

A Regulation (E.C.) 561/2006-Inspired Approach; Identification Required Facilities for the Dry Canal Project over the Expressway No.1, Western Iraq

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Abstract

This paper aims by means of Regulation (E.C.)561/2006-inspired approach methodology and development its criteria in security and control to identifying the necessary facilities required to upgrade the Western Section of the Expressway No.1 performance in case of future operating of the Dry Canal Project over this route in Iraq. Fully considers this inspire approach, the study presents a method to enable this route to be incapable in the future to run the expected future huge Dry Canal Project in Iraq as a new intercontinental hub for trading and freight movement between the East and the West. The Grand Canal Project and its main route the Expressway No.1 needs to be capable to serve all the route's numerous users according to world-class specifications and standards by following the European Council Regulation (E.C.)561/2006. Joining the international trade movements, Iraq should be started preparing all the necessary facilities for the future Dry Canal Project, and must begin the hard and enormous work by renewing, modernizing and reforming the entire infrastructure for suitable and safety transportation in the country, and to build primarily all the necessary facilities, in particular over the Expressway No.1, to insure the suitable running for this project on Earth. This qualitative research hopes to be serves as an academic document to be published and to be used as a main part in my PhD dissertation and hopes that it will also assist target groups of experts, designers and engineers who will work for this project in the future.

Keywords: Dry Canal, Expressway No.1, Facilities, Amenities, Rest Area, Traveler Center.

I. Introduction

The provision of Rest Centers and Rest Areas for all kinds of vehicle drivers is recognized as integral part of a holistic approach to the management of future required amenities through the Dry Canal Project on the Expressway No.1 in Iraq^[1]. The Grand Canal Project is recognized as one of the biggest future project in Iraq, and considered a major contributor to the national economy in the country.^{[5][6]} All future drivers which will use that new international route will be vulnerable to fatigue, in particular, professional truck drivers who spend a large amount of time on the road undertaking long journeys by crossing the Iraqi territory to Europe in two directions from North to South and vice versa have some legal requirements to stop and take rest under fatigue, also their movement should be checked under control and in safety conditions.^{[1][2]}

In 2006 the European Council has introduced strengthened fatigue management legislation (Regulation(E.C.)561/2006) involving stronger requirements for professional drivers of fatigue regulated small and heavy vehicles requiring them by law to stop and rest during journeys in order to contribute to a reduction in fatigue-related incidents on the European roads networks^[4]. As a result, the demand for the facilities needs such like Rest Centers, Rest Areas, etc. increased substantially and commenced a program of works aimed at delivering a more effective network for small and heavy vehicle facilities across the European States Controlled Road Network^{[1][3]}. By considering the set of existing service areas on the Expressway No.1, the present work develops a procedure for selecting the subgroup of the most suitable service areas for modification in order to provide the best services to the goods transporters. Under multiple criteria such like security and control, a new (Regulation (E.C.)561/2006)-inspired approach study is developed that uses the main characteristics of the problem under study with the goal of selecting the best required facilities and its locations as well.^{[3][4]} It is recommended to substitute the existing randomly and unsuitable installations along this grant route with other

new essential amenities, such like full-service rest area/travel centers, check points, etc. and all these facilities should be located in the right nodes as a full-network. ^[14]

I.1 Study Scope

The study process involved extensive inspire approach data collection (Regulation (E.C.) No.561/2006), projections of future traveler facilities demand along the Expressway No.1, and by adding of the security and control installations through the development of the security and control criteria in the list of the main characteristics of Regulation (E.C.)561/2006 ^[3]. In short, initialize all the trade movements necessities and all the individual traveler amenities, also, development of security and control recommendations. Highway amenities such like Rest Centre is a public facility, located next to a large thoroughfare such as a highway, expressway or freeway at which drivers and passengers can rest, or refuel without exiting on to secondary roads, these facilities may include park-like areas, fuel stations, restroom and restaurants etc. ^{[1][4]}

Like most other countries in the world, road transportation is the most important communication in Iraq, but public facilities on the sides of the main routes are still poor and not enough to meet the travelers' needs and demands, also every appropriate site interval should be located highway rest centers for the travelers and drivers to relax before continuing their journey ^{[3][14]}. Therefore, this study is an attempt has been made to catch up with high international level and standards and to be useful to upgrade the planning layout of the Iraqi Dry Canal Project facilities over its route on the Expressway No.1 in future.

I.2 Study Area

The Expressway No.1 in Iraq with 1250km long, has two main sections (Western and Southern) with (10 parts), and was built under the most rigorous technical conditions, in order to ensure a comfortable and safe drive at maximum speed of 150 km/h and maximum axle load of 16.3 tons ^[6]. The Expressway No.1 goes in his western section through the biggest governorate in Iraq (Al-Anbar). Half of the residents of this governorate are living on the banks of the Euphrates River outside cities and the towns, there were between 1.9 million and 2 million inhabitants in the districts, the largest cities are Ramadi and Fallujah ^[7]. This section of the road starting from Bagdad West to Rutbah is a 455 km 3X3 lane with standing lane (15.5m width), splitting into two 2X2 lane roads, from Rutbah city to Trebil center on the (Jordanian Border), and Rutbah city to Al-Walid center on the (Syrian Border) ^{[6][7]}.

The Expressway No. 1 western section between Trebil center and Ramadi area falls largely within the Mesopotamian shrub desert region and comprised of several main wadis crossing the western desert of Iraq to the Euphrates ^[7]. The stony desert carries only a sparse herb growth, and only in the wadi where there are temporary pools and springs is there more abundant vegetation. The Expressway No. 1 passes 2 km to the North of the ecologically important site boundary within the Mesopotamian Shrub Desert Eco-region of the Habbaniyah Lake. Sand dunes are very common which cause many accidents; there should be special equipment at Al Rutbah City to avoid these accidents ^{[6][7]}.

