



**Republic of Moldova
Ministry of Transport and Road Infrastructure
State Road Administration**

and

European Bank for Reconstruction and Development

ROAD SECTOR PROGRAM

Rehabilitation of R14 Balti-Sarateni Road

Lot 1: km 26+600 to km 38+300

**Lot 2: km 43+000 to km 61+000 and
km 64+370-km 66+657**

TENDER DOCUMENTS:

PART 2 – REQUIREMENTS

Road Safety Audit Findings

Tendering No. RSP/2013/OT/W6

Invitation for Tenders No. RSP/2013/OT/W6/01-02

Chisinau, 2014

Improving Road Safety in Moldova

Task 1 - Summary Table of Findings

| Sheet No. | Ref | Finding | Suggested Solution | Rank | Designer's Comment | Accept / Decline |
|-----------------------|----------|--|--|------|--------------------|------------------|
| General Issues | | | | | | |
| | A | The rumble strips proposed for the entries into villages continue past the village entry signs. This makes it unclear to drivers what the purpose of the rumble strips is and what they are warning of. This makes them less effective. | Position the final rumble strip immediately adjacent to the village name plate. In addition, the addition of a speed limit roundel to the village sign may improve compliance with the speed limit. | M | Accepted | |
| | B | The rumble strips on the approaches to pedestrian crossings are likely to be ineffective, as drivers should already be aware of the presence of the crossing before reaching the first of the rumble strips. | Lay red anti-skid surfacing on the approaches to all crossings (50-75m). This will both enhance visibility of the crossing for approaching drivers and also improve the drivers' chances of stopping before reaching the crossing, particularly during wet conditions. | M | Accepted | |
| | C | The proposed signing layout at roundabouts is complicated and therefore may confuse road users: | | M | Accepted | |
| | | C1. Stack-type signs on the immediate approach may encourage drivers to turn left directly, rather than negotiate the roundabout to do so. | C1. Replace the stack type signs with a repeated map type sign. | M | Accepted | |
| | | C2. The priority sign (8.13.1) also instructs drivers to turn left instead of negotiating the roundabout. | C2. Remove these priority signs from all roundabouts. | M | Accepted | |
| | | C3. The entry angle onto the circulatory section is often too acute, making it easier for drivers to enter the roundabout at higher speeds. This may lead to collisions, particularly with slower moving vehicles in the outside lane of the roundabout. | C3. Increase the entry angle by 'squaring-up' the entries, possibly by reducing the width of the splitter island on the approach. | M | Accepted | |
| | | | In addition, it is recommended that destination signs be used on each splitter island to give information to drivers on the circulatory section regarding which exit to take. | M | Accepted | |

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| | D | In a number of locations, there are 'give-way' intersections where a minor road enters a bus stop layby or parking place before the main road. This reduces the visibility for the driver on the minor road, as the give way line is at a 45 degree angle to the main road. It also creates, in effect, two give way points out of the intersection, which may cause difficulties for following vehicles, if the leading vehicle brakes at the second point – the layby marking - before entering the main road. | Separate the bus stop / parking layby from the minor road give way point by relocating them at an appropriate distance away. This will ensure that the intersection and layby operate as separate vehicle movements and will reduce conflicts. | M | Accepted | |
| | E | There is a lack of consistency in the layouts at the end of two-lane sections, when merging into one lane. In some locations the lane loss is from the offside and in some the lane loss is from the nearside. This results in additional confusion for drivers, who are not sure about which lane will have priority at the next location. | Standardise the two to one lane merge. It is suggested that the offside lane loss would be more appropriate, as slower vehicles will not be forced across into the end of a potentially faster moving overtaking lane. It will also encourage overtaking drivers to reduce their speed at the end of the two lane sections. | M | Accepted | |
| | F | The use of uncontrolled 'zebra' type crossings on sections of road with more than one lane in each direction may lead to a problem for pedestrians. A vehicle, waiting for a pedestrian to cross, may mask that pedestrian to drivers in the next lane, meaning that this vehicle may not stop. This may lead to a collision with the pedestrian or a shunt-type collision, or loss of control, caused by emergency braking. | Only use uncontrolled zebra type crossings on two-lane roads. Either reduce the number of lanes through built up areas, or use traffic signal controlled crossing where there are more than two lanes. | H | Accepted | |

