

Research on cycling infrastructure in Copenhagen



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Research on cycling infrastructure CPH

Bicycle Account (risk calculation)

Narrow cycle lane in intersection (conflict registration)

Cycling travelling speed and green wave (floating bike)



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The Bicycle Account/Cycling Policy and research

- The Account - seen over more than 10 years - becomes a research project
- The Policy has initiated a specific project on cycling travelling speed
- The Account made it possible to calculate risk



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What cyclists think

	1996	1998	2000	2002	2004	2006	2008
CPH as a city for cyclists 	7	8	8	8	8	8	9
Cyclist sense of safety 	6	6	6	6	6	5	5
Amount of cycle tracks 	6	6	7	6	6	6	6
Cycle track width 	7	7	6	5	5	5	4
Condition of cycle tracks 	5	5	4	5	5	5	5
Condition of roads 	2	3	2	3	3	3	3
Bicycle parking generally 	4	3	4	3	3	3	3
Combining cycling and public transport 	5	4	5	5	5	6	5



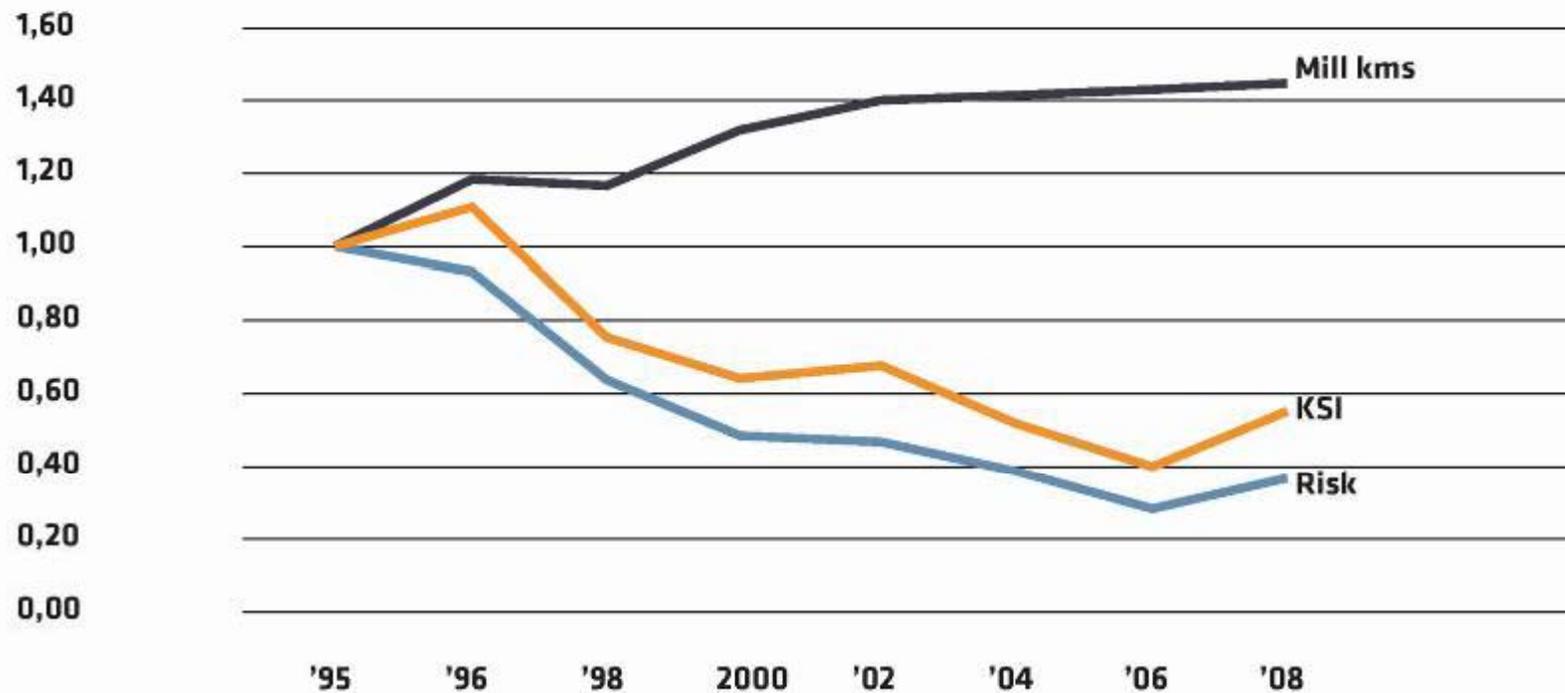
Goals and key figures

ECO-METROPOLIS	1996	1998	2000	2002	2004	2006	2008
Percentage that cycle to work or education (%)	30	30	34	32	36	36	37
Seriously injured cyclists (number per year)	252	173	146	152	124	92	121
Percentage of cyclists that feel safe (%)	60	58	57	56	58	53	51
OTHER KEY FIGURES							
Cycled kilometres (mio./km per weekday)	0.93	0.92	1.05	1.11	1.13	1.15	1.17
Cycled km between serious casualties (mio./km)	1.2	1.8	2.4	2.4	3.0	4.2	3.2
Cycling speed (km/h)					15.3	16.0	16.2
Cycle tracks (km)	294	302	307	323	329	332	338
Cycle lanes (km)		6	10	12	14	17	18
Green cycle routes (km)	29	30	31	32	37	39	41
Bicycle parking spaces on roads and pavements (1000)					29.5		34.8



