

Republic of Turkey

Ex-Post Evaluation of Japanese ODA Loan  
“Bozuyuk - Mekece Road Improvement Project”<sup>1</sup>

External Evaluator: Nobuyuki Kobayashi, OPMAC Corporation

## 0. Summary

The objective of this project was to improve State Road D650 and construct the Bozüyük bypass road to accommodate an increasing traffic volume, and thereby contribute to smoother freight logistics and vitalization of the local economy. The relevancy of this project is high as the project scope is consistent with the Turkish Government’s policy to encourage a high-standardization of roads and with the necessity of handling an increase in freight vehicles. On the other hand, the efficiency of the project is low since the project costs exceeded the plan due to difficult engineering works in mountainous areas, and the project period substantially exceeded the plan due to a delay in procurement and prolonged construction works. The traffic volume in the section targeted by the project has increased mostly as forecasted and the number of freight vehicles has also increased remarkably. As the result of the road improvements, the average travel speed is faster and the number of traffic accidents has decreased. In addition, the following improvements have been seen; improved driving comfort, and a decrease in cargo damage. As effects sufficient for an industrial road project have been seen, effectiveness and impact of the project is high. Moreover, the executing agency has dealt with an increasing proportion of contract management in operation and maintenance by a training program. Major problems which could impair the project sustainability have not been observed in the management, technical, and financial aspects of the project. Thus, sustainability of the effects induced by the project is high.

In light of the above, this project is evaluated to be satisfactory.

## 1. Project Description



Project Location



The road section improved by the project

<sup>1</sup> In this report, the names of places contain accent marks in accordance with Turkish names except the project name which does not contain accent marks in the loan agreement.

## 1.1 Background

Turkey's national land size (790,000km<sup>2</sup>) is twice as large as Japan's land size. Thus, the road sector plays a major role in domestic transportation. Since the 1950's, the Turkish Government has prioritized the road sector in its national development plans and promoted the development of a road network. Trunk roads (expressways, state highways, and provincial roads) have been extended from approximately 47,000km in 1950 to approximately 62,000km in 1998.

State Road D650 (the road targeted by the project) runs north-south through the west part of the country. It is an industrial road connecting the Marmara Region, an advanced industrial area, and the Mediterranean Region, a major agricultural area. In particular, one section targeted by the project (the Bozüyük - Mekece target-section) includes industrial cities such as Bursa, Izmit, and Eskişehir. As a result of developing the road network since the 1990's, motorization has developed remarkably in Turkey. Vehicle passage, especially freight vehicles, has continued to increase, noticeably reducing travel speed and traffic jams because of insufficient road capacity. Moreover, as freight transportation increased there were concerns that the State Road would be an obstacle for road traffic, and improving road standards to meet the demand for an increase of freight traffic using the roads had become imperative.

Given the background mentioned above, the Turkish Government prioritized the improvement of the State Road D650 in the road development plan, and conducted a feasibility study in 1997. Taking the results of this study into consideration, this project set out to improve the Bozüyük - Mekece section of the State Road, which is approximately 85km. While the old road ran through urban areas in Bozüyük and Bilecik (two major cities along the State Road D650) the new road renovated by the project took a route which detours around the urban areas of the two cities.

## 1.2 Project Outline

The objective of this project is to meet an increase of transport demand by the widening and construction of the Bozüyük - Mekece section of State Road D650 and the Bozüyük bypass road, thereby contributing to smooth freight logistics and vitalization of the local economy.