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|---------------------------------------|-----|--|---|------|---|--|
| R14 Balti – Sarateni | | | | | | |
| <i>Lot 1 – Km 26+600 to km 38+300</i> | | | | | | |
| 1 | 8A | From this drawing, it does not appear that vehicles travelling from the direction of Balti are legally able to make a left turn towards Singerei. This may cause confusion and possibly conflicts, as drivers attempt to turn left illegally at one of the three gaps with opportunities to do so. | The layout of this intersection needs redesigning, with consideration given to the safe movement of all vehicles – and pedestrians where appropriate. Safe design means that each manoeuvre, from each direction, must be possible with the absolute minimum number of possible conflict points. A suggestion for this location may be the construction of a roundabout intersection, giving equal and predictable priority to vehicles approaching from all directions. This type of intersection would also be familiar to drivers – unusual layouts create confusion, and confusion often leads to collisions. | VH | The junction will be rearranged during the preparation of the Construction Drawings as per the drawing on the right | Accept This is an improvement as it allows for all turning manoeuvres but it could be simplified by utilising the right turn filter road as the T-Junction Entrance |
| 3 | 8B | At the intersection, the tapered central marking, used to bring vehicles from lane two into lane one, is much too short, given the speed of this road and the presence of the bend. There is also no signing to indicate the offside lane loss and there are no hatch markings to highlight the 'ghost island'. This may create a number of types of conflict, when fast-moving vehicles are forced into the nearside lane by the sudden appearance of the markings, or by stationary vehicles in the centre of the road waiting to turn left from the opposite direction. | Extend the tapered ghost island to a point prior to the bend and install appropriate warning signs. Also, lay the correct hatch markings within the ghost island. | H | Accepted | |

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| ALL | 8C | There is no indication of which direction has priority in the centre lane. This could lead to serious head-on collisions involving vehicles overtaking from both directions. | Use a solid white line in one direction, to prevent overtaking. Alternatively, use central hatching to reduce the carriageway to a single lane in each direction. | VH | Accepted | |
| 6 | 8D | The intersection on the second section does not allow safe travel between the two side roads. Drivers from Bereseni to Singerei, in particular, must negotiate oncoming traffic in order to reach the minor road opposite. | Re-align the minor roads, so that the intersection operates as a standard cross-roads. Alternatively, close the road to Singerei – or make the road one way at this point, preventing vehicles from turning into the side road. The one way option, however, may be difficult to enforce. | VH | Accepted | |
| 8 | 8E | Km 32+100 At the end of the two lane section, the lane loss is from the nearside. See General, Problem E. | Use offside lane loss | M | Accepted | |
| 11 | 8F | There is no dedicated left turn pocket to use for the turn towards Singerei adjacent to the gas station. This means that fast-moving vehicles in the offside lane, travelling around this bend, may be confronted by stationary vehicles waiting to turn left from this lane. | Create a left turn pocket, beginning prior to the bend, with appropriate signing, possibly utilising the space currently dedicated to the access lane for the gas station. | H | Accepted | |
| 11 | 8G | At the top of this intersection, vehicles travelling from Singerei towards Sarateni do not have adequate direction towards the slip road. If the 'no entry' sign is missed, they will travel straight on into the path of oncoming vehicles travelling towards Singerei. | Lay give way lines across the exit from Sarateni-Singerei and direct drivers from Singerei to their right, towards the slip road where they can access the main road towards Sarateni. | VH | Accepted | |
| 12 | 8H | Km 34 The pedestrian crossing stretches over three lanes, directly into the centre of the bus layby. If a bus is stationary, the pedestrian must decide whether to cross in front or behind the bus. This may lead to problems if the bus is just departing. | Relocate the crossing away from the layby. Also see General, Problem F. | H | Accepted | |

