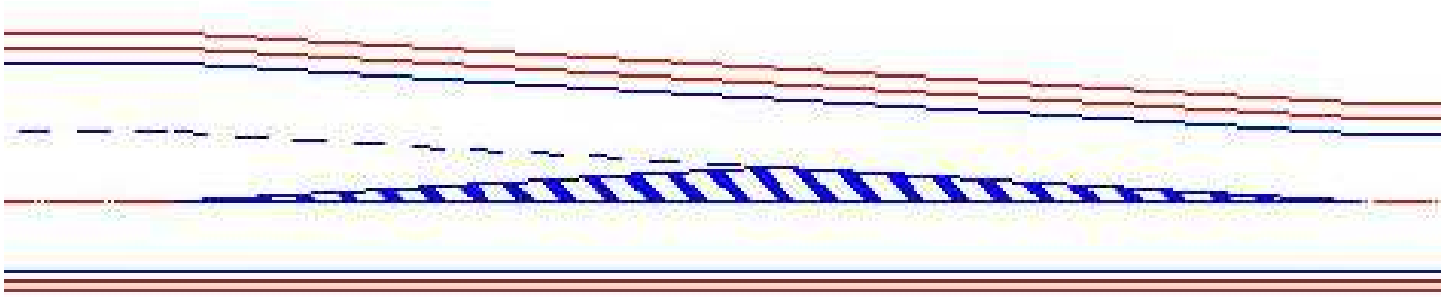

fig. 1230 (ghost island between traffic flown in the opposite direction diverge lane BX)

- *SÚK **V** + SÚK **VI**....use it **at the end of traffic island on minor road** – see fig. 1240*

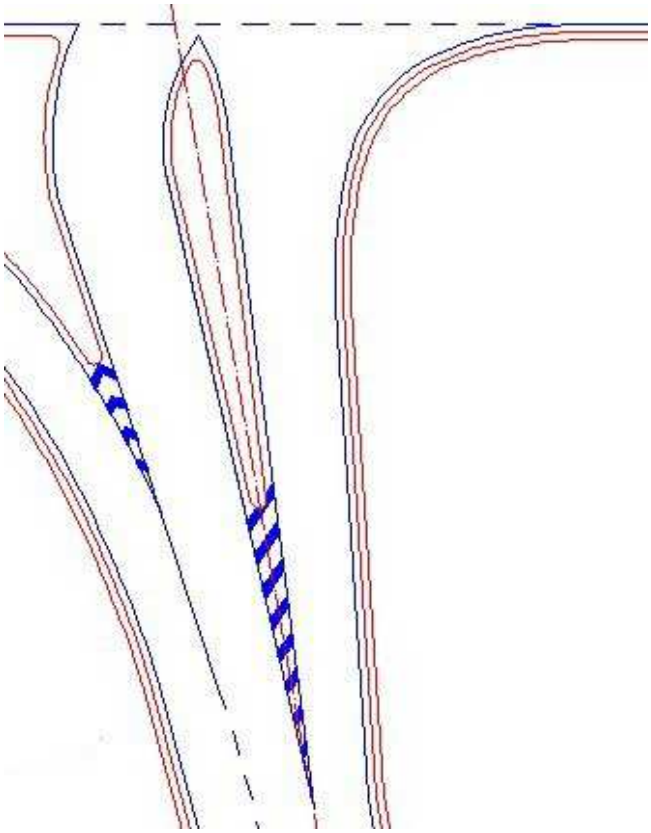

fig. 1240 (ghost at the end of splitter island on minor road)

- **Triangular ghost islands** – is used **instead of channelising** traffic **island** (**area < 7 m2** or **length** of **one edge < 3,00 m**) according to the principle in *fig. 1250* (is not used for SÚK IV)

