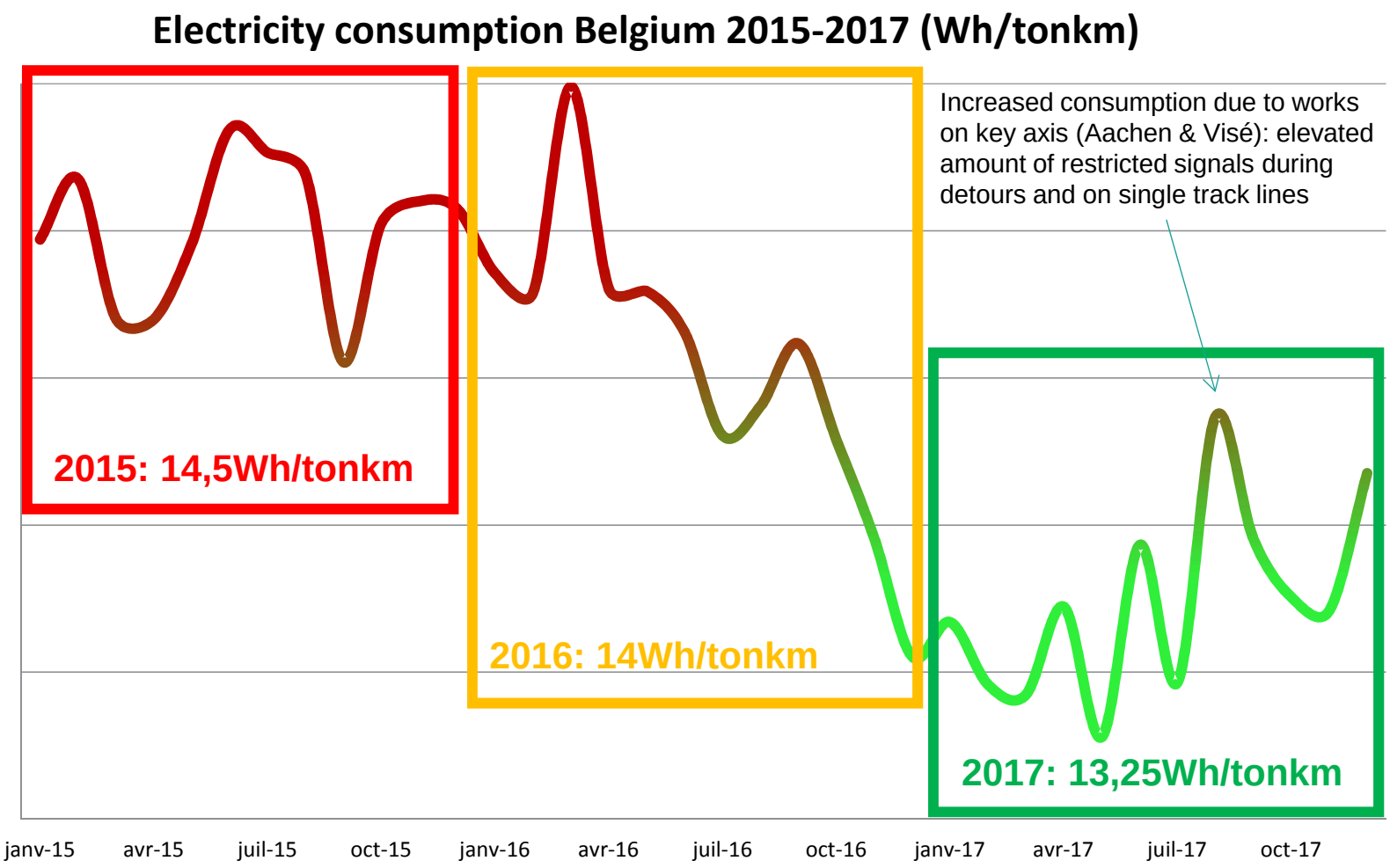
ENERGY EFFICIENT TIME TABLES

LINEAS
YOUR FREIGHT FORCE

20/02/2018, Lineas

ESULTS ECO-DRIVING PROJECT LINEAS (2016-2017)

MEASURED) CONSUMPTION DECREASE OF**8,75%** OVER THE LAST 2 YEARS



Golden ECO-driving rules

- ✓ Traction + coasting (avoid cruise control)
- ✓ Use of electrical brake (>10% regeneration)
- ✓ Anticipate conflicts & unnecessary stops

