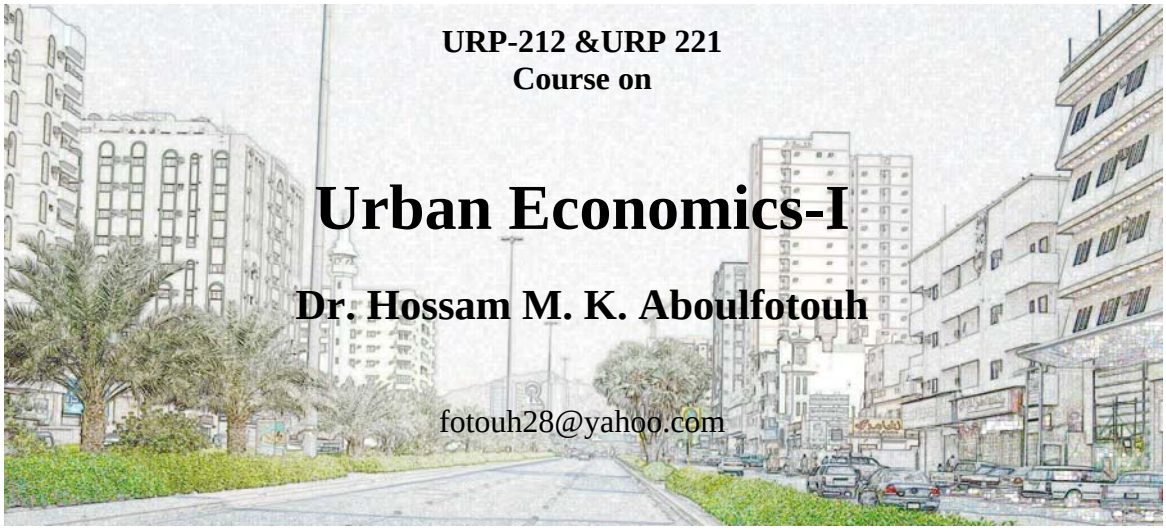
KING ABDULAZIZ UNIVERSITY
Faculty of Environmental Design
Department of Urban & Regional Planning



URP-212 &URP 221
Course on

Urban Economics-I

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Lecture note#3: Using the Demand Graph for Reckoning the Efficient Design Capacity of a Multi-story Parking in a District Center.

In planning, the total capacity *C* of the on-street parking could be reckoned empirically using the following equation.

$C = (S * \pi R^2) / (2 L * W * U^{-1})$.

Where:
- *R* is a radius of the catchment area of a multi-story parking.
- *S* is the percentage of the area of roads in the city, according to the bylaws.
- *L* is the average length of a car park area.
- *W* is the average-width of roads that have (free) on street parking from both sides.
- *U* is a percentage of the usable part from the total length of all streets.

Example: if *S*=0.30; *R*=300m; *L*=6m; *W*=30m; and *U*=0.8; then,

$C = (0.3 * 3.14159.. * 300^2) / (2*6*30*0.8^{-1}) = 189$ cars.

Here the number of cars *C* is the quantity Q_o for the price P_n=zero per hour.

The local authority might decide to build a multi-story parking in the center of this catchment area and prohibit the on street parking, in order to ease the traffic flow. Setting the price per hour P_n (to cover at least the fixed cost of operation and maintenance-O&M) will identify the efficient design capacity Q_n of the multi-story cars parking, in relation to the value of the unaffordable price P_o per hour, see fig-1.

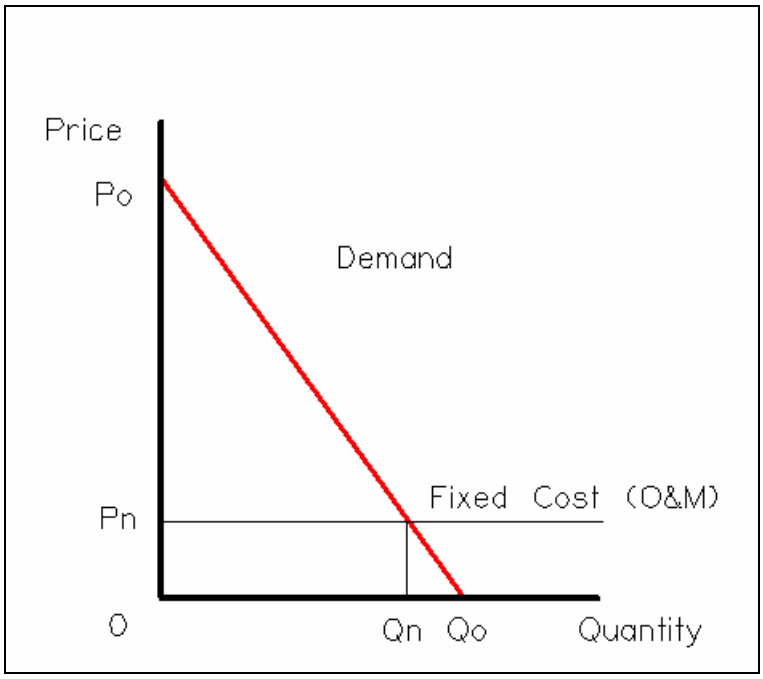

Figure-1

Example using the following equation:

$Q_n = Q_o [(P_o - P_n)/P_o]$

It is similar to the following equation [see lecture-1].
$P_n = P_o - [(P_o/Q_o) * Q_n]$

Now, if Q_o=1000 cars, the unaffordable P_o = 50 SR, and the fixed cost FC of O&M= P_n= 10 SR per hour; then,

Q_n= 1000 [(50-10)/50] = 800 Cars.