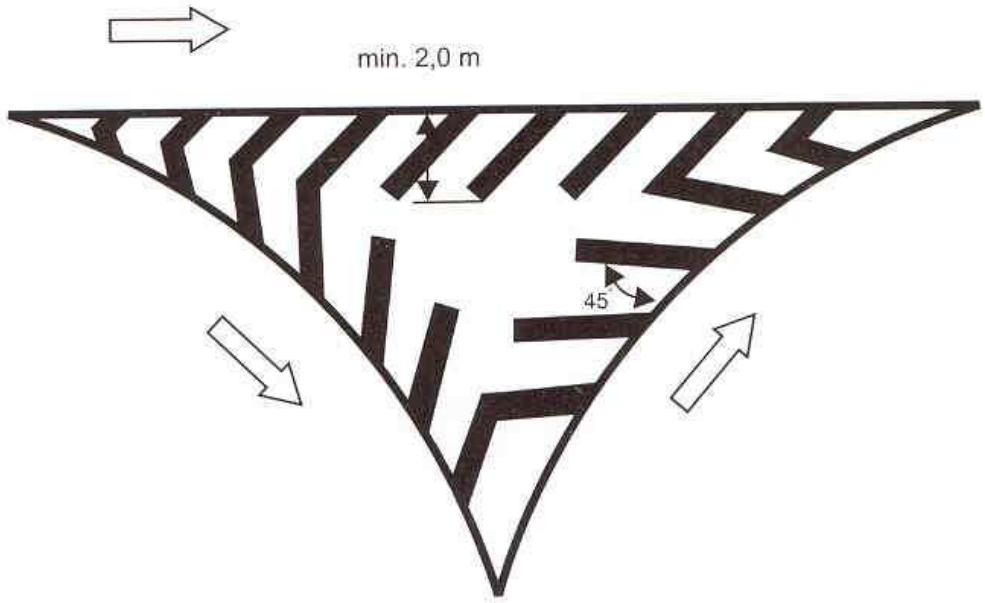

fig. 1250 (marking principle of triangular ghost island)

Solid and broken lines:

- **solid line** – application:
  - ***between*** *traffic flow in the* ***opposite direction*** *at junction (parallel to red dot and dash centerline – see fig. 1280)*
  - ***between mainline*** *(flow* ***8****) and left turn* ***lane*** *(flow* ***7****) on major road* ***at length „L_c“*** *(see fig. 1300)*
- **broken line 3/6** (see *fig. 1260*) – application:
  - ***between*** *traffic* ***flows of the opposite direction*** *outside the junction (does not occur for the use of the exercise)*

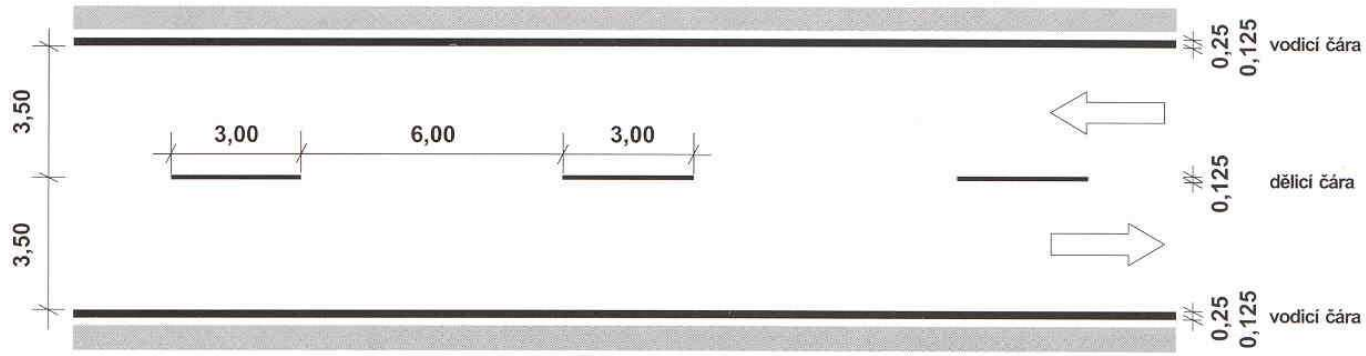

fig. 1260 (broken line 3/6)

