

Bukti Submit Artikel Id 10489 ke Jurnal Teknologi, Tanggal 07 Februari 2017

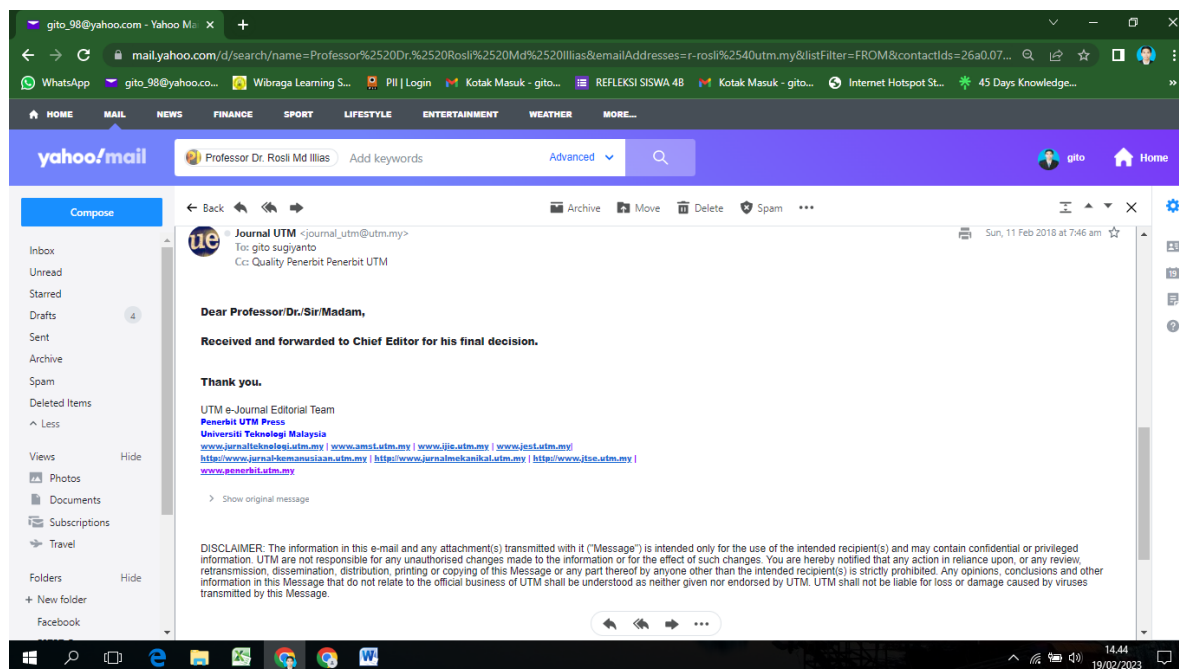
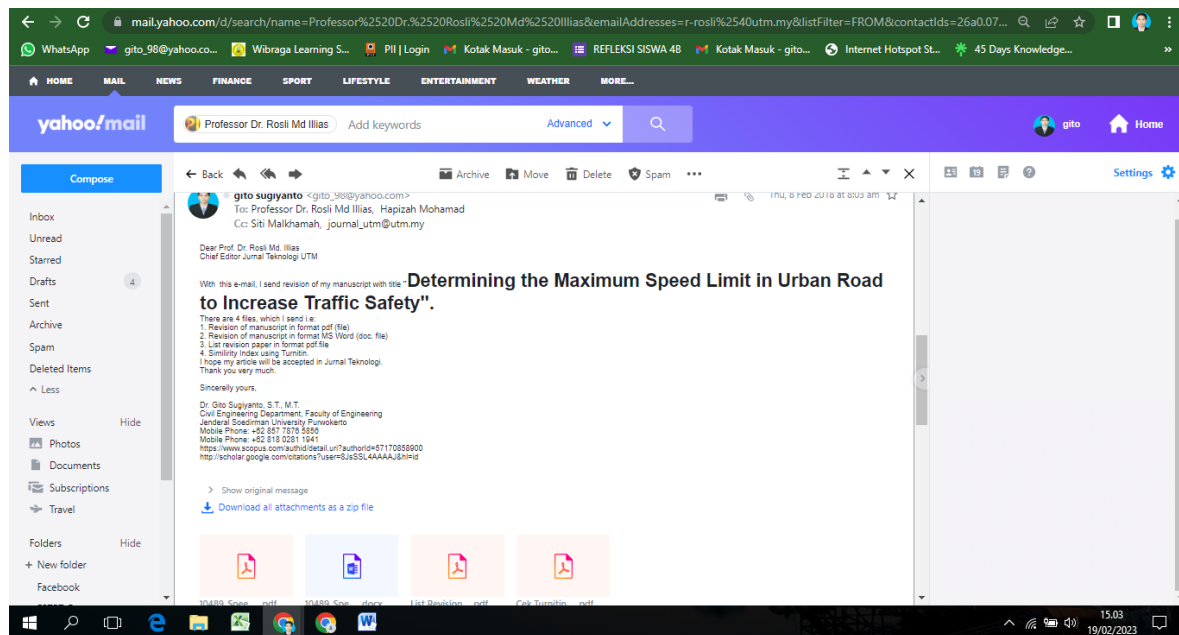
The screenshot shows the submission dashboard for article ID 10489 by Sugiyanto et al. The article title is "DETERMINING THE MAXIMUM SPEED LIMIT IN URBAN ROAD TO INCREASE TRAFFIC". The dashboard includes tabs for Workflow and Publication. Under the Publication tab, there are sub-tabs for Submission, Review, Copyediting, and Production. The Submission Files section shows a file named "admin, Manuscript Speed Limit.docx" uploaded on February 7, 2017. There is a "Download All Files" button. The Pre-Review Discussions section is currently empty, with an "Add discussion" button.

Hasil Review I: Resubmit for Review Tanggal 22 Januari 2018

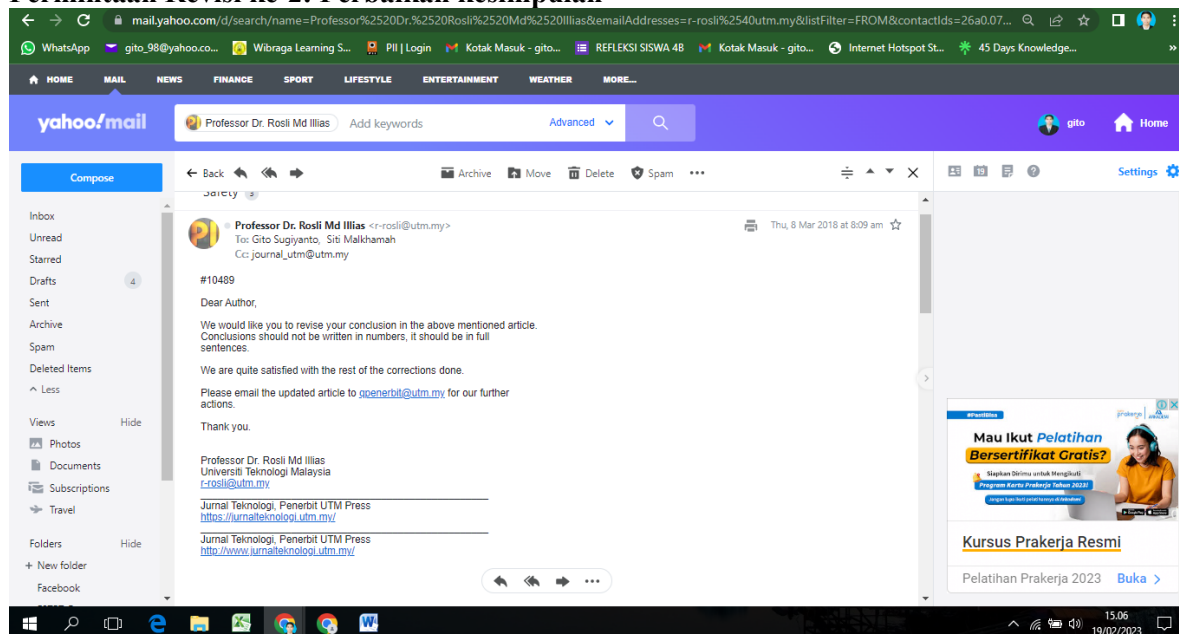
The screenshot shows an email from Professor Dr. Rosli Md Illias to Gito Sugiyanto. The email is dated Monday, 22 Jan 2018 at 4:11 pm. The subject is "[JT] Editor Decision". The email content states: "We have reached a decision regarding your submission to Jurnal Teknologi, 'The Determination of Maximum Speed Limit in Arterial and Collector Road to Increase Traffic Safety'. Our decision is to: RESUBMIT FOR REVIEW. 2. Reviewers have now commented on your paper. You will see that they are advising that you revise your manuscript. If you are prepared to undertake the work required, I would be pleased to reconsider my decision. 3. For your guidance, reviewers' comments are attached. Please refer to the attachment and kindly rework & rewrite your article. YOU SHOULD ALSO ATTACH THE LIST OF CORRECTIONS BEING DONE. 4. Please upload your revised article in the system for our further action and alert us through email : jurnal_utm@utm.my. THANK YOU."

The screenshot shows the submission dashboard for article ID 10489, with an "Editor Decision" message displayed. The message is from Gito Sugiyanto (gito_98) to Professor Dr. Rosli Md Illias (rmdillias). The message content states: "Dear Gito Sugiyanto: We have reached a decision regarding your submission to Jurnal Teknologi, 'The Determination of Maximum Speed Limit in Arterial and Collector Road to Increase Traffic Safety'. Our decision is to: REVISION REQUIRED 2. Please be advised all articles that have been chosen to be published in Jurnal Teknologi will be charged MYR530.00 including 6% GST. If you agree to this term, please fill in the document 'JT Invoice Request and Payment Instructions NORMAL ISSUE' attached to enable us prepare a formal invoice. Please email this document to jurnal_utm@utm.my after you have resubmit your article."

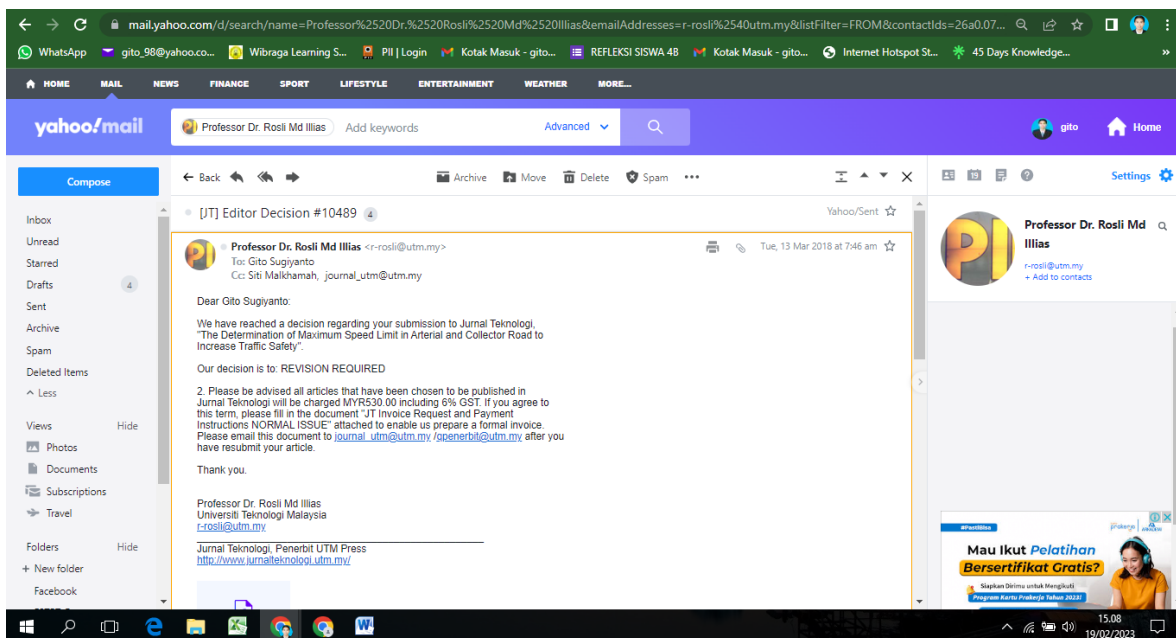
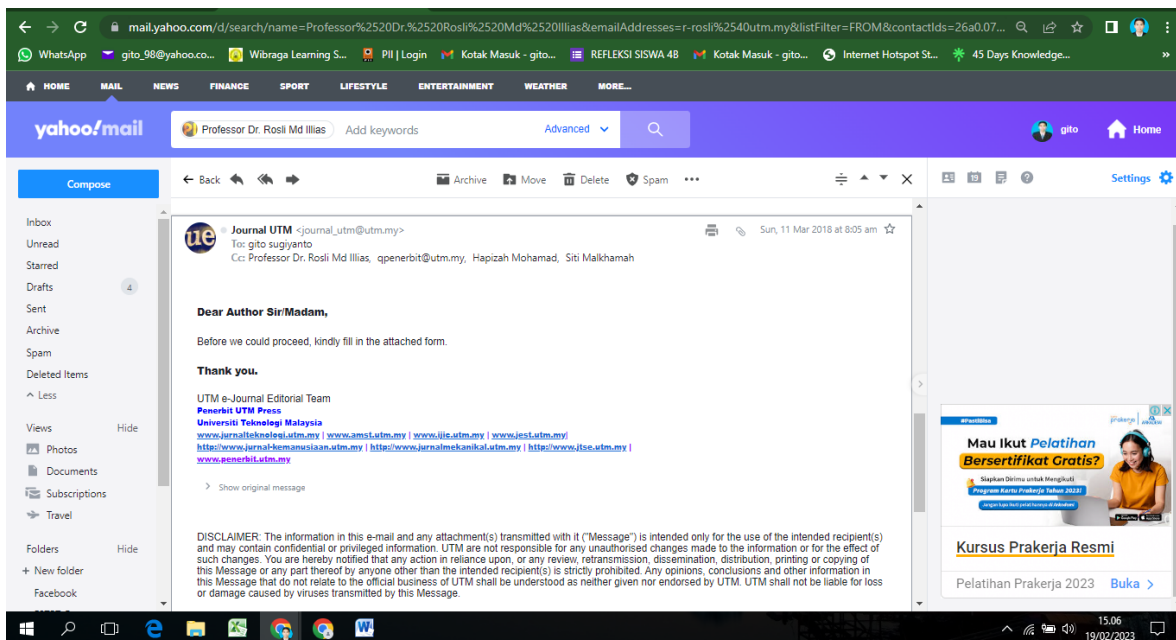
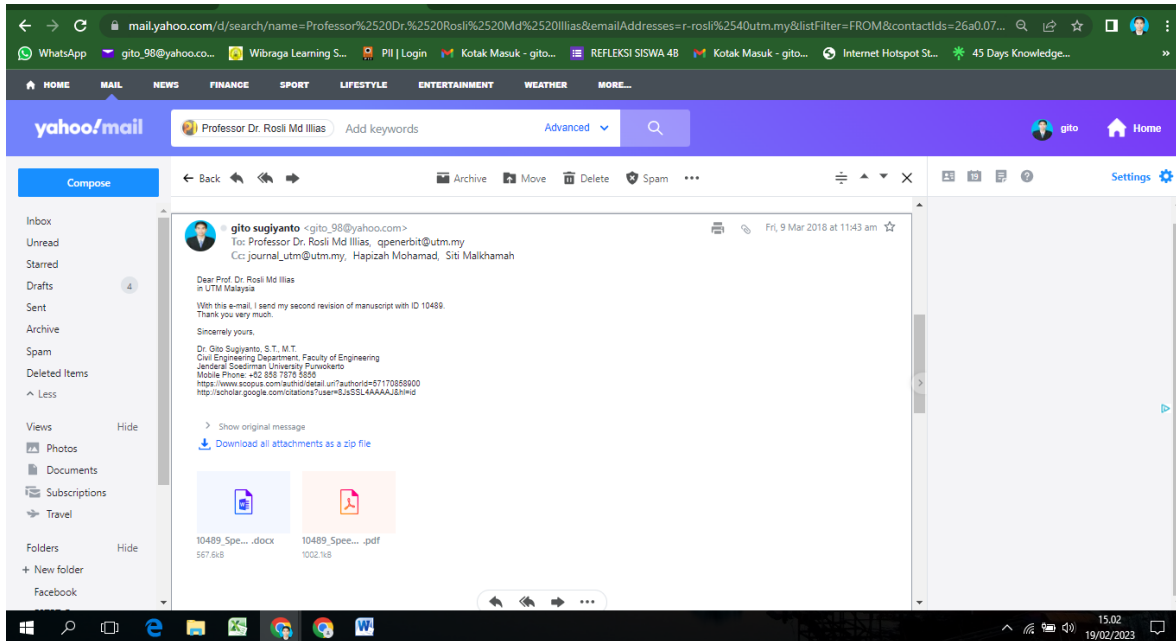
Revisi Hasil Review I: Submit Tanggal 8 Februari 2018