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|-----------|-----|---|--|------|--------------------|------------------|
| 12 | 8I | Km 34+750 The pedestrian crossing stretches over three lanes into the bus layby. | Relocate the crossing away from the layby. Also see General, Problem F. | H | Accepted | |
| 13 | 8J | The pedestrian crossing stretches over three lanes into the bus layby. | Relocate the crossing away from the layby, unless a suitably wide, kerbed island can be provided. Also see General, Problem F. | H | Accepted | |
| 14 | 8K | Km 36+100 and km 36+600 These sections of overtaking lane are too short. Vehicles attempting to overtake may be forced back to the nearside lane before completing their manoeuvre, possibly resulting in conflicts. | Continue the central hatching through these short sections. | M | Accepted | |
| 15 | 8L | Km 37+250 This section of overtaking lane is too short. Vehicles attempting to overtake may be forced back to the nearside lane before completing their manoeuvre, possibly resulting in conflicts. | Continue the central hatching through this short section. | M | Accepted | |
| 16 | 8M | Km 37+850 This section of overtaking lane is too short. Vehicles attempting to overtake may be forced back to the nearside lane before completing their manoeuvre, possibly resulting in conflicts. | Continue the central hatching through this short section. | M | Accepted | |
| 16 | 8N | The pedestrian crossing stretches over four lanes, with laybys on both sides of the crossing. There is also a minor road with the give way point within the layby | Relocate the crossing away from the laybys and separate the give way intersection from the layby. See General, Problems D and F. | H | Accepted | |

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| R14 Balti – Sarateni | | | | | | |
|---------------------------------------|----|--|---|---|-----------------|--|
| Lot 2 – Km 43+000 to km 66+657 | | | | | | |
| 1 | 8P | Km 43+500 There is a left turn pocket which leads directly into an overtaking lane. Vehicles slowing down or waiting to turn left may be struck from behind by overtaking vehicles. | Separate the left turn pocket from the overtaking lane using central hatch markings. | M | Accepted | |
| 4 | 8Q | Km 45+500 There is a left turn pocket which leads directly into an overtaking lane. Vehicles slowing down or waiting to turn left may be struck from behind by overtaking vehicles. | Separate the left turn pocket from the overtaking lane using central hatch markings. | M | Accepted | |
| 4 | 8R | Km 46+100 This left turn pocket is too long. This may encourage drivers to overtake using it and could possibly lead to conflicts with vehicles slowing down or waiting to turn left. | Shorten the left turn pocket to a standard length. | M | Accepted | |
| 4 | 8S | Km 46+400 This left turn pocket is too long. This may encourage drivers to overtake using it and could possibly lead to conflicts with vehicles slowing down or waiting to turn left. | Shorten the left turn pocket to a standard length. In addition, separate the opposing left turn pockets with a short section of central hatching. | M | Accepted | |
| 4 | 8T | Km 46+650 There is a left turn pocket which leads directly into an overtaking lane. Vehicles slowing down or waiting to turn left may be struck from behind by overtaking vehicles. | Separate the left turn pocket from the overtaking lane using central hatch markings. | M | Accepted | |

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|---|----|---|--|----|-----------------|--|
| 6 | 8U | The layout on the top section is too complicated. It creates numerous conflict points for both vehicles and pedestrians. Vehicles turning left from the side roads need to give way at two points, causing confusion for following vehicles. Pedestrians attempting to cross at the pedestrian crossing need to be aware of vehicles approaching on the main road, accelerating out of the side road and those emerging from the gas station access. Buses slowing down to stop at the bus stop may also come into conflict with vehicles speeding up in the acceleration lane. | Simplify the layout by removing all of the acceleration and deceleration lanes and creating three simple give way intersections. Relocate the pedestrian crossing to a point where it crosses the minimum number of lanes possible and avoids laybys. See also General, Problems D and F. | VH | Accepted | |
| 6 | 8V | Km 47+350 There is a left turn pocket here which does not have an intersection to make a turn into. This may cause confusion and possibly lead to conflicts. | Remove the left turn pocket. | M | Accepted | |
| 6 | 8W | Km 47+500 There is a left turn pocket which leads directly into an overtaking lane. Vehicles slowing down or waiting to turn left may be struck from behind by overtaking vehicles. | Separate the left turn pocket from the overtaking lane using central hatch markings. | M | Accepted | |
| 6 | 8X | Km 47+700 There is a pedestrian crossing at the end of an overtaking section. Drivers may be concentrating on manoeuvring back into the nearside lane and not on potential crossing pedestrians. | Relocate the pedestrian crossing or end the overtaking lane further back. | H | Accepted | |