I.3 Methodology

Identifying all the required amenities over the Expressway No.1, a new methodology is proposed, this method enables the best set of traveler's facilities to be determined from a set of possible locations valued in relation to multiple attributes, adding to them the factor of security and control, in addition to variables and those characteristics described below. This new methodology is developed the security and control part too for this particular problem in an effort to determine the best subgroups of locations from a set of feasible sites. The methodology proposed is inspired approach by data development Regulation (E.C.)561/2006 adding the security and control value and adapted to the characteristics that are typical of the problem in question.

The Study adopted and developing specific criteria belongs to the Regulation (E.C.) No.561/2006, they are being used to inform and help determine the appropriate recommendations for new facilities forward suitable operation of the future Dry Canal Project in Iraq over the Expressway No.1. This method combines qualitative information along with more subjective data to define the locations and functions of a proposed facility and the security for saving flow. The following criteria were considered for each existing or new location, facility, in addition the security criteria were added to this study to insure the safety for the traffic along the specific route:

- a. Type of facility (e.g., Full-Service Rest Area/Travel Centers, Rest area, Check &Control Points);
- b. Existing and projected capture rate (number of travelers stopping);
- c. Physical location opportunities/constraints;
- d. Potential traveler services (e.g., welcome center, retail, etc.);
- e. Relations with adjacent facilities.
- f. Security and Control. ^{[2][3]}

By adding the security and control installations through the development of the criteria in the list of the main characteristics of Regulation (E.C.)561/2006, is the proper selection to define the required facilities and

their locations over the Expressway No.1 in the western section as a first phase. More specifically, each evaluated unit is allowed to select its own value of distance and location, so that its efficiency can be measured in the best possible situation through the speed/time and the site ratio. Thus, if one facility does not reach the possible maximum value, then the cause will not be the arbitrary selection of facilities. The application of Regulation (E.C.)561/2006 has achieved the objectives for which it was originally conceived, and number of criteria have been generated and inspired whose common characteristic is the endogenous determination of the location, added to that the new criteria in security and control.

I.4 Why the (Regulation (EC) No.561/2006)?

The Dry Canal Project is offering a new global link for transporting goods between the North (Europe) and East (Asia), the Expressway No.1 should be ready and capable to running this project in Iraq^{[5][6][7]}. So, Shipments (Cargo) coming across the Gulf will be loaded in trucks from the Iraqi southern port and then they will continue their journey by crossing Iraq to reach Europe directly through Turkey. In this condition, the main reason for adopting this regulation could be summarized as following; Most of these truck's drivers will continue to carrying their goods to several countries inside Europe and vice versa, so, they'll be obligated to following the {Regulation (E.C.) No.561/2006}, in result, the drivers will follow the same rules and have the same rest conditions starting from Iraq to Europe and vis versa. Accordingly, the study will follow the rules above which belongs to the {Regulation (E.C.) No.561/2006}, to define all the facilities required over the Expressway No.1 to serve the Future Giant Dry Canal Project in Iraq.

II. General Definitions:

II.1. Regulation (EC) No.561/2006;

Regulation (E.C.) No.561/2006 of the European Parliament and of the Council of 15 March 2006 on the harmonization of certain social legislation relating to road transport and amending Council Regulations (EEC) No.3821/85 and (EC)No.2135/98 repealing Council Regulation (EEC)No.3820/85^{[1][3]} The Regulation (E.C.) No.561/2006) represents the commencement of a multi-stage, strategic approach to the provision of facilities for both heavy vehicle drivers and motorists across the European continent, and ultimately intends to ensure that suitable opportunities to stop and rest are available across Europe. ^{[1][2][3][14]}

II.2 The Dry Canal Project;

The general description of the Dry Canal project is; A primary overall vision according to the announced by the Iraqi officials, indicates; that cargo coming up from Asia through the Gulf will be loaded onto trucks and trains from Iraq's ports in the south, then the Commodities and goods shipped through the country over the Expressway No.1 to Turkey in the North to reach Europe, or west to Jordan and Syria to reach the Mediterranean and vice versa^[6]. This will give shippers an alternative to the traditional but longer route around the Arabian Peninsula and up through Egypt's Suez Canal. Therefore, Iraq needs to expand and modernize its rail network, roads, airports and seaports in order to become a commercial hub on a par with more developed Gulf neighbors^{[5][6]}. Iraqi government's desire is to build an integrated transport system, to link with regional countries through the Dry Canal Project that connects Asia to Europe, by using the Iraqi land as a bond for the global trade movement, and transforming its territory into a land route alternative to the Suez Canal. Consequently, it is possible to observe the massive size of infrastructure projects, which have been contracted between the government and the biggest companies to rebuild the entire necessary infrastructure which belongs to this giant project^{[6][7]}.