|  |   |
|--|---|
| Loan Approved Amount/<br>Disbursed Amount              | 29,367 million yen / 29,199 million yen   |
| Exchange of Notes Date/<br>Loan Agreement Signing Date | August, 1999 / September, 1999  |
| Terms and Conditions                                   | <p>Interest Rate 2.2%<br/>(Consulting Service: 0.75%)</p> <p>Repayment Period 25 year<br/>(Consulting Service: 40 year)<br/>(Grace Period: 7 year)<br/>(Consulting Service: 10 year)</p> <p>Conditions for Procurement: General untied<br/>(Consulting Service: Bilateral tied)</p> |
| Borrower /<br>Executing Agency                         | The Republic of Turkey /<br>Ministry of Transport, Maritime Affairs and<br>Communications, General Directorate of Highways<br>(KGM)   |
| Final Disbursement Date                                | June, 2012  |
| Main Contractor<br>(Over 1 billion yen)                | Mon Ins. Ve Tic. Ltd. Sti. (Turkey), Limak Ins. San. Ve<br>Tic. A.S. (Turkey)   |
| Main Consultant<br>(Over 100 million yen)              | Nippon Koei CO., LTD. (Japan) / Temelsu Ulus, Huh. Hiz.<br>A.S. (Turkey) (JV)   |
| Feasibility Studies, etc.                              | “Bozüyük-Bilecik First Division Border Feasibility<br>Report” KGM, 1997   |
| Related Projects                                       | —   |

## 2. Outline of the Evaluation Study

### 2.1 External Evaluator

Nobuyuki Kobayashi, OPMAC Corporation

### 2.2 Duration of Evaluation Study

This ex-post evaluation study was conducted according to the following schedule.

Duration of the Study: September, 2014 – September, 2015

Duration of the Field Study: December 31, 2014 – January 14, 2015

March 28, 2015 – April 3, 2015

### 2.3 Constraints during the Evaluation Study

Since JICA's internal information was insufficient, analysis in "3.2. Efficiency" is based on the project completion report and information provided by the executing agency. As the average speed data from the executing agency covers only the period after 2004, the lack of sufficient data disabled the analysis of average speed to compare before and after construction.

## 3. Results of the Evaluation (Overall Rating: B<sup>2</sup>)

### 3.1 Relevance (Rating: ③<sup>3</sup>)

#### 3.1.1 Relevance to the Development Plan of Turkey

The transportation sector of the Seventh Development Plan (1996-2000) planned that 80% of public investment in the sector would be allocated to road construction reflecting an importance of road traffic in passenger and freight transportation. In the period of the Seventh Development Plan, it had been planned that 75% of all the state highways and the provincial roads would be paved and that divided high-standard roads would be extended from 5,000km to 5,500km. Moreover, the Development Plan mentions gaps in local development as one of the most significant development issues in the country and the plan proposed reducing such gaps. As a sector plan of road development, the Turkish Government formulated the "State Road Investment Program" targeting the period between 1997 and 2007 which focused more on reinforcing transportation capacity through improvement of the road standards. In this program, 17 sections were selected as the most prioritized projects. This project planned to construct an 85.8km part of the selected prioritized section (Adapazarı - Bozüyük, 133km).

The development plan at the time of the ex-post evaluation (the 10<sup>th</sup> Development Plan (2014-2018) approved by the national assembly in July 2013) includes an extension of high-standard roads in the targets. It is planned that divided roads would be extended from 21,067km in 2013 to 25,722km by 2018, and roads for automobiles use are to be extended from 2,256km in 2013 to 4,000km by 2018. Moreover, asphalted roads on which heavy vehicles are able to travel are to be extended from 18,468 km in 2013 to 39,552km in 2018. This Development Plan also mentions the importance of balancing national welfare among regions by alleviating the development gap. "The Plan of Transportation and Telecommunications of Turkey", a sector plan of transportation at the time of the appraisal, sets 2023 as the target year and plans to extend the length of divided roads to 37,000km. This plan also touted a policy to promote reinforcing South - North Corridor through improvement of transportations by high-standardizing roads between the Black Sea Region and the Mediterranean / Southeastern Anatolia Region. The section improved by the project is a part of the Third South - North Corridor (Karasu - Sakarya - Kütahya - Afyon - Burdur -

<sup>2</sup> A: Highly satisfactory, B: Satisfactory, C: Partially satisfactory, D: Unsatisfactory

<sup>3</sup> ③: High, ② Fair, ① Low

Antalya Corridor).

Both the Turkish Government's Development Plans and their transportation sector plans at the time of the appraisal and the ex-post evaluation maintained the aim of promoting high-standardization of the roads, and there was no change in the priorities of the policy (high standardization of roads to improve freight logistics, etc.) before and after the project implementation. In the sector plan at the appraisal, this project was included in the prioritized sections to be developed. In the sector plan at the time of the ex-post evaluation, the project has been also regarded as a prioritized section for improvement and as one of the major corridors in the South-North transportation. This project is to high-standardize the Bozüyük - Mekece section of State Road D650 which connects the South and the North areas, thus, the project scope and the targeted section is consistent with the above policies.