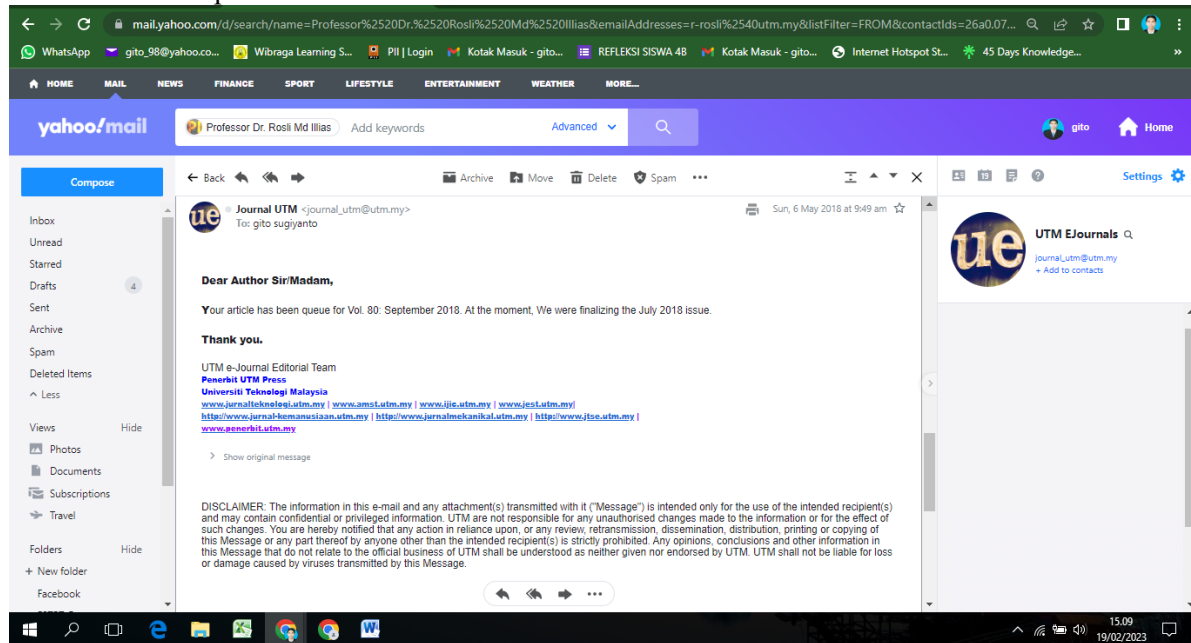
Permintaan Revisi ke-2: Perbaikan kesimpulan



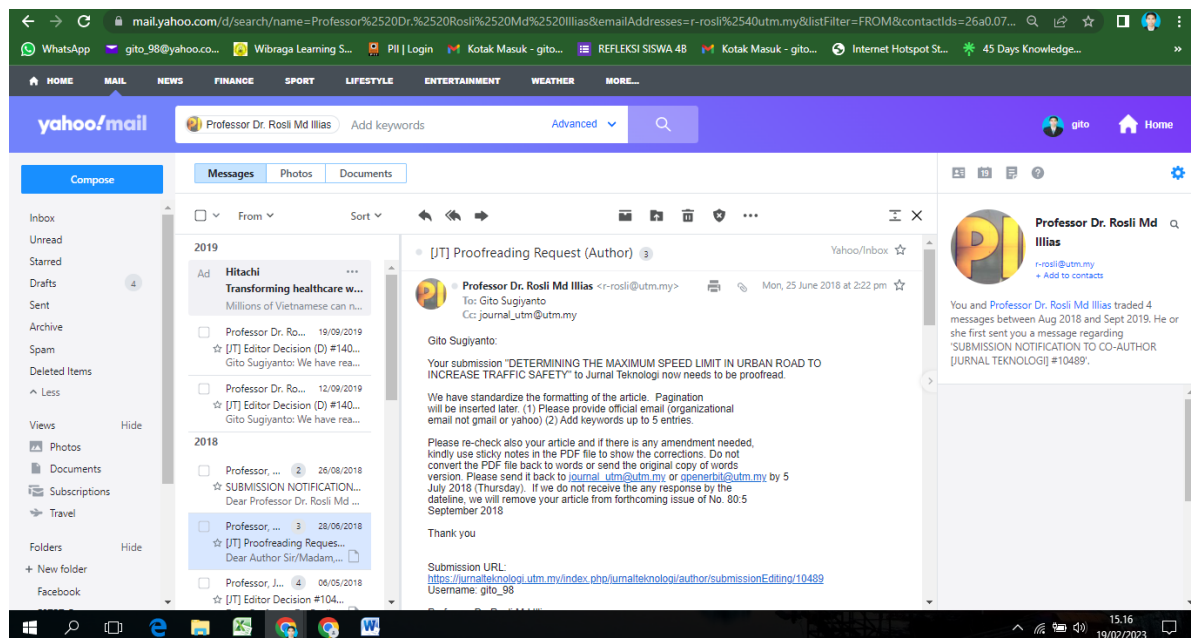
Bukti e-mail: Revisi ke-2 manuscript ID 10489



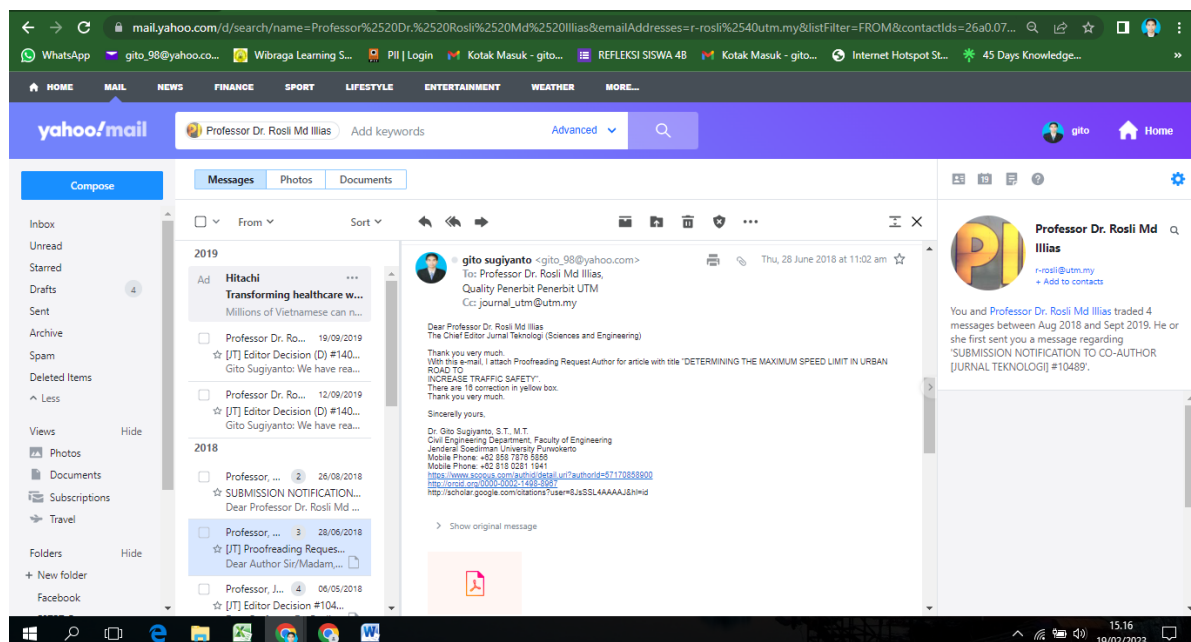
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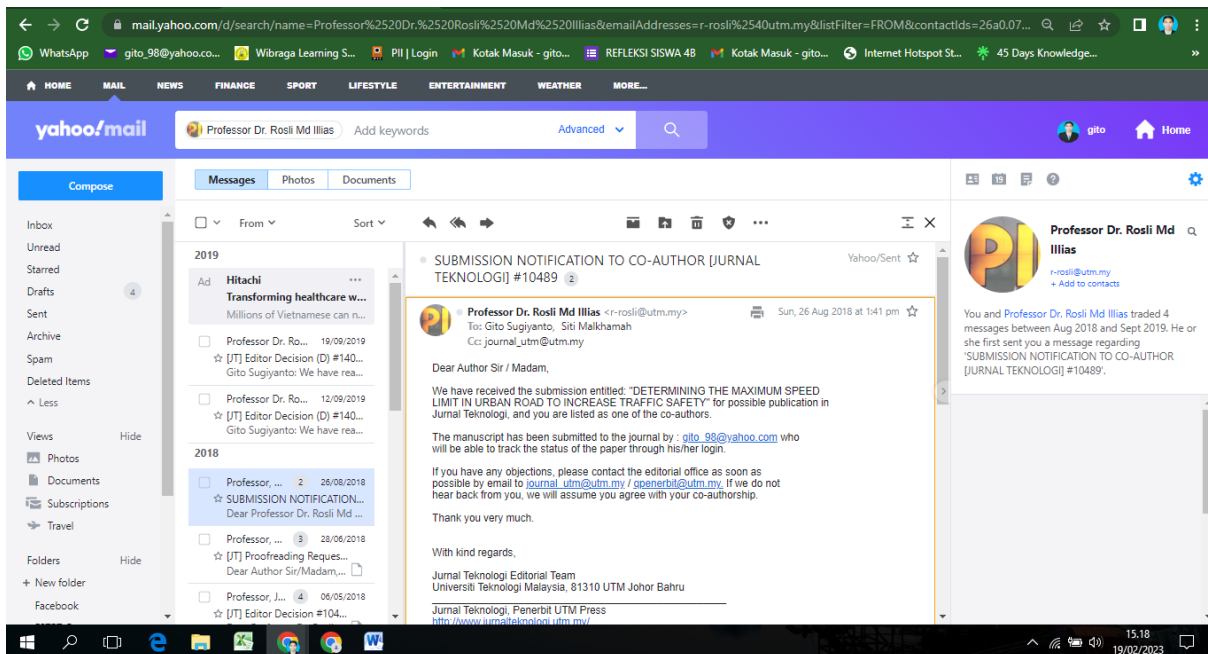
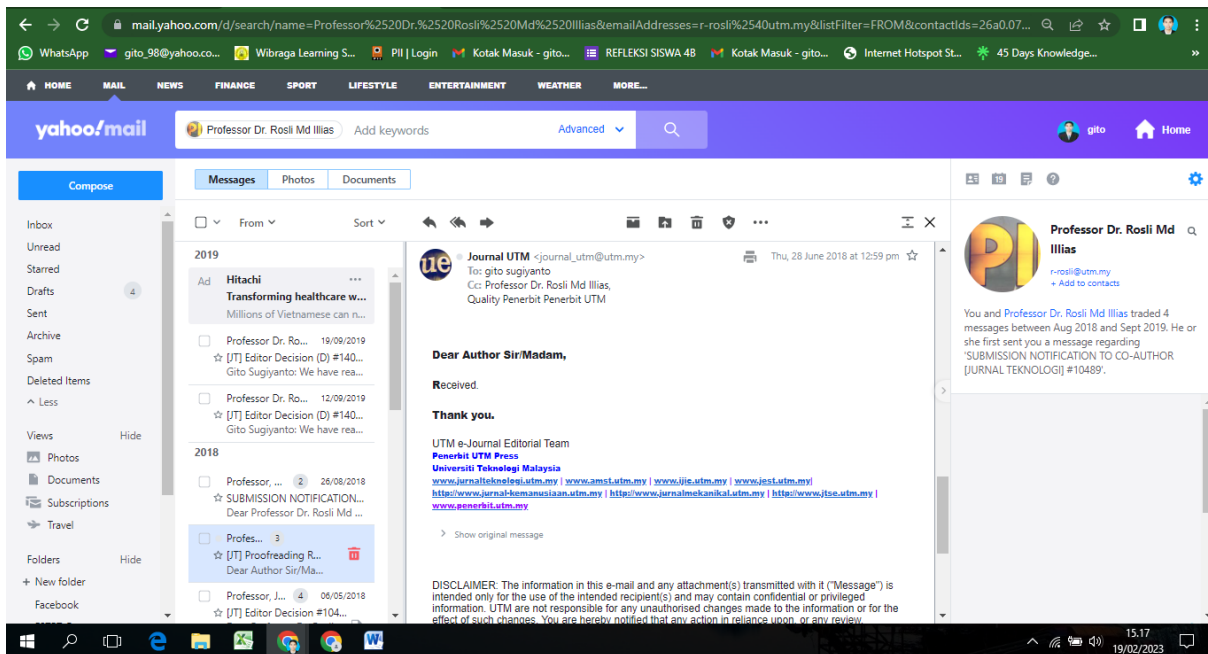