II.3 The Expressway No.1 in Iraq;

The Expressway No.1 in Iraq by far is the largest expressway project in the Middle East, passes through 7 governorates and 17 Districts whose total population is around 5.5 million^[6]. There are 6 population centers within 1 km of the Expressway, and a further 4 within 2kms. The Expressway No.1 in Iraq is one of the biggest and attractive roads structures built in the Middle-East^[5]. This main corridor it was and still one of the most important travelled roads for decades, it is vital to Iraq's economy^{[5][7]}. The Expressway No.1 is heavily used by trade freight trucks, tourists, and the general public in the country. This super modern path with 1,250 km long connects Kuwait and southern regions of Iraq with the capital Baghdad, with western regions on the borders with Jordan and Syria^[6]. It should be one of the main future routes of the Dry Canal Project, as a new connection through the Iraq territory for international trade movement between East and West of the world.^[7]

II.4 Full-Service Rest Area/Travel Centers;

Full-travel Center/travel centers are a commercial roadside infrastructure element that includes public amenities which are of primary need and shall be provided at no charge and no obligations for users and additional travel related services as commercial activities. Travel centers are open 24 hours a day and offer a variety of fast food

and full-service dining options, fuel, rest rooms and other amenities for travelers ^{[1][3]}. There are several types of roadside facilities that provide opportunities for travelers to safely stop, rest and manage their travel needs and safely access some of the state's recreational facilities. Besides public open roadside facilities worldwide known as rest areas or SRA (Safety Road Area) there are specially developed commercial facilities travel centers which provides refueling, rest (parking), and often ready-made food and other services to motorists and truck drivers in addition to public amenities which are of primary need and shall be provided at no charge and no obligations for users ^[2]. Benefits include improved safety by reducing driver fatigue and the number of vehicles parked on the shoulders of state routes, refuge from adverse driving conditions, and increased tourism promotion, proper level of comfort for motorists avoiding exiting from main road for food and beverages ^[1].

II.5 Travelers Rest Area;

A rest area is a safe area beside the road where drivers can pull off the roadway to rest. Current research indicates that fatigue has been underestimated as a contributor to vehicle accidents in rural and remote regions. Rest areas can reduce fatigue-related accidents by allowing drivers to stop and rest at regular intervals ^{[8][9]}.

III. Regulation (EC) No.561/2006 General Criteria III.1 Rest Area Key Users

The summary of each essential required article used for this study is as following:

Article.1: This Regulation lays down rules on driving times, breaks and rest periods for drivers engaged in the carriage of goods in order to harmonies the conditions of competition between modes of inland transport, especially with regard to the road sector, and to improve working conditions and road safety. ^{[1][2][3]}

Article.4: For the purposes of this Regulation the following definitions shall apply: b) "vehicle" - (c) 'driver' - (d) 'break' - (f) 'rest' - (g) 'daily rest period' - (j) 'driving time' - (k) 'daily driving time' - (m) 'maximum permissible mass' - (q) 'driving period' ^{[1][2][3]}.

Article.6: The daily driving time shall not exceed 9 hours. However, the daily driving time may be extended to at most 10 hours not more than twice during the week ^{[1][2][3]}.

Article.7: After a driving period of four and a half hours a driver shall take. After a driving period of four and a half hours a driver shall take an uninterrupted break of not less than 45 minutes, unless he takes a rest period ^{[1][2]}.

There are three main categories of road users:

- a. Cargo vehicles/truck drivers;
- b. Tourists;
- c. General road users;

The main categories of road users and each of these categories has different motivation for stopping:

1. **Truck Drivers:** Cargo vehicles/truck drivers must stop for defined period in accordance to law. These stops are regulated by Regulation (EC) No.561/2006 and comprise 15-45 minutes for short-break (30 km) and 9-11 hours for long break (150-200 Km) ^{[1][2][14]}.
2. **Tourist Travelers:** Tourists being a very diverse group of users have a choice when to stop. This category often utilize opportunities provided by commercial facilities (petrol stations, road side shops, restaurants) but also require an equipped place for food & drinks breaks, sanitary needs, fatigue management. This importance of rest area in remote and little populated rural areas is critical because of lack of commercial roadside facilities ^{[1][2][14]}.
3. **General Road Users:** include residents of towns and villages raveling/commuting for work, shopping or personal matters. They are likely to make their journey as short as possible but may need to stop to manage fatigue. This group of users values the cleanness, safety ^{[1][2][14]}.

III.2 Regulation (E.C.) No 561/2006 General Criteria

The Regulation (E.C.) No.561/2006 general criteria in short could be; The road users' needs to make regular stops during their travel caused by different needs such as restroom use, short break/light exercise, vehicle check, pet relief, child relief, change drivers, and others as flowing;

- A. "Commercial vehicles operators, as they are required to follow regulations on driving time limits and must take breaks for short breaks and for long term rest for night sleep: Some of the required services may be found at special commercial facilities like roadside restaurants, gas stations, service stations and commercial truck parks but travel centers may offer an integrated combination of different services accomplished by unique opportunity of walk/picnic space, accommodation for travelers with special needs, parking places for vehicles of different size and services of welcoming centers" ^{[1][3][10]}.
- B. "The main aspect to be considered in this study is the amount of resting time required by the drivers of vehicles transporting goods. The drivers are obliged to respect certain minimum stops and rest periods during the exercise of their activity. These stops are regulated and it is established that, after a driving period of four and a half hours, drivers have to make an uninterrupted stop of at least 45 minutes. This stop can be substituted by a short pause of at least 15 minutes followed by another pause of at least 30

minutes, alternating with the driving activity so that the above-mentioned dispositions are met, (Regulation (E.C.) No.561/2006) ^[2]. Given that the maximum speed allowed for vehicles carrying goods is 80 km/hour on highways, 70 km/hour on main roads, and 60 km/hour or less on the remaining roads, even a non-stop route of 360 km is currently allowed. Nevertheless, traffic authorities recommend a pause after each two hours of driving, or after every 150-200 km, in order to prevent fatigue” ^{[1][3][10]}.

- C. “This distance is also justified by safety recommendations of the international traffic agencies, then the estimation is that there must be a full service rest area every 150-200 Km to enable drivers inspired approach to selecting parking areas for goods trucks to make the statutory pauses during the execution of their activity” ^{[1][3][10]}.