### 3.1.2 Relevance to the Development Needs of Turkey

At the time of the appraisal, the State Road D650 targeted to be improved by the project was the main trunk road connecting Marmara Region (İstanbul, Bursa, etc.) and the Mediterranean Region/ the Southeastern Anatolia Region (See Figure 1). It was the base route to transport industrial products from the Marmara Region to the Mediterranean / Southeastern Anatolia Region while agricultural products are transported from the Mediterranean Sea/ Southeastern Anatolia Region to the

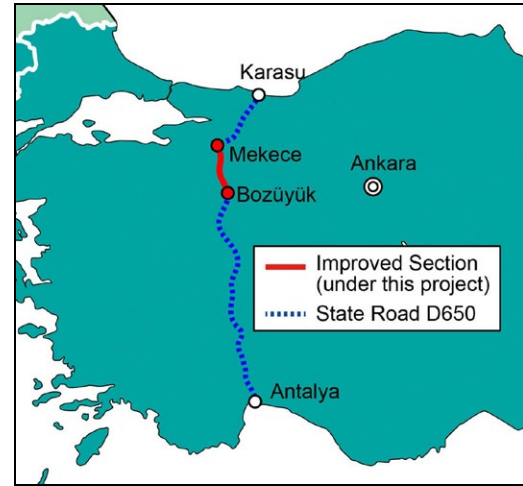


Figure 1: State Road D650

Marmara Region. The traffic volume between Bozüyük and Mekece in 1997 recorded 7,103 cars/day, which was 2.5 times the average traffic of the trunk roads in the country. In analysing the total traffic volume, the number of the freight vehicles, such as trucks and trailers, was 3,402 cars/day accounting for 47% of the total traffic volume in terms of the number of units. The traffic of large-sized vehicles has increased by 9.6% per year since 1992. Traffic jams had been chronic because the existing roads had only two lanes (one lane each way) and the road capacity was insufficient to meet the increased traffic demand especially for the large-sized vehicles which had increased significantly. In urban areas of the major cities along the road, serious traffic jams were common because through-traffic and inner city traffic were mixed in these cities. This brought about the necessity to meet the increasing traffic demands by improving the road standards.

At the time of the ex-post evaluation, the basic structure of economic activities had not undergone considerable change: the Marmara Region is an industrially advanced area

whereas the Mediterranean / South-eastern Anatolia Region’s major significant economic activity is related to primary industry. The State Road D650 targeted by the project has been continuously ranked as a trunk route for freight logistics among the regions. In 2000 immediately after the project implementation, Turkey’s share of road transportation in domestic freight transportation was 88.9%. The ratio in 2008 during the project implementation was 88.9% and it was 88.1% in 2012 after the project completion. Road transportation has an overwhelming share in freight transportation, thus, it is a pivotal sector in freight logistics (see Table 1).

Table 1: Domestic Freight Transportation by Traffic Mode (Share based on Tons and Kilos)

| Year | Roads | Sea Transport | Railways | Air Transport | Total  |
|------|-------|---------------|----------|---------------|--------|
| 2000 | 88.9% | 5.4%          | 5.4%     | 0.2%          | 100.0% |
| 2008 | 88.9% | 5.4%          | 5.2%     | 0.4%          | 100.0% |
| 2012 | 88.1% | 6.4%          | 4.8%     | 0.7%          | 100.0% |

Source: documents provided by the executing agency

The traffic volume between Bozüyük and Mekece in 2013 was 12,824 cars/day, in which the total volume of trucks and trailers was 5,055 cars/day. Its share of all the traffic volume was 39% in terms of the number of units. Development of motorization brought about an increase in automobile traffic, which resulted in a decrease ratio of freight vehicles. However, the number of freight vehicles itself has increased by 1.5 times the 1997 number of the units, which means the improved section fills a significant role as an industrial road.

