Department of Transport Technology and Economics April 2020

No.: **1**/2020. Name/Neptun: Pathan Zaid Khan/A3YI00

Traffic Flow Exercise 2

Application of speed-flow relationship

Determine the capacity of a road segment (without intersections) and scale (plan) the required capacity (supply) which fits to the traffic (demand).

1) **Determine the capacity** (VPHPL, q) of a single lane (and its c_s=80 % spare-value) as a dependent of speed (velocity, v) **in a range of 0-120 km/h with intervals of 5-5 km/h**. Afterwards **calculate the maximum flow** (capacity, q_{max}) and **the optimal speed** (v_{opt}) considering the following average paramameter values (g = 9,81 m/s^2):

l_{veh}	=	6,2	[m] vehicle length
l_s	=	0,6	[m] safety dinstance
t_r	=	1,2	[s] reaction time
φ	=	0,65	[-] friction factor
q_s	=	-0,2	[%] slope (+ is uphill, - is downhill)
α	=	0,5	[-] representing reduced distance headways

The results of the calculations should be **presented in a table as well as in a chart**.

2) **Scale (plan) the required number of lanes** (**considering spare capacity as well**, c_s) by the use of previuosly determined flow-speed relationship. The traffic volume (demand) can be seen in the following chart. Afterwards **calculate the capacity utilisation** (CU).

The average daily traffic volume (VPD) of the peak cross-section is the following:

Vehicle category	Veh/day	PCE*	**PCE/day**
passenger car	7365	1,0	
light truck	1512	1,4	
heavy truck	1171	1,8	
trailer truck	60	2,5	
non-articulated bus	261	1,8	
articulated bus	170	2,5	
motorcycle	140	0,7	

** Passenger car equivalent (PCE).*

- the peak hour traffic (PHT) is 11 % (ω) of average daily traffic volume (VPD),
- when peak hour traffic (as the basis of planning) occures on the road the average space-mean speed (v_s, speed of traffic flow) is 39,6 km/h,
- the relation between the number of lanes and the aggregate capacity is the following:

Number of lanes	Aggregate capacity (c_a)
1	100 %
2	175 %
3	250 %

3) Examine whether **changing** (increasing/decreasing) **number of lanes is neccessary**, if:
- the speed of traffic flow changes to 37,9 km/h,
- and the PHT changes by -4,8 % simultaneously.

If so **calculate the new capacity utilisation** as well.

Department of Transport Technology and Economics April 2020

No.: **2**/2020. Name/Neptun: Araujo Oliveira Manoel Victor/BII16N

Traffic Flow Exercise 2

Application of speed-flow relationship

Determine the capacity of a road segment (without intersections) and scale (plan) the required capacity (supply) which fits to the traffic (demand).

1) **Determine the capacity** (VPHPL, q) of a single lane (and its c_s=80 % spare-value) as a dependent of speed (velocity, v) **in a range of 0-120 km/h with intervals of 5-5 km/h**. Afterwards **calculate the maximum flow** (capacity, q_{max}) and **the optimal speed** (v_{opt}) considering the following average paramameter values (g = 9,81 m/s^2):

l_{veh}	=	5,4	[m] vehicle length
l_s	=	0,5	[m] safety dinstance
t_r	=	1,1	[s] reaction time
φ	=	0,78	[-] friction factor
q_s	=	-2,7	[%] slope (+ is uphill, - is downhill)
α	=	0,5	[-] representing reduced distance headways

The results of the calculations should be **presented in a table as well as in a chart**.

2) **Scale (plan) the required number of lanes** (**considering spare capacity as well**, c_s) by the use of previuosly determined flow-speed relationship. The traffic volume (demand) can be seen in the following chart. Afterwards **calculate the capacity utilisation** (CU).

The average daily traffic volume (VPD) of the peak cross-section is the following:

Vehicle category	Veh/day	PCE*	**PCE/day**
passenger car	6722	1,0	
light truck	2444	1,4	
heavy truck	817	1,8	
trailer truck	235	2,5	
non-articulated bus	255	1,8	
articulated bus	162	2,5	
motorcycle	64	0,7	

** Passenger car equivalent (PCE).*

- the peak hour traffic (PHT) is 9,1 % (ω) of average daily traffic volume (VPD),
- when peak hour traffic (as the basis of planning) occures on the road the average space-mean speed (v_s, speed of traffic flow) is 38,7 km/h,
- the relation between the number of lanes and the aggregate capacity is the following:

Number of lanes	Aggregate capacity (c_a)
1	100 %
2	175 %
3	250 %

3) Examine whether **changing** (increasing/decreasing) **number of lanes is neccessary**, if:
- the speed of traffic flow changes to 32,5 km/h,
- and the PHT changes by -8,3 % simultaneously.