Proofread Article Id 10489

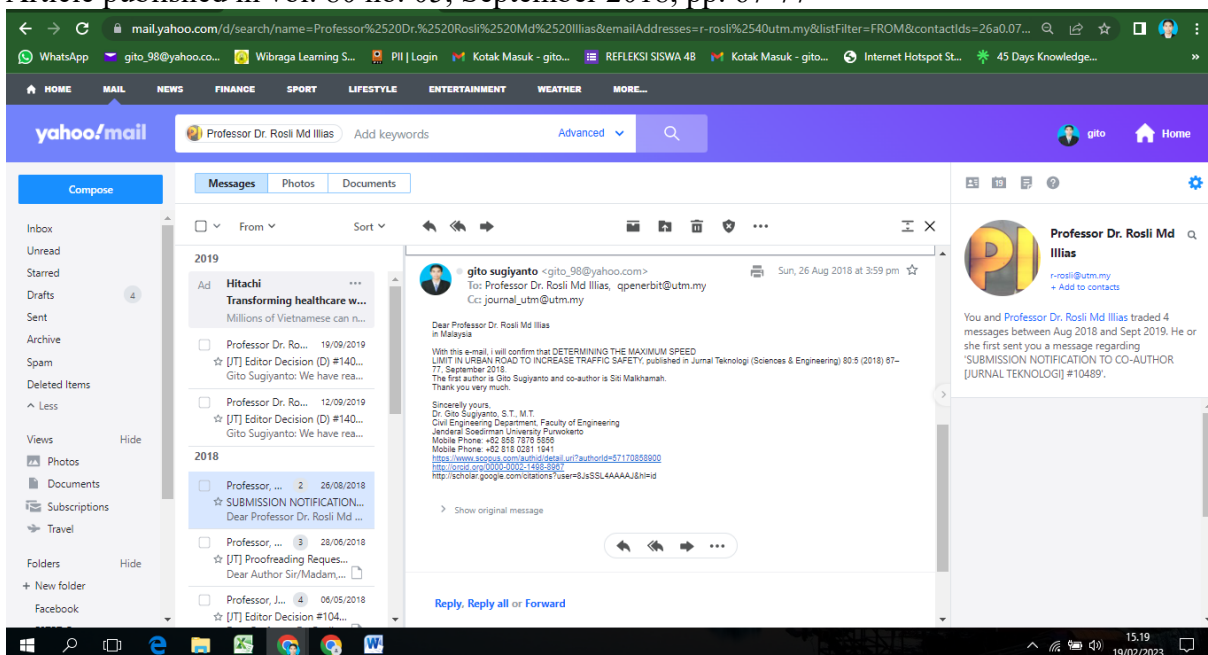


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Article published in vol. 80 no. 05, September 2018, pp. 67-77



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Professor Dr. Rosli Md Illias

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[JT] Editor Decision

2

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PI

Professor Dr. Rosli Md Illias

To: Gito Sugiyanto

Cc: Siti Malkhamah

, journal_utm@utm.my

Mon, 22 Jan 2018 at 4:11 pm

Gito Sugiyanto:

We have reached a decision regarding your submission to Jurnal Teknologi, "The Determination of Maximum Speed Limit in Arterial and Collector Road to Increase Traffic Safety".

Our decision is to: RESUBMIT FOR REVIEW

2. Reviewers have now commented on your paper. You will see that they are advising that you revise your manuscript. If you are prepared to undertake the work required, I would be pleased to reconsider my decision.

3. For your guidance, reviewers' comments are attached. Please refer to the attachment and kindly rework & rewrite your article. YOU SHOULD ALSO ATTACH THE LIST OF CORRECTIONS BEING DONE.

4. Please upload your revised article in the system for our further action and alert us through email : journal_utm@utm.my.

THANK YOU.

Professor Dr. Rosli Md Illias
Universiti Teknologi Malaysia
r-rosli@utm.my

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Re: [JT] Editor Decision

From: Journal UTM (journal_utm@utm.my)
To: gito_98@yahoo.com
Cc: qpenerbit@utm.my
Date: Sunday, 11 February 2018 at 07:46 am GMT+7

Dear Professor/Dr./Sir/Madam,

Received and forwarded to Chief Editor for his final decision.

Thank you.

UTM e-Journal Editorial Team

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On Thu, Feb 8, 2018 at 9:03 AM, gito sugiyanto <gito_98@yahoo.com> wrote:

Dear Prof. Dr. Rosli Md. Illias
Chief Editor Jurnal Teknologi UTM

With this e-mail, I send revision of my manuscript with title "**Determining the Maximum Speed Limit in Urban Road to Increase Traffic Safety**".

There are 4 files, which I send i.e:

1. Revision of manuscript in format pdf (file)
2. Revision of manuscript in format MS Word (doc. file)
3. List revision paper in format pdf.file
4. Simililarity Index using Turnitin.

I hope my article will be accepted in Jurnal Teknologi.

Thank you very much.

Sincerely yours,

Dr. Gito Sugiyanto, S.T., M.T.
Civil Engineering Department, Faculty of Engineering
Jenderal Soedirman University Purwokerto
Mobile Phone: +62 857 7876 5856
Mobile Phone: +62 818 0281 1941
<https://www.scopus.com/authid/detail.uri?authorid=57170858900>
<http://scholar.google.com/citations?user=8JsSSL4AAAAJ&hl=id>

On Monday, 22 January 2018, 4:11:38 pm GMT+7, Professor Dr. Rosli Md Illias <r-rosli@utm.my> wrote:

Gito Sugiyanto:

We have reached a decision regarding your submission to Jurnal Teknologi, "The Determination of Maximum Speed Limit in Arterial and Collector Road to Increase Traffic Safety".

Our decision is to: RESUBMIT FOR REVIEW

2. Reviewers have now commented on your paper. You will see that they are advising that you revise your manuscript. If you are prepared to undertake the work required, I would be pleased to reconsider my decision.

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4. Please upload your revised article in the system for our further action and alert us through email : journal_utm@utm.my.

THANK YOU.

Professor Dr. Rosli Md Illias
Universiti Teknologi Malaysia
r-rosli@utm.my

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Article

10489_Speed Limit Revision 6 Feb

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Review Discussions

Add discussion

Name	From	Last Reply	Replies	Closed
▶ Editor Decision	gito_982018-01-22 05:11 PM	gito_982018-03-13 08:46 AM	1	<input type="checkbox"/>

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Subject: [JT] Editor Decision #10489

From: r-rosli@utm.my

To: gito_98@yahoo.com

Cc: malkhamah@ugm.ac.id; journal_utm@utm.my

Date: Tuesday, 13 March 2018, 7:46:55 am GMT+7

Dear Gito Sugiyanto:

We have reached a decision regarding your submission to Jurnal Teknologi, "The Determination of Maximum Speed Limit in Arterial and Collector Road to Increase Traffic Safety".

Our decision is to: REVISION REQUIRED

2. Please be advised all articles that have been chosen to be published in Jurnal Teknologi will be charged MYR530.00 including 6% GST. If you agree to this term, please fill in the document "JT Invoice Request and Payment Instructions NORMAL ISSUE" attached to enable us prepare a formal invoice. Please email this document to journal_utm@utm.my / qpenerbit@utm.my after you have resubmit your article.

Thank you.

Professor Dr. Rosli Md Illias
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Article Text, 10489_Speed Limit Revision 6 Feb 2018.pdf (6)

March 21, 2018

Article Text

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Name	From	Last Reply	Replies	Closed
<div><div></div><div>Editor Decision</div></div>	gito_982018-01-22 05:11 PM	gito_982018-03-13 08:46 AM	1	<input type="checkbox"/>

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Review Form Response

Review Form 1

Article Title

The Determination of Maximum Speed Limit in Arterial

Series

- ☒ JT (Science and Engineering)
☐ JT (Social Sciences)

Year

2017

File number

Date of receipt *

Referee's name *

Address *

Phone number *

Email *

Date of completion *

Referee's comments

(1) Analysis of impact of reducing speed limit is not clear, i.e. Item 3.3(a) and 3.3(b) are discussed without data. Findings are taken from Reference no [22].
(2) Glaring grammatical errors

A. Evaluations

Please evaluate the paper according to the following criteria:

1. The topic is important and relevant for publication *

- ☒ Yes
☐ No

Comment

2. The work presented in the manuscript is original *

- ☒ Yes
☐ No

Comment

3. The manuscript uses sufficient references *

- ☒ Yes
☐ No

Comment

4. The manuscript uses appropriate language and styles *

- ☐ Yes
☒ No

Comment

Glaring grammatical errors

5. The title of the manuscript is appropriate *

- ☐ Yes
☒ No

Comment

paper focuses on the degree of speed limit compliance.

6. The order of presentation is satisfactory *

- ☒ Yes
☐ No

Comment

7. The abstract adequately summarizes the content of the manuscript *

- ☐ Yes
☒ No

Comment

8. The introduction is adequately developed *

- ☒ Yes
☐ No

Comment

9. The problem described in the manuscript is clearly stated *

- ☐ Yes
☒ No

Comment

10. The adopted methodology described in the manuscript is sound *

- ☐ Yes
☒ No

Comment

impact on safety was not correctly measured

11. The findings of this manuscript are correctly interpreted *

- ☒ Yes
☐ No

Comment

12. The manuscript is free from obvious errors *

- ☐ Yes
☒ No

Comment

13. The quality of figures and illustrations is acceptable for publications *

- ☒ Yes
☐ No

Comment

14. The manuscript does not dwell on any sensitive issues *

- ☒ Yes
☐ No

Comment

B. Suggestions to the author(s)

What can the author(s) do to improve the quality of this paper?

*

To explain how the reduction of the speed limit was implemented on site.
To provide data for safety analysis
Item 3.3 does not seem to be based on the data collected for the said study???

C. Recommendations to the editors

The manuscript should be:

*

- ☐ Published as it is
- ☐ Published with changes as recommended
- ☒ Returned to the writer to be completely reworked and rewritten
- ☐ Rejected

[Close](#)

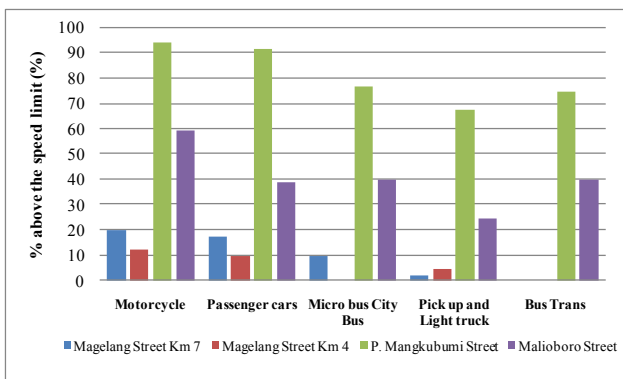
* Denotes required field

List Revision paper No. 10489

“Determining the Maximum Speed Limit in Urban Road to Increase Traffic Safety”