The road constructed and rehabilitated by this project is a major trunk road for the country’s freight logistics that connects the Marmara Region and the Mediterranean/Southeastern Anatolia Region. At the appraisal, the State Road D650 was an important section of domestic logistics and an increase in freight transportation was notable on the road. Alleviating the bottleneck was a development need for the project. Before and after the project implementation, the trend in the number of freight vehicles has been increasing. At the time of the ex-post evaluation, the improved section has played a role as an industrial road. Thus, the road constructed and rehabilitated by this project has strong needs in terms of the country’s freight logistics.

### 3.1.3 Relevance to Japan’s ODA Policy

As a reason for cooperation to transportation sector, in “Japan’s ODA White Paper 1999” issued by the Ministry of Foreign Affairs of Japan, investment in transportation sector was recognized as indispensable for economic development and improvement of living standards in the country, since unequipped transportation infrastructure impedes the transportation of living necessities, activation of industries, and correcting the gaps between cities and the

countryside. In addition, Turkey was ranked as a priority country for assistance for the Middle East Region. For such reasons, contribution to stabilize the region, potential power of economic growth, geographical significance, and a good relationship between the two countries were raised. Also, the important point for the assistance to Turkey included encouraging industrial development for addressing the disparities among regions. As the country's GNP has reached a relatively higher standard, it was planned that loan assistance would predominantly be implemented instead of grant aid. As the project is both a loan assistance and for road improvement in Turkey, it was consistent with Japan's ODA policy in terms of three points, namely, the project objective, the target country, and the aid scheme.

In light of the above, this project has been highly relevant to the country's development plan and development needs, as well as Japan's ODA policy. Therefore its relevance is high.

### 3.2 Efficiency (Rating: ①)

#### 3.2.1 Project Outputs

The project outputs are shown in Table 2. A main alteration in the outputs was that a needed change to the road alignment caused a change in the plan: instead of widening the existing road it was necessary to build a new section of road. The reasons for the change are as follows: ①the necessity to take the possibility of a landslide into consideration, ②a part of the route was changed from the left side to the right side of a river as it was difficult to operate heavy equipment. However, the target section of the project was the Bozüyük - Mekece section both for the plan and for the actual outputs, and there was no critical change in the distance of the section. Thus, no change in the project outputs which would affect the project effectiveness occurred. The road width of the Bozüyük bypass was 33m (for each direction, carriage way 3.5m x 3 lanes, shoulder 3m, and inner clearance 1m, plus refuge 4m) and that of the State Road D650 (the Bozüyük - Mekece section) was 26m (for each direction, carriage way 3.5m x 2 lanes, shoulder 3m, and inner clearance 1m, plus refuge 4m). Southbound and northbound directions of the target section were divided, and traffic safety equipment, such as guard rails, lights, delineators, and traffic enforcement cameras were installed.

Table 2: The Project Outputs

| Plan  | Actual  |
|---|---|
| <p>Civil Works:</p> <ul style="list-style-type: none"> <li>● Road Construction: total 85.8km <ul style="list-style-type: none"> <li>- Widening of the existing roads (2 lanes for one side) 42.2km</li> <li>- New road establishment (2 lanes for one side) 32.8km</li> <li>- Bozüyük bypass road (3 lanes for one side) 10.8km</li> </ul> </li> <li>● Bridge Construction: 32 places (total 2.1km)</li> <li>● Tunnel Construction: 2 places (2.4km and 0.8km)</li> </ul> | <p>Civil Works:</p> <ul style="list-style-type: none"> <li>● Road Construction: total 85.1km <ul style="list-style-type: none"> <li>- Widening of the existing roads (2 lanes for one side) 33.6km</li> <li>- New road establishment (2 lanes for one side) 41.4km</li> <li>- Bozüyük bypass road (3 lanes for one side) 10.1km</li> </ul> </li> <li>● Bridge Construction: 40 places (total 2.1km)</li> <li>● Tunnel Construction: 2 places (2.4km and 0.8km)</li> </ul> |
| <p>Consulting Services:</p> <ul style="list-style-type: none"> <li>Overseas: 240M/M</li> <li>Domestic: 1,781M/M</li> </ul>  | <p>Consulting Services:</p> <ul style="list-style-type: none"> <li>Overseas: 232M/M</li> <li>Domestic: 2,121M/M</li> </ul>  |