If so **calculate the new capacity utilisation** as well.

No.: **3**/2020. Name/Neptun: Alkhatatne Malek Abdulrahman Salameh/BIXGSM

Traffic Flow Exercise 2

Application of speed-flow relationship

Determine the capacity of a road segment (without intersections) and scale (plan) the required capacity (supply) which fits to the traffic (demand).

1) **Determine the capacity** (VPHPL, q) of a single lane (and its c_s=80 % spare-value) as a dependent of speed (velocity, v) **in a range of 0-120 km/h with intervals of 5-5 km/h**. Afterwards **calculate the maximum flow** (capacity, q_{max}) and **the optimal speed** (v_{opt}) considering the following average paramameter values (g = 9,81 m/s^2):

l_{veh}	=	6	[m] vehicle length
l_s	=	0,6	[m] safety dinstance
t_r	=	1,1	[s] reaction time
φ	=	0,59	[-] friction factor
q_s	=	-1,3	[%] slope (+ is uphill, - is downhill)
α	=	0,5	[-] representing reduced distance headways

The results of the calculations should be **presented in a table as well as in a chart**.

2) **Scale (plan) the required number of lanes** (**considering spare capacity as well**, c_s) by the use of previuosly determined flow-speed relationship. The traffic volume (demand) can be seen in the following chart. Afterwards **calculate the capacity utilisation** (CU).

The average daily traffic volume (VPD) of the peak cross-section is the following:

Vehicle category	Veh/day	PCE*	**PCE/day**
passenger car	12453	1,0	
light truck	1341	1,4	
heavy truck	1700	1,8	
trailer truck	78	2,5	
non-articulated bus	106	1,8	
articulated bus	62	2,5	
motorcycle	145	0,7	

** Passenger car equivalent (PCE).*

- the peak hour traffic (PHT) is 12 % (ω) of average daily traffic volume (VPD),
- when peak hour traffic (as the basis of planning) occures on the road the average space-mean speed (v_s, speed of traffic flow) is 42,3 km/h,
- the relation between the number of lanes and the aggregate capacity is the following:

Number of lanes	Aggregate capacity (c_a)
1	100 %
2	175 %
3	250 %

3) Examine whether **changing** (increasing/decreasing) **number of lanes is neccessary**, if:

- the speed of traffic flow changes to 35,8 km/h,
- and the PHT changes by -10,6 % simultaneously.

If so **calculate the new capacity utilisation** as well.

No.: **4**/2020. Name/Neptun: Husein Esra'a Abdel Razzaq/DTKIGX

Traffic Flow Exercise 2

Application of speed-flow relationship

Determine the capacity of a road segment (without intersections) and scale (plan) the required capacity (supply) which fits to the traffic (demand).

1) **Determine the capacity** (VPHPL, q) of a single lane (and its c_s=80 % spare-value) as a dependent of speed (velocity, v) **in a range of 0-120 km/h with intervals of 5-5 km/h**. Afterwards **calculate the maximum flow** (capacity, q_{max}) and **the optimal speed** (v_{opt}) considering the following average paramameter values (g = 9,81 m/s^2):

l_{veh}	=	6,4	[m] vehicle length
l_s	=	0,5	[m] safety dinstance
t_r	=	1,1	[s] reaction time
φ	=	0,77	[-] friction factor
q_s	=	1,1	[%] slope (+ is uphill, - is downhill)
α	=	0,6	[-] representing reduced distance headways

The results of the calculations should be **presented in a table as well as in a chart**.

2) **Scale (plan) the required number of lanes** (**considering spare capacity as well**, c_s) by the use of previuosly determined flow-speed relationship. The traffic volume (demand) can be seen in the following chart. Afterwards **calculate the capacity utilisation** (CU).