No.	Suggestions from Reviewer	Revision from Author	Page
1.	The title of manuscript (paper focuses on the degree of speed limit compliance)	The title of manuscript is replace: Before: “The Determination of Maximum Speed Limit in Arterial and Collector Road to Increase Traffic Safety” After: “ Determining the Maximum Speed Limit in Urban Road to Increase Traffic Safety ”	1
2.	a. Glaring grammatical errors b. Impact on safety was not correctly measured	<p>Author revision the manuscript from the abstract up to the conclusion</p> <p>Abstract: Based on the analysis result, the proposed maximum speed limit on urban road for arterial road type 4/2-UD residential and 4/2-UD CBD is 60 km/h for motorcycle and passenger car, 55 km/h for pick up and light truck, and 50 km/h for bus and truck. Proposed maximum speed limit for collector road type 2/1-UD office area is 45 km/h for motorcycle and 40 km/h for four-wheeled vehicles or more while for collector road type 2/1-UD CBD is 40 km/h for motorcycle and 35 km/h for four-wheeled vehicles or more. The installation of speed limit sign is less effective to reduce the vehicle speed, the speed only reduce 2.9-55 km/h (5.6-10.1%). More than 46.5% of motorcycle users ride exceeding speed limit followed by the passenger cars users (39.43%), microbus/city bus at 31.63%, bus Trans at 28.75%, pick up and light truck at 24.69%. The maximum speed limit in school safety zone on hours/after school is 30 km/h with the consideration that the pedestrian fatality rate on 30 km/h has probability of death 10%.</p> <p>Abstrak: Berdasarkan hasil analisis, diperoleh batas maksimum kecepatan kendaraan yang diusulkan pada ruas jalan perkotaan untuk jalan arteri tipe 4/2-UD permukiman dan 4/2-UD CBD adalah 60 km/jam untuk sepeda motor dan mobil penumpang, 55 km/jam untuk <i>pick up</i> dan truk kecil dan 50 km/jam untuk bus dan truk. Batas kecepatan maksimum untuk jalan kolektor tipe 2/1-UD perkantoran 45 km/jam untuk sepeda motor dan 40 km/jam untuk kendaraan roda 4 atau lebih dan untuk jalan kolektor tipe 2/1-UD CBD adalah 40 km/jam untuk sepeda motor dan 35 km/jam untuk kendaraan roda 4 atau lebih. Pemasangan rambu batas kecepatan kurang efektif untuk menurunkan kecepatan, kecepatan hanya berkurang 2,9-5,5 km/jam (5,6-10,1%). Lebih dari 46,5% pengguna sepeda motor melebihi batas kecepatan diikuti oleh mobil penumpang (39,43%), bus (31,63%), pick up dan truk ringan sebesar 24,69%. Batas kecepatan maksimum di kawasan Zona Selamat Sekolah pada jam masuk/pulang sekolah 30 km/jam dengan pertimbangan tingkat fatalitas pejalan kaki pada kecepatan 30 km/jam memiliki probabilitas meninggal dunia 10%.</p> <p>Conclusion: Based on the results, the following conclusion can be drawn: a. Proposed maximum speed limit based on the 85th percentile</p>	<p>1</p> <p>1-2</p> <p>10</p>

		<p>speed of vehicles for arterial road type 4/2-UD residential and 4/2-UD CBD is 60 km/h for motorcycle and passenger car, 55 km/h for pick up and light truck, and 50 km/h for bus and truck.</p> <p>b. Proposed maximum speed limit for collector road type 2/1-UD office area is 45 km/h for motorcycle and 40 km/h for four-wheeled vehicles or more while for collector road type 2/1-UD CBD is 40 km/h for motorcycle and 35 km/h for four-wheeled vehicles or more.</p> <p>c. The installation of speed limit sign is less effective to reduce the vehicle speed; vehicle speed on the field is only reduced 2.9 to 5.5 km/h (5.6 to 10.1%)</p> <p>d. More than 46.5% of motorcycle users ride exceeding speed limits followed by the passenger cars users (39.43%), microbus or city bus at 31.63%, bus Trans at 28.75%, pick up and light truck at 24.69%.</p> <p>e. The maximum speed limit in school safety zone on hours/after school is 30 km/h with the consideration that the pedestrian fatality rate on 30 km/h has probability of death 10%.</p>	
3.	To explain how the reduction of the speed limit was implemented on site	<p>Result and analysis:</p> <p>a. Magelang street km 7, Sleman is an arterial road, consists of 4 lanes 2 directions without median or undivided road (4/2 UD) with land use as a residential area, shops, and office. The wide of this road is 12.00 m with the road capacity is 4132 pcu/h. The speed limit value based on 85th percentile for motorcycle (64 km/h) and passenger car (62 km/h) is higher than the maximum speed limit in the field (60 km/h).</p> <p>b. Magelang street km 4, Yogyakarta is an arterial road in urban area consists of 4 lanes 2 directions without median or undivided road (4/2 UD) with land use as a central business district, residential area, shops, and office with maximum speed limit of 60 km/h, The wide of this road is 14.00 m with the road capacity is 5712 pcu/h.</p> <p>c. Pangeran Mangkubumi Street, Yogyakarta is a collector road in urban area with maximum speed limit of 30 km/h. This street consists of 2 lanes 1 direction without median or undivided road (2/1 UD) with land use as CBD, hotel, shops, and office. The wide of this road is 7.00 m with the road capacity is 2348 pcu/h.</p> <p>d. Malioboro Street, Yogyakarta is a collector road in urban area with maximum speed limit of 30 km/h. This street consists of 2 lanes 1 direction without median or undivided road (2/1 UD) with land use as a central business district, hotel, shops, market, and office. The wide of this road is 7.00 m with the road capacity is 1941 pcu/h.</p>	<p>4</p> <p>5</p> <p>6</p> <p>6</p>
4.	Determining speed limit	<p>Determining speed limit:</p> <p>The speed limits are set in accordance with the design standard of the roads. There are three type of road i.e.: arterial road, collector road, and local road. The road network consists of a variety of different types of roads; from motorways for long distance inter urban travel, to arterials in urban areas and down to the small local roads in residential areas and city centers. Proposed maximum speed limit value based on the 85th percentile speed of vehicles on urban road for arterial and collector road is presented in Table 5.</p>	7-8

		<table><tr><th colspan="9">Table 5 Proposed maximum speed limit of vehicles based on 85th percentile in urban road.</th></tr><tr><th rowspan="2"></th><th rowspan="2">Type of area</th><th rowspan="2">Speed limit (km/h)</th><th colspan="6">Maximum speed limit (km/h)</th></tr><tr><th>Motor cycle</th><th>Passenger car</th><th>Pick up, Light truck</th><th>Micro bus</th><th>City bus</th><th>Bus</th></tr><tr><td></td><td>Residential</td><td>60</td><td>60</td><td>60</td><td>55</td><td>50</td><td>50</td><td>50</td></tr><tr><td></td><td>CBD</td><td>60</td><td>60</td><td>60</td><td>55</td><td>50</td><td>50</td><td>50</td></tr><tr><td>b)</td><td>Office</td><td>30</td><td>45</td><td>40</td><td>40</td><td>40</td><td>40</td><td>40</td></tr><tr><td>d)</td><td>CBD</td><td>30</td><td>40</td><td>35</td><td>35</td><td>35</td><td>35</td><td>35</td></tr></table> <p>Proposed maximum speed limit value based on the 85th percentile speed of vehicles for arterial road type 4/2-UD residential and 4/2-UD CBD, the speed for motorcycle and passenger car at 60 km/h, for pick up and light truck at 55 km/h, for microbus, bus, city bus, truck at 50 km/h. Proposed maximum speed limit value for collector road type 2/1-UD office area, 45 km/h for motorcycle and 40 km/h for four-wheeled vehicles or more. While for collector road type 2/1-UD CBD, 40 km/h for motorcycle and 35 km/h for four-wheeled vehicles or more.</p>	Table 5 Proposed maximum speed limit of vehicles based on 85 th percentile in urban road.										Type of area	Speed limit (km/h)	Maximum speed limit (km/h)						Motor cycle	Passenger car	Pick up, Light truck	Micro bus	City bus	Bus		Residential	60	60	60	55	50	50	50		CBD	60	60	60	55	50	50	50	b)	Office	30	45	40	40	40	40	40	d)	CBD	30	40	35	35	35	35	35	
Table 5 Proposed maximum speed limit of vehicles based on 85 th percentile in urban road.																																																															
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b)	Office	30	45	40	40	40	40	40																																																							
d)	CBD	30	40	35	35	35	35	35																																																							
5.	Item 3.3 does not seem to be based on the data collected for the said study	<p>Impact on proportion of drivers exceeding speed limit</p> <p>The amount of violations on an individual road depends on many different local aspects, including the local maximum speed limit, characteristics of the road, characteristics of the road environment, traffic density, traffic composition, and the level of the enforcement in this country. The proportion of drivers exceeding the speed limit in urban road by category of road users illustrates in Figure 8. Speeding occurrences between 3-22 km/h above speed limit.</p> <div><table><caption>Data for Figure 8: Proportion of drivers exceeding speed limit (%)</caption><thead><tr><th>Vehicle Category</th><th>Magelang Street Km 7</th><th>Magelang Street Km 4</th><th>P. Mangkubumi Street</th><th>Malioboro Street</th></tr></thead><tbody><tr><td>Motorcycle</td><td>20</td><td>12</td><td>95</td><td>60</td></tr><tr><td>Passenger cars</td><td>18</td><td>10</td><td>92</td><td>38</td></tr><tr><td>Micro bus City Bus</td><td>10</td><td>0</td><td>75</td><td>40</td></tr><tr><td>Pick up and Light truck</td><td>2</td><td>5</td><td>68</td><td>25</td></tr><tr><td>Bus Trans</td><td>0</td><td>0</td><td>75</td><td>40</td></tr></tbody></table></div> <p>Figure 8 Proportion of drivers exceeding speed limit in urban road.</p> <p>Figure 8 shows the proportion of drivers in urban road that driving above the speed limit by category road users. For passenger car drivers, it shows that 17.25% of drivers exceed the speed limit in 4/2 UD-residential area and 91.67% in 2/1 UD-office area. For motorcycle users, it shows that 19.75% of road users exceed the speed limit in 4/2 UD residential area and 94.5% in 2/1 UD-office area. Motorcyclists represent the road user category with the highest rates of speeding with more than 46.5% of motorcycle users ride over the speed limits followed by the passenger cars users with</p>	Vehicle Category	Magelang Street Km 7	Magelang Street Km 4	P. Mangkubumi Street	Malioboro Street	Motorcycle	20	12	95	60	Passenger cars	18	10	92	38	Micro bus City Bus	10	0	75	40	Pick up and Light truck	2	5	68	25	Bus Trans	0	0	75	40	8-9																														
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		more than 39.43% user exceeding speed limit, microbus or city bus at 31.63%, bus Trans at 28.75%, pick up and light truck at 24.69%.																																																								
6.	Analysis of impact of reducing speed limit is not clear, i.e item 3.3 (a) and 3.3 (b) are discussed without data	<p>The analysis results of the maximum speed limit determination, before and after installing speed limit sign and proportion of drivers exceeding the speed limit was presented in Table 6 for the speed limit 30 km/h; in Table 7 for the speed limit 40 km/h; and was presented in Table 8 for the speed limit 60 km/h.</p> <p>Table 6 Speed and proportion of drivers exceeding the speed limit 30 km/h.</p> <table><tr><th rowspan="2">No.</th><th rowspan="2">Type of vehicle</th><th colspan="2">Speed limit based on 85th percentile (km/h)</th><th rowspan="2">Δ Speed limit (km/h) and (%)</th></tr><tr><th>Before installing speed sign</th><th>After installing speed sign</th></tr><tr><td>1.</td><td>Motorcycle</td><td>68.0</td><td>61.0</td><td>-7 km/h (10.3%)</td></tr><tr><td>2.</td><td>Passenger car</td><td>62.0</td><td>61.0</td><td>-1 km/h (1.6%)</td></tr><tr><td>3.</td><td>Pick up</td><td>58.7</td><td>57.0</td><td>-1.7 km/h (2.9%)</td></tr><tr><td>4.</td><td>Microbus</td><td>54.6</td><td>53.8</td><td>-0.8 km/h (1.5%)</td></tr><tr><td>5.</td><td>Bus</td><td>63.5</td><td>55.0</td><td>-8.5 km/h (13.4%)</td></tr><tr><td>6.</td><td>Light truck</td><td>57.0</td><td>55.5</td><td>-1.5 km/h (2.6%)</td></tr><tr><td>7.</td><td>Truck</td><td>53.0</td><td>51.0</td><td>-2 km/h (3.8%)</td></tr><tr><td></td><td>Average all veh.</td><td>52.6</td><td>47.5</td><td>-5.1 km/h (9.7%)</td></tr></table> <p>Impact of reducing speed limit in urban road can be seen in Table 6 to Table 9. If the maximum speed limit is 30 km/h, the average speed of all vehicles decrease from 52.6 to 47.5 km/h (5.1 km/h or 9.7%) and the proportion of motorcycles ride exceeding speed limit reduce 6%, passenger cars reduce 3.13%, pick up reduce 6.06%, microbus reduce 11.11%, and trucks reduce 7.9% up to 14.29%. For maximum speed limit 40 km/h, average speed of all vehicles decrease from 52.1 to 49.3 km/h (2.9 km/h or 5.6%). The proportion of motorcycle exceeding speed limit reduce 7.17%, passenger cars reduce 5.4%, pick up reduce 22.07%, microbus increase 6.25%, and truck reduce 19.17 up to 31.82%. If the maximum speed limit is 60 km/h, the average speed of all vehicles decrease from 54.9 to 49.4 km/h (5.5 km/h or 10.1%) and the proportion of motorcycles ride exceeding speed limit reduce 7.5%, passenger cars reduce 16.61%, pick up reduce 2%, microbus reduce 9.5%, and trucks reduce 4.75%.</p> <p>Table 9 Impact of reducing speed limit.</p> <table><tr><th>Maximum speed limit</th><th>Impact of changing the vehicle speed</th></tr><tr><td>30 km/h</td><td>The average speed of all vehicles decrease from 52.6 to 47.5 km/h (5.1 km/h or 9.7%).</td></tr><tr><td>40 km/h</td><td>The average speed of all vehicles decrease from 52.1 to 49.3 km/h (2.9 km/h or 5.6%).</td></tr><tr><td>60 km/h</td><td>The average speed of all vehicles decrease from 54.9 to 49.4 km/h (5.5 km/h or 10.1%)</td></tr></table> <p>Based on the analysis results obtained that the installation of speed limit signs on the highway is less effective to reduce vehicle speed. With the installation of vehicle speed limit sign, vehicle speed are reduced only about 2.9 to 5.5 km/h (5.6% to 10.1%).</p>	No.	Type of vehicle	Speed limit based on 85 th percentile (km/h)		Δ Speed limit (km/h) and (%)	Before installing speed sign	After installing speed sign	1.	Motorcycle	68.0	61.0	-7 km/h (10.3%)	2.	Passenger car	62.0	61.0	-1 km/h (1.6%)	3.	Pick up	58.7	57.0	-1.7 km/h (2.9%)	4.	Microbus	54.6	53.8	-0.8 km/h (1.5%)	5.	Bus	63.5	55.0	-8.5 km/h (13.4%)	6.	Light truck	57.0	55.5	-1.5 km/h (2.6%)	7.	Truck	53.0	51.0	-2 km/h (3.8%)		Average all veh.	52.6	47.5	-5.1 km/h (9.7%)	Maximum speed limit	Impact of changing the vehicle speed	30 km/h	The average speed of all vehicles decrease from 52.6 to 47.5 km/h (5.1 km/h or 9.7%).	40 km/h	The average speed of all vehicles decrease from 52.1 to 49.3 km/h (2.9 km/h or 5.6%).	60 km/h	The average speed of all vehicles decrease from 54.9 to 49.4 km/h (5.5 km/h or 10.1%)	9
No.	Type of vehicle	Speed limit based on 85 th percentile (km/h)			Δ Speed limit (km/h) and (%)																																																					
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7.	Impact on pedestrian safety	<p>Increased data in Table 10 and discussion:</p> <p>Table 10 Speed of motorcycle and passenger car at school safety zone in peak time period.</p> <table><tr><th rowspan="2">Location of school safety zone</th><th rowspan="2">Peak time</th><th colspan="2">Motorcycle speed (km/h)</th><th colspan="2">Passenger car speed (km/h)</th></tr><tr><th>Lane 1</th><th>Lane 2</th><th>Lane 1</th><th>Lane 2</th></tr><tr><td>SDN 1 Bobosan</td><td>morning</td><td>35.45</td><td>35.08</td><td>20.73</td><td>31.12</td></tr><tr><td>SDN 1 Bobosan</td><td>afternoon</td><td>39.78</td><td>41.74</td><td>35.29</td><td>38.34</td></tr><tr><td>SD 1 Al Irsyad</td><td>morning</td><td>24.65</td><td>20.23</td><td>17.89</td><td>22.38</td></tr><tr><td>SDN 4 Purwanegara</td><td>morning</td><td>36.01</td><td>39.47</td><td>28.21</td><td>31.30</td></tr><tr><td>SDN 4 Purwanegara</td><td>afternoon</td><td>38.51</td><td>36.58</td><td>36.05</td><td>31.30</td></tr><tr><td colspan="2">Average of speed (km/h)</td><td>34.88</td><td>34.62</td><td>27.63</td><td>30.89</td></tr></table> <p>Based on Table 10, motorcycles speed at peak time (morning and afternoon) more than 30 km/h, only in SD 1 Al Irsyad has value lower than 30 km/h. The average of speed for motorcycle in lane 1 is 34.88 km/h and in lane 2 is 34.62 km/h. The average speed of passenger car at lane 1 is 27.63 km/h and in lane 2 is 30.89 km/h. The average of speed for passenger car is lower than motorcycle. The result is similar with study Sugiyanto et al (2016), the average speed in school safety zone for motorcycle is 34.75 km/h and light vehicles is 29.26 km/h so the implementation of school safety zone has not been effective [32].</p>	Location of school safety zone	Peak time	Motorcycle speed (km/h)		Passenger car speed (km/h)		Lane 1	Lane 2	Lane 1	Lane 2	SDN 1 Bobosan	morning	35.45	35.08	20.73	31.12	SDN 1 Bobosan	afternoon	39.78	41.74	35.29	38.34	SD 1 Al Irsyad	morning	24.65	20.23	17.89	22.38	SDN 4 Purwanegara	morning	36.01	39.47	28.21	31.30	SDN 4 Purwanegara	afternoon	38.51	36.58	36.05	31.30	Average of speed (km/h)		34.88	34.62	27.63	30.89	10
Location of school safety zone	Peak time	Motorcycle speed (km/h)			Passenger car speed (km/h)																																												
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Average of speed (km/h)		34.88	34.62	27.63	30.89																																												
8.	Increased the reference	<p>The reference:</p> <p>[5] Sugiyanto, G., 2018. The effect of congestion pricing scheme on the generalized cost and speed of motorcycle. <i>Walailak Journal Science and Technology (WJST)</i>. 15(1): 95-16.: “Speed limits were introduced with the primary aim of reducing the incidence, severity of casualty crashes [4], and reduces the generalized cost [5]”.</p> <p>[8] Hosseinlou, M. H., S. A. Kheyraadi, and A. Zolfaghari. 2015. Determining optimal speed limits in traffic networks. <i>International Association of Traffic and Safety Sciences (IATSS) Research</i>. 39: 36-41. doi:10.1016/j.iatssr.2014.08.003.</p> <p>[9] Fleiter, J., A. Lennon, and B. Watson. 2010. How do other people influence your driving speed? Exploring the ‘who’ and the ‘how’ of social influences on speeding from a qualitative perspective. <i>Transportation Research Part F: Traffic Psychological Behavior</i>. 13(1): 49-62.: “Speed management represents an important strategy in order to improve road safety, because a strong relationship is between speed reducing the number of crashes in residential areas after research and crash occurrence and severity [7,8]”. “Speed limits enforcement is the main measure to control operating speeds but to obtain the compliance of drivers, the limits must be safe but also credible [7]. Drivers have a tendency to drive at speeds that they regard as socially acceptable [9]”.</p> <p>[21] Sugiyanto, G., A. Fadli, and M.Y. Santi. 2017. Identification of</p>	10 2 11 2 11																																														