Risk calculations based on Bicycle Account

Risk development

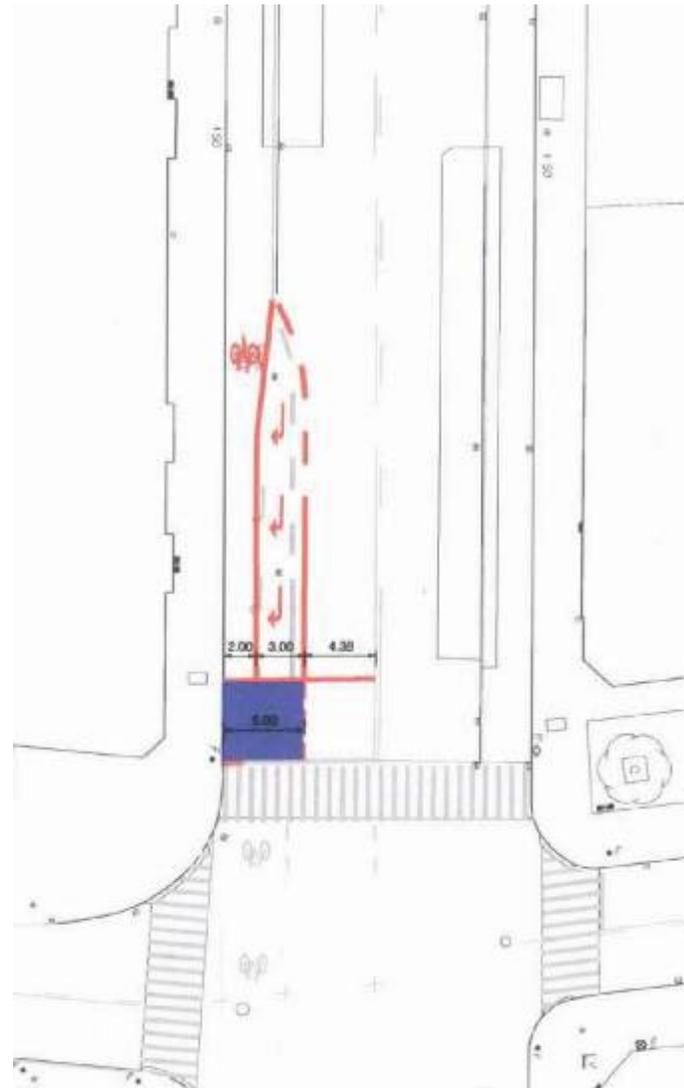


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Conflict registration - narrow cyclelane



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Conflict registration

Investigations has shown, that cyclists feel unsafe on shortened cycletracks in intersections

In 2 intersections, a shortened cycletrack was extended as a narrow lane to pedestrian crossing and stopline for cars was withdrawn

15 hours of observation in each intersection both before and after reconstruction

