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Hopkins, W. G. 1998. Introduction to Plant Physiology, John Wiley and Sons, London, 81-100.

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Parking Provision Requirements According to Type of Land Use in Major Saudi Arabian Cities

*Saleh A. Al-Fouzan **

ABSTRACT

The aim of this paper is to review and compare car parking provision according to use in some Saudi cities. It covers car parking requirements issued by Ministry of Municipal and Rural Affairs (MOMRA), Al-Riyadh, Jeddah, and Al-Madinah Municipalities. In addition, the paper discusses some difficulties facing the application of such requirements: limited land plot areas, conflict between these requirements and the setback system, continued drive towards strip commercial activities in Saudi cities, and the non-correlation between car parking requirements and the zoning system.

Upon data analysis, the paper shows some important results among which: requirements applied in some cities are different from those of the Ministry, different municipalities apply different requirements, the inconsistent use of measurement units in some cases, weakness of some requirements leading to provision of insufficient number of parking areas, non-correlation between car parking requirements and the zoning system in all cities, in addition to the fact that land areas in most Saudi cities do not facilitate the application of car parking requirements. Finally, the car parking requirements issued by MOMRA, although comprehensive and specific, are of general nature covering cities of all types and sizes. The paper concludes with recommendations and suggestions for upgrading the current situation of car parking provision requirements according to type of use.

Keywords: Parking, Car Parking, Parking Planning, Parking Controls, Parking Provision Requirements.

1. INTRODUCTION

In urban areas, vehicles occupy vast spaces of land either in the form of the road network when moving or in the form of car parking when idle. Thus, a crucial component in the transportation planning processes is the appropriate parking planning and design.

Car parking areas are part of urban transportation network as a whole: vehicle movement, pedestrian movement and public transport stations. The planning of parking inevitably entails analysis of multiple factors among which: projected types of land use, sites expected to be covered by urban expansion, components of car parking planning policies and resource requirements that can affect the operation/development of parking areas (KACST, 1987, p.15).

Among factors with a strong relation to car parking planning is the analysis of the number of parking spaces

required in a car parking, which is closely connected to land use types in any city. In addition, the number of car parking areas to be provided in every type of land use is heavily dependent on specific attributes of relevant community, life style, population, and the ratio of private car ownership.

The required number of parking spaces is measured by multiple measurement units according to specific types of land use: In residential areas, for example, it is estimated by the projected number of parking spaces required for every residential unit. However, it is estimated in commercial/office uses by the number of parking spaces required for every square meter of land or of used space. In schools and universities, such numbers are estimated in connection to student numbers or classroom numbers. The number of parking spaces is estimated by room number in hotels, by bed numbers in hospitals, by staff numbers in government departments and by worker numbers in factories, etc.

This paper focuses on the review/comparison of car parking requirements issued by the Ministry of Municipal and Rural Affairs (MOMRA) in the Kingdom of Saudi Arabia (KSA), and by Municipalities in KSA in

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connection to different types of land use. However, as car parking requirements issued by Municipalities of other regions are not available online, the study was limited to requirements issued by Municipalities of Al-Riyadh, Jeddah, and Al-Madinah. In addition, the paper presents an overview of difficulties facing the application and enforcement of these requirements. The paper concludes with suggesting appropriate solutions for upgrading current requirements.

This paper intends to be a first attempt to another, more comprehensive, study that will review the Saudi experience in comparison to some Arab and Western countries in the area of car parking requirements as they relate to different types of land use.

1.1. Importance of Research

Economic and urban development in KSA has had profound impact on the lifestyle of Saudi families including: higher family incomes, expansion of cities and villages, and more dependence on the private car as means of transportation in urban areas. These developments have made the Kingdom one of the biggest car importers in the Gulf region. According to statistics from the Ministry of Interior (MOI), the Kingdom had no more than 22 805 cars in 1971 (1391 H). This number reached 2 052 934 cars in 1996 (1416 H) (Ministry of Interior, 1971-1996). It is now 6 800 000 cars according to the latest statistics in 2008 (1429 H) (General Administration for Traffic, 2008). These numbers are experiencing continuous growth.

In the past, no problems were posed by car parking areas. However, it has become one of the problems facing authorities in the major cities in view of growing population and higher rates of private car ownership. Thus, car parking has become a principal component in urban transportation planning because of its relation to different activities, land use, pedestrian movement, public transportation stations and road network.

Many major cities in KSA are suffering from the problem of car parking provision because of the high private car ownership ratio and because the car parking planning is not done in line with land use planning. In addition, some car parking provision requirements in different Saudi cities do not reflect different uses or even the differences in density of any single use.

The leniency on part of traffic police in application of traffic penalties, and the moderate level of awareness among drivers in terms of car parking organization have

participated in lower efficiency of urban roads, less streamlined traffic and higher rates of car accidents.

MOMRA and some municipalities in KSA have issued requirements for the provision of car parking for every type of land use. However, there are obstacles hindering the application of those requirements. The obstacles will be discussed in details later in section 5.

1.2. Objectives

The objectives of this paper are:

1. To review the requirements for car parking areas according to type of use in some major Saudi cities (Al-Riyadh, Jeddah, and Al-Madinah) in addition to requirements issued by MOMRA.
2. To draw the comparison between MOMRA's requirements and those of various municipalities.
3. To identify the obstacles facing the application of car parking provision requirements.
4. To suggest suitable solutions that can lead to current amelioration in these requirements.