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|----|-----|--|--|----|-----------------|--|
| 8 | 8Y | The layout on this section is too complicated. It creates numerous conflict points for both vehicles and pedestrians. Vehicles turning left from the side road need to give way at two points, causing confusion for following vehicles. Pedestrians attempting to cross at the pedestrian crossing need to be aware of vehicles approaching on the main road and accelerating out of the side road. They are also forced to cross to or from either a bus layby or an acceleration lane with no crossing markings. Vehicles making a right turn from the side road at the end of the acceleration lane will need to turn slowly because of the angle, putting them at risk of being struck by accelerating vehicle from the previous side road. | Simplify the layout by removing the acceleration and deceleration lanes and creating two simple give way intersections. Relocate the pedestrian crossing away from the bus layby. See also General, Problems D and F. | VH | Accepted | |
| 11 | 8Z | Km 52 This section of overtaking lane is too short. Vehicles attempting to overtake may be forced back to the nearside lane before completing their manoeuvre, possibly resulting in conflicts. | Continue the central hatching through this short section. | M | Accepted | |
| 11 | 8AA | Km 52+300 There is a left turn pocket which leads directly into an overtaking lane. Vehicles slowing down or waiting to turn left may be struck from behind by overtaking vehicles. | Separate the left turn pocket from the overtaking lane using central hatch markings. | M | Accepted | |
| 15 | 8BB | Km 55+400 There is a left turn pocket which leads directly into an overtaking lane. Vehicles slowing down or waiting to turn left may be struck from behind by overtaking vehicles. | Separate the left turn pocket from the overtaking lane using central hatch markings. | M | Accepted | |

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|----|---------|--|--|---|---|---|
| 17 | 8CC | Km 57+200 The entry angle of this intersection is acute. This may lead to vehicles not slowing down completely before entering the main road, possibly causing problems for pedestrians crossing the intersection. | Build out the side of the intersection so that it is perpendicular to the main road, ensuring that all vehicles slow down to make their turns. | M | This is an entrance to a field and shall be closed off | Accept |
| 19 | 8DD | The pedestrian crossing is over too many lanes – see General, Problem F. In addition, pedestrians may also be at risk crossing the acceleration lane, as drivers will be concentrating on the main road behind them, looking for a gap in traffic. | Remove the acceleration and deceleration lanes and create a standard give way intersection. | H | Accepted | |
| 21 | 8EE | Km 60+500 The entry angle of this intersection is acute. This may lead to vehicles not slowing down completely before entering the main road, possibly causing problems for pedestrians crossing the intersection. | Build out the side of the intersection so that it is perpendicular to the main road, ensuring that all vehicles slow down to make their turns. | M | The junction will be rearranged during the preparation of the Construction Drawings so that the entry/exit from the secondary road is more perpendicular to the main road. See the drawing on the bottom of this page | Accepted If traffic movements are significant consider staggering the junction |
| 22 | 8FF | These two pedestrian crossings are too long – see General, Problem F. | Relocate the crossings or remove the acceleration and deceleration lanes. | H | Accepted | |
| 22 | 8G G | Km 60+750 This section of overtaking lane is too short. Vehicles attempting to overtake may be forced back to the nearside lane before completing their manoeuvre, possibly resulting in conflicts. | Continue the central hatching through this short section. | M | Accepted | |
| 23 | 8HH | Km 61+900 The pedestrian crossing is too long and crosses into the bus layby. | Relocate the crossing, also see General, Problem F. | H | Accepted | |