		<p>black spot and equivalent accident number using upper control limit method. <i>ARPN Journal of Engineering and Applied Sciences</i>. 12(2): 528-535.</p> <p>"The probability that a pedestrian will be died if hit by a motor vehicle increases dramatically with speed [19]". "Traffic accident locations have an effect on the severity [21]".</p>	3
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Appendix:

Table 5 Proposed maximum speed limit of vehicles based on 85th percentile in urban road.

Road function (type of road)	Type of area	Speed limit (km/h)	Maximum speed limit (km/h)							
			Motor cycle	Passenger car	Pick up, Light truck	Microbus	City bus	Bus	Truck	Trailer Truck
Arterial (4/2-UD)	Residential	60	60	60	55	50	50	50	50	45
Arterial (4/2-UD)	CBD	60	60	60	55	50	50	50	50	N/A
Collector (2/1-UD)	Office	30	45	40	40	40	40	40	40	N/A
Collector (2/1-UD)	CBD	30	40	35	35	35	35	35	35	N/A

Table 6 Speed and proportion of drivers exceeding the speed limit 30 km/h.

No.	Type of vehicle	Speed limit based on 85 th percentile (km/h)		Δ Speed limit (km/h) and (%)	Proportion of drivers exceeding the speed limit (%)		Δ driver exceeding speed limit (%)
		Before installing speed sign	After installing speed sign		Before installing speed sign	After installing speed sign	
1.	Motorcycle	68.0	61.0	-7 km/h (10.3%)	96.96%	90.96%	-6.00%
2.	Passenger car	62.0	61.0	-1 km/h (1.6%)	99.22%	96.09%	-3.13%
3.	Pick up	58.7	57.0	-1.7 km/h (2.9%)	100%	93.94%	-6.06%
4.	Microbus	54.6	53.8	-0.8 km/h (1.5%)	100%	88.89%	-11.11%
5.	Bus	63.5	55.0	-8.5 km/h (13.4%)	100%	78.57%	-21.43%
6.	Light truck	57.0	55.5	-1.5 km/h (2.6%)	97.37%	89.47%	-7.90%
7.	Truck	53.0	51.0	-2 km/h (3.8%)	100%	85.71%	-14.29%
	Average all veh.	52.6	47.5	-5.1 km/h (9.7%)	99.08%	89.09%	-9.99%

Table 7 Speed and proportion of drivers exceeding the speed limit 40 km/h.

No.	Type of vehicle	Speed limit based on 85 th percentile (km/h)		Δ Speed limit (km/h) and (%)	Proportion of drivers exceeding the speed limit (%)		Δ driver exceeding speed limit (%)
		Before installing speed sign	After installing speed sign		Before installing speed sign	After installing speed sign	
1.	Motorcycle	63.0	59.8	-3.2 km/h (5.1%)	80.47%	73.30%	-7.17%
2.	Passenger car	65.0	61.0	-4 km/h (6.2%)	87.96%	82.56%	-5.40%
3.	Pick up	62.0	57.9	-4.1 km/h (6.6%)	85.71%	63.64%	-22.07%
4.	Microbus	50.8	56.7	+5.9 km/h (11.6%)	75.00%	81.25%	+6.25%
5.	Bus	58.0	62.8	+4.8 km/h (8.3%)	100%	100%	0%
6.	Light truck	58.1	54.8	-3.3 km/h (5.7%)	79.17%	60.00%	-19.17%
7.	Truck	53.5	48.0	-5.5 km/h (10.3%)	81.82%	50.00%	-31.82%
	Average all veh.	52.1	49.3	-2.9 km/h (5.6%)	84.30%	72.96%	-11.34%

Table 8 Speed and proportion of drivers exceeding the speed limit 60 km/h.

No.	Type of vehicle	Speed limit based on 85 th percentile (km/h)		Δ Speed limit (km/h) and (%)	Proportion of drivers exceeding the speed limit (%)		Δ driver exceeding speed limit (%)
		Before installing speed sign	After installing speed sign		Before installing speed sign	After installing speed sign	
1.	Motorcycle	68.7	61.6	-7.1 km/h (10.3%)	19.75%	12.25%	-7.50%
2.	Passenger car	66.0	58.0	-8 km/h (12.1%)	17.25%	0.64%	-16.61%
3.	Pick up	58.0	57.9	-0.1 km/h (0.2%)	2.00%	0%	-2.00%
4.	Microbus	63.8	60.3	-3.5 km/h (5.5%)	9.50%	0%	-9.50%
5.	Bus	55.4	53.0	-2.4 km/h (4.3%)	9.50%	0%	-9.50%
6.	Light truck	58.1	57.6	-0.5 km/h (0.9%)	4.75%	0%	-4.75%
7.	Truck	56.7	53.2	-3.5 km/h (6.2%)	4.75%	0%	-4.75%
	Average all veh.	54.9	49.4	-5.5 km/h (10.1%)	9.64%	1.84%	-7.80%

List Revision 2 paper No. 10489

“Determining the Maximum Speed Limit in Urban Road to Increase Traffic Safety”

No.	Suggestions from Reviewer	Revision from Author	Page
1.	Revise your conclusion in the above mentioned article. Conclusions should not be written in numbers, it should be in full sentences.	Based on the results, the following conclusion can be drawn: the proposed maximum speed limit based on the 85 th percentile speed of vehicles in urban road for arterial road type 4/2-UD residential and 4/2-UD CBD is 60 km/h for motorcycle and passenger car, 55 km/h for pick up and light truck, and 50 km/h for bus and truck. Proposed maximum speed limit for collector road type 2/1-UD office area is 45 km/h for motorcycle and 40 km/h for four-wheeled vehicles or more while for collector road type 2/1-UD CBD is 40 km/h for motorcycle and 35 km/h for four-wheeled vehicles or more. Proposed maximum speed limit in school safety zone on hours/after school is 30 km/h. Installation of speed limit sign is less effective to reduce the vehicle speed; vehicle speed on the field is only reduced 2.9 to 5.5 km/h (5.6 to 10.1%). More than 46.5% of motorcycle users ride exceeding speed limits followed by the passenger cars users (39.43%), microbus or city bus at 31.63%, bus Trans at 28.75%, pick up and light truck at 24.69%.	9-10

Re: SUBMISSION NOTIFICATION TO CO-AUTHOR [JURNAL TEKNOLOGI] #10489

From: gito sugiyanto (gito_98@yahoo.com)
To: r-rosli@utm.my; qpenerbit@utm.my
Cc: journal_utm@utm.my
Date: Sunday, 26 August 2018 at 03:59 pm GMT+7

Dear Professor Dr. Rosli Md Illias
in Malaysia

With this e-mail, i will confirm that DETERMINING THE MAXIMUM SPEED
LIMIT IN URBAN ROAD TO INCREASE TRAFFIC SAFETY, published in Jurnal Teknologi (Sciences & Engineering) 80:5 (2018) 67–77, September
2018.

The first author is Gito Sugiyanto and co-author is Siti Malkhamah.
Thank you very much.

Sincerely yours,
Dr. Gito Sugiyanto, S.T., M.T.
Civil Engineering Department, Faculty of Engineering
Jenderal Soedirman University Purwokerto
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<https://www.scopus.com/authid/detail.uri?authorid=57170858900>
<http://orcid.org/0000-0002-1498-8967>
<http://scholar.google.com/citations?user=8JsSSL4AAAAJ&hl=id>

On Sunday, 26 August 2018, 1:41:26 pm GMT+7, Professor Dr. Rosli Md Illias <r-rosli@utm.my> wrote:

Dear Author Sir / Madam,

We have received the submission entitled: "DETERMINING THE MAXIMUM SPEED
LIMIT IN URBAN ROAD TO INCREASE TRAFFIC SAFETY" for possible publication in
Jurnal Teknologi, and you are listed as one of the co-authors.

The manuscript has been submitted to the journal by : gito_98@yahoo.com who
will be able to track the status of the paper through his/her login.

If you have any objections, please contact the editorial office as soon as
possible by email to journal_utm@utm.my / qpenerbit@utm.my. If we do not
hear back from you, we will assume you agree with your co-authorship.

Thank you very much.