Consequently, these new facilities must be comprehensive, executed on the right nodes and distances, and includes the factual functions as following:

1. There must be a Full-Service Travel Center every 150-200 Km to allow drivers with heavy trucks to take their long or short rest. ^{[1][3][2]}
2. Travelers Center with gas stations should be located at approximately 80 km in between, taking into account commercial facilities and noting that tourist interest points are regarded as part of the rest area network. Rest areas should not be located within 80 km of a commercial facility, unless they are tourist interest points. Existing rest areas will be considered on a case-by-case basis. ^{[1][2][3]}
3. Resting opportunities (Rest Area) should be no more than 30 km in between. ^{[1][2][3]}
4. That build rest areas and designate areas on select areas that can be long-term leased by gas stations and restaurants. The exception being the restrooms on rest areas with gas stations, where the gas station must provide sufficient restrooms for the travelers, and aesthetics of the rest area as the most critical factor when they choose to stop. ^{[1][2][3]}

IV. Definition Locations

The Expressway No.1 in Iraq by far is the largest expressway project in the Middle East, passes through 7 governorates and 17 Districts whose total population is around 5.5 million. There are 6 population centers within 1 km of the Expressway, and a further 4 within 2km. This expressway has two main sections (Western and Southern), with (10 parts), and was built under the most rigorous technical conditions, in order to ensure a comfortable and safe drive at maximum speed of 150 km/h and maximum axle load of 16.3 tons ^{[6][7]}.

IV.1 Western Section (Study Area)

The Expressway No.1 goes through the biggest governorate in Iraq (Al-Anbar). Half of the residents of this governorate are living on the banks of the Euphrates River outside cities and the towns, there were between 1.9 million and 2 million inhabitants in the districts, the largest cities are Fallujah city, Saqlawya city, Hit city and Rutbah city. This section of the road starting from Bagdad West^o (R0) to Jordanian Junction-Syrian near Rutbah city is a 455 km 3X3 lane with standing lane (15.5m width), splitting into two 2X2 lane roads, from Rutbah city to Trebil center on the (Jordanian Border), and Rutbah city to Al-Walid center on the (Syrian Border).

VI.2 Travel Center Design Guide

As Expressway No.1 traffic flow's volume after the Dry Canal Project operation will be increasing in the future, the demand for roadside traveler services (rest service centers, rest area, parking spaces, gas stations, etc.) is also anticipated to increase too ^[12]. In fact, the new facilities do not change in the future, if new amenities and/or services are added to any existing locations, there may be a need to supply additional parking and that is depend on future flow's volume.

VI.2.1 Location

The location of travel center shall help to create a viable business case and shall be determined considering two main factors:

- a. Tourists (in-land and transit) traffic trends and intensity; ^{[11][13]}
- b. Regular national and international haulers traffic trends and intensity; ^{[11][13]}

The exact rest area location shall be identified based on proper land availability, good views of surrounding area, taking into consideration geometric and environmental constraints. The location and design should encourage users to stop and utilize the offered services. Landscape and hardscape are required to be designed to incorporate sustainable design principles ^{[8][14]}. Through the implementation of green building principles, the site design and construction shall reduce negative impacts on the environment. Some of the key factors with regards to sustainability and landscape design are the proper selection of plant materials, retention and restoration of native habitat and reduced irrigation and maintenance requirements of the site. ^[9]

V.2.1 Definition Functions

According to the Regulation (E.C.) No.561/2006, each type of Rest Centers is different, and requires

consideration of the level of facilities that are appropriate at that particular site. Some are located on busy highways and need to be larger, others are in remote areas but provide a vital service in terms of facilities, while others are adjacent to commercial operations ^{[1][2][3]}. By adding the security check points and control as new facilities to the main list of the functions, it could be defining each type of the Rest Area as following:

A. Full-Service Rest Center;

The following architectural functions are proposed for Full-Service Travel Center every 150-200km in between;

1. Welcome Center main building (Rest Rooms, Restaurant, Entertainment, Shops, etc.)
2. Vehicle full-service building;
3. Management and administrative Center;
4. Bank
5. Medical Clinic;
6. Gas station area;
7. Main Security and control Center;
8. Truck parking area;
9. Bus parking area;
10. Passenger vehicle parking area;
11. Rest area;
12. Recreation Area;
13. Adding (Check & Control Point);

B. Travel Center;

The following zones area proposed to be provided at travel center every 80 km in between:

1. Gas station area;
2. Recreation area;
3. Truck parking area;
4. Bus parking area;
5. Passenger vehicle parking area;
6. Vehicle parking area for disabled persons;
7. Rest area;
8. Vehicle repair area;
9. Small shops;
10. Adding (Check & Control point);

C. Rest Area;

The following zones area proposed to be provided at Rest Area every 30 km in between:

1. Truck parking area;
2. Bus parking area;
3. Passenger vehicle parking area;
4. Vehicle parking area for disabled persons;
5. Picnic rest area;

D. Adding (Check & Control Point);

This zone area proposed to be provided at every important interchange or intersection over the Expressway No.1 route.

Application Criteria; Results

At the broader level of all kinds of rest stopping station's planning, it is important to identifying all stopping opportunities along the Expressway No.1 route. Locations of stopping opportunities along the route include Full-Service Rest Center, Travel service centers, Rest area and Check & Control Points. Examining these assists in finding sections of the route where new rest centers or improvements will complement existing stopping opportunities ^[10]. Adding Security & Control Check Points for the facilities in developing these criteria was to insure the safety journey for all future Dry Canal project and to control the goods movement through this intercontinental hub over the Iraqi territory.

