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DEVELOPMENT OF BICYCLE COMPATIBILITY-INDEX

The wider the right-hand lane and the fewer the cars, the better it is for cycling

Key Facts

With the Bicycle Compatibility Index (BCI) a method was developed in the USA that is able to work out the bicycle compatibility of roads. Among the eleven factors that figure in the calculation are the width and volume of traffic in the right-hand lane, the adjoining land-use, the volume of lorry traffic and whether there is a cycle lane or a fixed curb lane.

Contents

At the moment there is no methodology that is generally accepted by engineers, planners or bicycle co-ordinators and thus it allows them to decide just how compatible a road is for bicycles and motor-vehicles using a road together efficiently. It is also assumed that the volume of motor-traffic and the type of road both influence a cyclist's decision whether to use a certain road or not.

The American Federal Highway Authority has therefore sponsored a financial study in which a method was developed to obtain a Bicycle Compatibility Index - BCI. Numerous earlier investigations were included in the analysis. The instrument should be used by bicycle coordinators traffic planners, traffic engineers and others in order to assess the qualities of specific roads for both motor-vehicles and cyclists. Practical people should be put in the position of determining the level of service of a road for bicycles guided by existing or proposed characteristics and this should be used for business, outline sketches and planning analysis.

The Bicycle Compatibility Index - BCI (see Table 1) obtained from the results of the investigations of the section of a road can be calculated if the following features of the road are known:

– Is there a cycle lane or permanent curb lane more than 90cm wide?

– How wide is the cycle lane or permanent curb lane?

– How wide is the outer (right-hand) lane?

– What is the volume of traffic (motor-vehicles) per hour in the outer lane?

– What is the volume of traffic in the other lanes in the same direction?

– What is the level of speed of the motor-traffic (85% percentile)?

– Is there a parking lane (available) with more than 30% of the parking area being used (by motor-vehicles)?

– Is the area adjacent to the road a residential area?

The following factors should also be considered:

– Volume of lorries in the outside lane.

– Frequency of change whilst parking.

– Number of motor-vehicles turning right.

The lower the calculated BCI-value, the more compatible a road is for the average adult cyclist (Table 3). For a road 20m wide whose original design shows a very low compatibility factor (first illustration in figure 2) two alternatives were drawn up (firstly: a wide right-hand lane, secondly: a 1.20m wide cycle lane). Consequently, the calculation of the bicycle compatibility index - BCI shows that the solution with the cycle lane produces a moderately low BCI, therefore relatively bicycle compatible, whilst the solution with the wide lane was classified as in between.

Contribution	*"Development of the Bicycle Compatibility Index"*, in. Bicycle and Pedestrian Research 1998, Transportation Research Record 1636, Washington DC, 1998, 1SSN 0361-1981
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TABLE 1 – Bicycle Compatibility Index Model, Variable Definitions and Adjustment Factors

$$BCI = 3.67 - 0.966BL - 0.410BLW - 0.495CLW + 0.002CLV + 0.0004OLV + 0.022SPD + 0.506PKG - 0.264AREA + AF$$

where:

BL = presence of a bicycle lane or paved shoulder ≥ 0.9 m
no = 0
yes = 1

BLW = bicycle lane (or paved shoulder) width
meters (to the nearest tenth)

CLW = curb lane width
meters (to the nearest tenth)

CLV = curb lane volume
vehicles per hour in one direction

OLV = other lane(s) volume - same direction
vehicles per hour

SPD = 85th percentile speed of traffic
km/h

PKG = presence of a parking lane with more than
30 percent occupancy
no = 0
yes = 1

AREA = type of roadside development
residential = 1
other type = 0

AF = $f_t + f_p + f_r$

where:

f_t = adjustment factor for truck volumes (*see below*)

f_p = adjustment factor for parking turnover (*see below*)

f_r = adjustment factor for right turn volumes (*see below*)

Adjustment Factors

Hourly Curb Lane Large Truck Volume[1]	f_t	Parking Time Limit (min)	f_p
≥ 120	0.5	≤ 15	0.6
60 - 119	0.4	16 - 30	0.5
30-59	0.3	31 - 60	0.4
20-29	0.2	61 - 120	0.3
10-19	0.1	121 - 240	0.2
< 10	0.0	241- 480	0.1
		> 480	0.0

Hourly Right Turn Volume[2]	f_r
≥ 270	0.1
< 270	0.0

[1] Large trucks are defined as all vehicles with 6 or more tires.
[2] Includes total number of right turns into driveways or minor intersections along a roadway segment.