With kind regards,

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DETERMINING THE MAXIMUM SPEED LIMIT IN URBAN ROAD TO INCREASE TRAFFIC SAFETY

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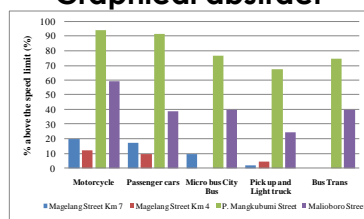
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Graphical abstract



Abstract

Speed is one of the main risk factors in road traffic safety and become a traffic problem in developing countries. Three factors that cause accidents are human factor, vehicle, and environment. Speeding is one of the main cause factors in traffic accident. Traffic speed must be limited adjust with the activities in the street and potential accident. The aim of this research is to determine the maximum speed limit in urban road to increase traffic safety and to analyze the percentage of vehicle exceeding speed limit. The method to determine maximum speed limits using 85th percentile. Based on the analysis result, the proposed maximum speed limit on urban road for arterial road type 4/2-UD residential and 4/2-UD CBD is 60 km/h for motorcycle and passenger car, 55 km/h for pick up and light truck, and 50 km/h for bus and truck. Proposed maximum speed limit for collector road type 2/1-UD office area is 45 km/h for motorcycle and 40 km/h for four-wheeled vehicles or more while for collector road type 2/1-UD CBD is 40 km/h for motorcycle and 35 km/h for four-wheeled vehicles or more. The installation of speed limit sign is less effective to reduce the vehicle speed, the speed only reduce 2.9-5.5 km/h (5.6-10.1%). More than 46.5% of motorcycle users ride exceeding speed limit followed by the passenger cars users (39.43%), microbus/city bus at 31.63%, bus Trans at 28.75%, pick up and light truck at 24.69%. The maximum speed limit in school safety zone on hours/after school is 30 km/h with the consideration that the pedestrian fatality rate on 30 km/h has probability of death 10%.

Keywords: Speed limit, traffic safety, speeding, traffic accident, pedestrian safety

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1.0 INTRODUCTION

Speed is one of the main risk factors in traffic safety [1]. It is difficult to examine the role of speed [2], higher speeds are proven to increase the likelihood of getting involved in a crash. Not only an increased chance of getting involved in crash, but the severity of crash also increases with speed, as the degree of kinetic energy at the time of the collision is higher [3]. Speed limits were introduced with the primary aim of reducing

incidence, severity of casualty crashes [4], and reduces generalized cost [5]. This countermeasure was brought in with the aim of revealed that up to 30% of casualty crashes occur on residential streets [6]. Speed management is an important strategy to improve road safety [7, 8]. Speed limits enforcement is the main measure to control operating speeds [7], the speed acceptable to drivers [9]. TRL in 1994, found a relationship between speed and injury accidents- the higher speed, more accidents-indicating that 5%

change in accidents was associated with a 1 mph change in average speed [10].

The determination of the speed limit should consider the road conditions and areas along roadsides. About 20% of urban streets within Great Britain were designated 20 mph limits, and many other authorities planned to introduce low speed limits into their urban areas. The drivers of these policies may vary from city to city [11]. Australia lowered the speed limit for urban areas from 60 to 50 km/h have been shown to reduce the risk from accidents, revealed significant reductions in both fatal and serious injury crashes, and substantial overall social cost savings. Crash reductions in 50 km/h zones, relative to changes observed in crash frequency in all speed zones remaining 60 km/h in South East Queensland for various crash severity levels. On average, statistically significant yearly estimated reductions of 22% for all reported crashes, 20% for all property damage crashes, 23% for all casualty crashes, 24% for serious casualty crashes, and 88% for fatal crashes [4].

Traffic safety is a social problem that handling must be done comprehensively. Traffic speed must be limited adjust with the activities in the street and potential accident. Speeding-which encompasses excessive speed or inappropriate speed, is dangerous. Speed is an aggravating factor in the severity of all accidents [3]. Speeding was the main human error that contributed 57% to the crashes. In Thailand, cases involving vehicle hitting trees be the most serious and resulting 48 fatalities [12]. If the terms of the performance of traffic, the higher speed will improve traffic performance, opposite from the aspect of traffic safety, speed will decrease the degree of safety because of the risk of accidents becomes greater. Lowered speed limit reduces the risk from accident; reduce the externality cost like accident cost [13]. The cost of accidents can be decreased by reducing the frequency of accidents and severity of injury [14]. Total accident cost in Purbalingga Regency, Central Java, Indonesia was estimated 0.38% of the gross domestic product [15]. It is necessary for the determination of the maximum speed limit of vehicle as mandated in Indonesian Law No. 22 of 2009 on different types of road function, the type of terrain, and types of land use and the level of activity [16].

Research related to the speed limit and the risk of accidents concluded that lowered the speed limit will reduce the average driving speed, the number of accidents and the severity. The study of Roads and Traffic Authority (RTA) in New South Wales, after implementation speed limit, found that on 50 km/h streets there was a 25.3% reduction crashes and mean travelling speeds drop 0.94 km/h (RTA, 2000 in [17]). In Queensland, reductions 8% in casualties overall, 18% in fatalities, and mean travelling speeds dropping by 5 km/h (Walsh and Smith, 1999 in [17]). The establishment of speed limits in urban areas in Victoria reduced traffic accidents by 12% [4]. In Queensland, default of speed limits at 50 km/h, the relationship between the speeds with risk of injury due to accidents concluded that overall changes in average speed for every 1

km/h will change the risk of accidents about 3%. Andersson and Nilsson (1997) concluded that severity of injuries and fatalities changed along with changes in average speed [4]. According to the initial speed limit, through the application of two models an exponential function and power model, slightly higher support was given to the exponential function, which showed an increase of 1.58 in the number of fatal crashes if speed increased with 1 km/h from an initial speed of 85 km/h. The number of injury crashes was estimated to increase with 1.21. Starting from an initial speed of 75 km/h an increase of 0.79 fatal crashes with an increase by 1 km/h was found, for the injury crashes this was 0.86 [18].

Increasing vehicle speed affect to the increased reaction time and distance it takes to stop and increased likelihood of errors that can be carried by the driver. Pedestrians, incur a risk of about 80% of being killed at a collision speed of 50 km/h. Wearing seat-belts and using well-designed cars for car occupants generally can provide protection to a maximum of 70 km/h in frontal impacts, and 50 km/h in most side impacts (Tingvall et al., 1999 in [19]. Probability of fatal injury for a pedestrian colliding with a vehicle shown in Figure 1.

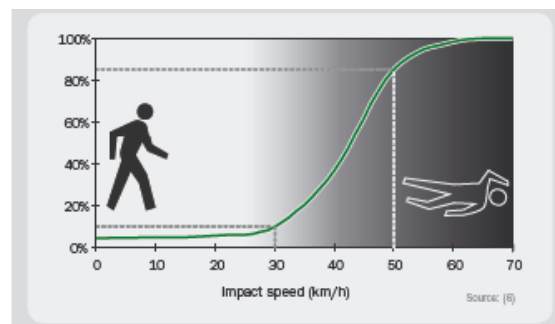


Figure 1 Probability of fatal injury for a pedestrian colliding with a vehicle [3]

High speeds increase the risk of accidents. Australian Transport Safety Bureau stated that the reaction time can be as little as 1 second but mostly ranged from 1.5 up to 4 seconds [19]. Illustration stopping distances in an emergency braking is shown in Figure 2.

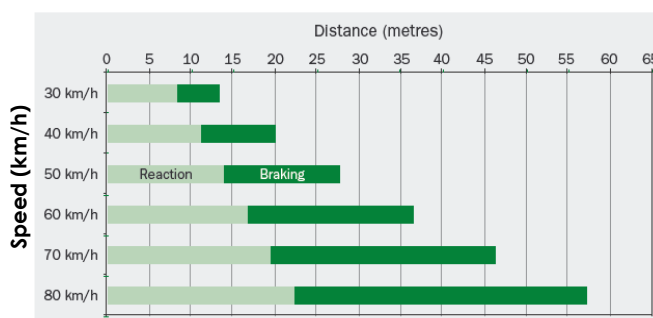


Figure 2 Illustration stopping distance in an emergency braking [19]

Based on the procedure traffic handbook was issued by Directorate General of Land Transportation, Minister of Transportation Republic of Indonesia in 2005, the risk of driving at high speeds raise the risk involved in a traffic accident [20]. At a speed of 50 km/h the car will be needed 41 m to stop, but at a speed of 60 km/h takes a distance of 58 m to stop. This makes the difference is quite noticeable on the opportunities accidents involved motorists. Traffic accident locations have an effect on the severity [21].

The aim of this study is to determine the maximum speed limit of vehicles on urban roads and to analyze the application trial of maximum speed limit to know the percentage of vehicle that exceeding the speed limit and its impact on pedestrian safety.

2.0 METHODOLOGY

2.1 Study Location

The study location is in Special Region of Yogyakarta Province, Indonesia. Study location in four streets: Magelang Street km 7 and Magelang Street km 4 is an arterial road in urban area; Pangeran Mangkubumi Street and Malioboro Street is collector road. The location of study can be seen in Figure 3.

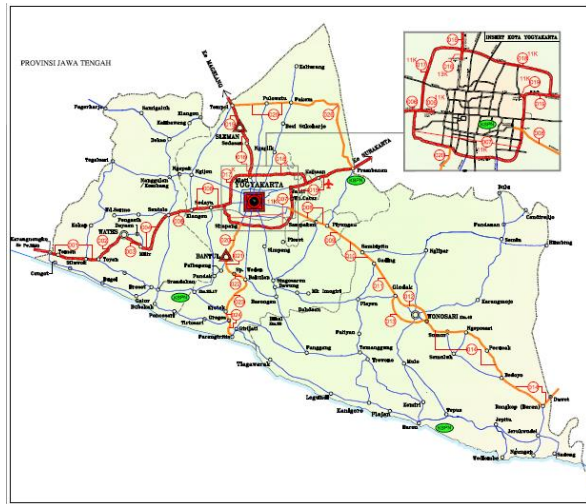


Figure 3 Location of study in Special Region of Yogyakarta Province

2.2 Data Collection and Analysis

Maximum speed limit data in arterial and collector road obtained from Department of Transportation Special Region of Yogyakarta Province. Vehicle speed of motorcycle, passenger car, pick up and light truck, microbus, bus, TransJogja bus, truck, and trailer truck

obtained in the field using speed gun. The statistical analysis of vehicle speeds results, include the mean, mode, median, variance, standard deviation, the amount of data, and 15th, 50th, 85th, and 98th percentiles for each type of vehicles. The determination of the maximum speed limit based on vehicle speed at the 85th percentile is distinguished by the type of land use i.e.: school area, residential area, Central Business District (CBD), hotel, shop, market, and industrial district. The impact of reducing speed limit was analysis on vehicle percentage that violating the speed limit and impact in pedestrian safety.

3.0 RESULTS AND DISCUSSION

3.1 Analysis of Vehicle Speed

a. Vehicle Speed in Magelang Street km 7, Sleman

Magelang street km 7, Sleman is an arterial road, consists of 4 lanes 2 directions without median or undivided road (4/2 UD) with land use as a residential area, shops, and office. The wide of this road is 12.00 m with the road capacity is 4132 pcu/h. The maximum speed limit of vehicles in Magelang street km 7, Sleman is 60 km/h. The number of vehicles has taken as many as 643 vehicles, with an S-curve of vehicle speed as shown in Figure 4. The type of vehicles in the field was dominated by motorcycles (52.10%) followed by passenger cars (29.86%). Based on Figure 4, it can be seen that 17.25% of passenger cars users and 19.75% of motorcycle users exceed the maximum speed limit in the field is 60 km/h. In addition to passenger cars and motorcycles, the types of vehicles that exceed the maximum speed limit are bus (9.5%), pick-up and light truck with a percentage of approximately 2%. The statistical analysis of vehicle speeds results, include the mean, mode, median, variance, standard deviation, the amount of data, and 15th, 50th, 85th, and 98th percentiles for each type of vehicles in Table 1.

The average speed of motorcycle at 51 km/h, passenger car at 52 km/h, pick up and light truck at 45.4 km/h, microbus at 41.1 km/h, bus at 43.2 km/h, truck at 41.5 km/h, and trailer truck at 34.2 km/h. The average speed from 643 vehicles is 49.8 km/h. This value is smaller than the maximum speed limit in the field (60 km/h). The speed limit based on 85th percentile varied between 36.8 km/h for trailers truck up to 64 km/h for motorcycles. The speed limit value based on 85th percentile for motorcycle (64 km/h) and passenger car (62 km/h) is higher than the maximum speed limit in the field (60 km/h).