Following this route, application criteria over the Western Section of the Expressway No.1(Study Area) according to regulation (E.C.)561/2006 could be that Cargo vehicles/truck drivers and all the route users must stop for defined period in accordance to law. These stops which regulated by Regulation (E.C.) No.561/2006 could be definite over the Expressway No.1 (Western Section) In accordance with the actually lengths, as shown in: Fig:2, Fig:3, Fig:4, Fig:5, Fig:6, Fig:7, Fig:8, Fig:9, Fig:10, Tab:1, Tab:4.

Starting from R0, the closer station from Baghdad city near Abu Gharib region in the middle of the country, which it is considered as the main station over the middle of the Expressway No.1 route as well. Consequently, the results of application the criteria over all these parts is as following:

a. Part R9-A, Baghdad West R0– Intersection with Habbaniyah Lake, length:63km;

1. Full-Service Travel Center; (R0) as a main and central installation at the station **A**. This station it can be

- considerate as the main station over the middle of the Expressway No.1 route ^{Fig:4, Tab;1, Tab.4.}
2. Rest Area; 30km from station **A**. needs to be located at the intersection of Falluja city with Abu Gharib region at the station **B**. ^{Fig:4, Tab;1, Tab.4.}
 3. Check & Control Point; 1km from station **B**. needs to be located to guaranty security and to control the traffic on the intersection with Expressway No.8 at the station **C**. ^{Fig:4, Tab;1, Tab.4.}
 4. Check & Control Point; 15km from station **C**. needs to be located at the intersection on Saqlawia region at the station **D**. ^{Fig:4, Tab;1, Tab.4.}
 5. Rest Area; 7km from station **D**. needs to be located at the intersection on Habbaniyah lake region at the station **E**. ^{Fig:4, Tab;1, Tab.4.}
 6. Check & Control Point; 1km from station **E**. needs to be located to guaranty security and to control the traffic on the intersection with Habbaniyah lake at the station **F**. ^{Fig:4, Tab;1, Tab.4.}
- b. Part R9-B, Intersection with Habbaniyah Lake –Intersection with Hit city, length:61km;** ^{Fig:5, Tab;1, Tab.4.}
7. Travel Center; 35km from station **F**. needs to be located at the station **G**. ^{Fig:5, Tab;1, Tab.4.}
 8. Rest Area;34km from station **G**. needs to be located with Hit city at the station **H**. ^{Fig:5, Tab;1, Tab.4.}
 9. Check & Control Point; 1km from the station **H**, needs to be located to guaranty security and to control the traffic on the intersection with Hit city at the station **I**. ^{Fig:5, Tab;1, Tab.4.}
- c. Part R10, Intersection with Hit city – Tullaha Region, length:134km;**
10. Rest Area; 30km from station **I**. needs to be located at the station **J**. ^{Fig:6, Tab;1, Tab.4.}
 11. Travel Center; 28km from station **J**. needs to be located at the station **K**. ^{Fig:6, Tab;1, Tab.4.}
 12. Rest Area; 39km from station **K**. needs to be located at the station **L**. ^{Fig:6, Tab;1, Tab.4.}
 13. Full-Service Travel Center; 37km from station **L**. needs to be located at the station **M**. ^{Fig:6, Tab1, Tab.4.}
- d. Part R11, Tullaha Region – Rutbah city, length:137km;**
14. Rest Area; 30km from station **M**. needs to be located at the station **N**. ^{Fig:7, Tab;1, Tab.4.}
 15. Rest Area; 28km from station **N**. needs to be located at the station **O**. ^{Fig:7, Tab;1, Tab.4.}
 16. Travel Center; 23km from station **O**. needs to be located at the station **P**. ^{Fig:7, Tab;1, Tab.4.}
 17. Rest Area; 30km from station **P**. needs to be located at the station **Q**. ^{Fig:7, Tab;1, Tab.4.}
 18. Check & Control Point; 25km from station **Q**. needs to be located at the station **R**. ^{Fig:7, Tab;1, Tab.4.}
 19. Rest Area; 1km from station **R**. needs to be located at the station **S**. ^{Fig:7, Tab;1, Tab.4.}
- e. Part R12, Rutbah city – Trebil Center (Jordanian border), length:129km;**
20. Travel Center; 21km from station **S**. needs to be located at the station **T**. ^{Fig:8, Tab;1, Tab.4.}
 21. Rest Area; 20km from station **T**. needs to be located at the station **V**. ^{Fig:8, Tab;1, Tab.4.}
 22. Full-Service Travel Center; 22km from station **V**. needs to be located at the station **W**. ^{Fig:8, Tab;1, Tab.4.}
 23. Rest Area; 34km from station **W**. needs to be located at the station **X2**. ^{Fig:8, Tab;1, Tab.4.}
 24. Travel Center; 32km from station **X2**. needs to be located at the station **Y2**. ^{Fig:8, Tab;1, Tab.4.}
- f. R13, (Jordanian-Syrian) Junction-Syrian border, length:76km;**
25. Rest Area; 22km from station **W**. needs to be located at the station **X1**. ^{Fig:9, Tab;1, Tab.4.}
 26. Rest Area; 30km from station **X1**. needs to be located at the station **Y1**. ^{Fig:9, Tab;1, Tab.4.}
 27. Travel Center; 24km from station **Y1**. needs to be located at the station **Z1**. ^{Fig:9, Tab;3, Tab.4.}

General Discussions

- i. This study witnessed remarkable the possibility of development in the execute and expansion of traveler facilities over the Expressway N0.1 according to the Regulation (EC) No.561/2006, and Adding Security & Control Check Points for the facilities in developing these criteria The goal of this planning study for the overhaul of Expressway No.1 facilities system was defined from the onset as a two-fold mission.
- ii. The study was to develop a comprehensive program for the improvement of traveler facilities, a determination of the future Dry Canal needs over the Expressway No.1, and the development of a series of recommended strategies to meet those needs. Second, the study was to generate actual improvement concepts for all Expressway No.1 western section traveler facilities, as well as concepts for several potential new facilities as needed.
- iii. The overall development of the Dry Canal Project will play a pivotal role in the growth of the suggested traveler facilities along the selected Expressway in Iraq. It is evident from application criteria results that the concentration of all travelers' facilities was near the intersections with main roads near the major cities.
- iv. It expected to be noticed the future growth of the major groups of traveler facilities i.e. food-joints, security posts and health services, banks and communications, fuel-filling and allied services.
- v. Before, traveler's facilities were mainly randomly concentrated along the route, but after this study, these facilities could spread all along the Expressway No.1 at the right locations.

