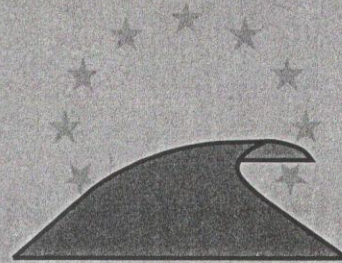


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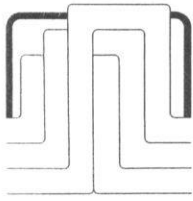
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Urban Traffic
*Preliminary communication**

DEVELOPMENT OF A BI-MODAL METHODOLOGY FOR URBAN STREETS FUNCTIONAL CLASSIFICATION AS URBAN PLANNING CONTRIBUTION

U. D. C. 656.131

1 Introduction

Our mobility is now threatened by congestion, delay and pollution and so increasingly, the issue of transportation and land use planning is hard to ignore. Fortunately by understanding how land use and transportation work together, many problems can be mitigated through careful and innovative planning.

Changes in the transportation system, especially changes in freight traffic can have significant impacts on local land use patterns. Freight traffic is an important factor for national economy growth, but it is also one of the main technical factors with height disproportional influences on the urban street capacity and level of service. Based on the herein stated, freight traffic is of fundamental importance for level of service analysis, especially for urban traffic flows and with accordance to the urban street form which need to accompany its function.

Such arguments lead to a clear need for heavy vehicle level of service impact assessment, and functional relationship statement between the functional evaluation-FE and functional classification - FC of urban street network.

Urban street network FC is the process by which arterials and urban streets are divided into classes, categories or systems according to the character of traffic service they are intended to provide.

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The term FC has two interpretations:

First: "In general, FC is every operational classification, which serves to the function".

Second: "FC is every specific classification based on the function, form, use, environment, etc".

For urban street network or any urban street model for FC, specific functional relationships need to be examined and a specific methodology created.

1.1 Object and Purpose

The objective of this research is the analysis of urban street network FC systems. Its general purpose is to develop and adopt a new bi-modal methodology for urban streets FC, based on a specific level of service-LOS for passenger cars and heavy vehicles as a classification theme.

2 The Purpose of Functional Classification

The FC systems general purpose is a different urban street type's identification. Such kinds will have different form, functions and use combinations that will describe: "urban street form appropriate to a specific traffic flow, with appropriate level of comfort and level of safety for traffic users as well as better living quality for citizens". Namely, this general purpose means that FC and FE are closed by their purposes (Fig. 1).

As it is obvious, there is a need a frame between the FC and FE to be defined. It will include urban street design, regulation and use, and will function as follows:

- FC informs about the urban street design and regulation;
- Urban street design and regulation support the urban street use;
- Urban street use depends on and influences its performances.
- Performance evaluation is suitable to urban street use and FC;
- FC is established based on urban street FE.

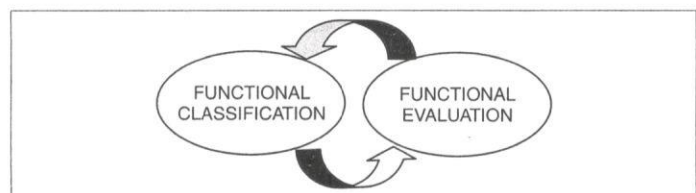


Fig. 1. Functional classification and functional evaluation relationship

Source: Made by the authors

3 Traditional FC Systems Analysis

There has been a wealth of research and analysis of FC systems that have emphasized question such as in [2]: "what is the amount and is there any balance in terms of mobility and access"?

For the purpose of the work this FC systems are called "Traditional" (Fig. 2).

In the traditional systems, urban streets are simply categorized as: arterial, collector and local streets, or as those that have entrances to the places we want to go, our homes, businesses, places of recreation and workplaces, and those that are used for traveling long distances efficiently.