- **broken line 1,5/1,5** – application:
  - ***between mainline and auxiliary lane*** *(see fig. 1270 and fig. 1280)*

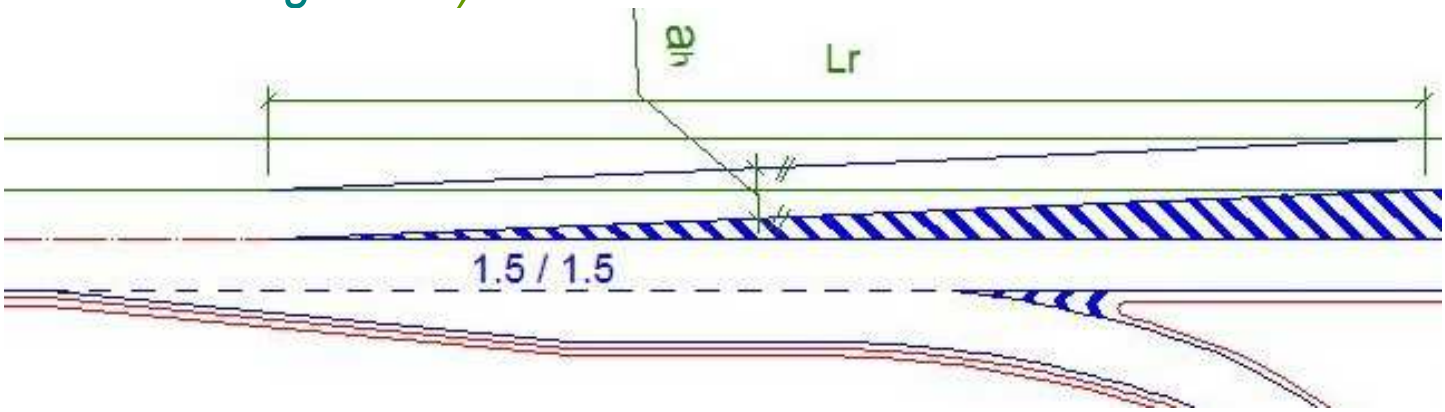

fig. 1270 (broken line 1,5/1,5 between flows 2 and 3)