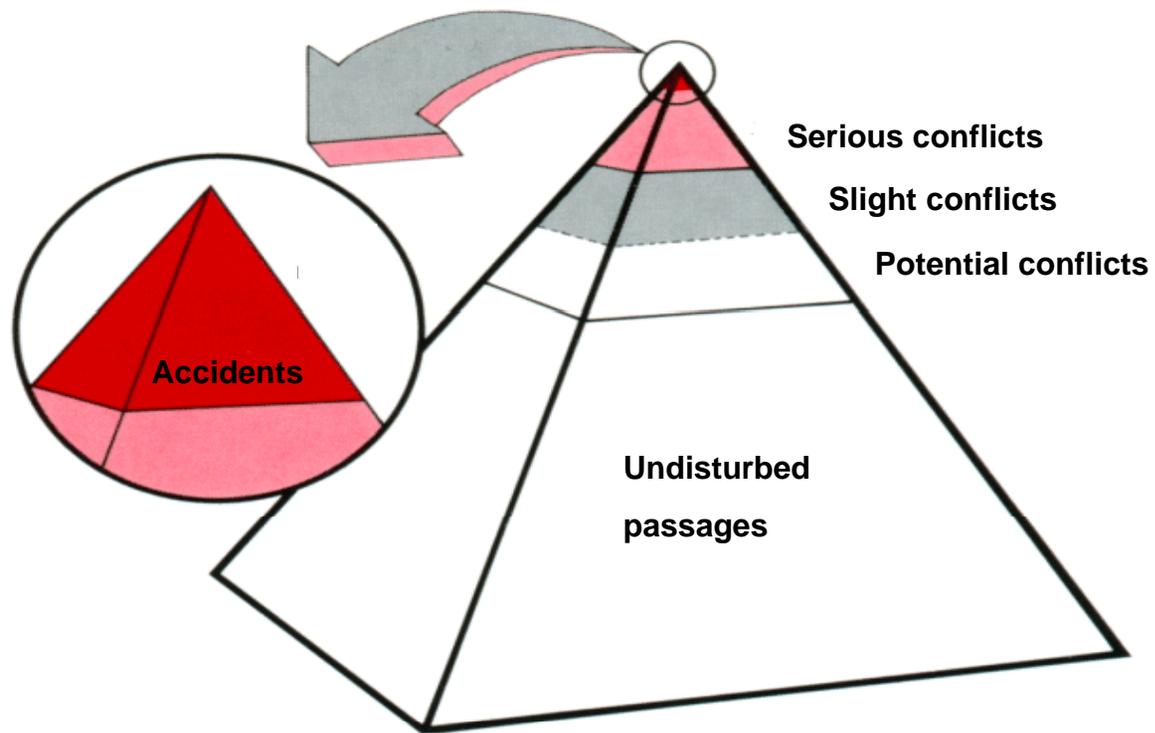
Conflict registration used for the first time in Copenhagen



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Method developed by Lunds Technical University, Sweden

Systematic registration of conflicts between road users can give an indication of the number of accidents in the long run

Results from conflict studies can quickly describe safety implications of new designs - not waiting 3-5 years collecting accident information from police

Registration only by trained and experienced personnel

Everything is videofilmed



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Conflicts - results of investigation

FIRST INTERSECTION:

	Serious conflicts	Slight conflicts	All conflicts
Before:	1	3	4
After:	3	1	4

SECOND INTERSECTION:

	Serious conflicts	Slight conflicts	All conflicts
Before:	5	2	7
After:	5	0	5



More data needed ...

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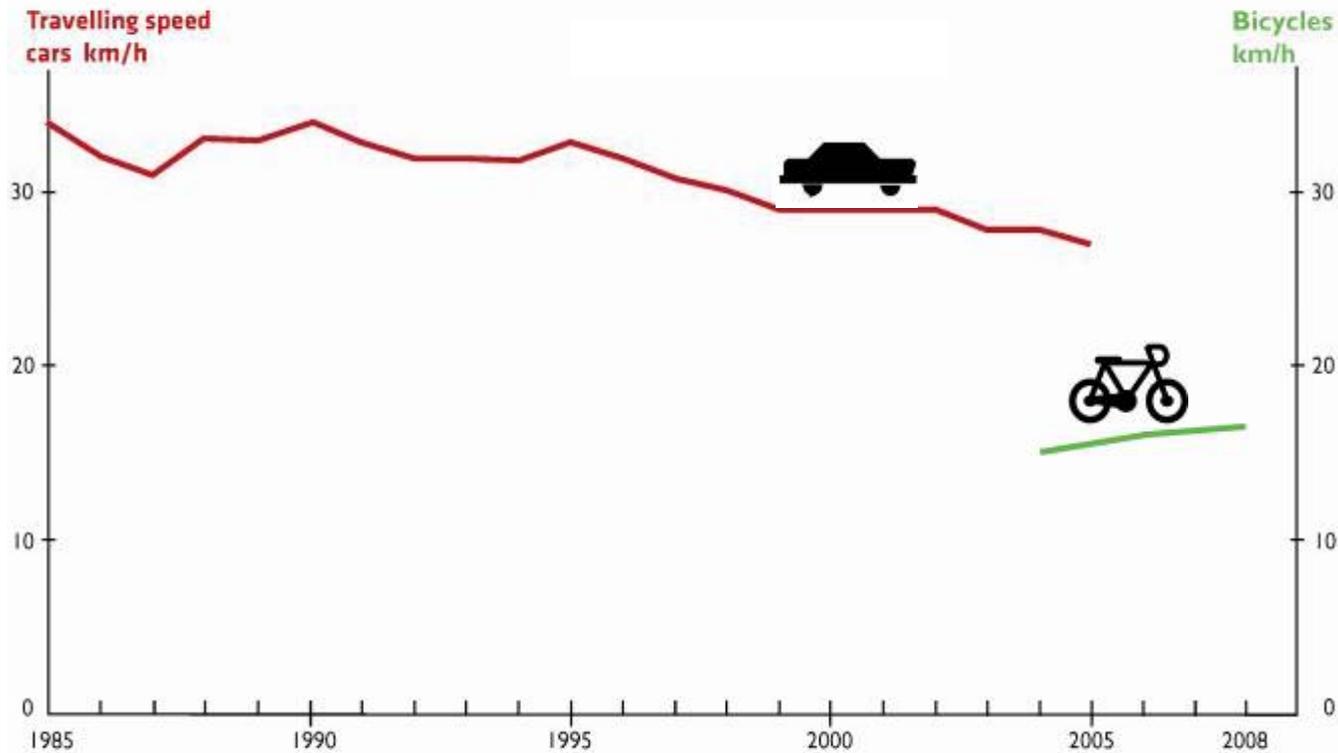
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Floating bike - travelling speed and green wave