1.3. Methodology

This paper follows a comparative approach in reviewing car parking requirements according to different types of land use in some major Saudi Arabian cities. The paper relies on reviewing different car parking requirements according to conditions set by Ministry of Municipal and Rural Affairs (MOMRA), Al-Riyadh Municipality, Jeddah Municipality, and Al-Madinah Municipality. The paper also relies on comparing different car parking requirements in different types of land use between MOMRA's requirements and those of municipalities.

The paper attempts to define the obstacles facing the application of car parking provision requirements in the Saudi Arabian cities, and to suggest suitable solutions that can lead to current amelioration in these requirements.

The paper contains also an overview on previous papers and studies, reports of official agencies and their websites, in addition to available scientific resources in terms of parking planning and standards/requirements of parking areas provision.

2. LITERATURE REVIEW

The number of needed parking areas depends on the size of city, economic status of the population and

private car ownership rates. In bigger cities with wealthier populations and higher private car ownership rates, the number of needed parking areas will inevitably be higher.

This number varies according to the type of use, site of use, size of city, usage density, private car ownership rates, daily travel rate per capita, and the time rate of single car parking for single purpose (Abdelwahed, 1986, p51). Some parameters are to be taken into account when deciding parking sites such as minimizing time required to reach the parking, provision of sufficient parking areas in city center, and studying distances people are to walk to/from the parking (KACST, 1987, pp.19-20).

A UK study found that availability of parking has a great effect on people's choice of means of transportation. Other studies suggest that conditions of parking areas have more effect on people's choice of means of transportation than the conditions of public transportation especially when going to work. This effect can be also found in places well provided by public transportation (Department for Communities and Local Government, 2001, p.19).

A study has proved that parking cars, or cars coming in/going out car parking, participate, directly or indirectly, in about 10% of car accidents. The same study showed that parking cars may accountable by approximately 8% to 10% of pedestrian fatalities (KACST, 1987, p.13).

A western study shows that zoning for parking was relatively rare among the American cities before World War II. However, by 1969 virtually all American cities with populations exceeding 25 000 zoned for parking as their primary method of dealing with land-use problems associated with rising car ownership rates. A concise history of zoning for parking shows that despite its continuing popularity, it has almost always been a controversial topic. A review of major studies reveals important aspects of zoning for parking as it has changed over time. Zoning for parking began as an occasional approach to resolving specific problems associated with growing car storage requirements. It gradually became the preferred method to ensure adequate parking space in car-oriented communities (Ferguson, 2004, p.1).

Locally, the Administration of Scientific Research in King Abdulaziz City for Science and Technology (KACST) issued in 1987 (1407 H) the "Saudi Guidelines

for Car Parking Design" which contained but little hint about car parking areas requirements. It said that the required number of parking areas depends on relevant land uses in addition to life style of community and population of the city. The "guidelines" suggested undertaking a detailed study of local conditions in different part of KSA in order to determine number of parking areas necessary for every type of land use (KACST, 1987, p.18).

In 2004 (1424 H), the Comprehensive Strategic Plan for Arriyadh City tried to embed requirements for car parking in the final report on land use and development systems (High Commission for the Development of Arriyadh, 2004, pp.287-291). The report stated that such standards for car parking would be used temporarily until the completion of the study undertaken by the Arriyadh Development Authority (ADA) and the Riyadh Municipality (High Commission for the Development of Arriyadh, 2004, p.287).

In 2006 (1426 H), Ministry of Municipal and Rural Affairs, MOMRA, issued the "Guidelines of Planning Standards for Car Parking" which detailed the planning standards and ratios for car parking areas and the factors affecting site choices for parking in terms of the relation between demand on parking and the already available parking areas. The "guidelines" contained a separate table of requirements for car parking in different land uses.

In 2007 (1427 H), the Administration of Building Licensing affiliated to the Department of Construction and Projects in Al-Riyadh Municipality issued two guides: "Technical Conditions for Licensing the Construction of Villas, Apartment Buildings, Commercial/Residential Buildings and Dwellings for Workers and Singles" and the "Technical Conditions for Licensing the Construction of Service Buildings in Al-Riyadh City". Both guides mentioned some requirements relevant to the provision of car parking for different uses.

In 2008 (1428 H), Jeddah Municipality issued codes and guidelines for construction inside the urban boundaries of the Municipality with a separate table showing car parking requirements in different types of land use. In addition, the Al-Madinah Municipality website contains clarification of controls and requirements in different types of land use among which the car parking requirements in every type of land use.

3. CURRENT REQUIREMENTS FOR CAR PARKING PROVISION

In this part, the paper reviews the requirements of car parking provision issued by Ministry of Municipal and Rural Affairs (MOMRA), Al-Riyadh Municipality, Jeddah Municipality, and Al-Madinah Municipality.

3.1. MOMRA Requirements

As mentioned above, in 2006 (1426 H), MOMRA issued the "Guidelines of Planning Standards for Car Parking" showing the planning ratios and standards relevant to car parking in terms of the relation between demand on parking areas and already available numbers of them. It contained a separate table of requirements for car parking in different land uses as showing in Table (1).