No use of any technological (eg. C-DAS or Traffic Contr

Goal: 12 Wh/tonkm

But… drivers are demotivated t perform ECO-driving because of **large amount of restrictive sign** that cause unnecessary stops an higher consumption

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NEFFICIENT BELGIAN TIMETABLES (P100) AND UNFORESEE
ESTRICTIVE SIGNALS BLOCK ECO-DRIVING DEVELOPMEN

XAMPLE: ZEEBRUGES – MONTZEN (DRIVER: LAURENT JOSEPH)

E 40043 : 1352t + 84t (Traxx MS
Railpath : P100
Vmax : 100km/h
Zeebruges – Montzen : 252 km
Top ECO-Driver : Laurent Joseph

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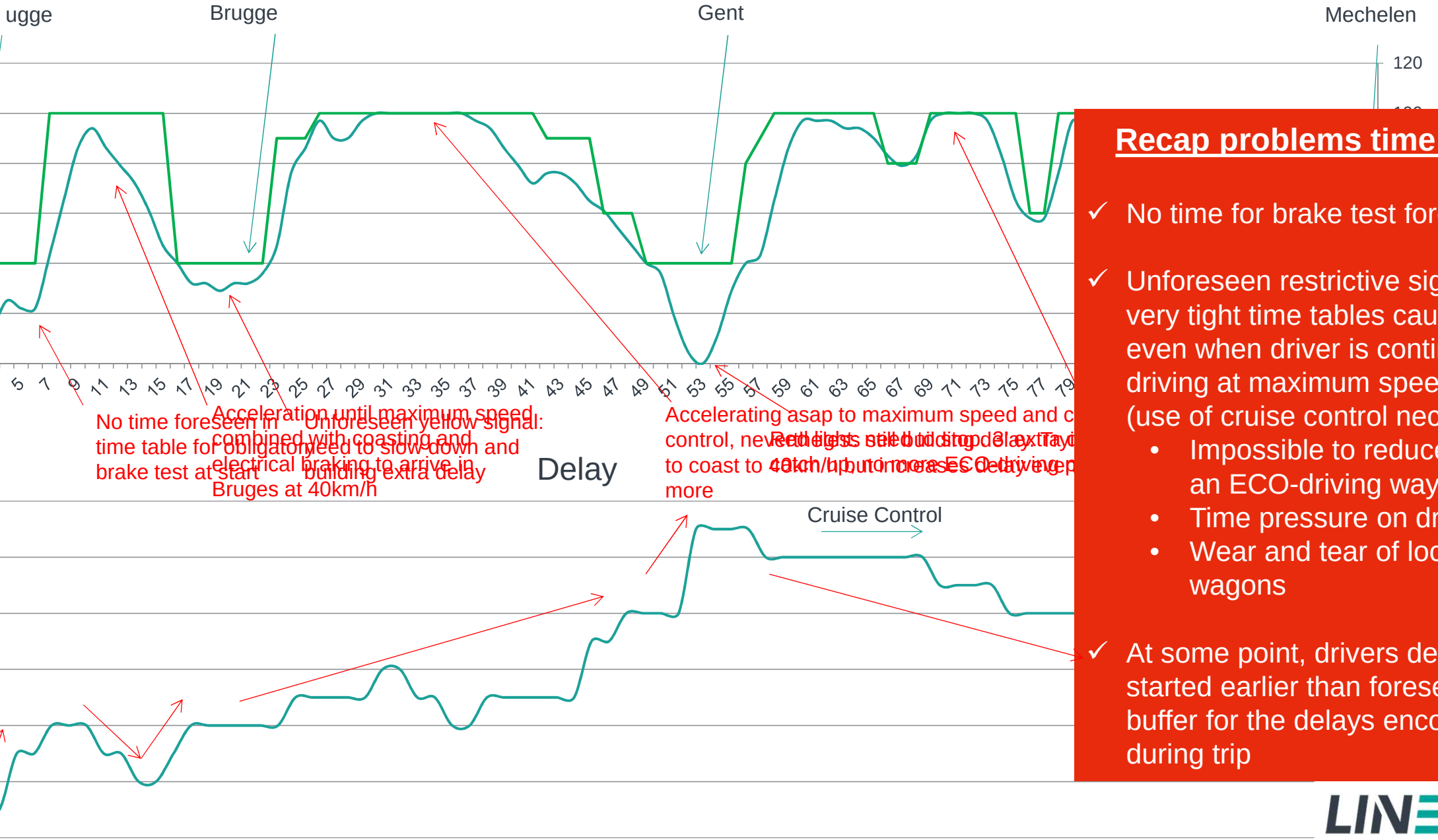
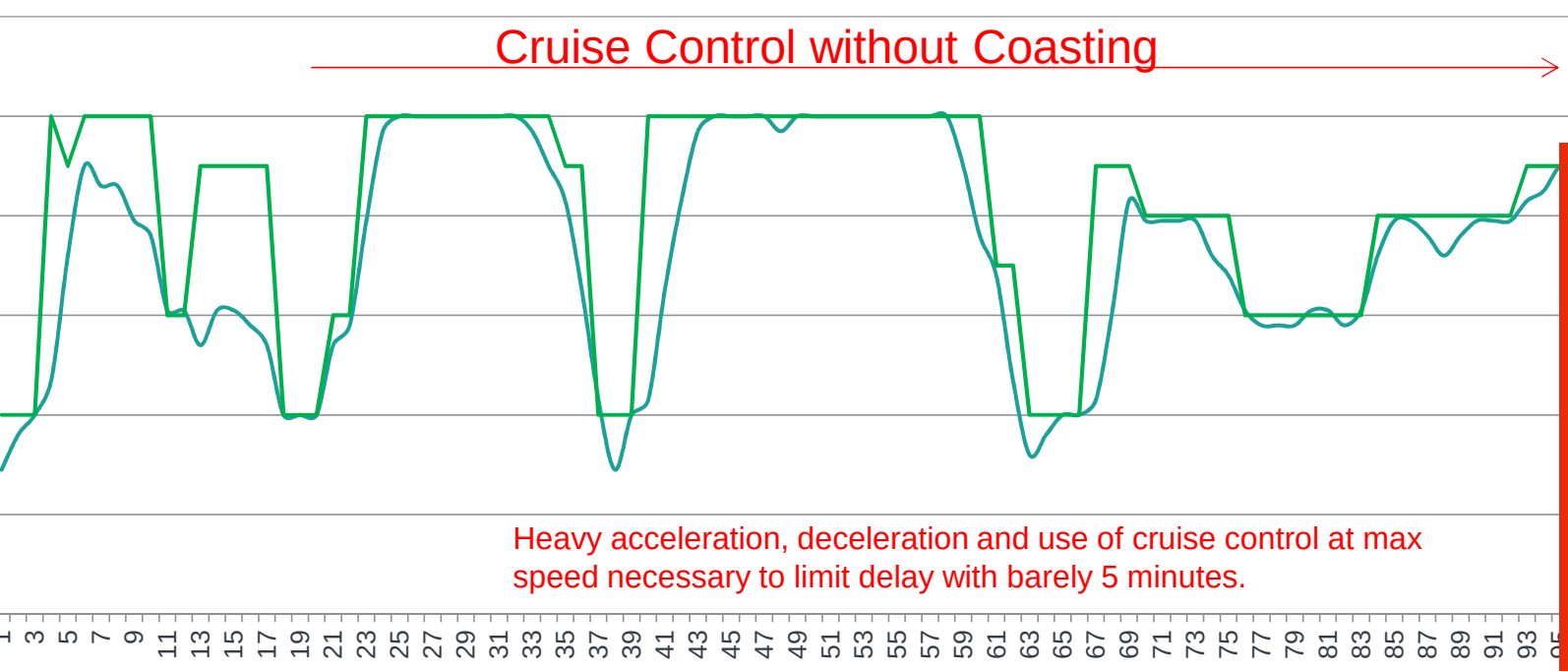
I:Zeebruges – Mechelen: Unforeseen stops in very tight time table cause delays even when driving at max s