The average daily traffic volume (VPD) of the peak cross-section is the following:

Vehicle category	Veh/day	PCE*	**PCE/day**
passenger car	7611	1,0	
light truck	1444	1,4	
heavy truck	1611	1,8	
trailer truck	123	2,5	
non-articulated bus	339	1,8	
articulated bus	115	2,5	
motorcycle	85	0,7	

** Passenger car equivalent (PCE).*

- the peak hour traffic (PHT) is 9,9 % (ω) of average daily traffic volume (VPD),
- when peak hour traffic (as the basis of planning) occures on the road the average space-mean speed (v_s, speed of traffic flow) is 57,4 km/h,
- the relation between the number of lanes and the aggregate capacity is the following:

Number of lanes	Aggregate capacity (c_a)
1	100 %
2	175 %
3	250 %

3) Examine whether **changing** (increasing/decreasing) **number of lanes is neccessary**, if:
- the speed of traffic flow changes to 56,3 km/h,
- and the PHT changes by +21,8 % simultaneously.

If so **calculate the new capacity utilisation** as well.

No.: **5**/2020. Name/Neptun: Sagidullayeva Slushash/DU3H70

Traffic Flow Exercise 2

Application of speed-flow relationship

Determine the capacity of a road segment (without intersections) and scale (plan) the required capacity (supply) which fits to the traffic (demand).

1) **Determine the capacity** (VPHPL, q) of a single lane (and its c_s=80 % spare-value) as a dependent of speed (velocity, v) **in a range of 0-120 km/h with intervals of 5-5 km/h**. Afterwards **calculate the maximum flow** (capacity, q_{max}) and **the optimal speed** (v_{opt}) considering the following average paramameter values (g = 9,81 m/s^2):

l_{veh}	=	5,6	[m] vehicle length
l_s	=	0,7	[m] safety dinstance
t_r	=	1	[s] reaction time
φ	=	0,57	[-] friction factor
q_s	=	-1,1	[%] slope (+ is uphill, - is downhill)
α	=	0,6	[-] representing reduced distance headways

The results of the calculations should be **presented in a table as well as in a chart**.

2) **Scale (plan) the required number of lanes** (**considering spare capacity as well**, c_s) by the use of previuosly determined flow-speed relationship. The traffic volume (demand) can be seen in the following chart. Afterwards **calculate the capacity utilisation** (CU).

The average daily traffic volume (VPD) of the peak cross-section is the following:

Vehicle category	Veh/day	PCE*	**PCE/day**
passenger car	7365	1,0	
light truck	2023	1,4	
heavy truck	1171	1,8	
trailer truck	79	2,5	
non-articulated bus	295	1,8	
articulated bus	29	2,5	
motorcycle	178	0,7	

** Passenger car equivalent (PCE).*

- the peak hour traffic (PHT) is 10,8 % (ω) of average daily traffic volume (VPD),
- when peak hour traffic (as the basis of planning) occures on the road the average space-mean speed (v_s, speed of traffic flow) is 40,9 km/h,
- the relation between the number of lanes and the aggregate capacity is the following:

Number of lanes	Aggregate capacity (c_a)
1	100 %
2	175 %
3	250 %

3) Examine whether **changing** (increasing/decreasing) **number of lanes is neccessary**, if:

- the speed of traffic flow changes to 39,3 km/h,
- and the PHT changes by +16,1 % simultaneously.

If so **calculate the new capacity utilisation** as well.

No.: **6**/2020. Name/Neptun: Dibirov Muslum/DUKV1Z

Traffic Flow Exercise 2

Application of speed-flow relationship

Determine the capacity of a road segment (without intersections) and scale (plan) the required capacity (supply) which fits to the traffic (demand).

1) **Determine the capacity** (VPHPL, q) of a single lane (and its c_s=80 % spare-value) as a dependent of speed (velocity, v) **in a range of 0-120 km/h with intervals of 5-5 km/h**. Afterwards **calculate the maximum flow** (capacity, q_{max}) and **the optimal speed** (v_{opt}) considering the following average paramameter values (g = 9,81 m/s^2):

l_{veh}	=	6,3	[m] vehicle length
l_s	=	0,7	[m] safety dinstance
t_r	=	1	[s] reaction time
φ	=	0,63	[-] friction factor
q_s	=	2,7	[%] slope (+ is uphill, - is downhill)
α	=	0,5	[-] representing reduced distance headways

The results of the calculations should be **presented in a table as well as in a chart**.

2) **Scale (plan) the required number of lanes** (**considering spare capacity as well**, c_s) by the use of previuosly determined flow-speed relationship. The traffic volume (demand) can be seen in the following chart. Afterwards **calculate the capacity utilisation** (CU).