In this table we notice that, in residential uses, the number of car parking is determined by stating the required number for every residential unit or for every room (as in hotels), in addition to assessing the required number of car parking areas by square meters of floors for commercial uses (like malls, restaurants, warehouses and wholesale shops), for service uses (like banks, professional offices, municipal and governmental offices and service workshops) and for industrial uses (like factories). However, the required number of parking areas for recreational facilities (recreation facilities and entertainment centers) was assessed by the square meters of total area. It was assessed by square meters of audience area in theaters, libraries and meeting halls, by numbers of student in schools and universities and by numbers of worshippers in mosques. The "guidelines" stated that it didn't speak about some uses like airports, fairs, etc, which would be subject to detailed study in such projects according to project requirements of car parking areas which would depend on size and composition of every single project.

It's obvious that the requirements issued by MOMRA rely heavily on the use of area unit of floors (except in residential buildings, schools/universities, mosques and meeting halls) in order to calculate the required number of car parking areas.

3.2. Requirements of Al-Riyadh Municipality

In the case of Al-Riyadh Municipality, there is no dedicated table to show requirements for car parking provision in different land uses. Thus, the researcher tried to summarize different requirements in terms of car parking relying on 2007 (1427 H) publications by the Administration of Building Licensing affiliated to the General Administration of Construction Planning in the Authority of Construction and Projects:

- Technical Conditions for Licensing the Construction of Villas, Apartment Buildings and Dwellings for Workers and Singles; and
- Technical Conditions of the Construction of Service Buildings in Al-Riyadh City.

Table (2) shows a summary of car parking requirements in every type of use according to Al-Riyadh Municipality.

3.3. Requirements of Jeddah Municipality

Compared to requirements of other Municipalities, Jeddah Municipality gave a separate table to show car parking requirements in every type of land use as shown in Table (3).

For calculation of required car parking areas, these requirements focus on the use of floor area in all uses (except for schools, universities, and hospitals).

3.4 Requirements of Al-Madinah Municipality

The case in Al-Madinah is similar to the case in Al-Riyadh Municipality: No table dedicated to showing the different car parking requirements for every type of land use. The researcher has summarized requirements by types of use according to specified requirements and controls on the website of Al-Madinah Municipality. It is rather surprising that the guidelines presented on the website of Al-Madinah Municipalities have ignored car parking requirements for several urban land uses. Table (4) shows different car parking requirements for every type of land use.

It's clear that the requirements issued by the Ministry (MOMRA) and the municipalities in the KSA are not part of the zoning system in line with comprehensive city plans.

Table 1. Car parking requirements issued by MOMRA

	Use	Description	Required parking spaces	Unit
1	Residential	1- One family dwelling (villa)	2	House
		2- Multi family dwelling (apartment building)	1	Apartment (one bedroom)
			1.5	Apartment (two bedrooms or more)
		3- Hotel residential unit (condo)	1	Condo
		4- Hotels	1	Room (up to 40 rooms, then 1 space for every 2 rooms)
2	Commercial centers	1- Local level	6	For every 100 m ² (of floor area)
		2- Neighborhood, city and region	8	
3	Restaurants		1	For every 15 m ² (of floor area)
4	Banks and offices of professionals		1	For every 25 m ² (of floor area)
5	Service workshops		1	For every 25 m ² (of floor area)
6	Student services		1	For every 25 m ² (of floor area)
7	Meeting halls/theaters/libraries		1	For every 3.5 m ² (of sitting area)
8	Play grounds and sport centers		1	For every 5 seats
9	Government and municipal offices		1	For every 25 m ² (of floor area)
10	Mosques		1	For every 5 worshippers
11	Schools/ colleges	1- Elementary and preparatory	1	For every 5 pupils
		2- Secondary and occupational	1	For every 5 students
		3- University	1	For every 3 students
12	Hospitals		1; or	For every 100 m ² (of floor area)
			1	For every 2 beds
13	Factories		1	For every 30 m ² (of floor area)
14	Warehouses/ wholesale stores		1	For every 40 m ² (of floor area)
15	Recreation/ entertainment centers		25	For every 100 m ² (of total area)

Source: Researcher with reliance on "Guidelines of Planning Standards for Car Parking",.(2006)(1426 H). Table 1-2, p 8.

Table 2. Car parking requirements issued by the Municipality of Al-Riyadh

	Main use	Description	Mini. parking spaces	Unit
1	Residential	One family dwelling	---	For every residential unit (parking can be secured in basement or ground floor)
		Buildings	1	
		Singles' dwellings (more than 2 floors)	1	
		Singles' dwellings (ground and 1 st floor)	Normal setback	
		Workers' dwellings	As per regulations	
2	Educational services	Educational centers and institutions	5	For every classroom
		Secondary schools	5	
		Preparatory schools	3	
		Elementary schools	2	
		Nursery/ Kinder gardens	1	
3	Health services	Private clinic	1	Every 100 m ²
		Private hospital		

	Main use	Description	Mini. parking spaces	Unit
4	Commercial services	Phone kiosks	1	Every kiosk
		Car shops	1	Every 100 m ² of land area
		Car dealers	1	Every 100 m ² of land area
		Butane gas vendors	Front setback	
		Print houses	Front setback (no less than 6 m)	
		Plant nurseries	Front setback (6 m)	
5	Transportation services	Limousine centers	3 in areas with setback	
		Car rental	10	
		Forwarders	---	
		Aerial and naval shipping	---	
		School transportation centers	Front setback	
6	Recreational services	Sports centers	1	For every 50 m ²
		Gems	Previously licensed parking	
		Paid-for playgrounds for kids	Car parking (No specific number)	
		Wedding halls	1	For every 50 m ² (No parking under the building)
		Furnished apartments	1	Every unit
		Commercial rest places	---	---
		Cafés	2	Every 25 m ²
7	Public services	Barber shops	---	
		Car service (workshops and maintenance)	1	Every 100 m ² of land area
		Car polishing centers	---	
		Car shedding shops	Front setback	
		Restaurants and kitchens	1	Every 50 m ² of building area
		(Mandi) kitchens	1	Every 50 m ² of building area
		Water hydrants	Parking for water cisterns (No specific number)	
8	Industrial services	Factories	---	
		Concrete and blocks factories	---	
		Warehouses	setback	
		Workshops	setback	

