

# Kapacitetshåndbogen



## Trafikteknik

Håndbog for

# Kapacitet og serviceniveau

Vejdirektoratet – Vejreglerådet September 2015

Vejdirektoratets sagsnummer: 14/04141

De vigtigste konkrete ændringer i forhold til foregående udgave er:

- Den grundlæggende kapacitet af vej med fire spor eller flere er reduceret fra 2300 til 2200 personbilenheder pr. time pr. kørespor (tabel 3.1)
- Personbilækvivalenten for køretøjer med længde 5,8-12,5 meter på strækning med fire spor eller flere er reduceret fra 2,0 til 1,8 (tabel 3.5)
- Personbilækvivalenter for store køretøjer i prioriteret kryds er justeret (tabel 4.1)
- Kritiske intervaller og følgetider i prioriterede kryds er justeret (tabel 4.2)
- Ændret reduktionsfaktor for udkørende trafik større end 800 personbilenheder pr. time i 2-sporet rundkørsel (tabel 5.3)
- Justerede følgetider i signalregulerede kryds (tabel 6.2)

- Nyt kapittel om kapasitet ved vejarbejder

# Måling af kapacitet ved vejarbejder

## Kapacitet på motorveje

Kapacitet ved kortvarige afspærringer og forskellige sporkonfigurationer.

UDKAST



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Version: 24. august 2015

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## Capacity - temporary (max 3 days) work zones on freeways

New Danish study based on 25 cases from temporary work zones (2014-2015)

Data collected:

- Location/time for work zone
- Type of work zone, used signing/markings
- Traffic volume through work zone area (measured at flow break down)
- Volume data based on radar detector + video

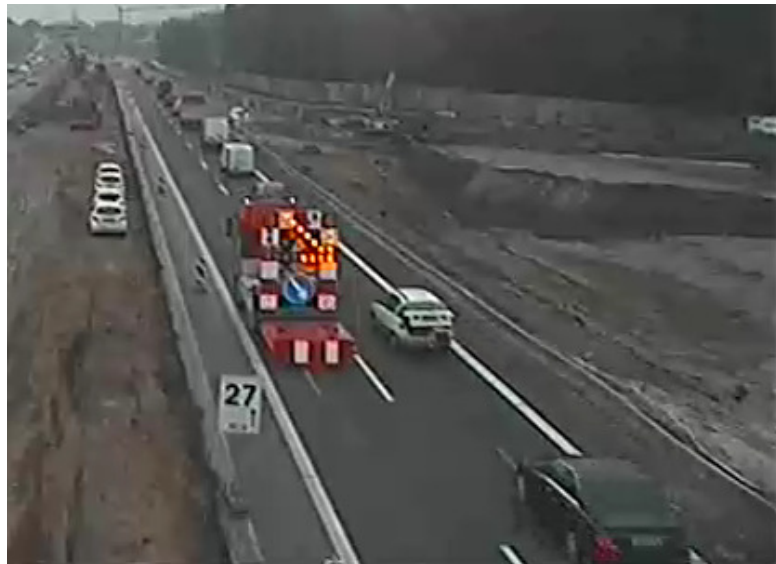




*Lane closure on 4+0*



*Crossover (3+3 -> 4+0)*



*Lane closure 2 -> 1 with TMA*



*Lane closure 3 -> 1 with two TMA's*



*Lane closure taper/running light*



Model( for short term works) developed based on data

$$Q_{workzone} = Q_{baseline} \cdot C_{lwidth} \cdot C_{acti} \cdot C_{lclosure} \cdot C_{crossover}$$

Where:

$Q_{workzone}$  = Work zone capacity (pc/l/h)

$Q_{baseline}$  = Baseline capacity for 1 lane (pc/l/h) = 2,100 pc/l/h

$C_{lwidth}$  = Correction factor for lane width

$C_{acti}$  = Correction factor for work zone activity

$C_{lclosure}$  = Correction factor at lane closures

$C_{crossover}$  = Correction factor at crossovers

## Correction factors in the model, short term works

### Correction factor for lane width

$C_{\text{width}}$	=	1.00	Normal lane width, e.g. 3.50-3.75 m
	=	0.90	Narrow lane width, e.g. 2.75-3.00 m

