

# Cooperative Design Approach On Highway Rest Areas Reflecting Regional And Residential Characteristics - In Case Of Maesong Rest Area In Korea -

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## Abstract

Over the past few years, rest areas on highways have greatly modernized with newly added features. They have gradually developed from small stops, which were originally used for food and beverage spaces to large stops with big shopping malls. During this process, a new paradigm called “living with(cooperative)” has appeared. We call this new kind, “the fourth generation rest areas”. Following paper will be based on the case study of Maesong van rest areas, which the Ministry of Land, Infrastructure and Transport of South Korea are planning to carry forward as the fourth generation rest areas. The concept of coexistence could be applied with several interests based on various indicators. The three interests which will be dealt here are the living with nation, region and residents. Based on these, this paper has its purpose on giving the guidance of the rest stops on highways through “living with”.

**Keywords:** highway rest area, bus terminal, national route, public transportation, stop function, van parking lot

## 1. Introduction

Highway rest area is changing. Recently, highway users are increasing due to increase of weekend travelers caused by five-day workweek settlement. Thus, it is evolving from prior function of rest and providing snack to culture complex of both enjoying shopping and culture. The following illustrates the history of highway rest area.

Table 1: History of rest areas

division	generation	form	merchandise
before 1980	1st	small	Simple beverages
1980~2000	2nd	large	F&B Enlargement
after 2010	3rd	complex	F&B Sophistication & diversification

Such change of forms to rest area operators is to be a solution to gain competitiveness for reflection of various needs of users and size enlargement due to increase of highway traffic. Nowadays, representative complex rest areas are Deok pyeong nature land in Yeong dong highway and Majang complex in Central highway. In these places, Various facilities (Lotte Mart, Fashion outlet, trails, pet cafe, photo zone, etc) can be seen which reflected needs of users.

This seems a great development that highway rest area escaped from mere 'rest' area to Malling form. However, only highway users are accessible to those areas, constitutional form to increase revenue and introduction of merchandise are still problems.

Highway rest areas are becoming more and more as famous tour spots and gateway of specific regions. Moreover, 4th generation rest are should be introduced which are not 3rd. 4th generation rest areas are for nation, region, enterprise, citizens. With active communications and harmonies, they should be a form providing social enterprise.

This thesis will explain Maesong vans rest area as an applied example which is about to be driven by ministry of transportation. Reflecting policy direction of national and regional position, later it would facilitate a foundation for rest areas to take place as famous spots. Introductory facilities are to be bus stop function, rest area near national route, and providing van parking grounds beside general functions. Through these measures, its purpose is to present vision of highway rest are with coexistence of region.

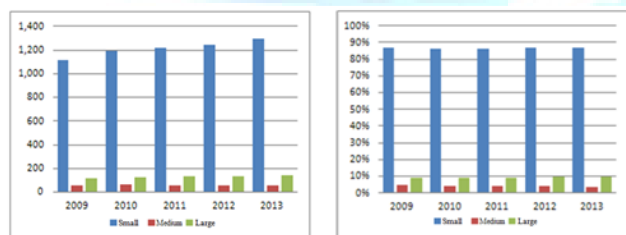
**2. Highway Facilities Nowadays****2.1 Highway Nowadays****2.1.1 Highway traffic and share**

From 2013, highway traffic was 1494millions/year increasing 4.0% yearly. About Car specific share, small car share was consistent while large car share increased.

Table 2: Highway traffic volume and share

Type		small	medium	large	sum
2009	million	1,114	59	112	1,286
	share	86.6%	4.6%	8.8%	100%
2010	million	1,191	61	126	1,377
	share	86.5%	4.4%	9.1%	100%
2011	million	1,218	59	136	1,409
	share	86.5%	4.2%	9.3%	100%
2012	million	1,240	56	135	1,431
	share	86.7%	3.9%	9.4%	100%
2013	million	1,295	55	144	1,494
	share	86.7%	3.7%	9.6%	100%

Source: Korea expressway corporation



Traffic volume

Traffic share

Fig. 1 Traffic volume and share

**2.1.2 Highway rest area nowadays**

Total rest area number is 178 in 2013 and showing 3.7% increase rate yearly. Van rest areas are showing rapid increase-doubled from 2010. Thus, rest areas are consistently increasing as highway traffic is increasing.