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|----|---------|--|--|----|-----------------|--|
| 23 | 8II | Km 61+900 There is a left turn pocket which leads directly into an overtaking lane. Vehicles slowing down or waiting to turn left may be struck from behind by overtaking vehicles. | Separate the left turn pocket from the overtaking lane using central hatch markings. | M | Accepted | |
| 25 | 8JJ | Km 63+800 There is a left turn pocket which leads directly into an overtaking lane. Vehicles slowing down or waiting to turn left may be struck from behind by overtaking vehicles. | Separate the left turn pocket from the overtaking lane using central hatch markings. | M | Accepted | |
| 26 | 8KK | Km 64+200 At the end of the two lane section, the lane loss is from the nearside. See General, Problem E. | Use offside lane loss | M | Accepted | |
| 27 | 8LL | The layout on this section is too complicated. It creates numerous conflict points for both vehicles and pedestrians. Vehicles turning left from the side roads need to give way at two points, causing confusion for following vehicles. Pedestrians attempting to cross at the pedestrian crossing need to be aware of vehicles approaching on the main road, accelerating out of the side road and those emerging from the gas station access. Buses slowing down to stop at the bus stop, and vehicles slowing down to turn into the gas station may also come into conflict with vehicles speeding up in the acceleration lane. | Simplify the layout by removing all of the acceleration and deceleration lanes and creating two simple give way intersections. Relocate the pedestrian crossing to a point where it crosses the minimum number of lanes possible and avoids laybys. See also General, Problems D and F. | VH | Accepted | |
| 27 | 8M M | Km 65+500 The pedestrian crossing is too long. | Relocate the crossing, also see General, Problem F. | H | Accepted | |
| 27 | 8N N | Km 65+800 There is a left turn pocket which leads directly into an overtaking lane. Vehicles slowing down or waiting to turn left may be struck from behind by overtaking vehicles. | Separate the left turn pocket from the overtaking lane using central hatch markings. | M | Accepted | |

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|----|-----|---|---|----|-----------------|--|
| 29 | 8PP | The layout on this section is too complicated. It creates numerous conflict points for both vehicles and pedestrians. The pedestrian crossings are at unsuitable locations as pedestrians are forced to cross into acceleration and deceleration lanes, and also into the centre of a bus layby. Buses slowing down to stop at the bus stop may also come into conflict with vehicles speeding up in the acceleration lane. There is no indication of how this scheme fits in with the existing situation at its limit. | Simplify the layout by removing all of the acceleration and deceleration lanes and creating one simple give way intersection. Relocate the pedestrian crossing to a point where it crosses the minimum number of lanes possible and avoids laybys. Ensure that the project has a transition into the existing road which does not lead to conflicts. See also General, Problems D and F. | VH | Accepted | |
|----|-----|---|---|----|-----------------|--|

8A: Road R14 – Sheet 1 – km 26+600

PROBLEM

From this drawing, it appears that vehicles travelling from the direction of Balti are not able to make a legal left turn towards Singerei. This may cause confusion and possibly conflicts, as drivers attempt to turn left illegally at one of the three gaps with opportunities to do so.