Source: documents provided by JICA, Project Completion Report, documents provided by the executing agency



Photo 1: Tunnel of the State Road D650



Photo 2: the Bozüyük bypass road

### 3.2.2 Project Inputs

#### 3.2.2.1 Project Cost

Actual project cost was 52,496 million yen whereas the planned project cost was 39,154 million yen. As the actual cost does not include the cost for obtaining the land, the calculation uses data that deducts the land obtaining cost from the project cost at appraisal as a benchmark value and is compared with the actual cost. Comparing the project cost at the appraisal with the land obtaining cost deducted (36,236 million yen), the actual project cost was 145% of the planned cost which is higher than planned. The reason for the increase in the project cost is that difficult engineering works in mountainous areas required additional works, such as soil improvement, protection of side slope, counter measures for landslide, and a change of road alignment. Although the civil works contract did not have a price adjustment clause, the contract amount was raised in accordance with the public procurement laws of Turkey.

#### 3.2.2.2 Project Period

Project period was significantly longer than planned. The actual project period was 145



months (199% longer than planned) whereas the planned period at the appraisal was 73 months. Although it was initially planned that the contract of road construction would be concluded in March 2001, the actual contract conclusion was made in December 2002, (more than a year and a half delay). The cause of the delay was that the executing agency was unfamiliar with procurement procedures. The actual period of civil works was 102 months whereas the planned period was 51 months. One of the causes of the prolonged period of civil works was an increase in establishing sections of new road because of a road alignment change. Also, the road alignment change required more land, which took additional time to obtain. In case agreement about compensation with the rightful claimants cannot be obtained, it is necessary to have an executive order from the court. This required more time for the procedures. Moreover, the economic crisis necessitated the need for an austerity budget which caused a decrease in the allocation of the project budget from the Turkish government and delayed civil works.

### 3.2.3 Results of Calculations of Internal Rates of Return (Reference only)

With regard to calculating the Economic Internal Rate of Return (EIRR), the actual EIRR was 8.6% whereas the planned EIRR was 10.1% (see Table 3 for preconditions for the calculation). The traffic volume exceeded expected volumes at the time of the appraisal and also there was an unexpected decrease in the number of traffic accidents which has increased the project's benefit. However, an increase in the project cost exceeding the planned data lowered the EIRR.

Due to the fact that the State Road D650 targeted by the project is an ordinary road and toll revenue is not generated, calculating the Financial Internal Rate of Return (FIRR) is not possible.

Table 3: Calculating Conditions of the Internal Rate of Return

|                | Calculating Conditions   |
|----------------|--|
| Costs          | Construction costs, Increased amount of O&M cost   |
| Benefits       | Decreased traffic accidents, Decreased travel costs  |
| Project Period | 30 years after the completion  |
| Preconditions  | <ul style="list-style-type: none"> <li>● As for traffic volume, actual data for 2011~2013 and projected data by the executing agency for 2014~2029 was used. The traffic volume is not projected to increase after 2029 given the road capacity.</li> <li>● Based on the projection at the appraisal on a benefit unit for decrease in travelling cost.</li> <li>● As for the decrease in traffic accidents, projected the decreasing rate comparing to the number of accidents in new and old roads for 3 years before/after the project completion. (actual data for rate decrease was 54% whereas the rate at the appraisal was assumed to be 50%)</li> <li>● As the project cost was 145% of the planned cost, O&amp;M cost was increased by the same ratio.</li> <li>● The conversion factor from financial price to economic price was 0.95 times with reference to EIRR at the appraisal.</li> <li>● As calculated in real terms at the appraisal, nominal price was adjusted by CPI, recalculated and converted to real terms for comparison.</li> </ul> |

In light of the above, the project cost exceeded the plan and project period significantly exceeded the plan. Therefore, efficiency of the project is low.