Resource: Summary by researcher from: "Technical Conditions for Licensing the Construction of villas, Apartment Buildings, Commercial/Residential Buildings and Dwellings for Workers and Singles, and the Technical Conditions for Licensing the Construction of Service Buildings in Al-Riyadh City.(2007)(1427 H).

Table 3. Car parking requirements issued by the Municipality of Jeddah

Type of use	Required parking
Villas	1 parking/250 m ²
Buildings	1 parking/150 m ² or 1 parking/unit whichever can provide more parking spaces
Offices	1 parking/60 m ²
Retail dealers	1 parking/45 m ²
Wholesale dealers	1 parking/50 m ²
Restaurants	1 parking/50 m ²
Fast food shops	1 parking/25 m ²
Banks	1 parking/15 m ²
Moles and Supermarkets	1 parking/25 m ²
Travel agents	1 parking/35 m ²
Car dealers	1 parking/100 m ²

Type of use		Required parking
Hotels		1 parking/60 m ²
		Restaurants: 1 parking/50 m ²
		Halls: 1 parking/25 m ²
		Shops/offices: 1 parking/70 m ²
Furnished units	Chalets	1 parking/30 m ²
	Apartments	1 parking/100 m ²
	Villas	1 parking/100 m ²
	Rest houses	1 parking/120 m ²
Wedding halls		1 parking/50 m ²
Schools		1 for every two class rooms (kinder garden/nursery)
		2 for every classroom (elementary)
		3 for every classroom (preparatory)
		5 for every classroom (secondary)
Institutes/collages/universities		1 for every 3 students
		1 for each faculty member
		1 for every 3 staff members
Mosques		According to special requirements
Hospitals/clinics		3 for every doctor's office/ 1 for every 4 beds/ 1 for every 3 staff members
Museums/show rooms		1 parking/100 m ²
Play grounds and sport centers		1 parking/50 m ²
Transportation stations/travel centers		1 parking/100 m ²
Butcher houses		1 parking/70 m ²
Crafts		1 parking/70 m ²
Equipment rental		1 parking/70 m ²
Gas stations		12 (A station)/ 8 (B station)/ 4 (C station)
Storage areas/warehouses		1 parking/70 m ²
Other uses		1 parking/50 m ²

Source: Jeddah Municipality, Local Plan of Jeddah Municipality: Building Codes and Controls, (2008)(1428 H), p 45-46.

Table 4. Car parking requirements of the Municipality of Al- Madinah

	Main service	Minimum number of parking spaces	Unit
1	Furnished residential units	1	Every dwelling
2	Educational services	Nursery/Kinder garden	Every classroom
		Elementary	
		Preparatory	
		Secondary	
3	Recreational centers	1	For every 100 m ² (of land area)
4	Wedding halls	1	For every 50 m ² of building area (use of underground parking prohibited)
5	Car dealers	1	For every 100 m ² (of land area)
6	Restaurants/Kitchens	1	For every 50 m ² (of land area)
7	Butane gas shops/distributors	Front setback of shop (no less than 6 m)	
8	Horse riding sites	Provision of 50 parking spaces	

Source: Summary by researcher in reliance on requirements and controles specified on Al-Madinah website, (2008)(1429 H), <http://www.amana-md.gov.sa>.

4. COMPARISON BETWEEN DIFFERENT CAR PARKING REQUIREMENTS

The previous part of this paper enlists four car parking provision requirements made by different Saudi public institutions. One can obviously distinguish the conflict existing in each and among the four cases as well that also reveals some kind of chaotic bylaws regards to car parking area requirement.

Table (5) compares parking provision requirements according to use issued by Ministry of Municipal and Rural Affairs (MOMRA), Municipality of Al-Riyadh, Municipality of Jeddah, and Municipality of Al-Madinah. It shows areas of different requirements between the Ministry and the municipalities:

4.1. Residential Land Use

Requirements of the Ministry and Jeddah Municipality cover different types of residential use like villas, apartment buildings, hotels, and furnished apartments: The Ministry relied on residential unit in determining required parking while Jeddah Municipality relied on residential area for that end. Table (5) is not showing any requirements concerning villas or hotels in Al-Riyadh, nor any requirements concerning villas, residential buildings, and hotels in Al-Madinah.

As for hotels, the Ministry requires one parking space per hotel room up to 40 rooms, then one parking space per every two rooms; while Jeddah Municipality require one parking space per 50 m² in addition to one parking space per every 50 m² of halls and one parking space per every 70 m² of hotel offices.

4.2. Commercial Services

All Municipalities have insufficient requirements concerning the provision of the needed parking for commercial uses. Most Municipalities require one parking space per every 100 m² of land area (land surface area) or even satisfy themselves by the front setback in butane gas shops, print houses, or plant nurseries as can be seen in the case of Al-Riyadh Municipality. However, the Ministry puts precise requirements in this regard distinguishing between different levels of commercial activity: It requires one parking space per every 17 m² of floor area in local activities while requiring one parking space per every 12.5 m² of floor area when it comes to an activity serving a complete neighborhood, city, or region.