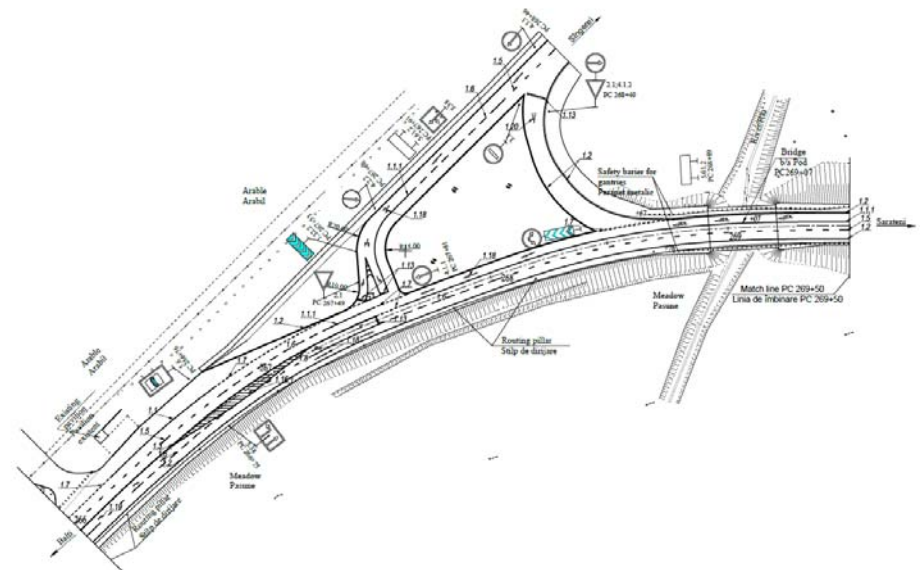
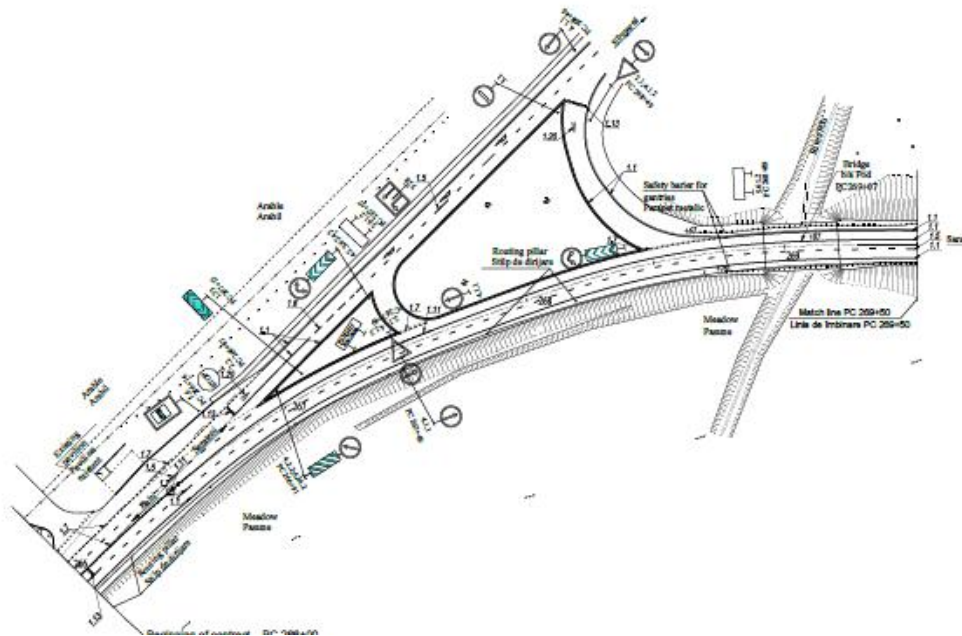
RECOMMENDATION

The layout of this intersection requires redesigning, with consideration given to the safe movement of all vehicles and pedestrians where appropriate. Safe design means that each manoeuvre from each direction must be possible with the absolute minimum number of possible conflict points. A suggestion for this location may be the construction of a roundabout intersection, giving equal and predictable priority to vehicles approaching from all directions. This type of intersection should be familiar to drivers as unusual layouts create confusion, and confusion often leads to collisions.

SRA REVIEW

The junction will be rearranged during the preparation of the Construction Drawings as per the drawing on the right.

This is an improvement as it allows for all turning manoeuvres but it could be simplified by utilising the right turn filter road as the T-Junction. The exact layout should be designed after determining which the major and minor roads are. Another advantage is that it moves the junction away from the garage entrance.