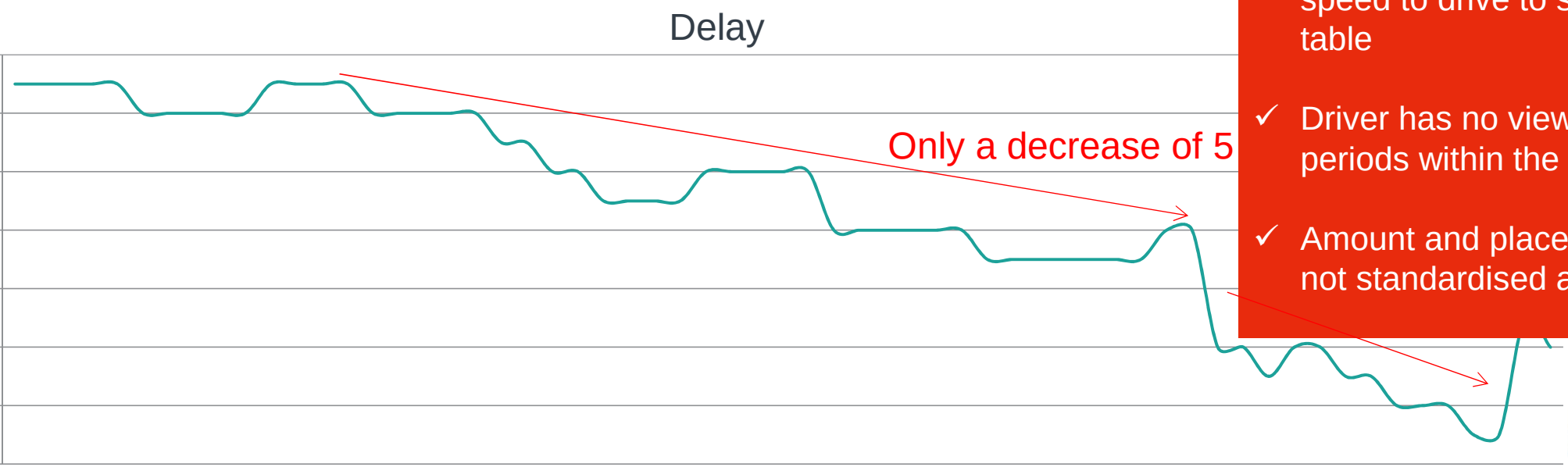


Recap problems time tab

- ✓ No time for brake test forese
- ✓ Unforeseen restrictive signal very tight time tables cause d even when driver is continuo driving at maximum speed (use of cruise control necess
  - Impossible to reduce de an ECO-driving way
  - Time pressure on driver
  - Wear and tear of loc an wagons
- ✓ At some point, drivers despe started earlier than foreseen buffer for the delays encount during trip

II: Mechelen– Montzen: Non-transparent, inefficient mix of very tight sections and sections with lots of l





Recap problems time table

- ✓ First 80% trip: time pressure ar driving at max speed necessar Restrictive signals cause delay Last 20% trip: too much buffer very low average speed
- ✓ Driver has no indication at wha speed to drive to stick to time table
- ✓ Driver has no view on the buffe periods within the railpath
- ✓ Amount and placement of buffe not standardised and not efficie

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NDICATION OF SPEED AND BUFFERS WITHIN TIME ABLES IS NECESSARY TO HELP ECO-DRIVERS

ETTER FLUIDITY IN THE OVERALL RAIL TRAFFIC IF EVERY RU WOULD RECEIVE AND U HIS INFC

40043	Station	Line	A	D/P	
	ZEEBRUGGE-VORMING	51A		23:09	
	ZEEBRUGGE-ROOSTER G	51A		23:10	
	ZEEBRUGGE-ROOSTER F	51A		23:12	
	LISSEWEGE	51A		23:12	
	Y.TER DOEST	51A		23:13	
	Y.DUDZELE	51A		23:16	
	Y.BLAUWE TOREN	51		23:18	
	BRUGGE-SINT-PIETERS	51		23:19	
	BRUGGE	50L/2		23:22	
	BRUGGE-BUNDELS U/V	50L/2		23:23	
	BRUGGE-ROOSTER E	50A/5		23:25	
	Y.OOSTKAMP	50A		23:28	
	OOSTKAMP	50A		23:28	
	BEERNEM	50A		23:32	
	MARIA-AALTER	50A		23:34	
	AALTER	50A		23:38	
	BELLEM	50A		23:40	
	HANSBEKE	50A		23:42	
	LANDEGEM	50A		23:44	
	DRONGEN	50A		23:47	
	Y.ASSELS	50A/6		23:48	
	GENT-ROOSTER SNEPBRUG	50A/6		23:49	
	GENT-SINT-PIETERS	50		23:51	
	Y.WEST DRIEHOEK LEDEBERG	50		23:55	
	Y.OOST DRIEHOEK LEDEBERG	50		23:56	
	MERELBEKE	50		23:57	
	Y.MELLE-WEST	50		23:59	
	MELLE	50		23:59	
	Y.MELLE	50		23:59	
	KWATRECHT	50		00:01	
	WETTEREN	50		00:03	
	SCHELLEBELLE	53		00:06	
	WICHELEN	53		00:09	
	SCHOONAARDE	53		00:11	
	OUDEGEM	53		00:14	
	DENDERMONDE	53		00:16	
	BAASRODE-ZUID	53		00:19	
	BUGGENHOUT	53		00:21	
	MALDEREN	53		00:23	
	LONDERZEEL	53		00:26	
	KAPELLE-OP-DEN-BOS	53		00:29	
	KAPELLE-OP-DEN-BOS-	53		00:30	
	Y.HEIKE	53		00:34	
	MECHELEN	27		00:38	
	MECHELEN-NEKKERSPOEL	27		00:40	
	MECHELEN-DIJKSTRAAT	27		00:41	
	Y.OTTERBEEK	27		00:42	
	Y.SINT-KATELIJNE-WAVER	27		00:43	
	SINT-KATELIJNE-WAVER	27		00:43	
	DUFFEL	27		00:45	
	Y.DUFFEL	13/1		00:47	
	Y.LINT	13		00:48	
	LIER-ROOSTER D/E	13		00:52	
	LIER	15		00:53	
	Y.NAZARETH	16		00:56	
	KLOOSTERHEIDE	16		00:57	
	BERLAAR	16		00:59	
	MELKOUWEN	16		01:02	
	HEIST-OP-DEN-BERG	16		01:04	
	BOOISCHOT	16		01:08	
	BEGIJNENDIJK	16		01:10	