The average daily traffic volume (VPD) of the peak cross-section is the following:

Vehicle category	Veh/day	PCE*	**PCE/day**
passenger car	14056	1,0	
light truck	2222	1,4	
heavy truck	1539	1,8	
trailer truck	279	2,5	
non-articulated bus	428	1,8	
articulated bus	120	2,5	
motorcycle	231	0,7	

** Passenger car equivalent (PCE).*

- the peak hour traffic (PHT) is 12,7 % (ω) of average daily traffic volume (VPD),
- when peak hour traffic (as the basis of planning) occures on the road the average space-mean speed (v_s, speed of traffic flow) is 59 km/h,
- the relation between the number of lanes and the aggregate capacity is the following:

Number of lanes	Aggregate capacity (c_a)
1	100 %
2	175 %
3	250 %

3) Examine whether **changing** (increasing/decreasing) **number of lanes is neccessary**, if:
- the speed of traffic flow changes to 59,7 km/h,
- and the PHT changes by -2 % simultaneously.

If so **calculate the new capacity utilisation** as well.

Traffic Flow Exercise 2

Application of speed-flow relationship

Determine the capacity of a road segment (without intersections) and scale (plan) the required capacity (supply) which fits to the traffic (demand).

1) **Determine the capacity** (VPHPL, q) of a single lane (and its c_s=80 % spare-value) as a dependent of speed (velocity, v) **in a range of 0-120 km/h with intervals of 5-5 km/h**. Afterwards **calculate the maximum flow** (capacity, q_{max}) and **the optimal speed** (v_{opt}) considering the following average paramameter values (g = 9,81 m/s^2):

l_{veh}	=	6,3	[m] vehicle length
l_s	=	0,7	[m] safety dinstance
t_r	=	1	[s] reaction time
φ	=	0,69	[-] friction factor
q_s	=	-0,4	[%] slope (+ is uphill, - is downhill)
α	=	0,5	[-] representing reduced distance headways

The results of the calculations should be **presented in a table as well as in a chart**.

2) **Scale (plan) the required number of lanes** (**considering spare capacity as well**, c_s) by the use of previuosly determined flow-speed relationship. The traffic volume (demand) can be seen in the following chart. Afterwards **calculate the capacity utilisation** (CU).

The average daily traffic volume (VPD) of the peak cross-section is the following:

Vehicle category	Veh/day	PCE*	**PCE/day**
passenger car	9389	1,0	
light truck	2889	1,4	
heavy truck	1503	1,8	
trailer truck	78	2,5	
non-articulated bus	428	1,8	
articulated bus	135	2,5	
motorcycle	78	0,7	

** Passenger car equivalent (PCE).*

- the peak hour traffic (PHT) is 12,2 % (ω) of average daily traffic volume (VPD),
- when peak hour traffic (as the basis of planning) occures on the road the average space-mean speed (v_s, speed of traffic flow) is 63 km/h,
- the relation between the number of lanes and the aggregate capacity is the following:

Number of lanes	Aggregate capacity (c_a)
1	100 %
2	175 %
3	250 %

3) Examine whether **changing** (increasing/decreasing) **number of lanes is neccessary**, if:

- the speed of traffic flow changes to 62,4 km/h,
- and the PHT changes by +5,5 % <u>simultaneously.</u>

If so **calculate the new capacity utilisation** as well.

Department of Transport Technology and Economics April 2020

No.: **8**/2020. Name/Neptun: Alatawneh Anas Abdullah Ahmad/H6ATDS

Traffic Flow Exercise 2

Application of speed-flow relationship

Determine the capacity of a road segment (without intersections) and scale (plan) the required capacity (supply) which fits to the traffic (demand).

1) **Determine the capacity** (VPHPL, q) of a single lane (and its c_s=80 % spare-value) as a dependent of speed (velocity, v) **in a range of 0-120 km/h with intervals of 5-5 km/h**. Afterwards **calculate the maximum flow** (capacity, q_{max}) and **the optimal speed** (v_{opt}) considering the following average paramameter values (g = 9,81 m/s^2):

l_{veh}	=	6,3	[m] vehicle length
l_s	=	0,6	[m] safety dinstance
t_r	=	1,2	[s] reaction time
φ	=	0,62	[-] friction factor
q_s	=	-1,9	[%] slope (+ is uphill, - is downhill)
α	=	0,5	[-] representing reduced distance headways

The results of the calculations should be **presented in a table as well as in a chart**.