8CC: Road R14, Sheet 17 km 57+200

PROBLEM

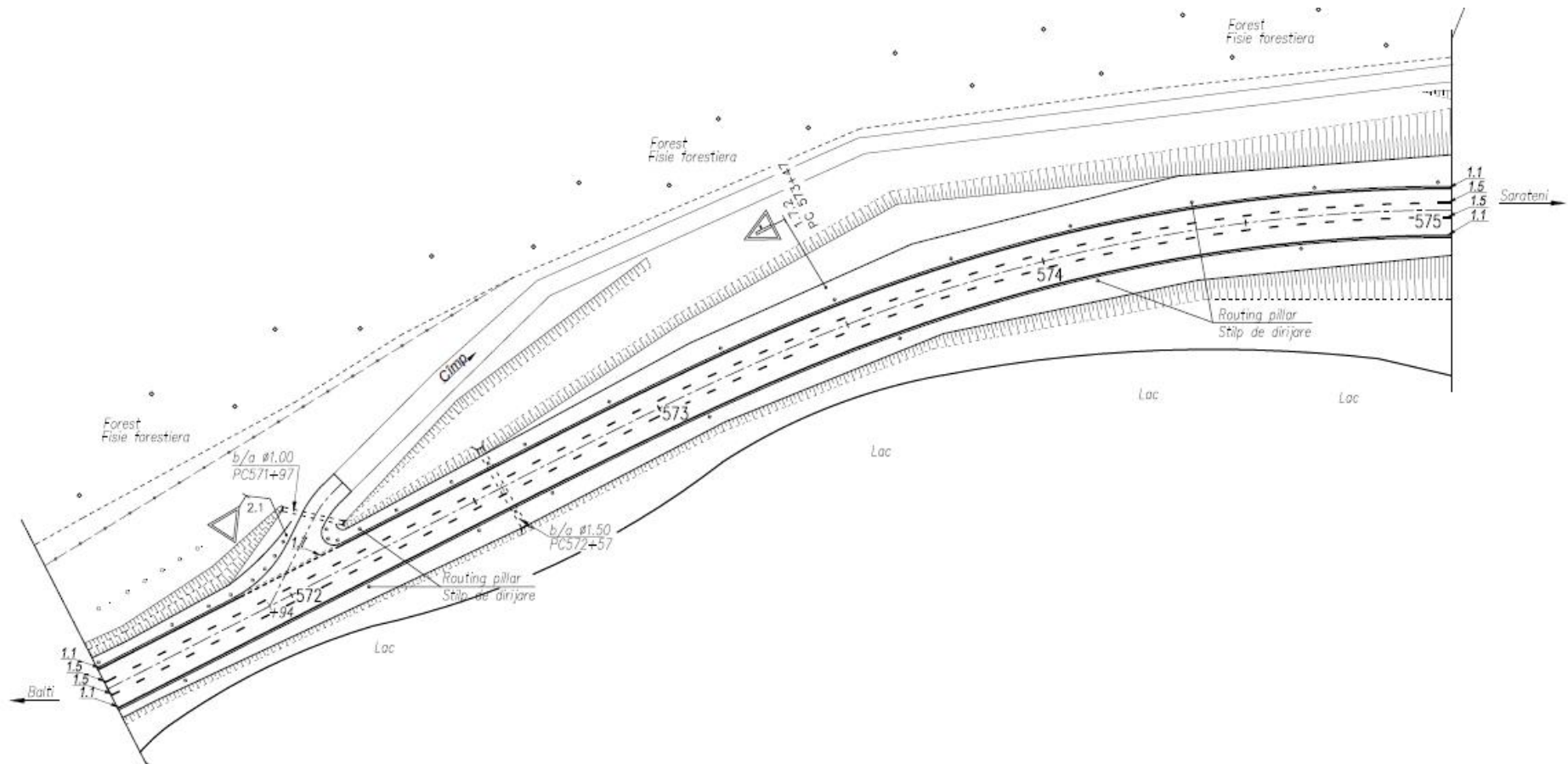
The entry angle of this intersection is acute. This may lead to vehicles not slowing down completely before entering the main road, possibly causing problems for pedestrians crossing the intersection.

RECOMMENDATION

Build out the side of the intersection so that it is perpendicular to the main road, ensuring that all vehicles slow down to make their turns.

SRA REVIEW

This is an entrance to a field and shall be closed off. **ACCEPTED**





8EE: Road R14 21 km 60+500 PROBLEM

The entry angle of this intersection is acute. This may lead to vehicles not slowing down completely before entering the main road, possibly causing problems for pedestrians crossing the intersection.

RECOMMENDATION

Build out the side of the intersection so that it is perpendicular to the main road, ensuring that all vehicles slow down to make their turns.

SRA REVIEW

The junction will be rearranged during the preparation of the Construction Drawings so that the entry/exit from the secondary road is more perpendicular to the main road. See the drawing on the bottom of this page. **ACCEPTED. If traffic movements are significant consider staggering the junction**