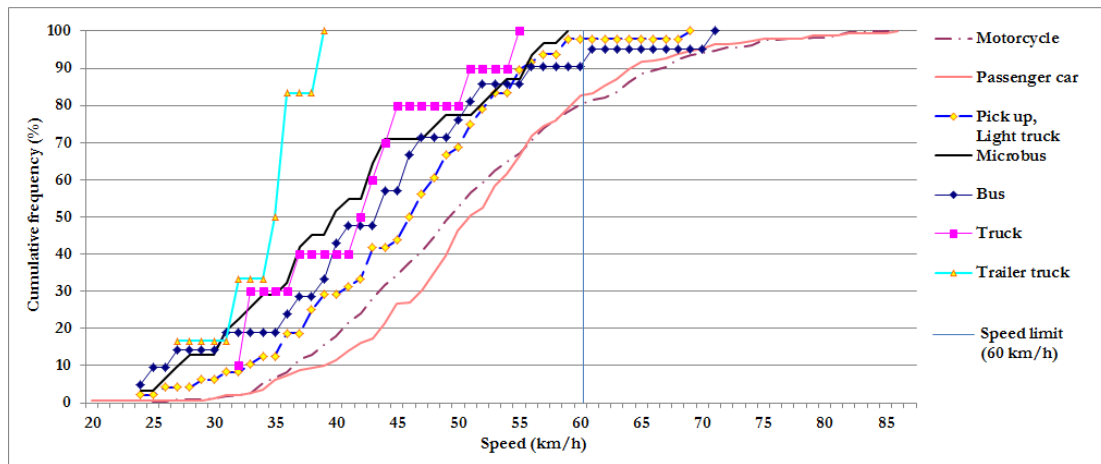


Figure 4 S-curve of vehicle speed in Magelang street km 7, Sleman

Table 1 Characteristics and statistical analysis of vehicle speed in Magelang street km. 7, Sleman

Statistical analysis	Motor cycle	Passenger car	Pick up, Light truck	Micro bus	Bus	Truck	Trailer truck	Total
Mean (km/h)	51.0	52.0	45.4	41.1	43.2	41.5	34.2	49.8
Modus (km/h)	49.0	50.0	43.0	37.0	40.0	33.0	36.0	49.0
Median (km/h)	50.0	51.0	46.5	40.0	44.0	42.5	35.5	49.0
Variance (km/h)	131.7	107.3	84.9	98.8	135.7	60.9	17.4	128.7
Standard deviation (SD)	11.5	10.4	9.2	9.9	11.6	7.8	4.2	11.3
Amount of data (n)	335	192	48	31	21	10	6	643
Percentile (km/h)	15	39.0	42.0	36.0	31.0	33.0	30.8	38.0
	50	50.0	51.0	46.5	40.0	42.5	35.5	49.0
	85	64.0	62.0	54.9	53.5	52.0	36.8	61.0
	98	77.6	75.7	59.6	57.8	67.0	38.7	75.0

b. Vehicle Speed in Magelang Street km 4, Yogyakarta

Magelang street km 4, Yogyakarta is an arterial road in urban area consists of 4 lanes 2 directions without median or undivided road (4/2 UD) with land use as a central business district, residential area, shops, and office with maximum speed limit of 60 km/h. The wide of this road is 14.00 m with the road capacity is 5712 pcu/h. The number of vehicles has taken as many as 717 vehicles, with an S-curve of vehicles speed as shown in Figure 5. The type of vehicles in the field was dominated by motorcycles (55.79%) followed by passenger cars (27.89%). The statistical analysis of vehicle speeds results, include the mean, mode, median, variance, standard deviation, the amount of data, and 15th, 50th, 85th, and 98th percentiles for

each type of vehicle in Table 2. The average speed of motorcycle at 48.3 km/h, passenger car at 48.3 km/h, pick up and light truck at 43.6 km/h, microbus at 33.1 km/h, and truck at 43.5 km/h. The average speed from 717 vehicles is 47.1 km/h. This value is smaller than maximum speed limit in the field (60 km/h). Standard deviation value varied between 8.7 for passenger car up to 10.8 for pick-up and light truck. The speed limit on 85th percentile varied between 41.8 km/h for microbus up to 59 km/h for motorcycle. Based on Figure 5, it can be seen that 10% of passenger cars users and 12.25% of motorcycle users exceed the maximum speed limit specified in the field is 60 km/h. In addition to passenger cars and motorcycles, the type of vehicles that exceed the maximum speed limit is pick-up and light truck with a percentage of approximately 4.75%.

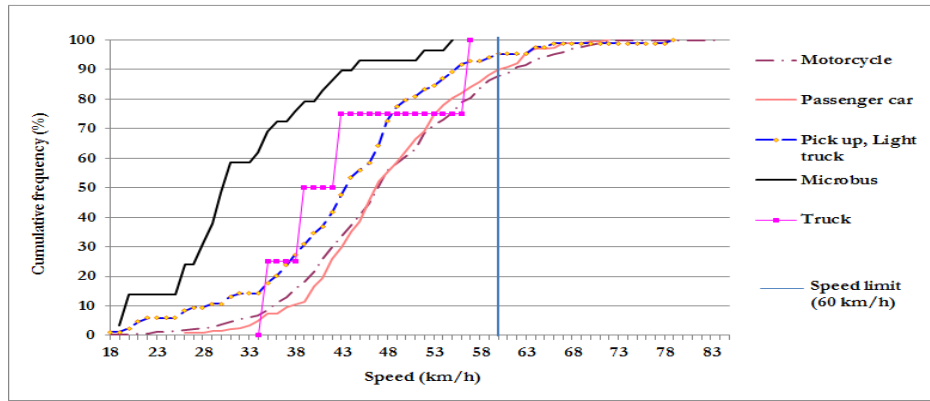


Figure 5 S-curve of vehicle speed in Magelang street km. 4, Yogyakarta

Table 2 Characteristics and statistical analysis of vehicle speed in Magelang Street km. 4, Yogyakarta

Statistical analysis	Motor cycle	Passenger car	Pick up, Light truck	Microbus	Truck	Total
Mean (km/h)	48.3	48.3	43.6	33.1	43.5	47.1
Modus (km/h)	47.0	46.0	48.0	20.0	N/A	47.0
Median (km/h)	47.0	47.0	44.0	33.0	41.0	47.0
Variance (km/h)	105.8	75.2	116.9	79.8	91.7	107.4
Standard deviation (SD)	10.3	8.7	10.8	8.9	9.6	10.4
Amount of data (n)	400	200	84	29	4	717
Percentile (km/h)	15	38.0	40.0	26.0	36.8	37.0
	50	47.0	47.0	33.0	41.0	47.0
	85	59.0	58.0	41.8	50.7	58.0
	98	70.0	67.0	53.3	56.2	68.7

c. Vehicle Speed in Pangeran Mangkubumi Street, Yogyakarta

Pangeran Mangkubumi Street, Yogyakarta is a collector road in urban area with maximum speed limit of 30 km/h. This street consists of 2 lanes 1 direction without median or undivided road (2/1 UD)

with land use as CBD, hotel, shops, and office. The wide of this road is 7.00 m with the road capacity is 2348 pcu/h. The number of vehicles has taken as many as 751 vehicles, with an S-curve of vehicle speed as shown in Figure 6. The type of vehicles in the field was dominated by motorcycles (55.92%) followed by passenger cars (31.96%).

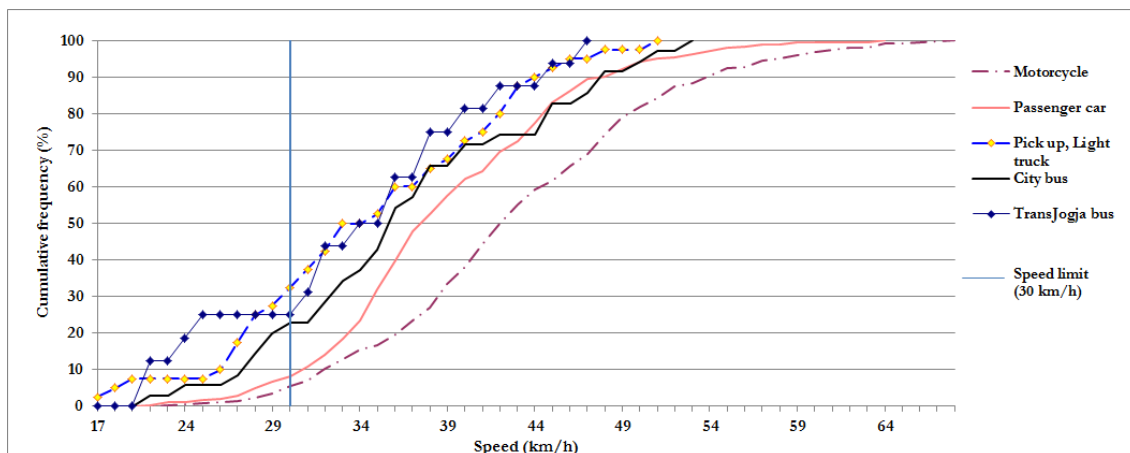


Figure 6 S-curve of vehicle speed in Pangeran Mangkubumi Street, Yogyakarta

Table 3 Characteristics and statistical analysis of vehicle speed in Pangeran Mangkubumi Street, Yogyakarta

Statistical analysis	Motor cycle	Passenger car	Pick up, Light truck	City bus	TransJogja	Total
Mean (km/h)	43.3	39.2	34.7	37.1	34.0	41.1
Modus (km/h)	39.0	35.0	27.0	36.0	22.0	36.0
Median (km/h)	42.5	38.0	34.0	36.0	35.0	40.0
Variance (km/h)	70.8	49.3	64.3	62.8	61.1	70.6
Standard deviation (SD)	8.4	7.0	8.0	7.9	7.8	8.4
Amount of data (n)	420	240	40	35	16	751
Percentile (km/h)	15	34.0	33.0	27.0	29.0	24.3
	50	42.5	38.0	34.0	36.0	35.0
	85	52.0	46.0	43.0	46.8	41.5
	98	62.6	55.2	48.7	51.6	46.4

Speed limit violations are very common. There are 67% to 94.5% of the drivers exceed the limit. Based on Figure 6, it can be seen that 94.5% of motorcycle users, 91.67% of passenger cars users, 77% of city bus, 75% of TransJogja bus, and 67.5% of pick up and light truck exceed the maximum speed limit specified in the field is 30 km/h. The statistical analysis of vehicle speeds results, include the mean, mode, median, variance, standard deviation, the amount of data, and 15th, 50th, 85th, and 98th percentiles for each type of vehicle shown in Table 3. The average speed of motorcycle at 43.3 km/h, passenger car at 39.2 km/h, pick up and light truck at 34.7 km/h, City bus at 37.1 km/h, and TransJogja bus 34 km/h. The average speed from 751 vehicles is 41.1 km/h. This value is greater than the maximum speed limit in the field (30 km/h). Standard deviation value varied between 7 for passenger car up to 8.4 for motorcycle. The speed limit on 85th percentile varied between 41.5 km/h for TransJogja bus up to 52 km/h for motorcycle.

d. Vehicle Speed in Malioboro Street, Yogyakarta

Malioboro Street, Yogyakarta is a collector road in urban area with maximum speed limit of 30 km/h. This street consists of 2 lanes 1 direction without median or undivided road (2/1 UD) with land use as a central business district, hotel, shops, market, and

office. The wide of this road is 7.00 m with the road capacity is 1941 pcu/h. The number of vehicles has taken as many as 745 vehicles, with an S-curve of vehicle speed as shown in Figure 7. The type of vehicles in the field was dominated by motorcycles (53.69%) followed by passenger cars (33.56%). Speed limit violations are very common. Among 24-60% of the drivers exceed the limit. Based on Figure 7, it can be seen that 59.5% of motorcycle users, 38.8% of passenger cars users, 40% of city bus, 40% of TransJogja bus, and 24.5% of pick up and light truck exceed the maximum speed limit specified in the field is 30 km/h. The statistical analysis of vehicle speeds results, include the mean, mode, median, variance, standard deviation, the amount of data, and 15th, 50th, 85th, and 98th percentiles for each type of vehicle shown in Table 4.

The average speed of motorcycle at 33.1 km/h, passenger car at 28.5 km/h, pick up or light truck at 25.7 km/h, City bus at 28.1 km/h, and TransJogja bus at 29.5 km/h. The average speed from 745 vehicles is 30.8 km/h. This value is greater than the maximum speed limit in the field (30 km/h). Standard deviation value varied between 5.6 for TransJogja up to 8 for motorcycle. The speed limit on 85th percentile varied between 33 km/h for pick up or light truck up to 41 km/h for motorcycle.

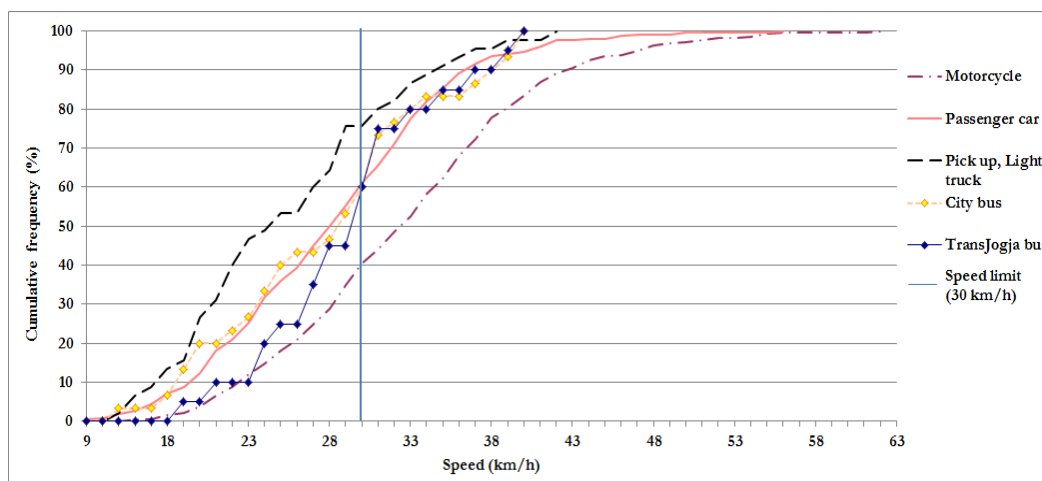


Figure 7 S-curve of vehicle speed in Malioboro Street, Yogyakarta

Table 4 Characteristics and statistical analysis of vehicle speed in Malioboro Street, Yogyakarta

Statistical analysis	Motor cycle	Passenger car	Pick up, Light truck	City bus	TransJogja	Total
Mean (km/h)	33.1	28.5	25.7	28.1	29.5	30.8
Modus (km/h)	29.0	24.0	20.0	31.0	30.0	29.0
Median (km/h)	33.0	28.5	25.0	29.0	30.0	30.0
Variance (km/h)	63.5	50.5	44.4	48.8	30.9	62.9
Standard deviation (SD)	8.0	7.1	6.7	7.0	5.6	7.9
Amount of data (n)	400	250	45	30	20	745
Percentile (km/h)						
15	25.0	21.0	19.6	20.0	24.0	22.0
50	33.0	28.5	25.0	29.0	30.0	30.0
85	41.0	35.0	33.0	36.0	35.3	38.0
98	52.0	44.0	39.4	40.0	39.6	49.1

3.2 Determining Maximum Speed Limit

In the 1960s speed limits in Sweden were set using the 85th percentile [22]. The 85th percentile speed of vehicles passing a given point is the speed at or below which 85 percent of the vehicles passing the point are traveling [23]. Speed limits are set in accordance with the road design standards. Based on road function, there are three types of road i.e: arterial road, collector road, and local road. The determination of maximum speed limit based on vehicle speed at the 85th percentile is distinguished by the type of land use i.e. residential area, office, and central business district. The maximum speed limit is distinguished by the type of vehicles that pass through in these roads are motorcycles, passenger cars, pick up or light trucks, microbus, bus, city bus,

trucks, and trailers truck. Proposed maximum speed limit value based on the 85th percentile speed of vehicles on urban road for arterial and collector road is presented in Table 5. Proposed maximum speed limit value based on the 85th percentile speed of vehicles for arterial road type 4/2-UD residential and 4/2-UD CBD, the speed for motorcycle and passenger car at 60 km/h, for pick up and light truck at 55 km/h, for microbus, bus, city bus, truck at 50 km/h. Proposed maximum speed limit value for collector road type 2/1-UD office area, 45 km/h for motorcycle and 40 km/h for four-wheeled vehicles or more. While for collector road type 2/1-UD CBD, 40 km/h for motorcycle and 35 km/h for four-wheeled vehicles or more.