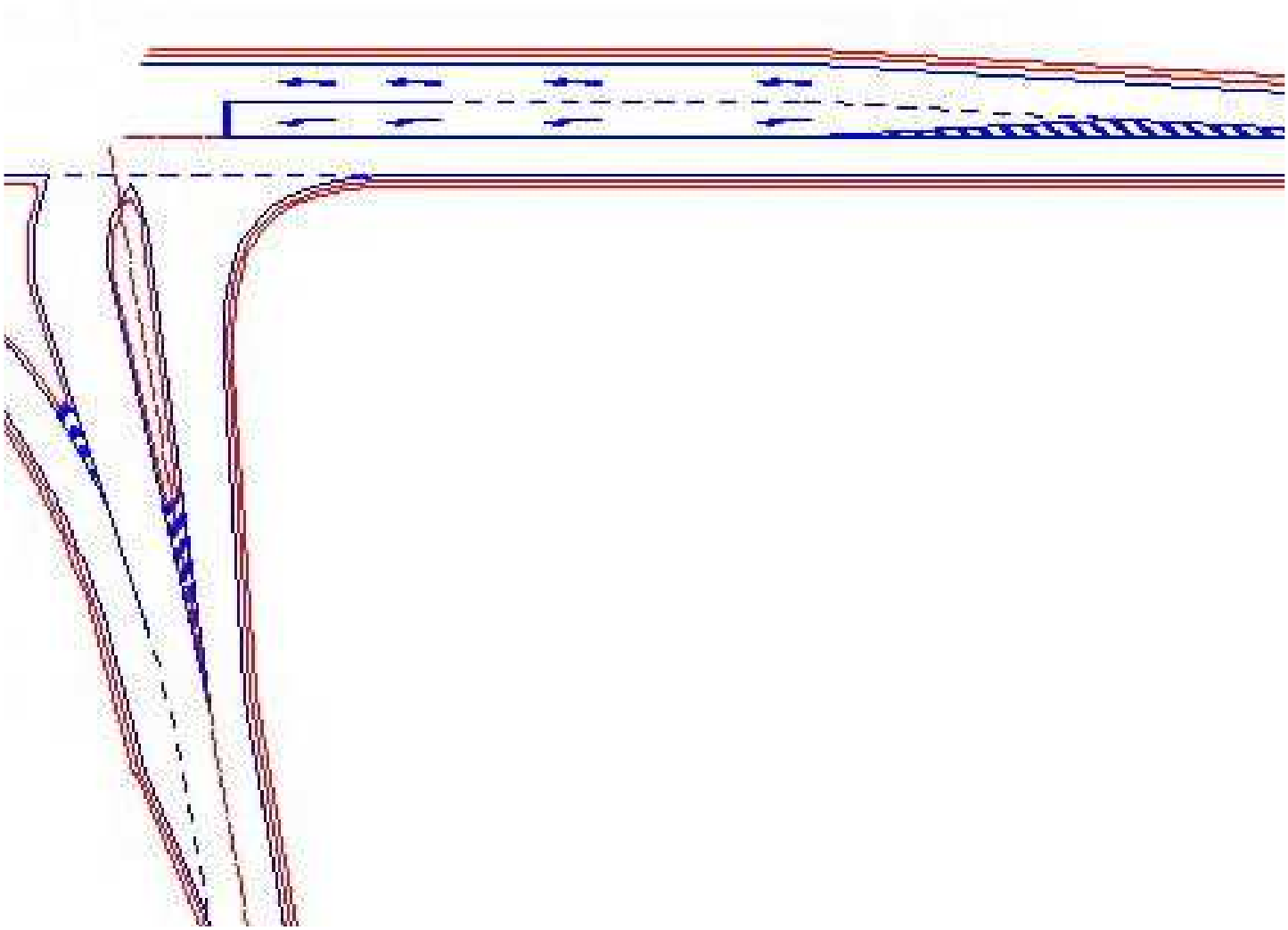

fig. 1280 (broken line 1,5/1,5 between flows 7 and 8 and between shortened merge lane and mainline on minor road)

- *driving over edges* = ***guiding strip*** *at junction* ⇒ *see application in fig. 1290*