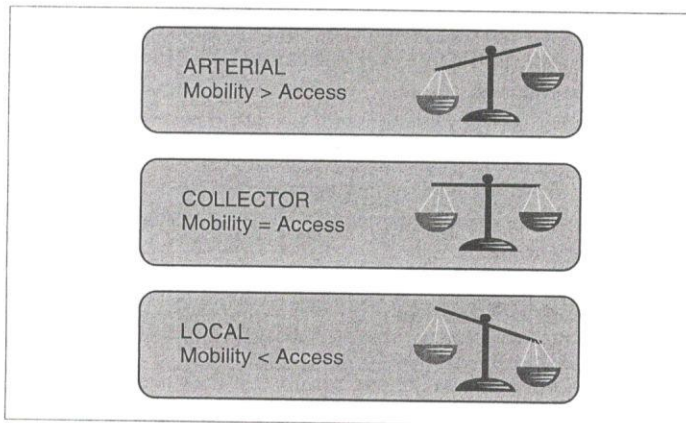


Fig. 2. Traditional FC systems balance

Source: Made by the authors

Traditional FC systems are on a distance from the prescriptive FC element (sustainable one), oriented to the descriptive FC element. Since they are not concentrated on some smaller traffic functions, they simply present a procedure where rural highway classification is copied for urban street classification. Furthermore, the analysis has shown that urban streets are treated as transport corridors for motor vehicles, instead as in [4], where a category “pedestrian street” has been stated. Fortunately, urban streets are multi-modal transport corridors, with more than mobility and access as functions. They are public places for citizen socialization as well. In order for an urban street to provide different functions for different traffic users, users and urban street design should not be ignored, on the contrary they need to be emphasized.

4 Alternative FC Systems Analysis

There is a vast majority of literature where FC systems different from the traditional systems are presented. Namely, a new approach has been used. It means that urban street users and urban street design are well integrated in to the complex urban form. It is important to note that every system different from the traditional one, has its one name.

For the purpose of the work they are called “Alternative”.

Alternative systems are based on traditional systems, with some additional measures and attributes used. The main difference from the traditional systems is the emphasis and incorporation of the living quality function. Some of the other specific attributes are stated below:

- Land use
- Travel type
- Travel time and distance
- Speed and access control
- Level of service and flow/capacity ratio
- Design standards etc.

5 Traditional vs. Alternative Systems Analysis

172 Reference [5] shows equal treatment for pedestrians and bicycles in the classification process. Namely, these are sensitive us-

ers which need more than basic capacity and safety. In relation to traditional systems, street categorization is based on connectivity as a theme. In other word, arterials and streets have a strategic role, by providing connection or separation among the urban zones. Obviously, it is more complex system, which integrates multi-modal trips with land use.

As it was previously stated, mobility means traveling long distances with height speeds. If it is known that the speed is a main criterion for FC in few European countries [6], it can be stated that travel speed is a connection between traditional and alternative systems.

Based on the analysis of the highway technical specification in Slovenia, it has been stated that there is no clear distinction between rural and urban FC.

In German FC system for example, a ratio land use/environment as a classification theme has been used, and as such this system explicitly identifies streets that are designed primarily as public gathering places.

Reference [3] shows urban street FC based on population density. It means that this system has not considered local changes. Vis a vis, European system is more complex. It defines environment friendly classes.

Inverse relationship between the mobility and access shows that there are even two street types and just one effective dimension to which every street can be adopted.

Methodologically, traditional systems are not real, exhaust or effective. On the contrary these systems present dysfunctional classification.

Finally, as in [7], FC system defined on urban street function as ideal criterion is trembled, and the reason is that urban streets should not be classified on the basis of their present function, but on their future function, which is fair enough in the context of future urban street design and regulation.

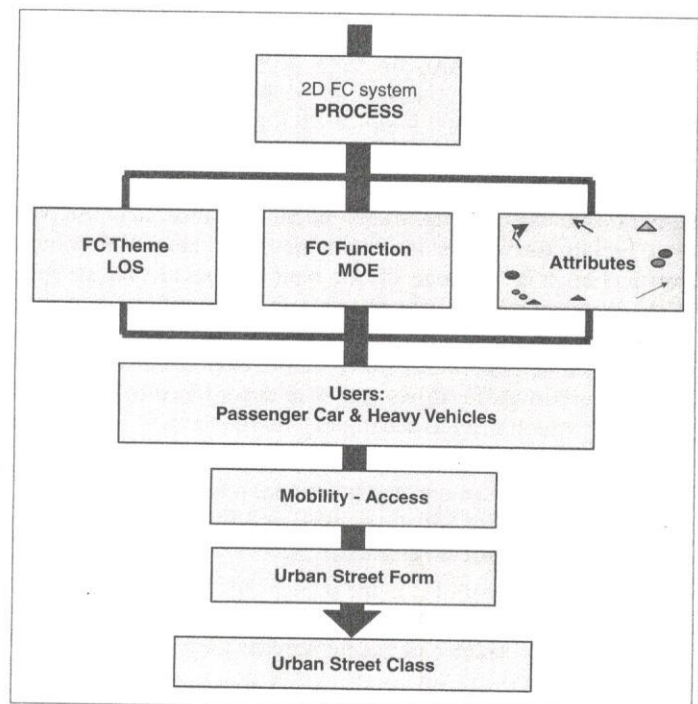


Fig. 3. Two Dimensional-2D FC system Process

Source: Made by the authors

AF	AE	AD	AC	AB	AA
BF	BE	BD	BC	BB	BA
CF	CE	CD	CC	CB	CA
DF	DE	DD	DC	DB	DA
EF	EE	ED	EC	EB	EA
FF	FE	FD	FC	FB	FA

Fig. 4. Proposed 2D Periodical table for FC

Source: Made by the authors

This analysis and the present situation shows that there is an urgent need for constructive and effective FC system design, based on approach and principles appropriate to the specific needs and aims.