2) **Scale (plan) the required number of lanes** (**considering spare capacity as well**, c_s) by the use of previuosly determined flow-speed relationship. The traffic volume (demand) can be seen in the following chart. Afterwards **calculate the capacity utilisation** (CU).

The average daily traffic volume (VPD) of the peak cross-section is the following:

Vehicle category	Veh/day	PCE*	**PCE/day**
passenger car	13468	1,0	
light truck	1541	1,4	
heavy truck	1567	1,8	
trailer truck	129	2,5	
non-articulated bus	348	1,8	
articulated bus	67	2,5	
motorcycle	252	0,7	

** Passenger car equivalent (PCE).*

- the peak hour traffic (PHT) is 10,6 % (ω) of average daily traffic volume (VPD),
- when peak hour traffic (as the basis of planning) occures on the road the average space-mean speed (v_s, speed of traffic flow) is 60,9 km/h,
- the relation between the number of lanes and the aggregate capacity is the following:

Number of lanes	Aggregate capacity (c_a)
1	100 %
2	175 %
3	250 %

3) Examine whether **changing** (increasing/decreasing) **number of lanes is neccessary**, if:
- the speed of traffic flow changes to 59,7 km/h,
- and the PHT changes by -7,2 % simultaneously.

If so **calculate the new capacity utilisation** as well.

No.: **9**/2020. Name/Neptun: Farias Chaves Quirino Yasmin/IMXR0M

Traffic Flow Exercise 2

Application of speed-flow relationship

Determine the capacity of a road segment (without intersections) and scale (plan) the required capacity (supply) which fits to the traffic (demand).

1) **Determine the capacity** (VPHPL, q) of a single lane (and its c_s=80 % spare-value) as a dependent of speed (velocity, v) **in a range of 0-120 km/h with intervals of 5-5 km/h**. Afterwards **calculate the maximum flow** (capacity, q_{max}) and **the optimal speed** (v_{opt}) considering the following average paramameter values (g = 9,81 m/s^2):

l_{veh}	=	6,2	[m] vehicle length
l_s	=	0,6	[m] safety dinstance
t_r	=	1	[s] reaction time
φ	=	0,69	[-] friction factor
q_s	=	-2,3	[%] slope (+ is uphill, - is downhill)
α	=	0,5	[-] representing reduced distance headways

The results of the calculations should be **presented in a table as well as in a chart**.

2) **Scale (plan) the required number of lanes** (**considering spare capacity as well**, c_s) by the use of previuosly determined flow-speed relationship. The traffic volume (demand) can be seen in the following chart. Afterwards **calculate the capacity utilisation** (CU).

The average daily traffic volume (VPD) of the peak cross-section is the following:

Vehicle category	Veh/day	PCE*	**PCE/day**
passenger car	13833	1,0	
light truck	1056	1,4	
heavy truck	1756	1,8	
trailer truck	293	2,5	
non-articulated bus	439	1,8	
articulated bus	138	2,5	
motorcycle	145	0,7	

** Passenger car equivalent (PCE).*

- the peak hour traffic (PHT) is 11 % (ω) of average daily traffic volume (VPD),
- when peak hour traffic (as the basis of planning) occures on the road the average space-mean speed (v_s, speed of traffic flow) is 51,4 km/h,
- the relation between the number of lanes and the aggregate capacity is the following:

Number of lanes	Aggregate capacity (c_a)
1	100 %
2	175 %
3	250 %

3) Examine whether **changing** (increasing/decreasing) **number of lanes is neccessary**, if:

- the speed of traffic flow changes to 47,1 km/h,
- and the PHT changes by -6,1 % <u>simultaneously.</u>

If so **calculate the new capacity utilisation** as well.

No.: **10**/2020. Name/Neptun: Lopez Lizarraga Julio Cesar/LPMZKT

Traffic Flow Exercise 2

Application of speed-flow relationship

Determine the capacity of a road segment (without intersections) and scale (plan) the required capacity (supply) which fits to the traffic (demand).

1) **Determine the capacity** (VPHPL, q) of a single lane (and its c_s=80 % spare-value) as a dependent of speed (velocity, v) **in a range of 0-120 km/h with intervals of 5-5 km/h**. Afterwards **calculate the maximum flow** (capacity, q_{max}) and **the optimal speed** (v_{opt}) considering the following average paramameter values (g = 9,81 m/s^2):

l_{veh}	=	6,5	[m] vehicle length
l_s	=	0,6	[m] safety dinstance
t_r	=	0,9	[s] reaction time
φ	=	0,72	[-] friction factor
q_s	=	-0,1	[%] slope (+ is uphill, - is downhill)
α	=	0,5	[-] representing reduced distance headways

The results of the calculations should be **presented in a table as well as in a chart**.