Table 5 Proposed maximum speed limit of vehicles based on 85th percentile in urban road

Road function (type of road)	Type of area	Speed limit (km/h)	Maximum speed limit (km/h)							
			Motor cycle	Passenger car	Pick up, Light truck	Microbus	City bus	Bus	Truck	Trailer Truck
Arterial (4/2-UD)	Residential	60	60	60	55	50	50	50	50	45
Arterial (4/2-UD)	CBD	60	60	60	55	50	50	50	50	N/A
Collector (2/1-UD)	Office	30	45	40	40	40	40	40	40	N/A
Collector (2/1-UD)	CBD	30	40	35	35	35	35	35	35	N/A

3.3 The Impact of Reducing Speed Limit

Speed limit is commonly set at the 85th percentile speed which is the speed at which 85% of the traffic is travelling and in the USA is set 8 to 12 mph (13 to 19 km/h) below that speed [24]. Review of speed limits for Canada identified where speed limits had been increased and decreased changes in speeding, fatalities, injuries, and property damage [25]. Effect of reducing mean speed from 55 to 50 mph/h in rural roads accident frequency multiplied by 0.86 [10]. An increase in speed will lead more accidents and more serious accidents [26].

a. Impact on Proportion of Drivers Exceeding Speed Limit

The amount of violations on an individual road depends on many different local aspects, including maximum speed limit, road characteristics, road environment, traffic density, traffic composition, and the level of enforcement in this country. The proportion of drivers exceeding the speed limit in urban road by category of road users illustrates in Figure 8. Figure 8 shows the proportion of drivers in urban road that driving above the speed limit by category road users. For passenger car drivers, it shows that 17.25% of drivers exceed the speed limit in 4/2 UD-residential area and 91.67% in 2/1 UD-office area. For motorcycle users, it shows that 19.75% of road users exceed the speed limit in 4/2 UD residential area and 94.5% in 2/1 UD-office area. Motorcyclists represent the road user category with the highest rates of speeding with more than 46.5% of motorcycle users ride over the speed limits followed by the passenger cars users with more than 39.43% user exceeding speed limit, microbus or city bus at 31.63%, bus Trans at 28.75%, pick up and light truck at 24.69%.

**Figure 8** Proportion of drivers exceeding speed limit

The analysis results of the maximum speed limit determination, before and after installing speed limit sign and proportion of drivers exceeding the speed limit was presented in Table 6 for the speed limit 30 km/h; in Table 7 for the speed limit 40 km/h; and was presented in Table 8 for the speed limit 60 km/h.

Impact of reducing speed limit in urban road can be seen in Table 6 to Table 9. If the maximum speed limit is 30 km/h, the average speed of all vehicles decrease from 52.6 to 47.5 km/h (5.1 km/h or 9.7%) and the proportion of motorcycles ride exceeding speed limit reduce 6%, passenger cars reduce 3.13%, pick up reduce 6.06%, microbus reduce 11.11%, and trucks reduce 7.9% up to 14.29%. For maximum speed limit 40 km/h, average speed of all vehicles decrease from 52.1 to 49.3 km/h (2.9 km/h or 5.6%). The proportion of motorcycle exceeding speed limit reduce 7.17%, passenger cars reduce 5.4%, pick up reduce 22.07%, microbus increase 6.25%, and truck reduce 19.17 up to 31.82%. If the maximum speed limit is 60 km/h, the average speed of all vehicles decrease from 54.9 to 49.4 km/h (5.5 km/h or 10.1%) and the proportion of motorcycles ride exceeding speed limit reduce 7.5%, passenger cars reduce 16.61%, pick up reduce 2%, microbus reduce 9.5%, and trucks reduce 4.75%.

Table 6 Speed and proportion of drivers exceeding the speed limit 30 km/h

No.	Type of vehicle	Speed limit based on 85 th percentile (km/h)		Δ Speed limit (km/h) and (%)	Proportion of drivers exceeding the speed limit (%)		Δ driver exceeding speed limit (%)
		Before installing speed sign	After installing speed sign		Before installing speed sign	After installing speed sign	
1.	Motorcycle	68.0	61.0	-7 km/h (10.3%)	96.96%	90.96%	-6.00%
2.	Passenger car	62.0	61.0	-1 km/h (1.6%)	99.22%	96.09%	-3.13%
3.	Pick up	58.7	57.0	-1.7 km/h (2.9%)	100%	93.94%	-6.06%
4.	Microbus	54.6	53.8	-0.8 km/h (1.5%)	100%	88.89%	-11.11%
5.	Bus	63.5	55.0	-8.5 km/h (13.4%)	100%	78.57%	-21.43%
6.	Light truck	57.0	55.5	-1.5 km/h (2.6%)	97.37%	89.47%	-7.90%
7.	Truck	53.0	51.0	-2 km/h (3.8%)	100%	85.71%	-14.29%
Average all veh.		52.6	47.5	-5.1 km/h (9.7%)	99.08%	89.09%	-9.99%

Table 7 Speed and proportion of drivers exceeding the speed limit 40 km/h

No.	Type of vehicle	Speed limit based on 85 th percentile (km/h)		Δ Speed limit (km/h) and (%)	Proportion of drivers exceeding the speed limit (%)		Δ driver exceeding speed limit (%)
		Before installing speed sign	After installing speed sign		Before installing speed sign	After installing speed sign	
1.	Motorcycle	63.0	59.8	-3.2 km/h (5.1%)	80.47%	73.30%	-7.17%
2.	Passenger car	65.0	61.0	-4 km/h (6.2%)	87.96%	82.56%	-5.40%
3.	Pick up	62.0	57.9	-4.1 km/h (6.6%)	85.71%	63.64%	-22.07%
4.	Microbus	50.8	56.7	+5.9 km/h (11.6%)	75.00%	81.25%	+6.25%
5.	Bus	58.0	62.8	+4.8 km/h (8.3%)	100%	100%	0%
6.	Light truck	58.1	54.8	-3.3 km/h (5.7%)	79.17%	60.00%	-19.17%
7.	Truck	53.5	48.0	-5.5 km/h (10.3%)	81.82%	50.00%	-31.82%
Average all veh.		52.1	49.3	-2.9 km/h (5.6%)	84.30%	72.96%	-11.34%

Table 8 Speed and proportion of drivers exceeding the speed limit 60 km/h

No.	Type of vehicle	Speed limit based on 85 th percentile (km/h)		Δ Speed limit (km/h) and (%)	Proportion of drivers exceeding the speed limit (%)		Δ driver exceeding speed limit (%)
		Before installing speed sign	After installing speed sign		Before installing speed sign	After installing speed sign	
1.	Motorcycle	68.7	61.6	-7.1 km/h (10.3%)	19.75%	12.25%	-7.50%
2.	Passenger car	66.0	58.0	-8 km/h (12.1%)	17.25%	0.64%	-16.61%
3.	Pick up	58.0	57.9	-0.1 km/h (0.2%)	2.00%	0%	-2.00%
4.	Microbus	63.8	60.3	-3.5 km/h (5.5%)	9.50%	0%	-9.50%
5.	Bus	55.4	53.0	-2.4 km/h (4.3%)	9.50%	0%	-9.50%
6.	Light truck	58.1	57.6	-0.5 km/h (0.9%)	4.75%	0%	-4.75%
7.	Truck	56.7	53.2	-3.5 km/h (6.2%)	4.75%	0%	-4.75%
Average all veh.		54.9	49.4	-5.5 km/h (10.1%)	9.64%	1.84%	-7.80%

Table 9 Impact of reducing speed limit

Maximum speed limit	Impact of changing the vehicle speed
30 km/h	Average speed of all vehicles decrease from 52.6 to 47.5 km/h (-5.1 km/h or 9.7%).
40 km/h	Average speed of all vehicles decrease from 52.1 to 49.3 km/h (-2.9 km/h or 5.6%).
60 km/h	Average speed of all vehicles decrease from 54.9 to 49.4 km/h (-5.5 km/h or 10.1%).

Based on the analysis results obtained that the installation of speed limit signs on the highway is less effective to reduce vehicle speed. With the

installation of speed limit sign, vehicle speed is reduced only about 2.9 to 5.5 km/h (5.6 to 10.1%). This result is similar with study Malkhamah et al (2012), installing the speed limit sign in arterial road only reduce the speed in rural road 5-10% [27]. The speed limit change was only communicated by adapting traffic signs. Parker [28] stated that "changing posted speed limits alone, without additional enforcement, educational programs or other engineering measures, only has a minor effect on driver behavior". Therefore in addition to the installation of speed limit signs also need to be coupled with the traffic management is most suitable for application in the field adjusted to the geometric roads and land use. There is a decrease in injury crashes in 62% of the

locations after lowering speed limit from 90 to 70 km/h. There was a decrease in crash rates at intersections at 43% of the locations and 70% at road sections. In the case of the fatal and serious injury crashes, a decrease is found at 67% of the locations. A distinction between road sections and intersections showed a decrease in severe crashes at 49% and 67% of the locations, respectively [1].

Lowering speed limit will not automatically lead to a change in travel speeds. The factors such as habits, non-acceptance of the new measure or inattentiveness might explain why the actual speed adaptation is lower than the required speed adaptation [29]. Furthermore the infrastructure of the road was not adapted, which makes it less appealing for drivers to adapt their behavior, whereas others will strictly follow the rules. This can lead to an increase in the variance in travel speeds, which is an important risk factor for the occurrence of crashes [30].

b. Impact on Pedestrian Safety

According to National Highway Traffic Safety Administration (NHTSA) [31] more than 30% of accidents related to speed that causes mortality and a high social cost. Based on Figure 2, up to a speed of 30 km/h, the speed impact on fatality rate of pedestrian is 10%, which means that if a pedestrian hit by a vehicle at a speed of 30 km/h, the probability of a pedestrian died was 10%. Along with the addition of speed, after a speed of 30 km/h, the pedestrian fatality rate will increase dramatically. For speed of 50 km/h, the impact speed on fatality rate of pedestrian to 85% and at speed of 70 km/h, the impact speed on fatality rate of pedestrians to 100% Walz et al (1983) and the Swedish Ministry of Transport 2002 in [3]. For that, at school safety zone on hours/after school proposed the maximum speed limit is 30 km/h. The spot speed and average speed of vehicles before school safety zone relatively lower speed, but larger than the maximum speed limit (20 or 25 km/h) which allowed. The average speed of vehicle at school safety zone in peak time period can be seen in Table 10.

Table 10 Speed of motorcycle and passenger car at school safety zone in peak time period

Location of school safety zone	Peak time	Motorcycle speed (km/h)		Passenger car speed (km/h)	
		Lane 1	Lane 2	Lane 1	Lane 2
SDN 1 Bobosan	morning	35.45	35.08	20.73	31.12
SDN 1 Bobosan	afternoon	39.78	41.74	35.29	38.34
SD 1 Al Irsyad	morning	24.65	20.23	17.89	22.38
SDN 4 Purwanegara	morning	36.01	39.47	28.21	31.30
SDN 4 Purwanegara	afternoon	38.51	36.58	36.05	31.30
Average of speed (km/h)		34.88	34.62	27.63	30.89

Based on Table 10, motorcycles speed at peak time (morning and afternoon) more than 30 km/h, only in SD 1 Al Irsyad has value lower than 30 km/h. The average of speed for motorcycle in lane 1 is 34.88 km/h and in lane 2 is 34.62 km/h. Average speed of passenger car at lane 1 is 27.63 km/h and in lane 2 is 30.89 km/h. The average of speed for passenger car is lower than motorcycle. The result is similar with study Sugiyanto *et al.*, (2016), average speed in school safety zone for motorcycle is 34.75 km/h and light vehicles is 29.26 km/h [32].

4.0 CONCLUSION

Based on the results, the following conclusion can be drawn: the proposed maximum speed limit based on the 85th percentile speed of vehicles in urban road for arterial road type 4/2-UD residential and 4/2-UD CBD is 60 km/h for motorcycle and passenger car, 55 km/h for pick up and light truck, and 50 km/h for bus and truck. Proposed maximum speed limit for collector road type 2/1-UD office area is 45 km/h for motorcycle and 40 km/h for four-wheeled vehicles or more while for collector road type 2/1-UD CBD is 40 km/h for motorcycle and 35 km/h for four-wheeled vehicles or more. Proposed maximum speed limit in school safety zone on hours/after school is 30 km/h. Installation of speed limit sign is less effective to reduce the vehicle speed; vehicle speed on the field is only reduced 2.9 to 5.5 km/h (5.6 to 10.1%). More than 46.5% of motorcycle users ride exceeding speed limits followed by the passenger cars users (39.43%), microbus or city bus at 31.63%, bus Trans at 28.75%, pick up and light truck at 24.69%.

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