Table 3: Total number of rest area

Year	2008	2009	2010	2011	2012	2013
Number	150	159	169	171	173	178

Table 4: Number of van rest area

Year	2010	2011	2012	2013
Number	7	8	16	16

Fig 2 Revenue and cost per car

**2.1.2 Highway rest area revenue**

Highway rest area revenue was 706billion won/year from 2010 and is showing 3.6% increase rate yearly. However, cost of using rest area per car is decreasing.

Table 5: Highway rest areas revenue

year	2006	2007	2008	2009	2010
100 million	7,067	7,316	7,434	7,670	8,077

Table 6: Cost per car of Highway rest areas

year	2008	2009	2010
revenue(100million)	7,434	7,670	8,077
traffic(1million)	1,210	1,286	1,377
cost per car(won/car)	614	596	587

Improvement of lending policy of highway rest area facility

Rest area operators are considering solutions for more revenue since increased rest areas cause cost per car lowered.

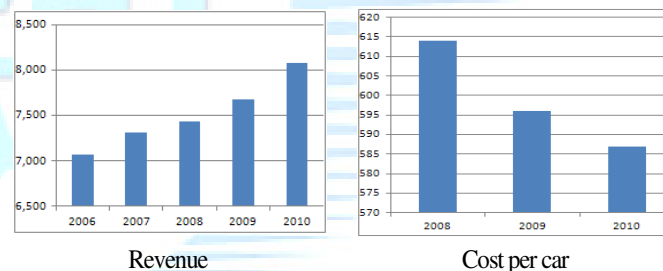


Fig. 3 Revenue and cost per car

**3. Improvement of highway rest area**

Should adopt rest areas mutually benefiting both national and local inhabitants.. For this purpose, it is necessary to see the problem from the perspective of ordinary passengers than the highway user perspective. First, you need to collect the policy directions, nearby residents' wishes, etc. associated with rest facilities. Later, this thesis would provide direction so rest areas can integrally manage above these functions

**3.1 Driven policies related to rest areas**

Ministry of Transportation has established a comprehensive vans rest facilities expansion plan (2015-2019). The content of this plan is a plan to improve working conditions for truck drivers and relieve the city's parking problems. Also, this plan is about adding van rest

area and van public garage into major logistics hub and van route.

### 3.1.1 Adding more van rest area near national route

The ministry of transportation is planning to construct 3 places of rest area near Chungnam, Gyeongnam national route and 2 in west coast highway over next 5 years. The Ministry of Transportation is also planning to provide amenities such as place to sleep, shower and is to construct 21 public garage nationwide. The ministry explains that it will secure large van parking lot in drowsiness shelter also apply idle lands of public authorities for temporary rest facility.

In addition, The ministry of transportation is trying to gain drivers' welfare by supplying rest areas near national route.

## 3.2 Policy related to region and citizen

In this thesis, citizens are limited into members of Gyeonggi province Hwasung city Maesong myeon Yamok li in which is planned to construct Maesong van rest area.

### 3.2.1 Solutions to illegal van parking

Large cars registered in Ansan city(In February of 2013) are 5604 construction machines, 1169 buses, 5506 vans. The van share is high but there are no van parking lots even though van traffic is high due to Sihwa and Banwol industrial park.

From these reasons, Ansan city has driven construction of van parking lot since 2003 since parking problems due to illegal parking of vans increased dramatically. The city founded public van parking lot construction plan 2011 in Seonbu dong 94-2 street Ilwon at the size of 114000 m<sup>2</sup>. However the plan is delayed that it has no business values. Nowadays, the city has built a temporary parking lot to solve parking problems in short term. In longer terms, it is planning to develop suburban areas into public parking lot. While the Ansan city hall is trying to secure van parking ground, private enterprises are delaying development that there is no business value.

### 3.2.2 Alternatives of regional terminal

Currently bus terminal is not operating in Hwaseong. Therefore, Hwaseong residents should take the trouble to

go back Geumjeong station, Suwon station, Ansan station and take a bus or train nearby bus terminal.

Residents have been using the detour route. This way there are increased travel time and distance thus increases social costs.

### 3.2.3 Ways to activate Yamok station(Su-In line)

As Su-In(Suwon-Incheon) line connecting Suwon city and Ansan city is launched recently, residents near station are expecting premium for improvement of public transportation accessibility. Yamok station is the nearest station near Hwasung Maesong myeon among Su-In line. However, Yamok station is moved 600m from original station for conserving budget. The original residents near station are strongly opposing moving the station.