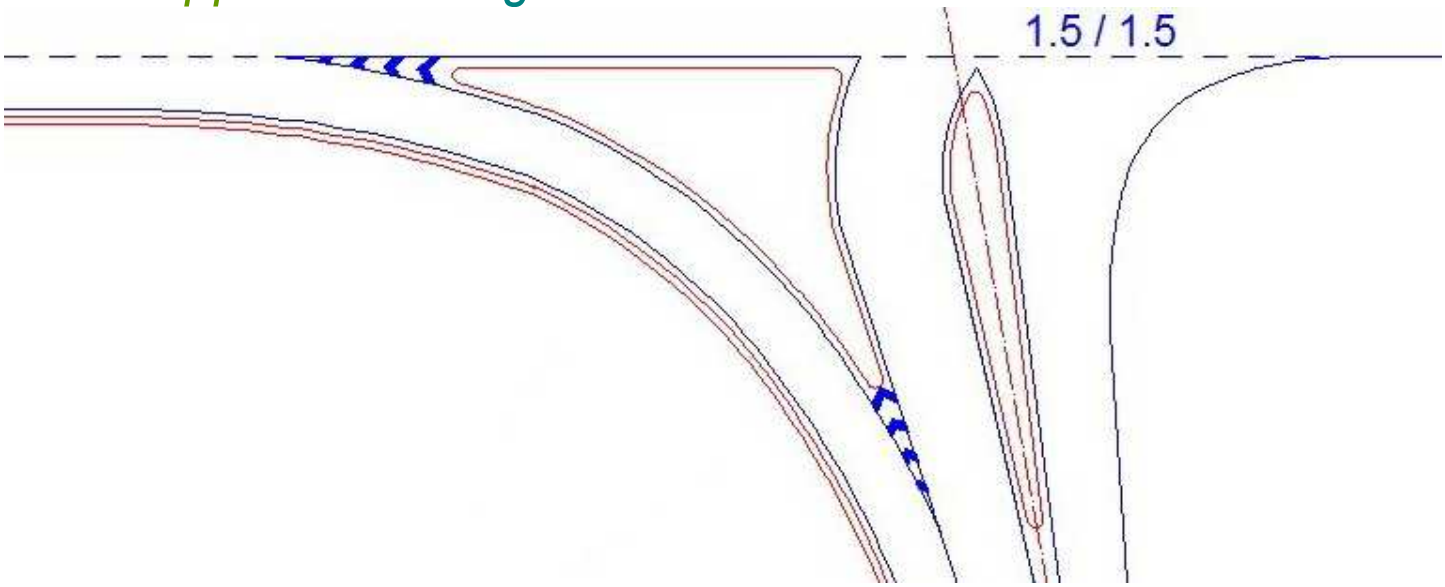

fig. 1290 (broken line 1,5/1,5 as guiding strip at junction)

Direction arrows:

- **dimensions** – see *fig. 1300*

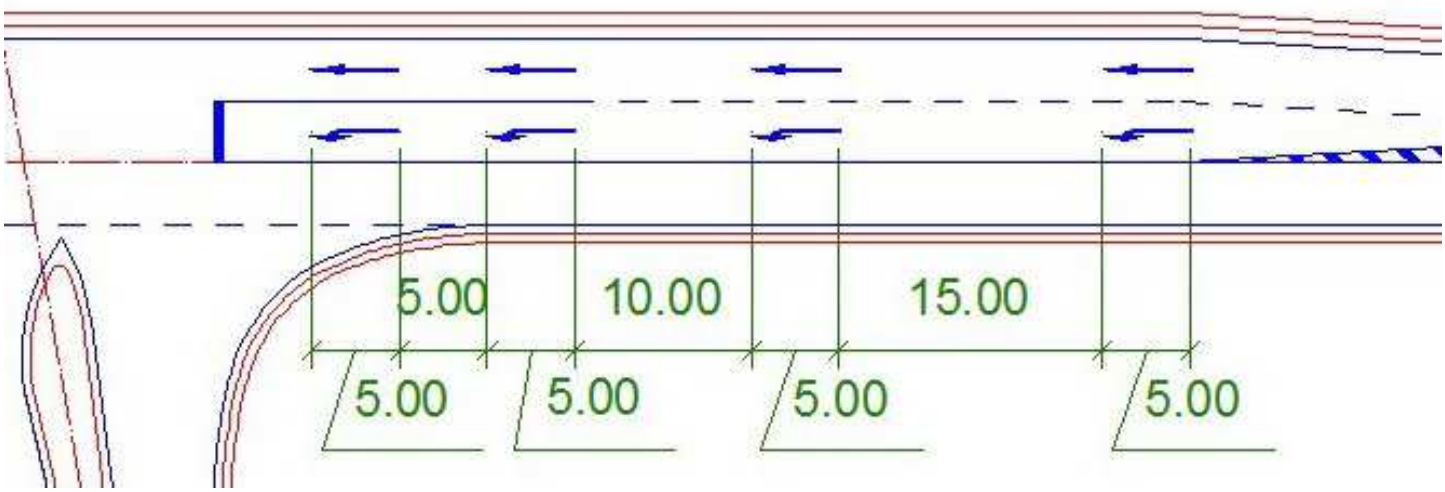

fig. 1300 (dimensions and positions of arrows)

  - ***arrow*** *length =* ***5 m***
  - ***gap*** *length =* ***5~20 m*** *(length* ***increases linearly*** *from stop line* ***outwardly from the junction****)*
  - ***repeat*** *from 3 times up to 5 times*
  - *they are located* ***next to each other*** *at parallel lanes*
- arrow **shape** – according to *fig. 1310*:

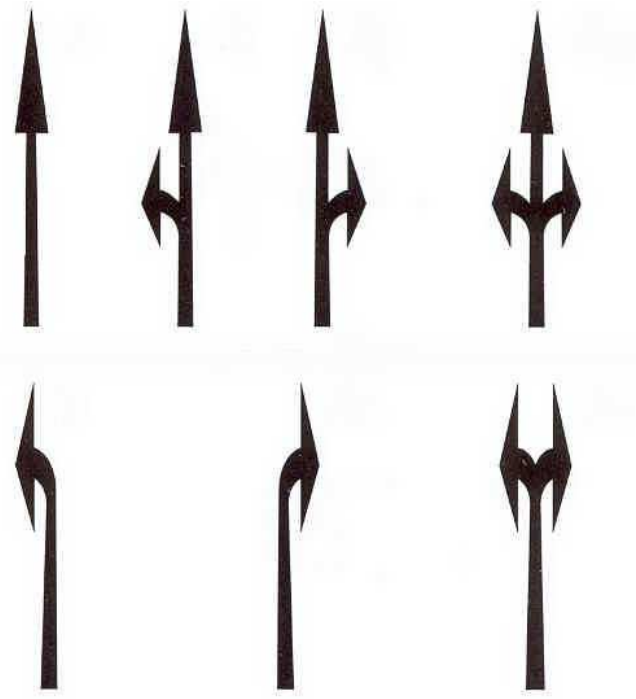

fig. 1310 (shape of direction arrows)

- *always **adapt** design to the particular junction **arrangement** (if there is no added lane – use 2. and 3. shape in fig. 1310)*
- ***retain** shape while plotting*
- ***CAD** blocks are available at the **network drive***

- arrow **occurrence**:
- *at **mainline and auxiliary lanes** on **major** road at the entrance to the junction (see fig. 1320 and fig. 1330)*

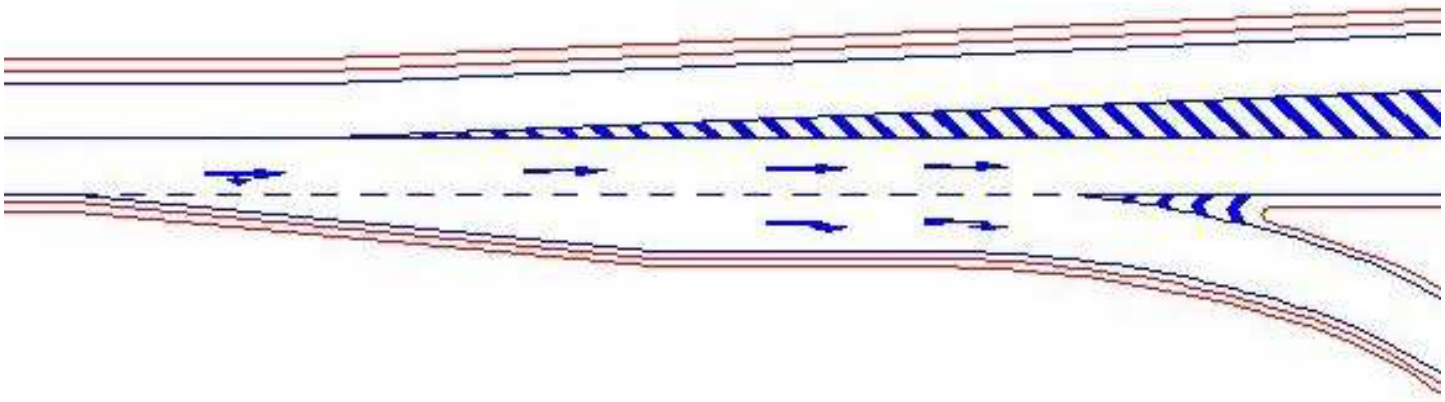

fig. 1320 (direction arrows at AX mainline and right turn diverge lane)

