

Summary:

Central approach cycle lanes in Oslo

The effect on objective and subjective safety and bicyclist behaviour

Central approach cycle lanes are likely to improve conditions for bicyclists. It is therefore recommended to include the measure in the bicycle handbook, and to use the measure to a greater extent than is the case today.

Intersections in urban areas are a major challenge

Road and transport authorities are working to promote bicycle use in Norwegian cities and towns. An important precondition for this policy is that the infrastructure to a greater extent be adapted for cycling. The design of intersections is probably the biggest challenge. Large and complex intersections are often difficult to design in a bicycle friendly way.

As an attempt to improve the condition for bicyclists in intersections, the Norwegian Public Roads Administration and City of Oslo have made central approach cycle lanes in some intersection in Oslo.

Central approach cycle lanes are cycle lanes at signalised intersections to the left of the motor vehicle right turn lanes. Figure i shows an example of a central approach cycle lane in Monolitveien in Oslo.



Figure i. Central approach cycle lane in Oslo (photo: M. Sørensen).

The Institute of Transport Economics (TØI) has examined whether central approach cycle lanes improve conditions for cyclists. We study the effect primarily on objective and subjective safety, as well as on behaviour, but also the effect on satisfaction, attitudes, and mobility. A study that includes all these parameters has never before been done, neither in Norway nor in other countries. The study is part of the project "Sustainable urban transport" by the Norwegian Public Roads Administration.

Six analysis intersections and four sub-studies

The study includes the following six intersections in Oslo:

1. Monolitveien - Ullernchausseen
2. Kierschowsgate – Kirkeveien
3. Akersgata - Keyzers gate
4. General Ruges vei - Eterveien
5. Middelthungsgate - Kirkeveien
6. Bogstadveien - Kirkeveien

To assess the effects, in-depth analyses was made of 64 accidents during 10 years, observation studies were performed during 42 hours covering 2,352 cyclists, and a interview survey was made of 388 cyclists in the six intersections mentioned. A before-and-after study was done for intersection 5, after studies were done for intersection 1-4, while a before study was done for intersection 6. Finally, a

literature review was done covering 33 handbooks and evaluation studies from eight countries.

Central approach cycle lanes should be included in relevant manuals

The main conclusions of this study are the following recommendations:

- Central approach cycle lanes should be included as standard solution in the Norwegian bicycle handbook and other relevant manuals.
- The measure should be used to a greater extent than is the case today in Norwegian intersections in urban areas.

The reason for these recommendations is that the measure is recommended and used in leading cycling countries, and that studies made in Oslo indicate that the measure as a whole contributes to improved conditions for cyclists without having any significant side effects.

Central approach cycle lanes are used as intended

Most of the cyclists, but not all of them, are using the measure as intended:

- 83 % of the cyclists going straight ahead in the intersection are using the cycle lane. In intersections without the measure 76 % of the cyclists going straight ahead are cycling in the middle of the road.
- 93 % of the cyclists turning right are cycling at the right side of the road or on the sidewalk, but 7 % are cycling in the cycle lane where they are not supposed to be. In intersections without the measure 9 % are turning right from the middle of the road.
- 97 % of the cyclists going straight ahead from the cycle lane are passing right through the intersection, while 3 % are using the pedestrian crossing.
- 88 % are cycling against green light from the cycle lane, while 12 % are cycling against red light.

The percentage of motorists who yield to cyclists at the merging area increased in the short term. 59 % of those cycling at the sidewalk state that they will bicycle in the middle of the road if central approach cycle lanes are made.

Probably improved road safety

Central approach cycle lanes are recommended in many other countries as a safety measure. The objective is to replace the dangerous conflicts between the right-turning motor vehicles and bicycles going straight ahead by less hazardous merging situations in front of the intersection.

Only one study has reported on the safety effect. This study has no unambiguous conclusion, but the measure does not seem to result in more bicycle accidents. The conclusion of five other studies that indirectly have examined the effect is that the measure is likely to have a positive safety effect for bicyclists.