2) **Scale (plan) the required number of lanes** (**considering spare capacity as well**, c_s) by the use of previuosly determined flow-speed relationship. The traffic volume (demand) can be seen in the following chart. Afterwards **calculate the capacity utilisation** (CU).

The average daily traffic volume (VPD) of the peak cross-section is the following:

Vehicle category	Veh/day	PCE*	**PCE/day**
passenger car	8174	1,0	
light truck	1439	1,4	
heavy truck	800	1,8	
trailer truck	265	2,5	
non-articulated bus	439	1,8	
articulated bus	125	2,5	
motorcycle	64	0,7	

** Passenger car equivalent (PCE).*

- the peak hour traffic (PHT) is 11,4 % (ω) of average daily traffic volume (VPD),
- when peak hour traffic (as the basis of planning) occures on the road the average space-mean speed (v_s, speed of traffic flow) is 50,9 km/h,
- the relation between the number of lanes and the aggregate capacity is the following:

Number of lanes	Aggregate capacity (c_a)
1	100 %
2	175 %
3	250 %

3) Examine whether **changing** (increasing/decreasing) **number of lanes is neccessary**, if:

- the speed of traffic flow changes to 50 km/h,
- and the PHT changes by -6,6 % <u>simultaneously.</u>

If so **calculate the new capacity utilisation** as well.

Department of Transport Technology and Economics April 2020

No.: **11**/2020. Name/Neptun: Al Qadri Yahya/R59DCB

Traffic Flow Exercise 2

Application of speed-flow relationship

Determine the capacity of a road segment (without intersections) and scale (plan) the required capacity (supply) which fits to the traffic (demand).

1) **Determine the capacity** (VPHPL, q) of a single lane (and its c_s=80 % spare-value) as a dependent of speed (velocity, v) **in a range of 0-120 km/h with intervals of 5-5 km/h**. Afterwards **calculate the maximum flow** (capacity, q_{max}) and **the optimal speed** (v_{opt}) considering the following average paramameter values (g = 9,81 m/s^2):

l_{veh}	=	6,1	[m] vehicle length
l_s	=	0,6	[m] safety dinstance
t_r	=	1	[s] reaction time
φ	=	0,66	[-] friction factor
q_s	=	0,9	[%] slope (+ is uphill, - is downhill)
α	=	0,6	[-] representing reduced distance headways

The results of the calculations should be **presented in a table as well as in a chart**.

2) **Scale (plan) the required number of lanes** (**considering spare capacity as well**, c_s) by the use of previuosly determined flow-speed relationship. The traffic volume (demand) can be seen in the following chart. Afterwards **calculate the capacity utilisation** (CU).

The average daily traffic volume (VPD) of the peak cross-section is the following:

Vehicle category	Veh/day	PCE*	**PCE/day**
passenger car	8722	1,0	
light truck	3000	1,4	
heavy truck	925	1,8	
trailer truck	119	2,5	
non-articulated bus	158	1,8	
articulated bus	73	2,5	
motorcycle	148	0,7	

** Passenger car equivalent (PCE).*

- the peak hour traffic (PHT) is 11,8 % (ω) of average daily traffic volume (VPD),
- when peak hour traffic (as the basis of planning) occures on the road the average space-mean speed (v_s, speed of traffic flow) is 54,7 km/h,
- the relation between the number of lanes and the aggregate capacity is the following:

Number of lanes	Aggregate capacity (c_a)
1	100 %
2	175 %
3	250 %

3) Examine whether **changing** (increasing/decreasing) **number of lanes is neccessary**, if:

- the speed of traffic flow changes to 53,5 km/h,
- and the PHT changes by +25 % <u>simultaneously.</u>

If so **calculate the new capacity utilisation** as well.

No.: **12**/2020. Name/Neptun: Netto de Souza Rodrigo/VPOIW7

Traffic Flow Exercise 2

Application of speed-flow relationship

Determine the capacity of a road segment (without intersections) and scale (plan) the required capacity (supply) which fits to the traffic (demand).