Conclusions

This work discusses the locations of new facilities for the cargo drivers and all general road users in the dry

Canal Project over the Expressway No.1 southern Iraqi territory. European regulations on transportation force drivers to make specific rest stops along their route and give priority to the parking of goods vehicles in service areas with special characteristics. Drawing from the necessary required data that was collected from the regulation (E.C.)561/2006-inspired approach methodology. Adding Security & Control Check Points for the facilities in developing these criteria and to secure the new man trade movement over the expressway No.1.

The results show the possibility of execute in total of 27 facilities to serve the future Dry Canal Project over the Western Section of the Expressway No.1 in Iraq. All these facilities could improve the all kinds of services for different types of travelers and users along the Expressway No.1, and also could provide employment to the surrounding community along this route. The study has improved work conditions for drivers and users who are covered by it, as well as has improved general Expressway No.1 services. Since those facilities guarantee adequate rest, and also taking into account experience with enforcement practices during the driving according to the regulation (E.C.)561/2006, a system of compensation for reduced daily rest periods is no longer necessary for all the Dry Canal future users over this route.

The work, therefore, underlines the need for a network of four major kinds of Rest areas adapted for goods trucks, tourist and other users that satisfies the drivers' rest requirements in accordance with the law, prevents social risk, and minimizes the collective rejection that a potential accident involving any of these vehicles might cause. A new method is proposed, a regulation (E.C.)561/2006 -based model that enables the best set of areas to be determined from the 27 possible locations, which are valued in relation to four variables types of facilities The 27 best locations are offered for cases in which service areas are to be located, under the limitation that 27 is the maximum number of locations that can be established if the restriction of locating areas ranging from approximately 150-200 km, 80km and 30km apart is to be respected. The choice of these four options as possible solutions is merely illustrative, since it will remain the responsibility of the corresponding authorities on the matter to decide on the final number of locations, probably upon the basis of economic criteria

The general requirements thus solved provides a helpful tool for the decision-making process concerning the location of this kind of service area. Not only do drivers find their necessities for longer rest stops to be satisfied, but this methodology also minimizes both the exposure to potential accidents involving vehicles in transporting goods over through the Dry Canal Project over the Expressway No.1 in Iraq.

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Fig.1; Iraq's Position in World Map



Fig.2 Expressway No.1 (Southern & Western) Sections



Fig.3 Expressway No.1 (Western Section) Study Area

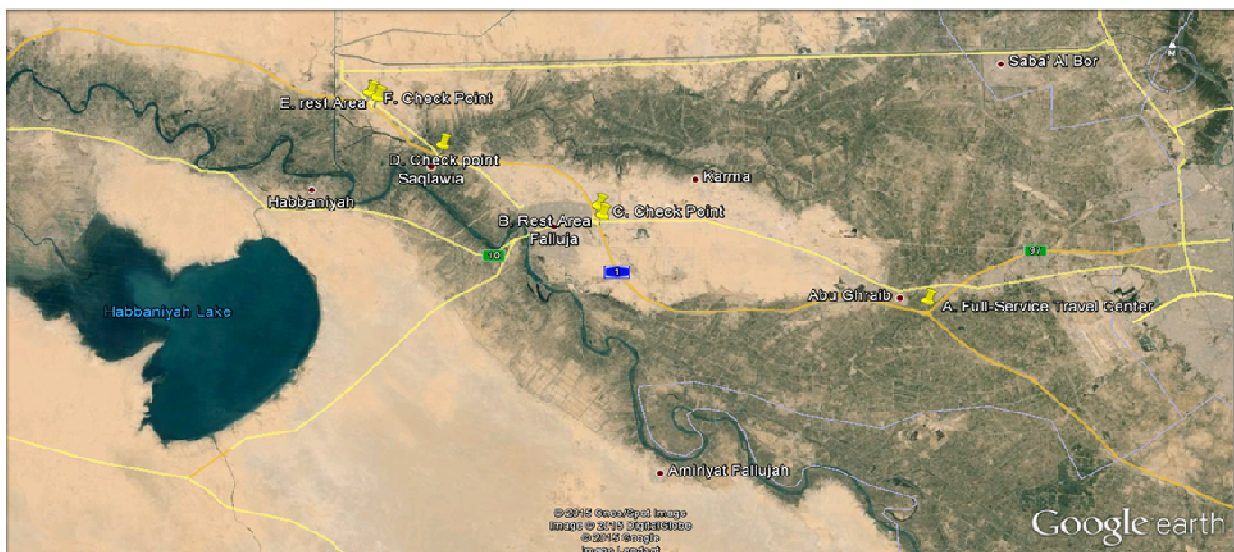


Fig.4; R9-A, Baghdad West R0– Intersection with Habbaniyah Lake, 63km Length.