	NIEUWE Y.NOORD DR.AARSCHOT	16		01:11	
	Y.NOORD DRIEHOEK AARSCHOT	16		01:12	
	Y.OOST DRIEHOEK AARSCHOT	35		01:13	
	LANGDORP	35		01:15	
	TESTELT	35		01:20	
	ZICHEM	35		01:23	
	DIEST	35		01:26	
	Y.DIEST	35		01:28	
	SCHULEN	35		01:34	
	SCHULEN-SAS	35		01:34	
	Y.WEST DRIEHOEK HASSELT	35		01:39	
	HASSELT-AFLOS L35	35		01:40	
	HASSELT	34		01:42	
	DIEPENBEEK	34		01:50	
	BEVERST	34		01:56	
	Y.ROOIERWEG	34		01:57	
	BILZEN-WIJKSPOOR	34		01:58	
	BILZEN	34		01:59	
	TONGEREN	34		02:08	
	VERB.HESSENATIE-	34		02:09	
	FRONT. WALLONIE-FLANDRE L34	34		02:12	
	Y.GLONS	24		02:12	
	BASSENGE	24		02:16	
	RACC.VISE-CBR	24		02:23	
	Y.VISE-HAUT	24		02:26	
	VISE-HAUT	24		02:27	
	Y.BERNEAU	24		02:30	
	FRONT. WALLONIE-FLANDRE L24	24		02:33	
	FOURON-SAINT-MARTIN	24		02:36	
	REMERSDAAL	24		02:41	
	FRONT. FLANDRE-WALLONIE L24	24		02:42	
	MONTZEN-GRIL M	24L/1		02:43	
	MONTZEN	24L/1	02:45		

Max speed

80% traction

Eco (Traction/Coasting)

Example: made by ECO-driver Laurent Joseph

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INEAS DRIVERS PREFER THE DUTCH WAY

ProRail

ery limited to no conflicts

se of **advice speed** and **takeover speed** to be able
prevent and/or catch up after unforeseen conflicts.

erage **speed** on sections is **fixed** and is mentioned on
etable (advice and takeover speed).

ecessity and possibility to drive at **takeover speed**
fore works take place.

ain that **sticks to the time table** has **priority**. If
lay, a new railpath has to be provided

affic Control provides **pro-active assistance** when
foreseen situations take place.

INFRABEL

× A **significant amount of conflicts** causing delays an
unnecessary deceleration and acceleration.

× Some sections require **max speed** , some contain **too m**
buffer and some are simply **unrealistic** in the foreseen
There is **no standard** and **optimization is required**

× Average **speed** can **vary day after day** and is not
mentioned on timetable.

× Time tables **do not take into account** speed limitation
during "**temporary" works, weather** or **topography**

× Still happens that **priority** is given to lighter **passenger**
trains, even if it has a delay and the freight train is on time

× Traffic Control provides **no pro-active assistance** whe
unforeseen situations take place.

HANK
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