Assignment-1:
Reckon the efficient design capacity of a multi story parking in Abdullah Areif St. in Makkah city, using the following given information, and taking into consideration that the construction cost will be financed, by a cross-subsidy, from the sell of commercial shops in the lower floors.
- The area of the available plot is 54m * 116m.
- The average period of parking per day = 15 hours.
- Area per one car = 27M
- The maximum building height = 7 floors.
- Cost of operation and maintenance per M^2 = 2 SR a day.
- The unaffordable P_o = 30 SR per hour; & and P_n=FC of O & M.
- On street parking will be prohibited only in the main streets of the catchment area, within the white rectangle in fig-2.

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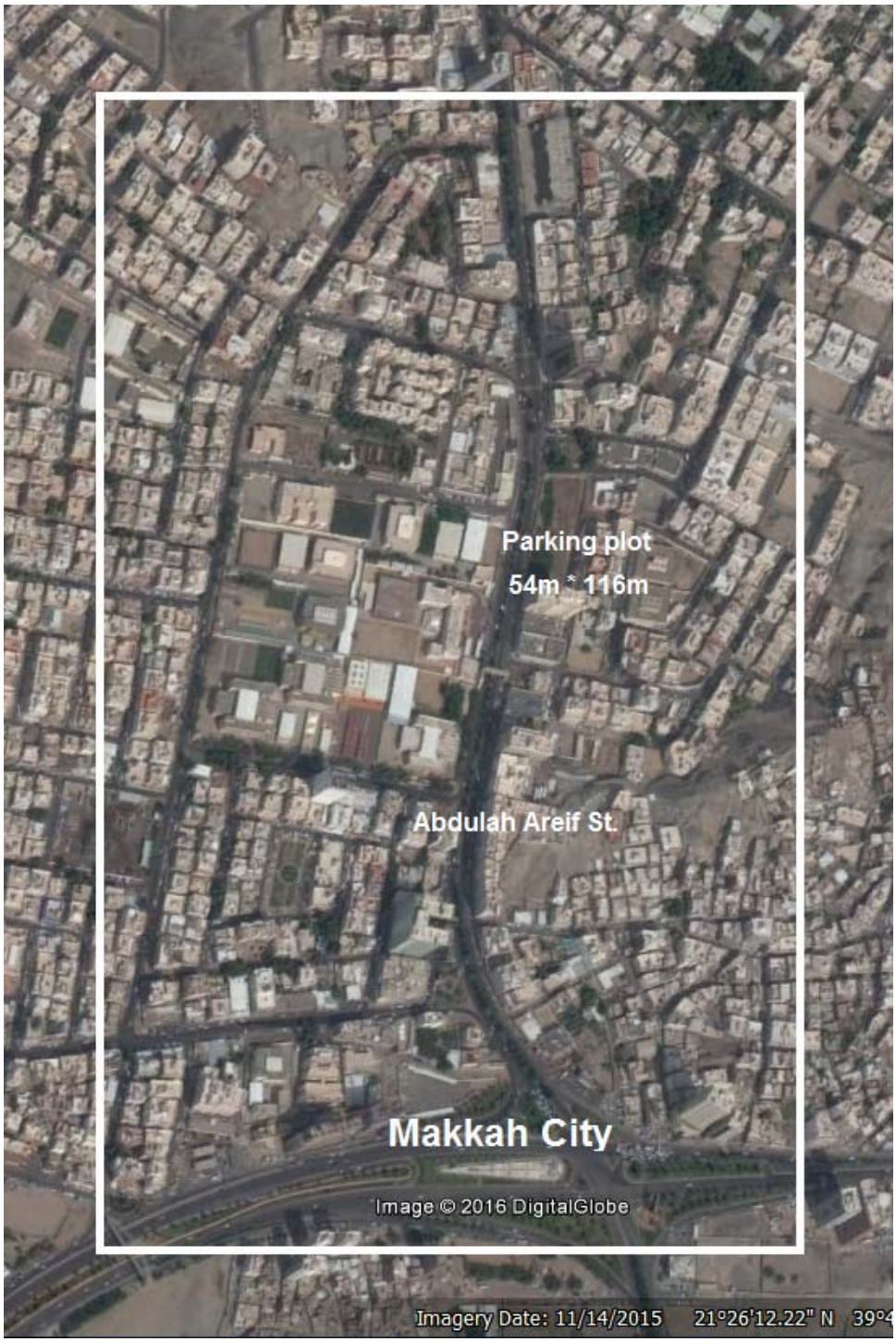

Figure-2: Abdulah Arief Street, Makkah [Source: Google Earth Data, 2015]

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