

Summary:

Measures for Bicycles in City Intersections

International experiences and evaluation studies

A review of foreign effect studies of six measures for bicycles in intersections in urban areas and one measures for pedestrians shows that cycle boxes, advanced stop lines and coloured cycle lanes improve the conditions for bicyclists, and therefore should be used more in Norway than the case is today. Central feeder lanes and special marking of pedestrian crossings will probably also have a positive effect. The effect of right and left hand side feeder lanes cannot be assessed, as they have not been examined in any foreign effect studies.

A follow-up of a previous study

In the beginning of 2009 the Institute of Transport Economics (TØI) made a literature survey of 59 guidelines and handbooks for bicycles, pedestrians and public transport from nine countries. The aim was to summarise foreign recommendations about how intersections in urban areas should be designed, so as to ensure good conditions for environment friendly transportation. The results were published in TØI-report 1004/2009 “Design of intersections in cities – International recommendations to ensure environmentally friendly transportation in cities”.

TØI-report 1004/2009 recommends supplementary reviews of evaluation studies for the most relevant measures, in order to confirm - if possible - that the measures have the expected positive effect.

This report includes such a review for seven selected measures: Cycle boxes, advanced stop lines, coloured cycle lanes, central feeder lanes, two kinds of multiple feeder lanes, and special marking of pedestrian crossings.

The review includes effects for vulnerable road users in terms of objective and subjective safety, mobility, behaviour and attitudes.

The aim of the review is to help answer the following questions:

- If the measure is already included in Norwegian handbooks, should its use be extended?
- If the measure is not included in Norwegian handbooks, should it be included?
- Should the effect of the measures be studied even more to make it possible to recommend if the measure should be included in Norwegian handbooks and/or be used more than today?

The review includes 65 studies from seven different countries varying from zero to 21 studies for each of the seven measures. Table I summarises the results of the review.

Table I. Likely effect for seven measures in intersections in urban areas for vulnerable road users. +: positive effect, 0: neutral effect, -: negative effect.

	Number of studies	Total effect	Safety	Subjective safety	Mobility	Behaviour	Attitude	Following the law
Central feeder lane	7 studies	(+)	(+)	(-)	(+)/0	(+)	(+)	(+)
Multiple feeder lanes, right side	0 studies	?	?	?	+	?	?	?
Multiple feeder lanes, left side	4 studies	?	+/-	-	+	?	? (+)	?
Cycle box	13 studies	+	0/+	+	+	+/-	+	0 /-
Advanced stop lines	12 studies	+	+	+	(+)	(+)/(-)	+	?
Coloured / special marked cycle lane	21 studies	+	+	+	0	+	+	0-
Special marking of pedestrian crossings	8 studies	(+)	(+)	(+)	0	+	(+)	(+)

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Measures that should be used more

The seven measures are divided into three groups regarding the three questions.

The first group includes cycle boxes, advanced stop lines and coloured/special marked cycle lanes.

It is recommended that the use of these measures in Norway be extended because:

- Many studies of the effect of these measures have been made, several of high quality.
- These measures will improve the conditions for bicyclists in terms of most of the parameters.
- These measures are recommended in most of the foreign bicycle handbooks and are already included in the Norwegian bicycle handbook.
- These measures are rarely used in Norway, even though they are already in the Norwegian handbook, are used in many other countries, and seem to improve the conditions for bicyclists in city intersections.

Cycle box and advanced stop lines may also improve conditions for pedestrians. Such measures with positive effect for both bicyclists and pedestrians should be prioritised.

Measures that should probably be used more

The second group includes central feeder lanes and special marking of pedestrian crossings.

It is recommended to conduct Norwegian field trials for these measures, so as to confirm that these measures have a positive effect and should be included in

relevant Norwegian handbooks. A Norwegian field trial with central feeder lane is already started and will be finished in fall 2010.

The reasons for the recommendation are:

- These measures have been less evaluated than measures in group 1. Thus, the conclusion is weaker. However, it seems that these measures have a positive effect for bicyclists and pedestrians, respectively.
- These measures are described or recommended in several foreign handbooks, although in fewer handbooks than as group 1.
- These measures are not included in relevant Norwegian handbooks.

Measures that should be studied more

The third group consist of multiple feeder lanes on the left and right hand side.

For these measures it is recommended to postpone any decision on further use in Norway, until more foreign studies have been conducted. On the other hand, since some countries must be the first to try out possible new measures, Norwegian pilot studies should be considered.

The reasons for the recommendation are:

- These measures have not been evaluated. Thus, it is not possible to document their effect on bicyclists.
- These measures are only recommended in a few foreign handbooks.
- These measures are not included in the Norwegian bicycle handbook.

The possibility for success

The review shows varying effects of the respective measures. A number of conditions may increase the possibility of obtaining a good effect:

- *Maintenance*: Continual maintenance is important to get a good effect. This applies in particular to coloured cycle lanes that quickly lose visibility and impact.
- *Education*: New measures may be difficult to understand and use the right way. If a measure is not used as intended, it will lose its positive effect. Thus, several studies recommend to inform the road users on how they are supposed to use the measure. Note, on the other hand, that roads should be designed in such a way that they are self-explanatory and can be used without any further instructions.
- *Adequate numbers*: On the one hand the measure has to be implemented a minimum numbers of places for the road users to get used to it and learn how to use it. On the other hand some measures, such as coloured cycle lanes, will lose their positive effect if they are over-used.