4.3. Restaurants

Requirements of the Ministry provides for larger number of parking spaces when compared with other requirements: They require one parking space per every 15 m² of floor area in a restaurant while, in Al-Riyadh or Al-Madinah, Municipality require one parking space per every 50 m² of building area. The Municipality of Jeddah requires one parking space per every 50 m² in restaurants and one parking space per every 25 m² in fast food restaurants.

4.4. Banks

When it comes to banks, the Municipality of Jeddah requirements provide for larger number of parking spaces when compared with the requirements of the Ministry. It requires one parking space per every 15 m² of floor area. As for offices of professionals, requirements of the Ministry come first claiming one parking space per every 25 m² (as it is the case with banks) while Municipality of Jeddah requires one parking space per every 60 m². Table 5 is not showing any requirements concerning parking of banks or offices of professionals in Al-Riyadh or Al-Madinah.

4.5. Service Workshops

Requirements of the Ministry provide for a larger number of parking spaces: They require one parking space per every 25 m² of floor area in service workshops while the Municipality of Al-Riyadh requires one parking space per every 100 m² of land area. Table (5) says nothing about required parking for service workshops in Jeddah or Al-Madinah.

4.6. Health services

Requirements of the Ministry provide for larger number of parking spaces: They require one parking space per every 25 m² of floor area in health facilities while the Municipality of Al-Riyadh requires one parking space per every 100 m² of land area in private clinics. They contain nothing about required parking for health services in Jeddah or Al-Madinah Municipalities.

4.7. Hospitals

The Ministry requires one parking space per every 100 m² of floor area in hospitals or per every 2 hospital beds while Municipality of Al-Riyadh requires one parking space per every 100 m² of land area in private hospitals. Municipality of Jeddah requires 3 parking spaces per every doctor's office/ 1 parking spaces per

every 4 beds/ 1 parking spaces per every 3 personnel. However, all requirements notably do not provide for sufficient parking spaces for hospitals. Table 5 doesn't show parking requirements for hospitals in Al-Madinah Municipality.

4.8. Meeting Halls, Theaters, and Libraries

The Ministry requires one parking space per every 3.5 m² of sitting area. However, table (5) doesn't show requirements concerning Meeting halls, theaters, and libraries in Al-Riyadh, Jeddah, and Al-Madinah Municipalities.

4.9. Governmental and Municipal Offices

The Ministry requires one parking space per every 25 m² of office floor area. However, the table is not showing requirements concerning government offices in Al-Riyadh, Jeddah, and Al-Madinah Municipalities.

4.10. Mosques

The Ministry requires one parking space per every 5 worshippers without drawing any distinction among Eid prayers, grand mosques, or local mosques. The table shows no requirements concerning mosques in Al-Riyadh and Al-Madinah Municipalities. However, Municipality of Jeddah talks about special requirements for mosque parking without clarifying the nature of such requirements.

4.11. Schools and Colleges

Requirements are divided into five groups: Kindergardens, elementary schools, preparatory schools, secondary and occupational schools in addition to university colleges. Requirements of the Ministry focus on student numbers while those of different municipalities focus on number of classrooms. Probably, from practical point, the student number criterion is more accurate in view of different numbers of student in classrooms and different sizes of such classrooms. However, the problem with student number criterion is that it is subject to assessment and can be tampered with by some operators with difficulty in keeping to total student numbers after creation of the school. The Ministry unrealistically requires the same numbers of parking spaces in different kinds of schools while secondary schools need more parking spaces than in preparatory schools that, in turn, need more parking spaces than elementary schools.

- **Kindergardens:** All Municipalities require one

parking space for every classroom. The table is not showing requirements of the Ministry.

- **Elementary Schools:** All Municipalities require two parking spaces for every classroom while the Ministry requires one parking space per every five pupils.
- **Preparatory Schools:** All Municipalities require five parking spaces for every classroom while the Ministry requires one parking space per every five pupils.
- **Secondary Schools:** All Municipalities require five parking spaces for every classroom while the Ministry requires one parking space per every five students.
- **Universities:** The Ministry requires one parking space per every three students while the Municipality of Jeddah requires one parking space per every three students in addition to one parking space per professor and another one per every three staff members. Table 5 shows no requirements in Al-Riyadh or in Al-Madinah Municipalities. There is no doubt that specifies requirements are weak in terms of providing for sufficient parking, especially in secondary schools and universities.

4.12. Factories

The Ministry requires one parking space per every 30 m² of floor area. No requirements of any municipalities are shown in the table.

4.13. Warehouses, Wholesale/Retail Shops

- **Warehouses:** The Ministry requires one parking space per every 40 m² of floor area in a warehouse. Municipality of Jeddah requires one parking space per every 70 m² of area. However, Municipality of Al-Riyadh requires just the front setback areas. No requirements of Al-Madinah Municipality are shown in table (5).
- **Wholesale Shops:** The Ministry requires one parking space per every 40 m² of floor area in a wholesale shop. Municipality of Jeddah requires one parking space per every 50 m² of area. No requirements of Al-Madinah and Municipality of Al-Riyadh are shown in table (5).
- **Retail Shops:** Municipality of Jeddah requires one parking space per every 45 m² of area. However, the table states no requirements by the Ministry or by Municipality of Al-Riyadh and Al-Madinah.