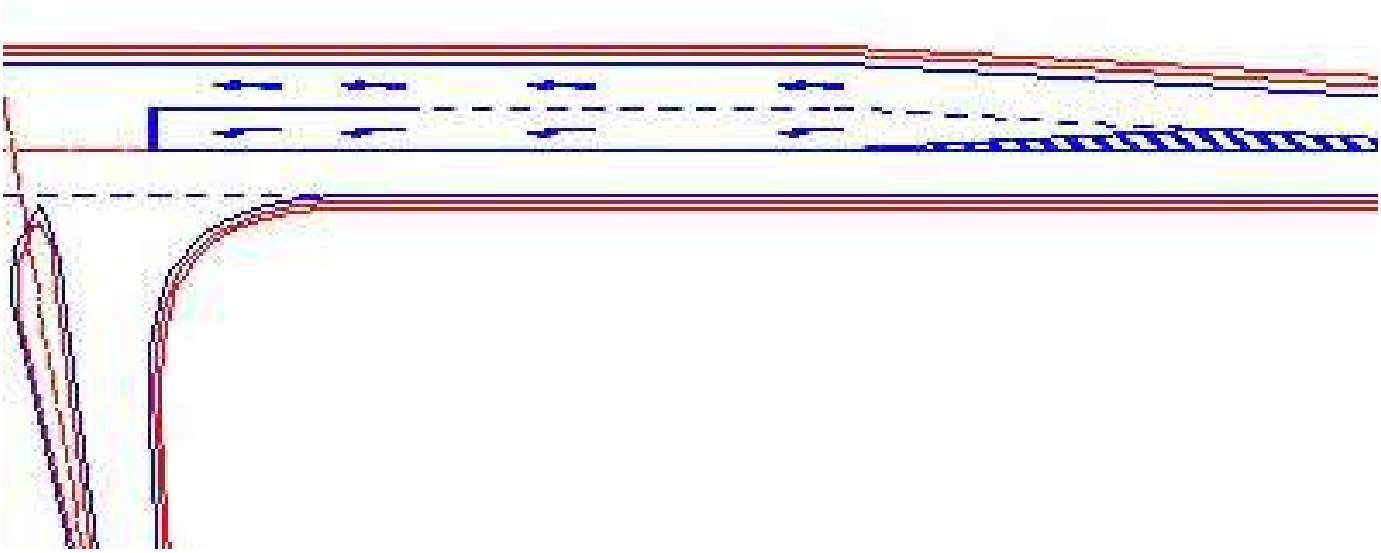

fig. 1330 (arrows at BX mainline and left turn diverge lane)

- ***minor** road – possibility of using **shape „Y“** (the last one in fig. 1310)*

RESULTING ARRANGEMENT OF THE JUNCTION AND DIMENSIONING

- resulting **junction arrangement** (including greening of channelising islands) – see the principle (without dimensioning) in *fig. 1340* (left side = SÚK VI + right side = SÚK V)