Car- and cycling travelling speed



Car speed
34 km/h (1985)
33 km/h (1995)
27 km/h (2005)



Bicycle speed
15.3 km/h (2004)
16.0 km/h (2006)
16.2 km/h (2008)

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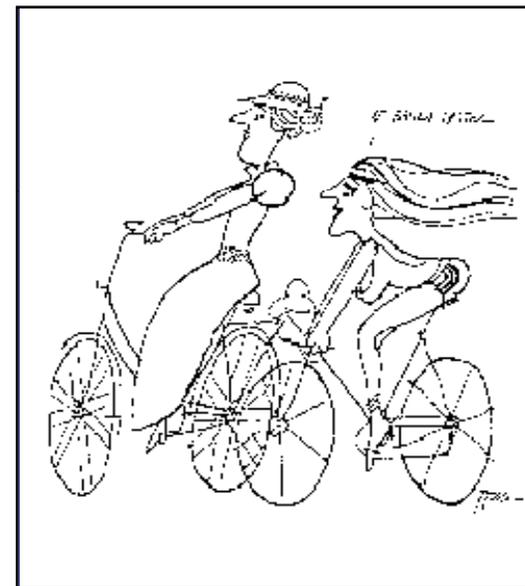
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Cycling travelling speed

Goal: Increase cycling travelling speed with 10%

- **Eliminating detours**
- **Widening cycle tracks**
- **Redesigning intersections**
- **Green waves for cyclists (can contribute with more than 10% increase on selected streets)**

Move over sister!



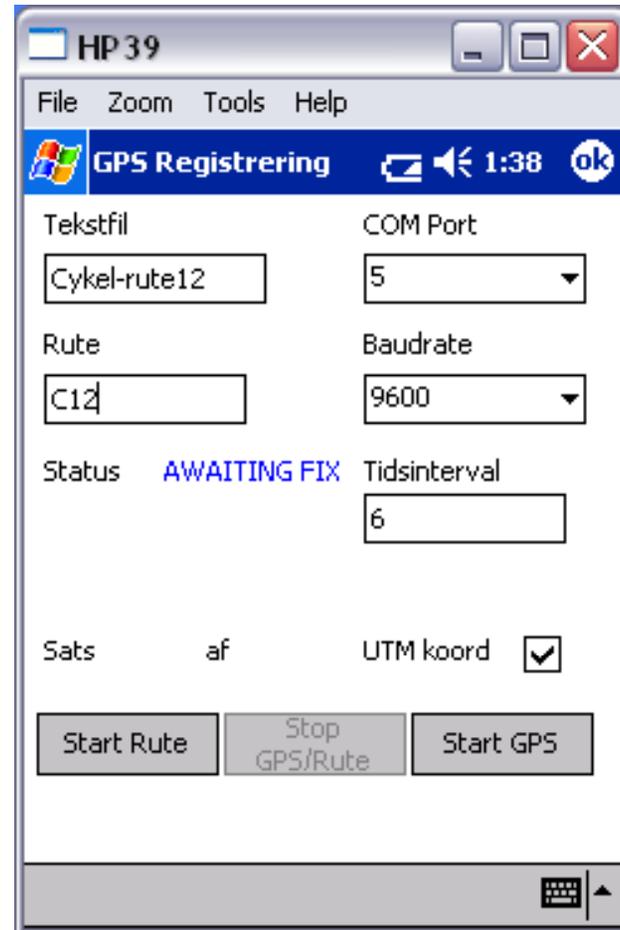
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Floating bike

- "Floating mode"
 - when enough cyclists are present
- "Fixed mode"
 - as a supplement (20 km/h)



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Green wave on Nørrebrogade

- Green wave adjusted to a cyclist's speed of 20 km/h
- 6:30 am to 12 - green wave adjusted to cyclist towards city C.
- 12 to 6 pm - green wave adjusted to cyclist from city C.