4.14. Recreational Services

Recreational services cover recreation facilities,

entertainment centers, sport centers, gems, wedding halls, meeting halls, cafes, and horse riding sites.

- **Recreation facilities and entertainment centers:** The Ministry requires one parking space per every 4 m² of total area. However, and very differently, Municipality of Al-Madinah requires one parking space per every 100 m² of land area. Table 5 states no requirements set by Municipality of Al-Riyadh and Jeddah.
- **Sports centers:** The Ministry requires one parking space per every 5 seats while the parking of the building is enough for Municipality of Al-Riyadh. No requirements are stated for Municipality of Jeddah or Al-Madinah.
- **Wedding halls and meeting halls:** The Ministry requires one parking space per every 3.5 m² of total sitting area in meeting halls. However, all municipalities require one parking space per every 50 m² in wedding halls. The requirements of the Ministry are, no doubt, provide for more parking spaces, and the requirements of municipalities are weak and fail in providing for sufficient parking spaces.
- **Cafes and horse riding sites:** Municipality of Al-Riyadh requires one parking space per every 12.5 m² in cafes, while Municipality of Al-Madinah requires 50 parking spaces per every riding site. Table 5 shows no requirements set by the Ministry or by other municipalities concerning cafes and horse riding sites.

5. OBSTACLES HAMPERING THE APPLICATION OF CAR PARKING PROVISION

Officials in municipalities face some obstacles in applying parking requirements. Among these obstacles are: limited areas of land, conflict between these requirements and the setback system, continued drive towards strip commercial activities in some cities in KSA, and the non-correlation between car parking requirements and the zoning system. The following is a brief discussion of each of these factors:

5.1. Limited Areas of Land

Parking consumes large area in any project: A car needs about 18 m² for parking in addition to some 12 m² for maneuver and pavement inside the parking. This means about 30 m² per car. When a project presumably needs 30 parking spaces, it needs 900 m² of parking area.

Reviewing the land situation in any Saudi city, one finds that large portions of plots are in the category of

1000 m² or less. These areas lay an awful burden on municipalities trying to apply parking requirements. The problem gets bigger when allocating these areas for commercial, educational, health or religious activities.

5.2. Conflict between Parking Requirements and the Setback System

In Saudi cities, some construction codes concerning commercial and service activities require normal front setback of about 5-6 meters or 1/5 of the width of street. This front setback fulfils two ends: Usage of front setback area in order to widen the street in future and usage of setback area as car parking, which is the most prominent case.

However, the problem is that both the front setback system and car parking requirements consume a huge area of land in any project. In addition, the number of parking spaces provided by front setbacks is small and insufficient either for the needs of commercial activities on the ground floor or for service and residential usages on the upper floors. What one can notice in practice is that some municipalities suffice with front setback as car parking when applying parking provision requirements. Limited available land areas (mentioned before) are among the factors forcing authorities to consider front setback areas sufficient for parking. Thus, there is a need for re-considering front setback system in view of car parking provision requirements according to each type of land use.

5.3. Continued Drive towards Strip Commercial Activities in Saudi Cities

Commercial or service activities are found either in strip form along commercial streets or in clusters of activities in big commercial centers generally serviced by car parking areas. Commercial and service activities are abundant on commercial streets in most Saudi cities. However, one of the disadvantages of such activity is its negative effect on street performance especially in terms of parking provision and management.

Commercial and service activities normally attract large numbers of cars accompanied by shortage of available parking areas. Parking cars make streets narrower for vehicular traffic and even can completely paralyze circulation. These arouse the need for clustering activities in big commercial and service centers supplied with sufficient parking. Commercial strip type should be restricted and minimized.

Table 5. Comparison of car parking requirements set by the Ministry and different Municipalities

Use	Description	Parking provision requirements according to land use			
		Ministry	Al-Riyadh Municipality	Jeddah Municipality	Al-Madinah Municipality
1 Residential	▪ One family dwellings (villas)	2/House	----	1/250 m ²	----
	▪ Multi family dwellings (apartment buildings)	1/Apartment Apartment of one bedroom; 1.5 parking space per every 2 extra rooms	1/Apartment	1/150 m ² ; or 1/Apartment (Whichever provide more parking)	----
	▪ Hotel residential units (condos)	1/Apartment	1/Apartment	1/100 m ²	1/Apartment
	▪ Hotels	1/room up to 40 rooms, then 1 per every 2 extra rooms	----	1/60 m ² (Restaurants: 1/50 m ²), (Halls: 1/50 m ²), (Offices: 1/70 m ²)	----
2 Commercial services	▪ Local commercial center	Approx. 1/17 m ² (of floor area)	----	----	----
	▪ Neighborhood/ city/ regional commercial center	1/12.5 m ² (of floor area)	----	----	----
	▪ Car show rooms	----	1/100 m ² (of land area)	1/100 m ²	----
	▪ Car dealers	----	1/100 m ² (of land area)	----	1/100 m ² (of land area)
	▪ Car rental	----	10	----	----
	▪ Limousine centers	----	3	----	----
	▪ Butane gas vendors	----	Front recess	----	Front recess
	▪ Print houses	----	Front recess	----	----
3 Restaurants	▪ Plant nurseries	----	Front recess	----	----
		1/15 m ² (of floor area)	1/50 m ² (of building area)	1/50 m ²	1/50 m ² (of land area)
4 Fast food restaurants Banks Professionals offices		----	----	1/25 m ²	----
		1/25 m ² (of floor area)	----	1/15 m ²	----
		1/25 m ² (of floor area)	----	1/60 m ²	----
5 Service workshops		1/25 m ² (of floor area)	1/100 m ² (of total area)	----	----