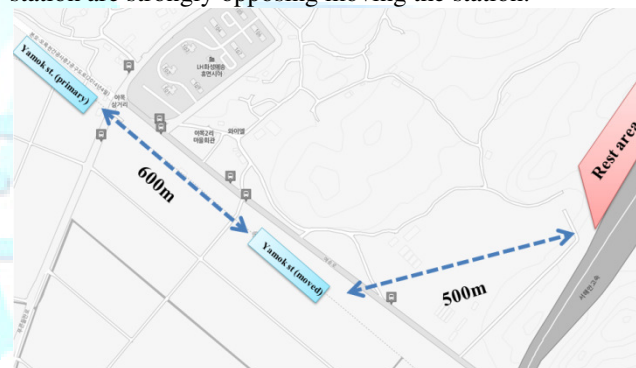


Fig. 4 Yamok station (primary and moved)

There is strong necessity to provide reasons for residents to move the station by making activation solution of the station.

## 3.3 Policies etc.

### 3.3.1 Introducing Smart IC.

Highway IC is the only gateway for cars from general route to highway. Generally, IC locations are constructed before highway construction so they are difficult to reflect traffic pattern and change of social structure. Still there is necessity to utilize appropriate smart IC, through this we need to reduce driving distance and driving time then ultimately reducing social costs.





Fig. 5 Smart IC

### 3.3.2 Ways to activate food truck.

The government has legalized the food truck business in August 2014. The government has expanded business up to city park (neighborhood parks, cultural park, waterfront parks, etc.), sports facilities (stadium • rowing stadium, etc.), Tourist Complex (resorts, beaches, etc.), riverbed (River Park).

However, operators are not able to manage food truck without local operators' permission. In addition, the current food truck business areas are available for nine points with only 22 trucks. Food trucks are under larger debate about the effectiveness of the policy. But the government is unable to offer any solutions.

Through the activating food truck, as youth unemployment rate rose, there is necessity to provide realistic alternative to increase job.



Food truck



Goods truck

Fig. 6 Types of Commerce trucks

## 4. Application strategy of cooperative rest area

In this thesis, it would suggest strategy with dividing living with-rest area into living with nation, region, and citizen.

Table 7: Division of solutions and concept

Division	concept
living with nation	increasing van driver welfare, providing jobs(youth unemployment)
living with region	solving illegal parking, activating Yamok station
living with citizens	introducing terminal function, Introducing Smart IC

### 4.1 Cooperative rest area.

The ministry of transportation is planning to construct Maesong van rest area for increase of van drivers' welfare. Near Maesong rest area, Banwol and Sihwa industrial park and Gunpo van terminal are located so there is lots of traffic of vans near national route.

Also, national route connecting Suwon and Ansan(regional route 98) is expanded and newly constructed(2 lanes to 4 lanes) nearby Maesong rest area. Thus, drivers using original route will transfer to new route. The ministry is planning to construct 37 more van rest area and 7 more public parking lots until 2026. This would be a difficult measure to secure budget and land because van rest area near national route has little business value but is high cost. Thus Maesong van rest area should be used together with van rest area near national route to ultimately prepare for welfare increase of van drivers.

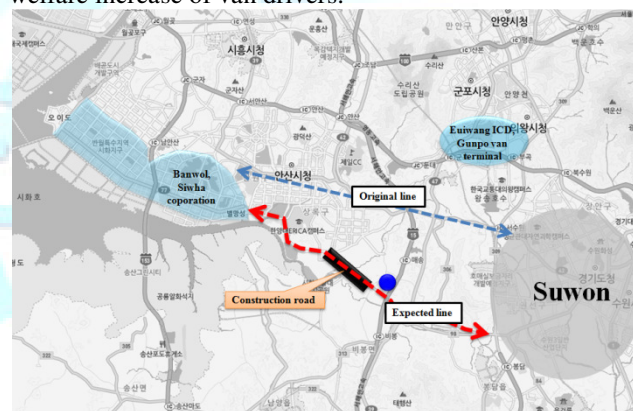


Fig. 7 Expected route according to newly constructed route

Furthermore, youth unemployment rate is rising yearly. However, there are no realistic solutions made to this problem. Everyone agrees that it is impossible to solve the big problem-youth unemployment rate by single measure during short term. Government should provide jobs according to youth demand by leveled procedures.