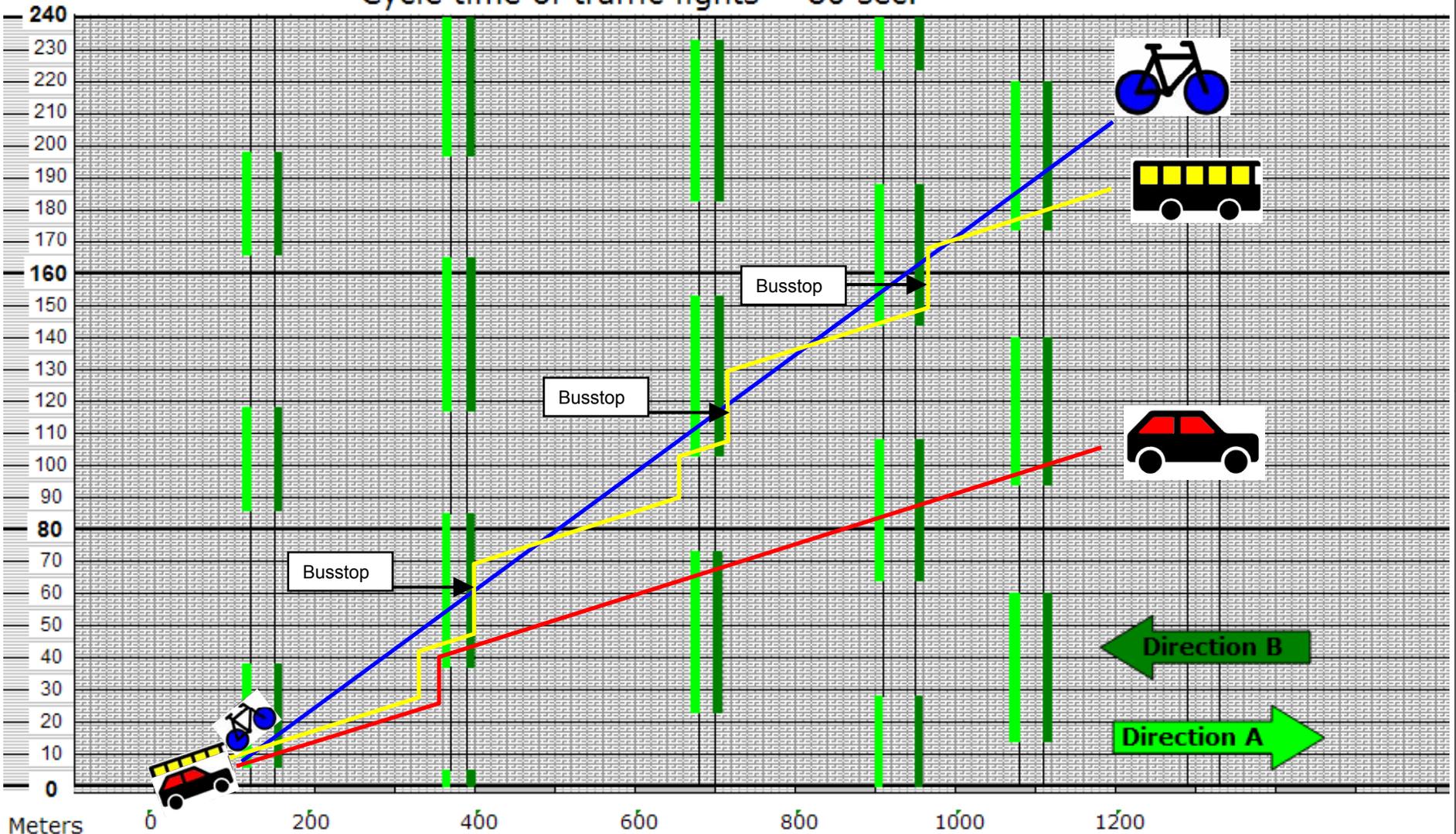
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Example of a green wave adjusted to a speed of 20 km/h

Cycle time of traffic lights = 80 sec.