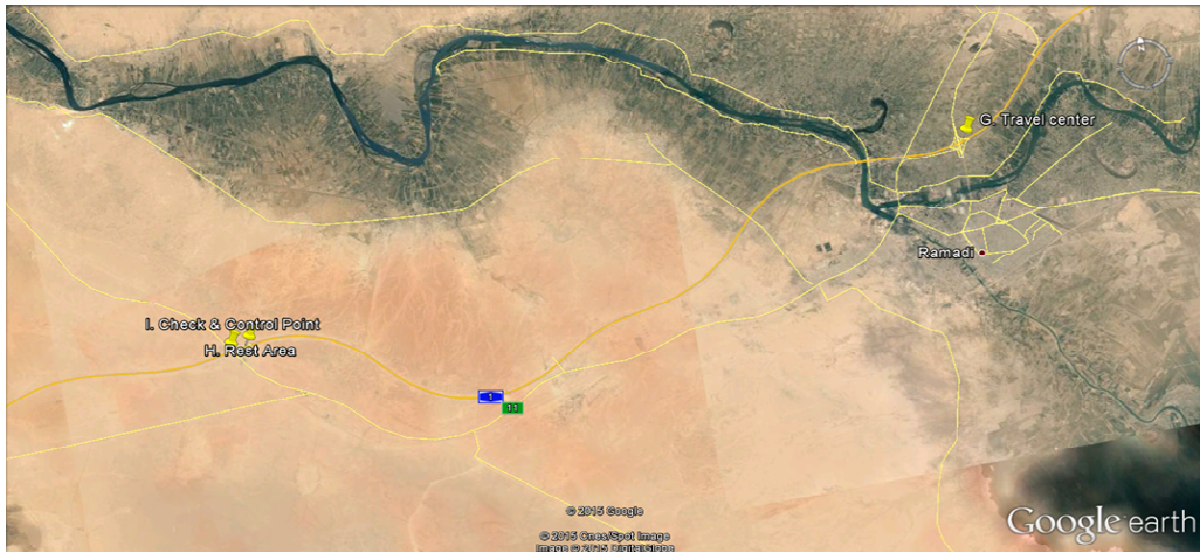


Fig.5; R9- B, Intersection with Habbaniyah Lake –Intersection with Hit city, 61km Length



Fig.6; R10: Intersection with Hit city – Tullaha Region,134km length

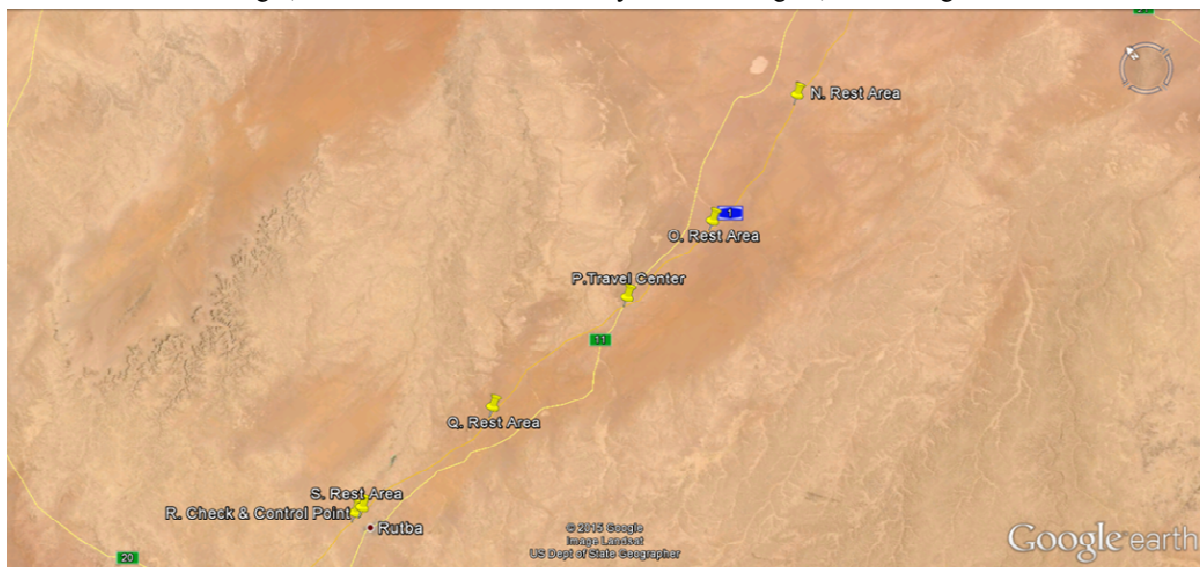


Fig. 7, R11Tullaha Region – Rutbah city, 137km Length.