### Correction factor for work zone activity

$C_{\text{acti}}$	=	1.00	No activity: Permanent installation
	=	0.95	Average work zone activity

### Correction factor at lane closures ( lane drop)

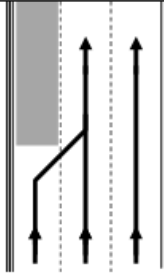
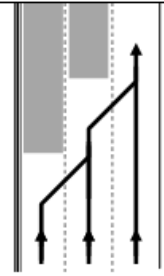
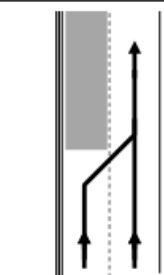
$C_{\text{closure}}$	=	1.00	No lane closure
	=	0.86	One lane closure by use of taper marking (delineators/running light/edge line)
	=	0.83	One lane closure by use of TMA

Notice: In case of two lane closures (eg. 3->1): Correction factor must be multiplied (e.g.  $0.86 \cdot 0.86 = 0.74$ )

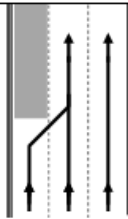
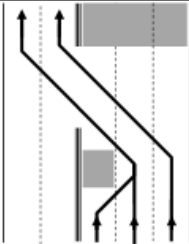
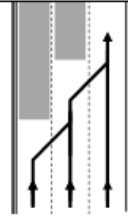
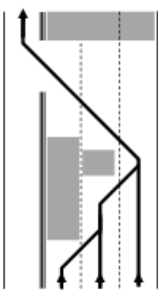
### Correction factor at crossovers

$C_{\text{crossover}}$	=	1.00	No crossover
		0.95	Crossover

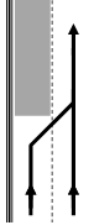
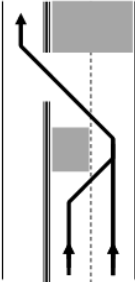
## Lane closure – normal lane width

Lane configuration	Marking at lane closure	Crossover	Capacity	
			Per lane (pc/l/h)	Total (pc/h)
3 -> 2		No	1,716	3,431
	TMA	No	1,656	3,312
3 -> 1		No	1,476	1,476
	TMA	No	1,374	1,374
2 -> 1		No	1,716	1,716
	TMA	No	1,656	1,656

## Lane closure/crossover – narrow lane width (e.g. at construction sites)

Lane configuration	Marking at lane closure	Crossover	Capacity	
			Per lane (pc/l/h)	Total (pc/h)
3 -> 2		No	1,544	3,088
	TMA	No	1,490	2,981
3 -> 2		Yes	1,467	2,934
	TMA	Yes	1,416	2,832
3 -> 1		No	1,328	1,328
	TMA	No	1,237	1,237
3 -> 1		Yes	1,262	1,262
	TMA	Yes	1,175	1,175

## Lane closure/crossover – narrow lane width (e.g. at construction sites)

Lane configuration	Marking at lane closure	Crossover	Capacity	
			Per lane (pc/l/h)	Total (pc/h)
2 -> 1		No	1,544	1,544
	TMA	No	1,490	1,490
2 -> 1		Yes	1,467	1,467
	TMA	Yes	1,416	1,416

## Capacity – different lane configurations (long-term work zones)

- Long road sections (> 2-4 km)
- Longer periods (> 2 months)
- Narrow lanes (2,5m-2,75m for lane 2 and 3 and 2,9m-3,0m for lane 1)

Based on Danish experiences at construction sites  
Best estimate/guess so far (rounded to the nearest 100)



*Lane config: 4+0*



*Lane config: 3+1*



*Lane config: 4+2*

Lane configuration		Capacity (pc/h)		
		A	B	
4 + 0		2+2 -> 4+0	4,000	3,800
		3+3 -> 4+0 (lane drop)	3,400	3,300
2 + 2		2+2 -> 2+2	4,000	4,000
3 + 1		2+2 -> 3+1	4,000	3,500
		3+3 -> 3+1 (lane drop)	3,400	3,000
4 + 2		3+3 -> 4+2	6,000	5,200
		4+4 -> 4+2 (lane drop)	5,200	4,500
2 + 0		1+1 -> 2+0	2,000	1,900
		2+2 -> 2+0 (lane drop)	1,700	1,600