	Use	Description	Parking provision requirements according to land use			
			Ministry	Al-Riyadh Municipality	Jeddah Municipality	Al-Madinah Municipality
6	Medical (healthcare) services		1/25 m ² (of floor area)	1/100 m ² (Private clinic)	3/Doctor's office; 1/ 4 beds; 1/ 3 staff members	----
7	Hospitals		1/100 m ² (of floor area) or 1/2 beds	1/100 m ² (Private hospital)		----
8	Meeting halls/theaters/libraries		1/3.5 m ² (of sitting area)	----	----	----
9	Governmental/municipal offices		1/25 m ² (of floor area)	----	----	----
10	Mosques		1/ 5 worshippers	----	According to special requirements	----
11	Schools and collages	■ Nurseries/ Kindergardens	----	1/ classroom	1/ classroom	1/ classroom
		■ Elementary schools	1/ 5 pupils	2/ classroom	2/ classroom	2/ classroom
		■ Preparatory schools	1/ 5 pupils	3/ classroom	3/ classroom	3/ classroom
		■ Secondary/occupational schools	1/ 5 students	5/ classroom	5/ classroom	5/ classroom
		■ University	1/ 3 students	----	1/ 3 students; 1/ professor; 1/ 3 staff members	----
12	Factories		1/30 m ² (of floor area)	----	----	----
13	Warehouses		1/40 m ² (of floor area)	Recess	1/70 m ²	----
	Wholesalers		1/40 m ² (of floor area)	----	1/50 m ²	----
	Retailers		----	----	1/450 m ²	----
14	Recreational services	■ Recreation facilities/ Entertainment centers	1/4 m ² (of total area)	----	----	1/100 m ² (of land area)
		■ Sports centers	1/ 5 seats	1/50 m ²	----	----
		■ Gems	1/ 5 seats	Parking of the building	----	----
		■ Wedding/ Meeting halls	1/3.5 m ² (of sitting area)	1/50 m ²	1/50 m ²	1/50 m ²
		■ Cafes	----	1/125 m ²	----	----
		■ Horse riding sites	----	----	----	50

5.4. Non-correlation between Car Parking Requirements and the Zoning System

Using the same parking requirements in different parts of a city is one of the obstacles facing the application of such requirements. Parking requirements are not correlated to the zoning system in a city. Zoning systems in some western cities cover the number of floors in buildings, density, setback areas, proportion of land allowed for building, in addition to car parking requirements according to use in different parts of the city. City center, for example, differs from city margins in terms of parking requirements; commercial streets differ from other streets; historical areas differ from other areas in the city, etc.

All this makes clear the need for connecting parking requirements to the zoning system in the city plan while stating the minimum and maximum number of required parking spaces for every type of use. These limits of requirements are to be applied in line with the zoning system in every individual part of the city.

6. RESULTS

The previous parts of this paper reviewed and compared car parking provision requirements made by the Ministry of Municipal and Rural Affairs (MOMRA), Municipality of Al-Riyadh, Municipality of Jeddah, and Municipality of Al-Madinah in addition to an overlook on obstacles facing the application of such requirements. In this part, the most prominent results of the study will be reviewed:

6.1. Inconsistency in Requirements and Units of Measurement

Car parking provision requirements differ between the Ministry and municipalities and from one municipality to another. In addition, requirements set by the Ministry focus on using the floor area unit in order to calculate needed parking spaces in most land uses (except residential areas, schools/universities, mosques and meeting halls). The Municipality of Jeddah focused on using land area of the building (except schools, universities and hospitals) as a measurement unit for calculation of needed parking spaces. In Al-Madinah and Al-Riyadh multiple units were used to calculate needed parking spaces. It seems that the usage of floor area units could be more precise and easier to apply when calculating needed parking spaces by municipalities.

6.2. Insufficient Requirement of Parking Spaces

It is noticed that some land uses were not mentioned in requirements set by some municipalities. It is noticed too that requirements concerning some main uses are weak in terms of provision of sufficient number of parking spaces. For example:

For Commercial Services, requirements set by all municipalities are very weak in terms of provision of sufficient number of parking spaces. Some municipalities require one parking space per every 100 m² of land area (land surface area) or even are satisfied with front setback areas. In fact, this is not sufficient to fulfill demand on parking.

For Hospitals, the Ministry requires only one parking space per every 100 m² of floor area or per every 2 hospital beds in private hospitals. Similarly, the Municipality of Al-Riyadh requires only one parking space per every 100 m² of land area in private hospitals. In fact, these requirements are not sufficient to fulfill the need for parking in hospitals. In more details, the Municipality of Jeddah requires three parking spaces per every doctor's office, one parking space per every 4 beds, and one parking space per every three personnel.

For Educational Services, all municipalities require 5 parking spaces per every secondary school class room while the Ministry requires one parking space per every 5 students. As for university, the Ministry requires one parking space per every 3 student while the Municipality of Jeddah requires the same in addition to one parking space per professor and another one per every three personnel. No doubt that these weak requirements fall short of satisfying the need for car parking in secondary schools and universities.

For Wedding/ Meeting Halls, requirements of all municipalities are very weak in terms of providing sufficient parking spaces for wedding halls: All municipalities require only one parking space per every 50 m² of total building area. Requirements of the Ministry (one parking space per every 3.5 m² of total sitting area) are, no doubt, provide for more parking spaces.