Fig.8: R12, Rutbah city – Trebil Center (Jordanian border),129km Length



Fig.9; R13, (Jordanian-Syrian) Junction-Syrian border, 76km Length

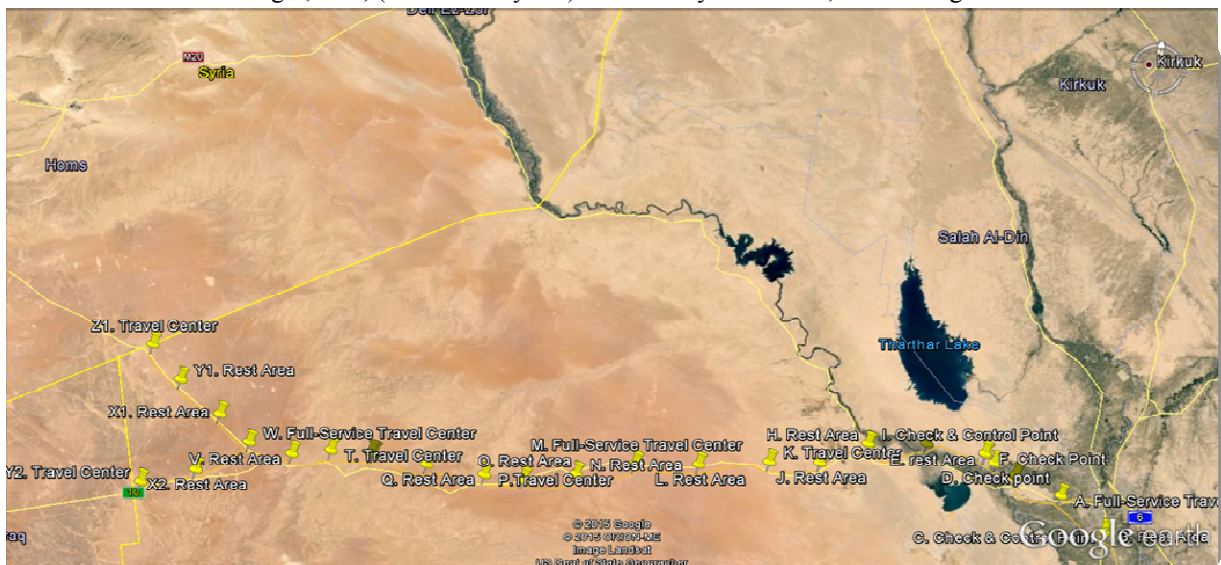


Fig.10; New Facilities Locations General Map

Tab.1; Western Sections Parts Length

Part	Description	Length [km]
R9. A	Baghdad West R0– Intersection with Habbaniyah Lake-54km length	124km
R9. B	Intersection with Habbaniyah Lake –Intersection with Hit city- 70km length	
R10:	Intersection with Hit city – Tullaha Region	134km
R11:	Tullaha Region – Rutbah city	137km
R12:	Rutbah city – Trebil Center (Jordanian border)	129km
R13:	(Jordanian-Syrian) Junction-Syrian border	76km

Tab.2; The Total Numbers of the Facilities

Facility	Unit
Full-Service Travel Center	3
Travel Center	6
Rest Area	13
Check & Control Point	5

Tab.3; The Numbers of the Facilities

Part	Description	Full-Service Travel Center	Travel Center	Rest Area	Check & Control Point	Total
R9.A	Baghdad West R0– Intersection with Habbaniyah Lake	1	0	2	3	6
R9.B	Baghdad West R0– Intersection with Habbaniyah Lake	0	1	1	1	3
R10	Intersection with Hit city – Tullaha Region	1	1	2	0	4
R11	Tullaha Region – Rutbah city	0	1	4	1	6
R12	Rutbah city – Trebil Center (Jordanian border)	1	2	2	0	5
R13	(Jordanian-Syrian) Junction-Syrian border	0	1	2	0	3

Tab.4; Facilities Results Table

No	Station	Part	Description	Function	Distance	Length
1.	A.	R9-A	Baghdad West R0– Intersection with Habbaniyah Lake	Full-Service Travel Center	R0 km.	54km
2.	B.	R9-A	Baghdad West R0– Intersection with Habbaniyah Lake	Rest Area	30km	
3.	C.	R9-A	Baghdad West R0– Intersection with Habbaniyah Lake	Check & Control Point	1km	
4.	D.	R9-A	Baghdad West R0– Intersection with Habbaniyah Lake	Check & Control Point	15km	
5.	E.	R9-A	Baghdad West R0– Intersection with Habbaniyah Lake	Rest Area	7km	
6.	F.	R9-A	Baghdad West R0– Intersection with Habbaniyah Lake	Check & Control Point	1km	
7.	G.	R9-B	Intersection with Habbaniyah Lake –Intersection with Hit city	Travel Center	35km	70km
8.	H.	R9-B	Intersection with Habbaniyah Lake –Intersection with Hit city	Rest Area	34km	
9.	I.	R9-B	Intersection with Habbaniyah Lake –Intersection with Hit city	Check & Control Point	1km	
10.	J.	R10	Intersection with Hit city – Tullaha Region	Rest Area	30km	

11.	K.	R10	Intersection with Hit city – Tullaha Region	Travel Center	28km	134km
12.	L.	R.10	Intersection with Hit city – Tullaha Region	Rest Area	39km	
13.	M.	R.10	Intersection with Hit city – Tullaha Region	Full-Service Travel Center	37km	
14.	N.	R11	Tullaha Region – Intersection with Rutbah city	Rest Area	30km	137km
15.	O.	R11	Tullaha Region – Intersection with Rutbah city	Rest Area	28km	
16.	P.	R11	Tullaha Region – Intersection with Rutbah city	Travel Center	23km	
17.	Q.	R11	Tullaha Region – Intersection with Rutbah city	Rest Area	30km	
18.	R.	R11	Tullaha Region – Intersection with Rutbah city	Check & Control Point	25km	
19.	S.	R11	Tullaha Region – Rutbah city	Rest Area	1km	
20.	T.	R12	Rutbah city – Trebil Center (Jordanian border)	Travel Center	21km	129km
21.	V.	R12	Rutbah city – Trebil Center (Jordanian border)	Rest Area	20km	
22.	W.	R12	Rutbah city – Trebil Center (Jordanian border)	Full-Service Travel Center	22km	
23.	X2.	R12	Rutbah city – Trebil Center (Jordanian border)	Rest Area	34km	
24.	Y2.	R12	Rutbah city – Trebil Center (Jordanian border)	Travel Center	32km	
25.	X1.	R13	Jordanian junction-Syrian border	Rest Area	22km	76km
26.	Y1.	R13	Jordanian junction-Syrian border	Rest Area	30km	
27.	Z1.	R13	Jordanian junction-Syrian border	Travel Center	24km	