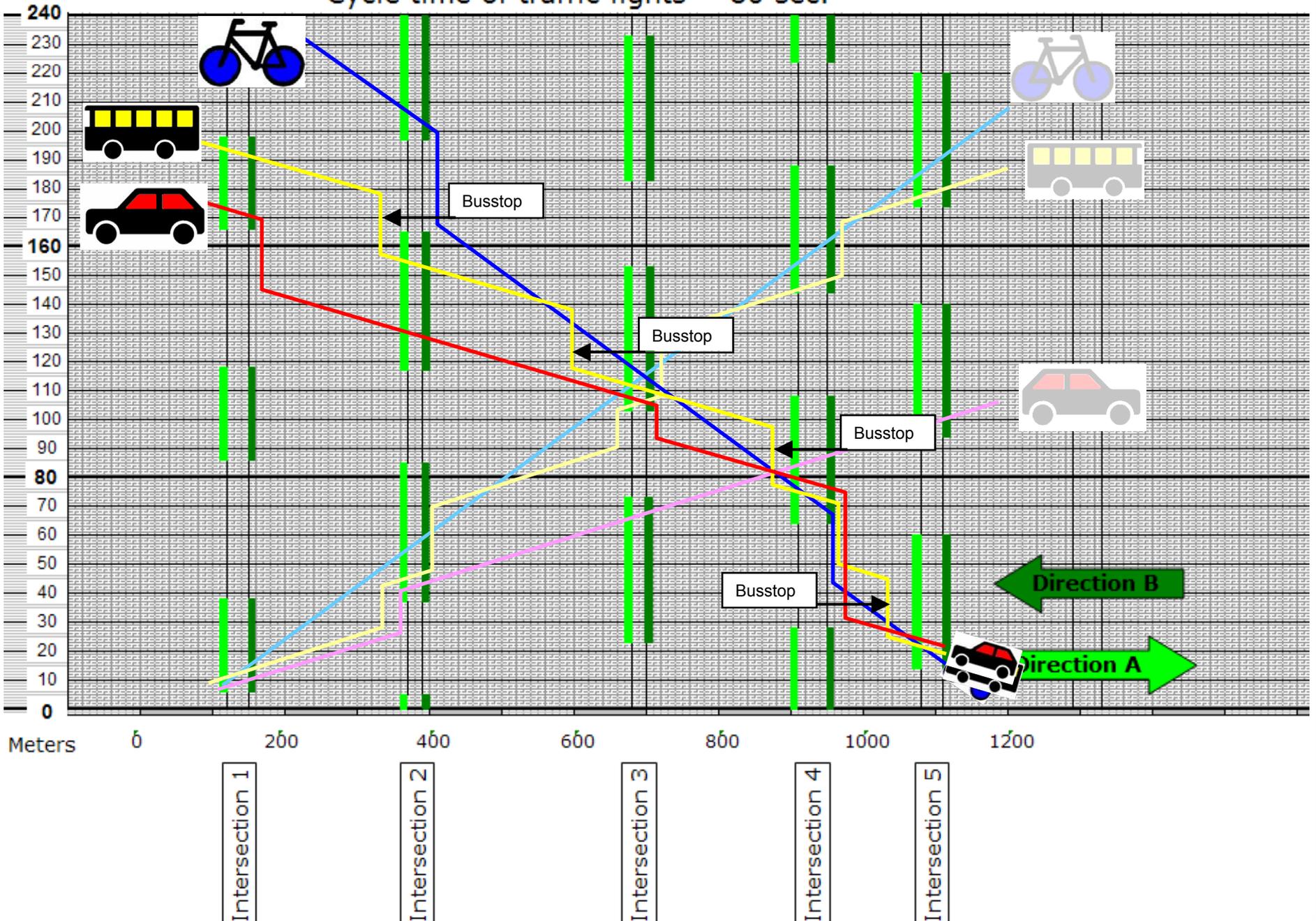
Seconds



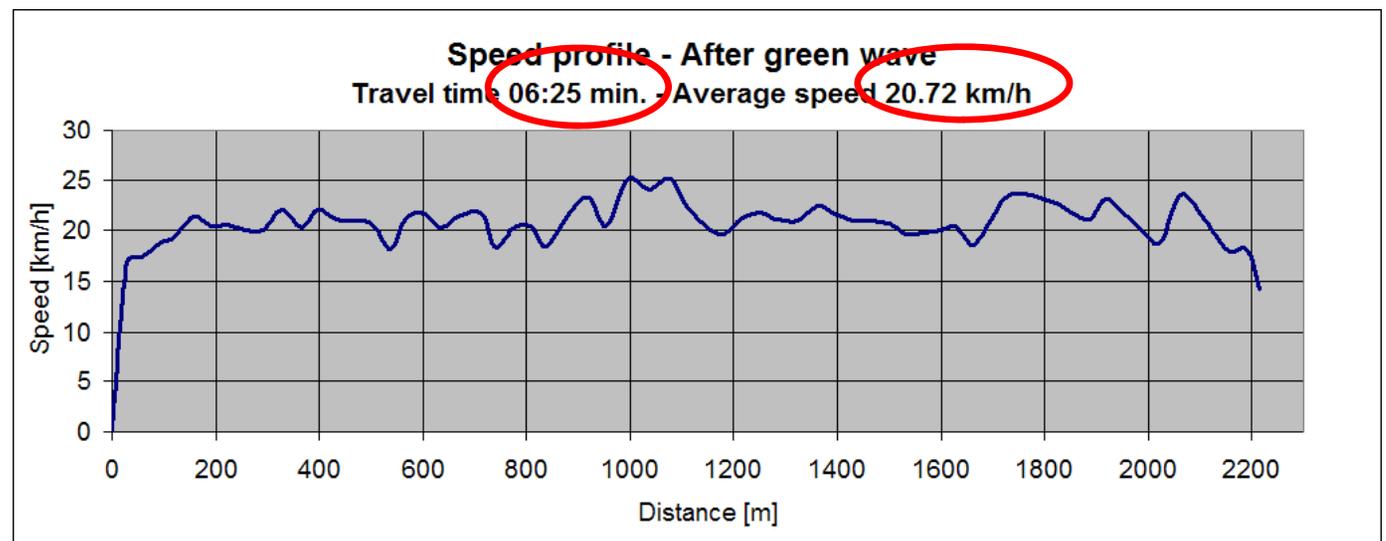
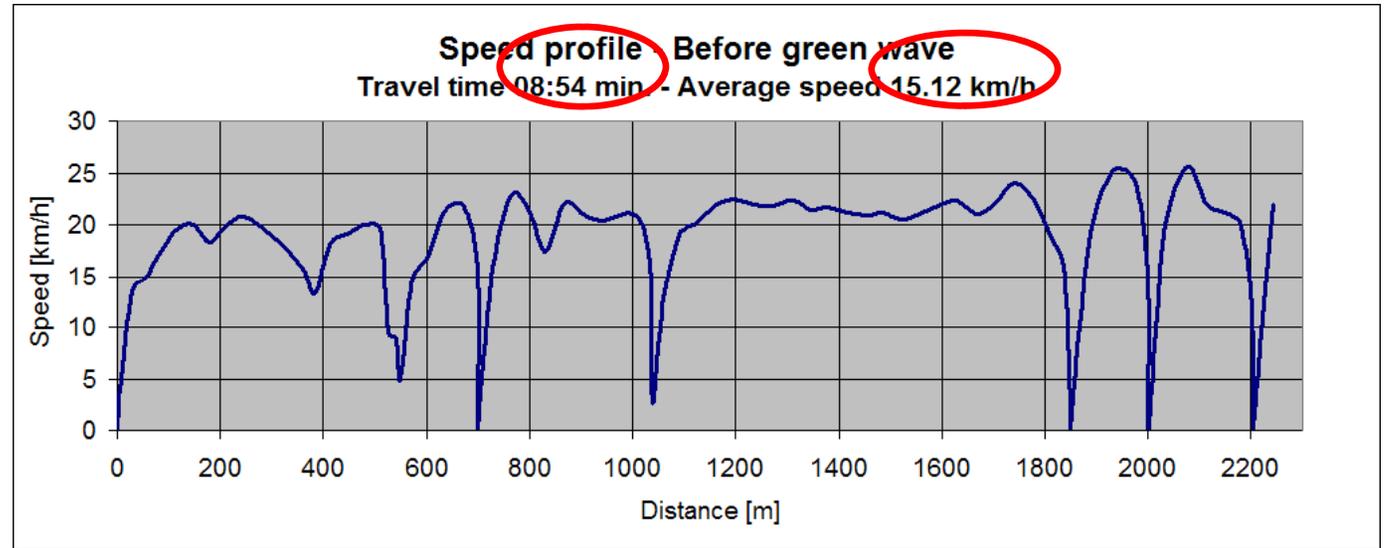
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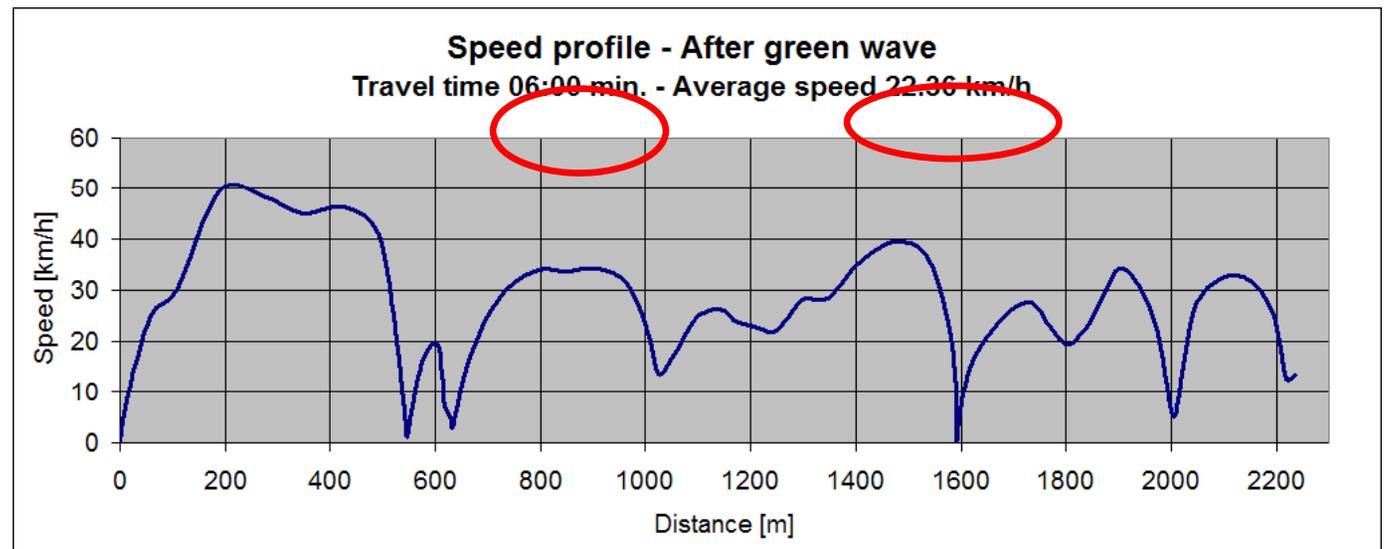
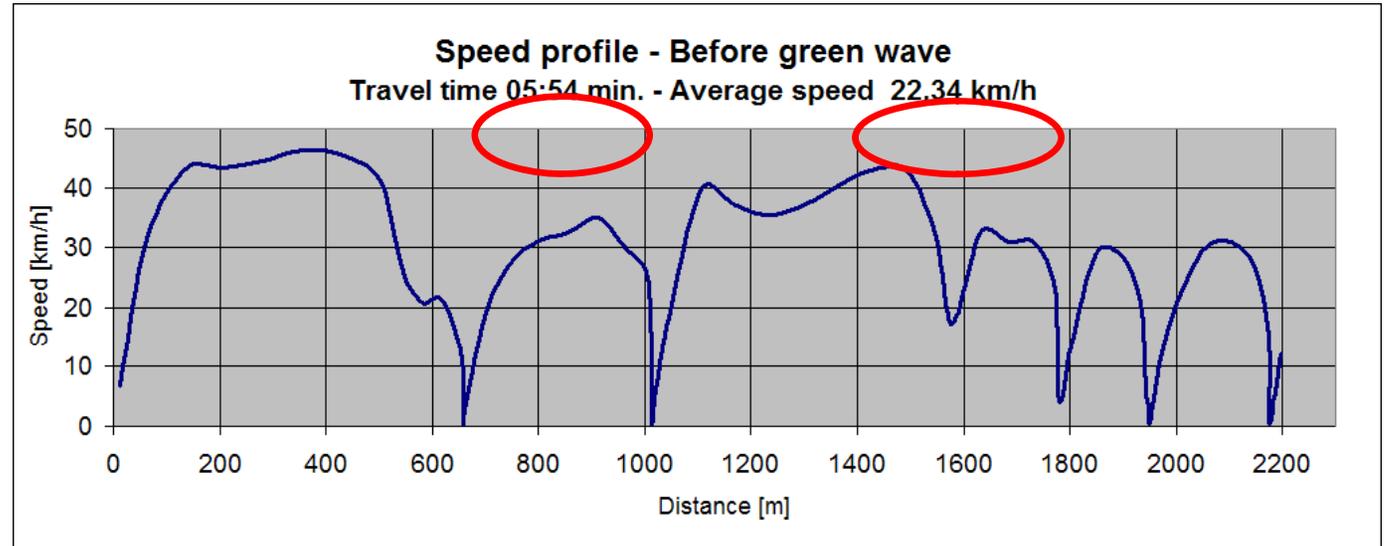
Seconds



Bicycles towards City - morning



Cars towards City - morning



Results for all modes

		Saved stops	Speed increase
To centre in the morning	Green wave	5-6	21%
From centre in the morning		0-1	-1%
From centre in the afternoon	Green wave	2-3	-1%
To centre in the afternoon		0-1	9%

Bikes

		Saved stops	Speed increase
To centre in the morning	Green wave	0	0%
From centre in the morning		0	11%
From centre in the afternoon	Green wave	1-2	21%
To centre in the afternoon		0-1	-4%

Cars



		Speed increase
To centre in the morning	Green wave	-1%
From centre in the morning		-4%
From centre in the afternoon	Green wave	2%
To centre in the afternoon		-12%

Buses



- ~~1~~
- ~~2~~
- ~~3~~
- ~~4~~
- ~~5~~
- ~~6~~
- ~~7~~
- ~~8~~
- ~~9~~
- ~~10~~
- ~~11~~
- ~~12~~

I  CPH



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Filmclips

- Conflicts
- Green wave



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