6.3. Land Plot Areas Do Not Support the Application of Parking Requirements

As mentioned before, most land plots fall in the category of 1 000 m² or less causing great difficulties for municipal and regional authorities when trying to apply car parking requirements. The problem gets bigger when allocating such areas for commercial, educational, health or religious activities. Probably, this is one of the factors

compelling authorities to be satisfied by front setback areas to be used as parking areas.

6.4. Non Correlation between Car Parking Requirements and the Zoning System

Requirements set by the Ministry and by all municipalities are general in nature and applied to different part of a city on an equal basis without being correlated to zoning system pertaining to the extensive city plan.

6.5. Generalized Nature of the Ministry Requirements

Requirements set by the Ministry of Municipal and Rural Affairs are precise and extensive. However, they are general requirements for all sizes and types of cities. They don't make any distinction among big, middle-sized and small cities/towns. The Ministry could require minimum, middle, and maximum number for car parking spaces in order to apply the maximum limit to big cities, the middle limit to middle-sized cities and so forth.

7. RECOMMENDATIONS

As mentioned earlier, this paper is intended to be the first stage of a more extensive study that will undertake the task of reviewing/comparing the Saudi experience with other experiences in Arab and Western countries in terms of requirements for the provision of parking areas. In this part of the study, some recommendations are given to deal with upgrading requirements of parking provision according to different types of land use in Saudi Arabia:

1. The paper suggests to officials in the Ministry and municipalities the creation of an administration (or independent unit) concerned with planning, design, managing and operation of car parking areas.
2. There is a need for a detailed study of local conditions and characteristics of Saudi communities in order to define right numbers of parking areas for every type of use.
3. Revising the normal front setback system in view of car parking provision requirements according to type of use.
4. The paper suggests using the unit of floor area in parking requirements because it is the most precise

unit to be used in calculating needed parking spaces, in addition to the easiness of using such a unit.

5. It is important in determining the required number of car parking spaces to distinguish between different levels of service: local level, neighborhood level, city level and region level.
6. Focusing on clustering commercial and service activities in big commercial centers supplied with sufficient numbers of parking spaces with limiting (or even prohibiting) the commercial strip type in such activities.
7. Municipalities and private sector could make better investment through the erection of multi-storey parking adequately distributed within urban centers. The establishment of multi-storey parking buildings, adequately located nearby strip/ribbon commercials and within busy commercial districts, coupled with the application of strict measures against curb parking and/or violation of highway codes, can release traffic congestions and reduce car accidents.
8. It is necessary for parking requirements to be part of the zoning system in line with comprehensive city plans, in addition to setting maximum/minimum limits for car parking spaces required for every type of land use. Limits of such requirements are to be applied in line with the zoning system.
9. The main objective of any city's parking policies is that parking provided in conjunction with development should provide parking for visitors, employees and all users of the development in a way that is consistent with ensuring that road safety and amenity are not adversely affected and that is consistent with the aim of promoting sustainable development.
10. The paper suggests that the Ministry of Municipal and Rural Affairs set maximum, middle, and minimum requirements for the number of parking spaces required for every type of land use: maximum limit to be applied for big cities, middle limit to middle-sized cities, and minimum limit to small cities and towns.

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اشتراطات توفير مواقف السيارات حسب نوع الاستعمال في بعض المدن السعودية

صالح بن عبد العزيز الفوزان*

ملخص

تهدف هذه الورقة إلى عرض ومقارنة اشتراطات توفير مواقف السيارات حسب نوع الاستعمال في بعض المدن السعودية. شملت الدراسة اشتراطات مواقف السيارات لوزارة الشؤون البلدية والقروية، واشتراطات أمانة منطقة الرياض، واشتراطات أمانة محافظة جدة، واشتراطات أمانة المدينة المنورة. عرضت الدراسة أيضاً بعض الصعوبات التي تواجه تطبيق اشتراطات مواقف السيارات في المدن السعودية مثل محدودية مساحات الأراضي، وتنافس اشتراطات توفير المواقف مع نظام الارتدادات على مساحة الأرض، واستمرار توجه المدن السعودية للنشاط التجاري الشريطي، وعدم ارتباط اشتراطات توفير مواقف السيارات بنظام تخصيص المناطق (Zoning). بعد تحليل المعلومات، أظهرت الورقة بعض النتائج الهامة كتيابن بعض اشتراطات توفير مواقف السيارات بين الوزارة وأمانات المدن، وبين أمانات المدن وبعضها، وأحياناً استخدام وحدات قياس مختلفة للاشتراطات، وضعف بعض الاشتراطات في توفير العدد المناسب من المواقف، وعدم ارتباط اشتراطات توفير مواقف السيارات بنظام تخصيص المناطق (Zoning) في كل المدن، هذا بالإضافة إلى أن معظم مساحات الأراضي في المدن السعودية لا تساعد على تطبيق اشتراطات مواقف السيارات، وأخيراً فإن اشتراطات وزارة الشؤون البلدية والقروية لتوفير مواقف السيارات بالرغم من دقتها وشموليتها إلا أنها اشتراطات عامة لكل أحجام المدن وأنواعها. وأختتمت الورقة بمجموعة من التوصيات والمقترحات المناسبة لتحسين الوضع الراهن لاشتراطات توفير مواقف السيارات حسب نوع الاستعمال.

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