### 3.3 Effectiveness<sup>4</sup> (Rating: ③)

#### 3.3.1 Quantitative Effects (Operation and Effect Indicators)

##### (1) Traffic Volume

Actual traffic volume data (2 years after the completion) in the Bozüyük - Mekece section of the State Road D650 has achieved the target of 2 years after the project completion that was set at the appraisal. Also, the traffic volume in the Bozüyük bypass road has reached approximately 90% of the target (see Table 4). Also, as to traffic of freight vehicles (total of trucks and trailers), the volume in the Bozüyük - Mekece section mostly achieved the target and that of the bypass section was 80% of the target. Since the first half of the 2000's, a policy to shift the carriers of freight vehicles from individuals to enterprises has been in place. This policy change promoted introduction of high performance tractors and as a result, the number of trailer trucks has increased whereas the number of trucks has decreased.

Table 4: Traffic Volume in the Project Targeted Section

Unit: Number of Cars/day

|   | Baseline           | Target                           | Actual                  | Actual                          | Actual                           |
|---|--------------------|----------------------------------|-------------------------|---------------------------------|----------------------------------|
|   | 1997               | 2007                             | 2011                    | 2012                            | 2013                             |
|   | F/S Implementation | 2 years after Project Completion | Project Completion Year | 1 year after Project Completion | 2 years after Project Completion |
| Traffic Volume in the Bozüyük - Mekece section of the State Road D650 | 7,103              | 12,668                           | 10,699                  | 11,525                          | 12,824                           |
| Automobiles   | 3,466              | 6,818                            | 5,411                   | 6,305                           | 7,372                            |
| Buses   | 235                | 348                              | 326                     | 366                             | 397                              |
| Trucks  | 3,139              | 5,113                            | 2,889                   | 2,614                           | 2,443                            |
| Trailers  | 263                | 389                              | 2,073                   | 2,240                           | 2,612                            |
| Traffic Volume in the Bozüyük bypass road                             | 13,677             | 24,351                           | NA                      | NA                              | 21,732                           |
| Automobiles   | 6,653              | 13,087                           | NA                      | NA                              | 12,761                           |
| Buses   | 691                | 1,023                            | NA                      | NA                              | 591                              |
| Trucks  | 5,827              | 9,492                            | NA                      | NA                              | 3,654                            |
| Trailers  | 506                | 749                              | NA                      | NA                              | 4,726                            |

Source: documents provided by JICA and the executing agency

##### (2) Average Speed per Hour

After opening the new road improved by the project (2011 and thereafter), the average driving speed in the Bozüyük - Mekece section has increased for all types of cars. The

<sup>4</sup> Sub-rating for Effectiveness is to be put with consideration of Impact. In accordance with the project objective, the direct project effects appeared in transportation in the targeted area is analyzed in "Effectiveness", and the effects to freight logistics and local economy induced as the result are mentioned in "Impact".

increase in speed is due to resolving slower travel by fewer traffic jams as the new road took a detour around urban areas in Bozüyük and Bilecik, which separated long-distance traffic and local traffic. The improvement of road alignment such as gentler curves and slopes also contributed to faster speed. The latest average speeds of the vehicles except passenger cars levelled off or moderately increased in comparison with the data in 2004. This result was due to lower speed limit for the vehicles except passenger cars.

Table 5: Average Speed in the Bozüyük - Mekece Section

Unit: km/h

| Type of Cars   | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 |
|----------------|------|------|------|------|------|------|------|------|------|------|
| Passenger cars | 79   | 75   | 75   | 77   | 76   | 79   | 82   | 94   | 100  | 103  |
| Pick-up        | 89   | 71   | 71   | 68   | 68   | 74   | 71   | 87   | 90   | 90   |
| Buses          | 84   | 72   | 71   | 72   | 67   | 75   | 72   | 86   | 89   | 91   |
| Trucks         | 76   | 66   | 66   | 62   | 61   | 67   | 65   | 74   | 75   | 76   |
| Trailers       | 74   | 65   | 66   | 63   | 61   | 66   | 60   | 72   | 73   | 74   |

Source: KGM

Notes: average speed of old road until 2010, average speed of new road since 2011. Average speed data before 2004 could not be obtained.