As expected, there were too few bicycle accidents in the accident analysis for the six intersections to estimate the safety effect of the measure. Observation and analysis of conflicts involving cyclists in the six intersections shows that there are

more conflicts in intersections with than without the measures. However, this is explained by other road safety problems in the intersections with the measure. At intersection 5 the marking of central approach cycle lanes is followed by a reduction in the number of conflicts, but this reduction is not statistically significant.

Based on the analyses it is difficult to assess the safety effect, but it does not seem likely that the measures will increase bicycle accidents.

Improved subjective safety and satisfaction

The survey shows that the measure improves subjective safety and satisfaction:

- Cyclists are feeling significantly safer in intersections with central approach cycle lanes than in general as bicyclists in Oslo. However, 33 % of the bicyclists are feeling unsafe in intersections with the measure.
- A before-and-after study for intersection 5 shows that the bicyclists are feeling significantly safer after the cycle lane has been made.
- Cyclists are significantly more satisfied in intersections with central approach cycle lanes than in general as bicyclists in Oslo. Yet, 27 % of the bicyclists are unsatisfied in intersection with the measure.
- A before-and-after study for intersection 5 shows that the bicyclists are significantly more satisfied after the cycle lane has been made.
- 68 % of the bicyclists think the central approach cycle lane improves conditions for bicyclists and is a good bicycle measure.

Improved mobility

No systematic study of the effect on mobility for cyclists has been made, so it is not possible to give a final assessment of this effect. However, it seems that the measure has a positive effect:

- The measure provides the opportunity for cyclists to overtake a possible traffic queue at the intersection.
- The measure induced more people to ride their bicycle in the roadway, where mobility for cyclists usually is best, rather than using the sidewalk.

Where can central approach cycle lanes be used?

The measure can be used at intersections with the following characteristics:

- Signal controlled intersections in urban areas with one lane for right turning.
- Primarily X-intersection, but also T-intersections.
- There are cycle lanes or cycle tracks.
- Large and complex intersections, where car drivers do respect the cycle lane.
- Room at the intersection for a separate bicycle lane.
- Low speed level at the merging area.
- Many bicyclists going straight ahead and motor vehicles turning right.

The measure may be less well suited for intersections with many school children.

For optimal positive effect for the bicycles, it is essential that the central approach cycle lanes be marked in several intersections, so both bicyclists and motorists get used to it and learn how to use the measure correctly.

How should central approach cycle lanes be designed?

Primarily inspired by the recommendations in foreign manuals it is recommended that central approach cycle lanes be designed in the following way:

- The merging area should be 15-60 m long, located at least 15 m before the intersection, and marked with dotted lines, bike symbols, arrows and/or colour.
- The bicycle lane should be at least 1.5 m wide and marked with lines, bike symbols, arrows and/or colour.
- It may be a good idea to mark the bicycle lane all the way through the intersection. This can be done by dotted lines, bike symbols, arrows and/or colour.
- The measure can be combined with advanced stop lines, cycle boxes and coloured marked cycle lanes.
- A new Norwegian road sign for the measure used in intersection 5 should be used in other intersections.
- The current road sign for cycle lanes should probably not be used at intersection with central approach cycle lanes.
- If car drivers are obliged to yield for bicyclists at the merging area, a road sign explaining this should be considered.

Continuous maintenance is very important to maintain the positive effect.

More studies

On account of various external circumstances, we were not able to carry out the study exactly as planned, and some of the results should therefore be interpreted with caution. Thus, it is recommended that this study be supplemented by more studies in intersections 5 and 6 and by a before-and-after studies in other intersections. Such studies will improve the documentation about the effect and make it possible to quantify its size. The studies should allow one to assess the short and long term effects and to determine where the measure would have the best effect.

The study should be conducted in the same way as in this project, but with a more systematic study on mobility. It would also be relevant to include car driver behaviour in the study.

Total package of measures

There are several good measures available, that improve the conditions for bicyclist in intersections. In addition to central approach cycle lanes, these are advanced stop lines, cycle boxes, and coloured marked cycle lanes. Today, these measures are used to a rather limited extent only. Expanding their use would make bicycling more attractive and induce more people to ride their bicycle.