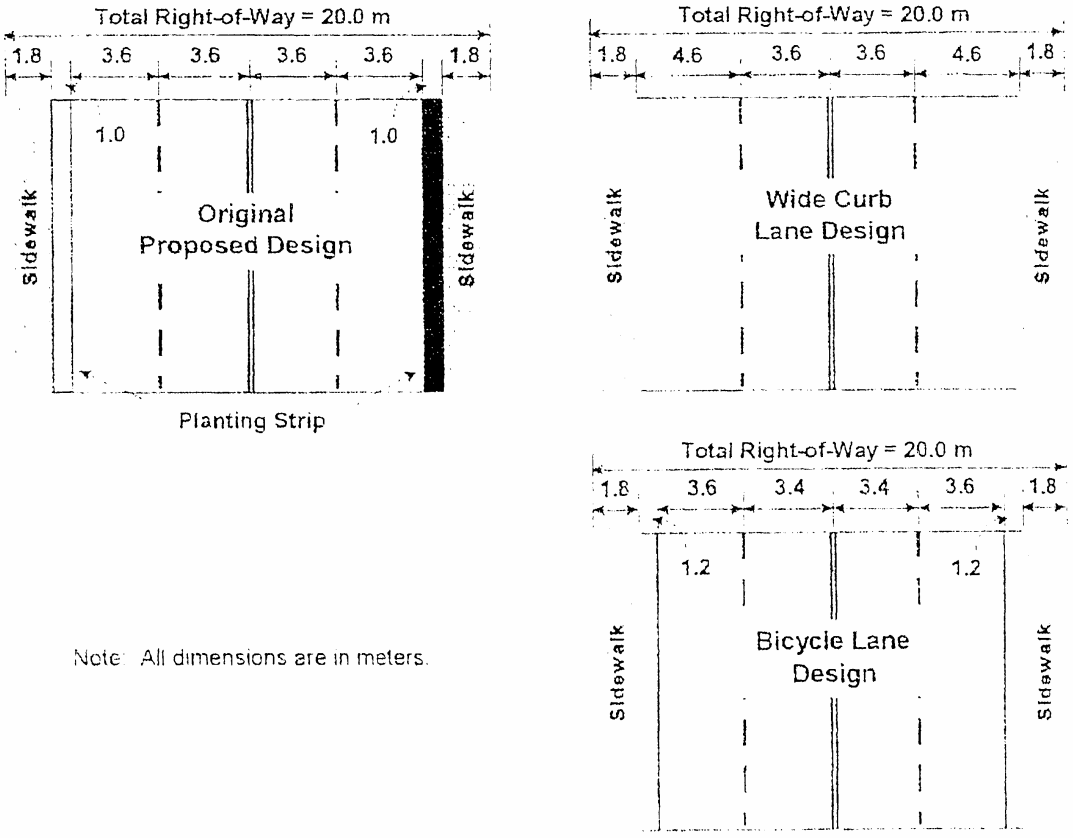
TABLE 3 Bicycle compatibility Index range associated with Level of Service designations and compatibility level qualifiers

TABLE 3 Bicycle Compatibility Index Ranges Associated with Level of Service Designations and Compatibility Level Qualifiers

LOS	BCI Range	Compatibility Level[1]
A	≤ 1.50	Extremely High
B	1.51 - 2.30	Very High
C	2.31 - 3.40	Moderately High
D	3.41 - 4.40	Moderately Low
E	4.41 - 5.30	Very Low
F	> 5.30	Extremely Low

[1] Qualifiers for compatibility level pertain to the average adult bicyclist.

FIGURE 2 Proposed geometric design options for the reconstruction of a minor arterial



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