For the purpose of this research it means Two Dimensional-2D FC system, which process will appreciate LOS for passenger cars and heavy vehicles as a FC theme or average travel speed as a FC function or LOS Measure of effectiveness - MOE, Fig. 3.

6 New Bi-modal Methodology for Urban Street FC

Each mode of transport has its own strengths and weaknesses concerning capacity, flexibility, safety and environmental im-

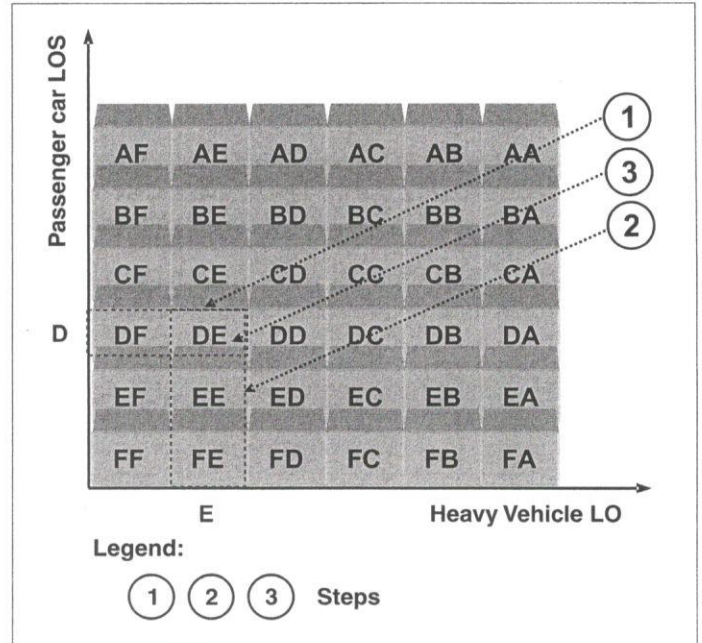


Fig. 5. Logic of the proposed LOS System for FC

Source: Made by the authors

pact. If the difficulties afflicting the vehicles are easily identifiable, so are the solutions. Namely, if the difficulty is felt as LOS decrease, LOS could be identified as FC theme, and so urban streets should be combined in a way that fits the strengths of each mode, building transport chain that is over allly more efficient, cost-effective and sustainable.

Developed and adopted "LOS System for FC" in common with the different urban street classes' attributes are prepared, following the several criterions:

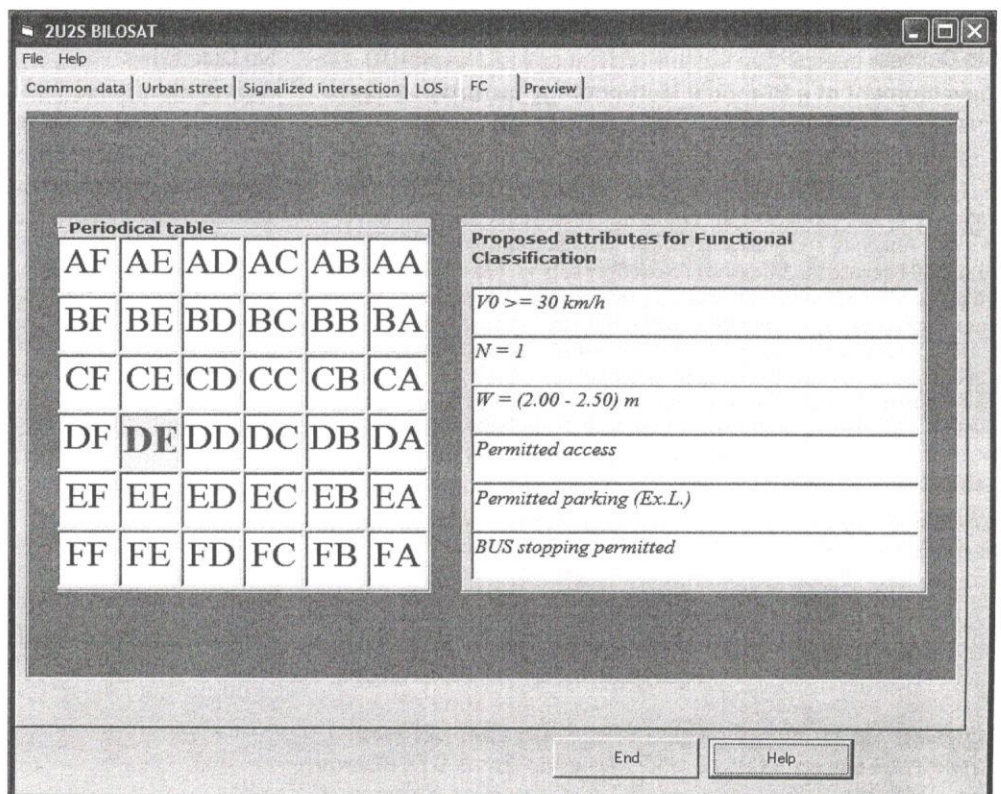


Fig. 6. FC User interface (a module of 2U2SBILOSAT)

Source: Made by the authors

- A comparative analysis among the known systems for FC.
- By following the alternative two-dimensional principles: form follows function.
- With users respect.

2D Periodical table for FC has been prepared and proposed, Fig. 4. LOS System for FC, use the logic explained as on Fig. 5 which shows that specific LOS for passenger cars and heavy vehicles, for example LOS-D for passenger cars (step 1) and LOS-E for heavy vehicles (step 2) will define urban street class "DE" (step 3), and its attributes placed in the spread cell of the proposed 2D Periodical table for FC.

Defined urban street class and its attributes are shown at the user interface named simply as FC in the 2U2SBILOSAT, Fig. 6.

Established urban street class might be more or less harmonized with the categorization given by the local authority. As such, it could be accepted or refused and changed, depending on the type of street design measures or traffic engineering measures that could be accomplished.

7 Conclusion

As discussed above, FC is used to categorize urban streets according to their predominant role. Different systems of FC employ different methodologies to achieve this goal.

Our goal was the development of a new methodology for FC, concerning the effects of the heterogeneous traffic flow on urban street network classification. We believe that as such, it will become part of the lexicon of the typical transportation engineering, providing street designs that promote different modes of transportation, reduce congestion and create livable neighborhoods with sustainable transportation.

Thus, as there are different perceptions of the FC concept, the idea of this research was not to find out the perfect urban street classification system, but to present a new concept, and a different way for urban street capacity, vehicle level of service, land use and FC, linking.

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SUMMARY

Jasmina Bunevska
Marija Malenkovska Todorova
Ivo Dukoski

Development of a Bi-modal Methodology for Urban Streets Functional Classification as Urban Planning Contribution

This paper presents a contribution to urban planning processes. Namely, a new bi-modal methodology for urban streets functional classification (FC) as a module of the Uniform Urban Street Segment Level of Service Analysis Tool -2U2SBILOSAT has been proposed. It is called bi-modal because the FC issue is passenger cars vs. heavy vehicles level of service, based on their average travelling speed. 2D spread (periodical table) of 36 types of streets (cells) has been created and modelled. Each cell represents one urban street class and consists of several urban street class attributes. The created methodology logic says: „Evaluation of the urban street level of service is specific to vehicle mode and equivalent to the urban street function. Urban street function is accompanied with an appropriate form and uniform place and role in the urban street network”.

Key words: urban street, functional classification, level of service, bi-modal methodology

SAŽETAK

Jasmina Bunevska
Marija Malenkovska Todorova
Ivo Dukoski

Razvoj bimodalne metodologije za funkcijsku klasifikaciju gradskih ulica kao doprinos urbanom planiranju

Rad predstavlja doprinos procesima urbanog planiranja. Naime, predlaže se nova bimodalna metodologija za funkcijsku klasifikaciju gradskih ulica kao modul jedinstvenog alata za analizu razine usluge segmenta gradskih ulica – 2U2SBILOSAT. Zove se bimodalna jer je tema funkcijske klasifikacije razina usluga osobnih automobila nasuprot teškim prometnim sredstvima, ovisno o njihovoj prosječnoj brzini kretanja. Načinjena je dvodimenzionalna periodička tablica s 36 vrsta ulica (ćelija). Svaka ćelija predstavlja jedan razred – vrstu gradskih ulica i sastoji se od više karakteristika. Dobivena logika metodologije glasi: “Ocjena razine usluge gradske ulice specifična je za vrstu vozila i odgovara funkciji gradske ulice. Funkciju gradske ulice prati odgovarajući oblik i jedinstveno mjesto i uloga u mreži gradskih ulica.”

Ključne riječi: gradska ulica, funkcijska klasifikacija, razina usluge, bimodalna metodologija