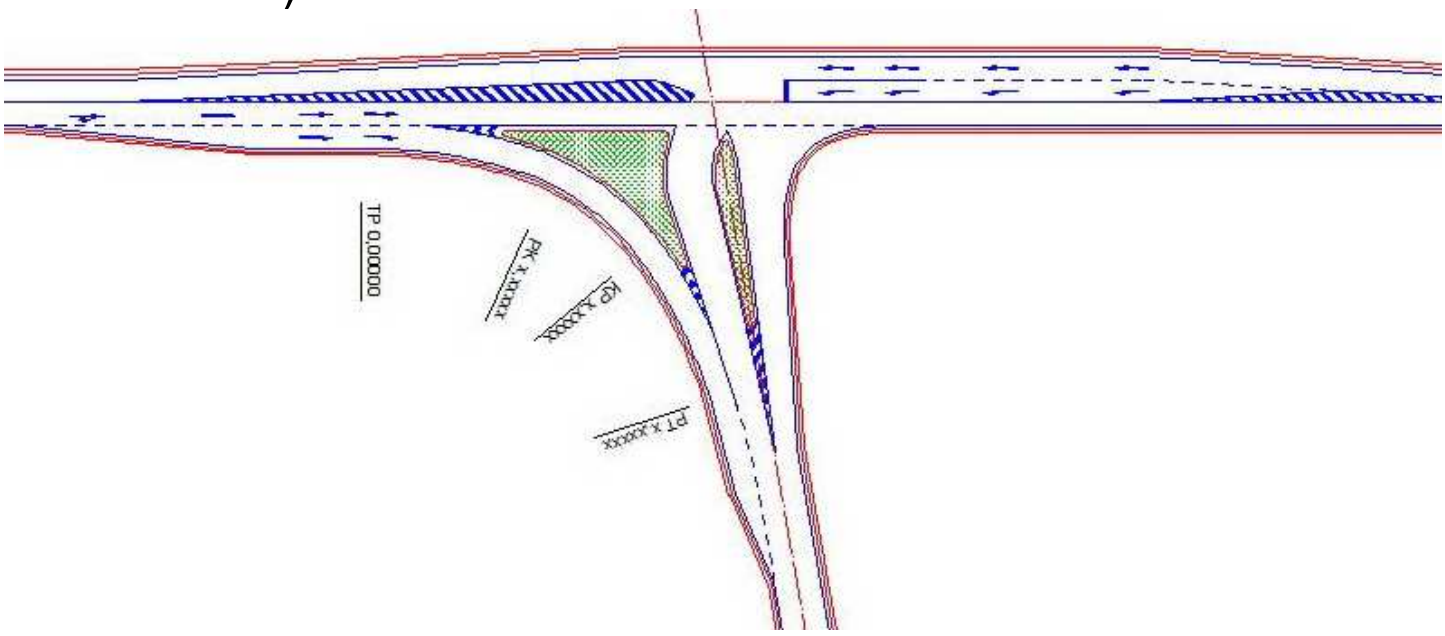

fig. 1340 (resulting junction arrangement without dimensioning – left side = SÚK VI + right side = SÚK V)

- **assign dimensions** to all necessary elements (all used dimensions + points of curve chainage for right turns according to the principle in *fig. 1340*)

Colour design – drawing principles for site plan 1:500:

1. **in red** (see *fig. 1340*):
   - *physical island edges (separating, channelising islands)*
   - *boundary between hard and soft shoulder (c ⇒ e)*
   - *carriageway edge (0,25 m from soft shoulder ⇒ „e“ + 0,25)*
2. **in blue** (all road marking including ghost islands !!!) – see *fig. 1340*:
   - *guiding strips*
   - *ghost islands*
   - *solid and broken lines*
   - *direction arrows*
3. **in black** (all dimensions and descriptions):
   - *lengths of flows for left turn out of major road (dimensions „L_c“, „L_d“, „L_v“ and „L_r“)* – *for SÚK V + SÚK VI*
   - *lengths of flows for right turn out of major road (dimensions „L_d“, „L_v“)* – *for SÚK VI*
   - *lengths of merge lane on major road (dimensions „L_a“, „L_m“ and „L_z“)* – *for SÚK VI*
   - *lengths of shortened merge lane on minor road (2 dimensions)* – *for SÚK III + SÚK V + SÚK VI*

- *lengths and widths used for widening of major road lane for bypassing left turn vehicle* – *for SÚK IV*
- *length of ghost island on connector „AX“ (dimension „L_r“)* – *for SÚK V + SÚK VI*
- *widths of all existing lanes „a_H“, „a_v“, „a_{ve}“ a „a_p“*
- *dimensions „c + v“ and „e + 0,25“ on all junction lanes*
- *concentric crossfall of junction connectors AC and CB („wedge“)* – *is not used at the corner*
- *point stationing TS, SC, CS, ST of connectors AC and CB*
- *horizontal curve tables of connectors AC a CB*