1) **Determine the capacity** (VPHPL, q) of a single lane (and its c_s=80 % spare-value) as a dependent of speed (velocity, v) **in a range of 0-120 km/h with intervals of 5-5 km/h**. Afterwards **calculate the maximum flow** (capacity, q_{max}) and **the optimal speed** (v_{opt}) considering the following average paramameter values (g = 9,81 m/s^2):

l_{veh}	=	5,5	[m] vehicle length
l_s	=	0,6	[m] safety dinstance
t_r	=	1	[s] reaction time
φ	=	0,67	[-] friction factor
q_s	=	2,7	[%] slope (+ is uphill, - is downhill)
α	=	0,5	[-] representing reduced distance headways

The results of the calculations should be **presented in a table as well as in a chart**.

2) **Scale (plan) the required number of lanes** (**considering spare capacity as well**, c_s) by the use of previuosly determined flow-speed relationship. The traffic volume (demand) can be seen in the following chart. Afterwards **calculate the capacity utilisation** (CU).

The average daily traffic volume (VPD) of the peak cross-section is the following:

Vehicle category	Veh/day	PCE*	**PCE/day**
passenger car	14056	1,0	
light truck	1903	1,4	
heavy truck	776	1,8	
trailer truck	230	2,5	
non-articulated bus	161	1,8	
articulated bus	90	2,5	
motorcycle	300	0,7	

** Passenger car equivalent (PCE).*

- the peak hour traffic (PHT) is 10,6 % (ω) of average daily traffic volume (VPD),
- when peak hour traffic (as the basis of planning) occures on the road the average space-mean speed (v_s, speed of traffic flow) is 61,6 km/h,
- the relation between the number of lanes and the aggregate capacity is the following:

Number of lanes	Aggregate capacity (c_a)
1	100 %
2	175 %
3	250 %

3) Examine whether **changing** (increasing/decreasing) **number of lanes is neccessary**, if:

- the speed of traffic flow changes to 56,2 km/h,
- and the PHT changes by -9,6 % simultaneously.

If so **calculate the new capacity utilisation** as well.

No.: **13**/2020. Name/Neptun: Pessoa Pacheco André/WV3WPQ

Traffic Flow Exercise 2

Application of speed-flow relationship

Determine the capacity of a road segment (without intersections) and scale (plan) the required capacity (supply) which fits to the traffic (demand).

1) **Determine the capacity** (VPHPL, q) of a single lane (and its c_s=80 % spare-value) as a dependent of speed (velocity, v) **in a range of 0-120 km/h with intervals of 5-5 km/h**. Afterwards **calculate the maximum flow** (capacity, q_{max}) and **the optimal speed** (v_{opt}) considering the following average paramameter values (g = 9,81 m/s^2):

l_{veh}	=	6,4	[m] vehicle length
l_s	=	0,6	[m] safety dinstance
t_r	=	1,2	[s] reaction time
φ	=	0,81	[-] friction factor
q_s	=	-1,3	[%] slope (+ is uphill, - is downhill)
α	=	0,6	[-] representing reduced distance headways

The results of the calculations should be **presented in a table as well as in a chart**.

2) **Scale (plan) the required number of lanes** (**considering spare capacity as well**, c_s) by the use of previuosly determined flow-speed relationship. The traffic volume (demand) can be seen in the following chart. Afterwards **calculate the capacity utilisation** (CU).

The average daily traffic volume (VPD) of the peak cross-section is the following:

Vehicle category	Veh/day	PCE*	**PCE/day**
passenger car	7802	1,0	
light truck	2951	1,4	
heavy truck	1550	1,8	
trailer truck	126	2,5	
non-articulated bus	428	1,8	
articulated bus	62	2,5	
motorcycle	226	0,7	

** Passenger car equivalent (PCE).*

- the peak hour traffic (PHT) is 9,7 % (ω) of average daily traffic volume (VPD),
- when peak hour traffic (as the basis of planning) occures on the road the average space-mean speed (v_s, speed of traffic flow) is 62,4 km/h,
- the relation between the number of lanes and the aggregate capacity is the following:

Number of lanes	Aggregate capacity (c_a)
1	100 %
2	175 %
3	250 %

3) Examine whether **changing** (increasing/decreasing) **number of lanes is neccessary**, if:
- the speed of traffic flow changes to 56,2 km/h,
- and the PHT changes by -2,8 % simultaneously.

If so **calculate the new capacity utilisation** as well.