One of the solutions is to expand business area of food truck into highway rest area. Food truck has lower starting cost-up to 20~25% compared to offline. It is possible to provide quick service so it goes well with highway rest area environment. Through this measure, expanding domestic market, activating car reform business, and a role of incubating should play a crucial role providing jobs. Like this, social costs would decrease by expanding rest area through living with nation

### 4.2 Region and cooperative rest area

Ansan city founded public van parking lot construction plan 2011 in Seonbu dong 94-2 street Ilwon at the size of

114000 m<sup>2</sup>. However the plan is delayed that it has no business values.

To develop van parking lot, it is difficult to secure construction cost to secure land and facilities for van drivers. Thus, it is necessary to secure van public parking lot near Maesong rest area to use facilities together. This will decrease construction and management cost.

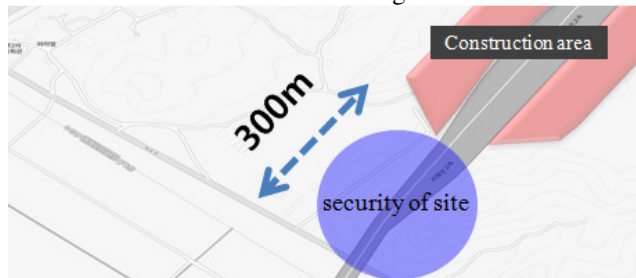


Fig. 8 Suggested areas to secure land near business area

To secure land for public parking lot, there should be convenient foundation of accessibility through public transportation. This is located near 500m to subway station also the bus stop is located near 200m. This provides convenient accessibility to drivers.

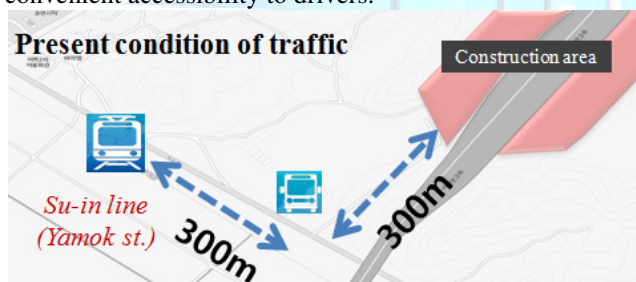


Fig. 9 Transportation nowadays near business area

Social cost would decrease by solutions to expand rest area function through living with region.

#### 4.3 Residents and cooperative rest area

Hwasung city has no bus terminal. Thus Hwasung citizens have difficulty moving to Ansan terminal and Suwon terminal. The ministry of transportation has difficulty providing realistic solution that new terminal would have less demand and security of budget. One of the possible solutions is adding bus stop function to Maesong rest area. Thus it is possible to build foundation that bus to Incheon and Ansan could stop for a while

If bus stop in rest area is newly built, 825 passengers daily will benefit from decrease of social cost assuming near 10km to business area is the using area.



Fig. 10 Transit distance and time according to terminal accessing solutions

As this rest area is activated, it has large possibility that it can be founded as a landmark near that thus making more people use it. However, the potential users should choose bypass route through Maesong IC and Bibong IC. Considering this increase of social cost, it is necessary to decrease social costs of near people and van drivers.

#### 4. Conclusion and suggestion

It is inefficient to manage highway facilities limited into only highway users. Nowadays rest area facilities are reflected of needs of highway users. Only merchandise introduction which can increase rest area revenue is the only driven way.

Highway rest area has faced 3rd generation and is no focusing on 4th. It is right to change its direction to live with people nearby.

This thesis suggested a rest area living with nation, region, and people such as Maesong van rest area.

Table 8: Solution to living with

	solution	idea
living with nation	Increasing van driver welfare, providing jobs.	providing rest area near national route, expanding food truck business
living with region	Solving illegal parking, activating Yamok station.	providing van parking lot
living with people	introducing terminal function and appropriate IC	Introducing bus stop and smart IC

Additionally, KTX's expansion and construction makes users to have great expectation. However the biggest victims are seemed to be managers of buses. Nowadays, there is frequently low rate of using buses in KTX available region.

Some regions may find activation solution of prior terminals because of low bus using rate.

Possible solutions could be managing low using rate terminals with nearby rest areas. Thus it is possible to secure connecting route from rest area to nearby cities. Through this, constructing temporary bus stop in rest area, decreasing bus gap, cost, and increasing of available people are expected.

Like this, rest areas have enough foundation which could be applied in various perspectives and usages. By providing right direction, it is necessary to construct highway rest area which can live with nation, region, and citizens.

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