### (3) The Number of Traffic Accidents

After the new road opened (2011 and thereafter), the number of traffic accidents, deaths, and injured has decreased remarkably. In comparison with the data in 2002, a year before the civil work, the number of traffic accidents, deaths, and injured decreased. Prior to the project implementation, many accidents occurred where road alignment was dangerous (e.g., steep curve). The following road improvements contributed to the decrease, i.e. separation of up and down lanes, widened road width, and gentler curves and slopes. Because the project targeting section is located mainly in mountainous areas, road improvement effectiveness in preventing traffic accidents was considerable. KGM has aggregated the number of traffic accidents every year and has taken safety measures for black spots where traffic accidents frequently occurred. For example, a left-turning lane was established at a place where vehicles waiting to turn left often collide with oncoming-passenger vehicles.

Table 6: Number of Traffic Accidents in the Bozüyük - Mekece Section

|   | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 |
|---|------|------|------|------|------|------|------|------|------|------|------|------|
| Number of Traffic Accidents (cases/ year) | 106  | 119  | 130  | 296  | 139  | 126  | 128  | 133  | 130  | 54   | 64   | 63   |
| Number of Deaths (persons/ year)          | 18   | 21   | 10   | 46   | 12   | 13   | 6    | 8    | 12   | 4    | 0    | 3    |
| Number of the Injured (persons/ year)     | 212  | 225  | 259  | 610  | 282  | 229  | 250  | 269  | 257  | 104  | 124  | 139  |

Source: KGM

Notes: the number of traffic accidents for the old road until 2010, that for the new road since 2011.

### 3.3.2 Qualitative Effects

#### (1) Change of Transportation Route

In this ex-post evaluation, a questionnaire study was implemented for truck drivers (61 persons in total) at three rest areas (the 7km, 47km, 52km spots from the starting point) in the improved section of the State Road D650. The result of the study shows that most drivers have stopped using the old road (see Table 7). As a decrease in traffic through urban areas in Bozüyük and Bilecik was assumed, it is judged, therefore, that the expected effect has been shown.

Table 7: Change of Transportation Route

|                            |                                 | Yes  | No    | Total  |
|----------------------------|---------------------------------|------|-------|--------|
| Do you still use old road? | Number of respondents (persons) | 2    | 59    | 61     |
|                            | %                               | 3.3% | 96.7% | 100.0% |

Source: Results of the questionnaire studies

#### (2) Vibration and Driving Comfortableness

In the questionnaire study for truck drivers, questions about vibration and driving comfort were also asked. 90% of the respondents chose “improved” and “somewhat improved” about vibration (see Table 8). Also, as to improvement of driving comfortableness, drivers answering “yes” and “yes to some extent” accounted for 90% of all respondents (see Table 9). Individual interview research also revealed that opinions of long-distance bus drivers are consistent with the result of the questionnaire study. The opinion was, “vibration has decreased in the Bozüyük – Bilecik section and the increased road width and gentler slopes made driving more comfortable”.

Table 8: Vibration during Driving

|   |                                 | Improved | Somewhat improved | Somewhat worsen | Worsen | Total  |
|---|---------------------------------|----------|-------------------|-----------------|--------|--------|
| Is vibration improved after the road improvement? | Number of respondents (persons) | 44       | 13                | 2               | 2      | 61     |
|   | %                               | 72.1%    | 21.3%             | 3.3%            | 3.3%   | 100.0% |

Source: Results of questionnaire study

Table 9: Driving Comfortableness

|   |                                 | Yes   | Yes to some extent | Not so much | No   | Total  |
|---|---------------------------------|-------|--------------------|-------------|------|--------|
| Do you feel more comfortable when you drive after the road improvement? | Number of respondents (persons) | 52    | 3                  | 5           | 1    | 61     |
|   | %                               | 85.2% | 4.9%               | 8.2%        | 1.6% | 100.0% |

Source: Results of questionnaire study

### 3.4 Impacts

#### 3.4.1 Intended Impacts

##### (1) Impacts on Local Traffic

Comparing the situation before and after project implementation, road traffic has become activated not only in the section targeted by the project but also in a wider area. In four sections neighboring the improved sections, the traffic volume has substantially increased compared to 1998 before the project commencement (see Figure 2 and Table 10). In particular, the traffic volume in South-North direction (Mekece - Sakarya section and Bozüyük-Kütahya section) had almost doubled from 1998 to 2013. Nevertheless other factors affecting the traffic demand need to be considered, it is inferred that the high-standardization of the road network brought about by this project induced traffic demand.

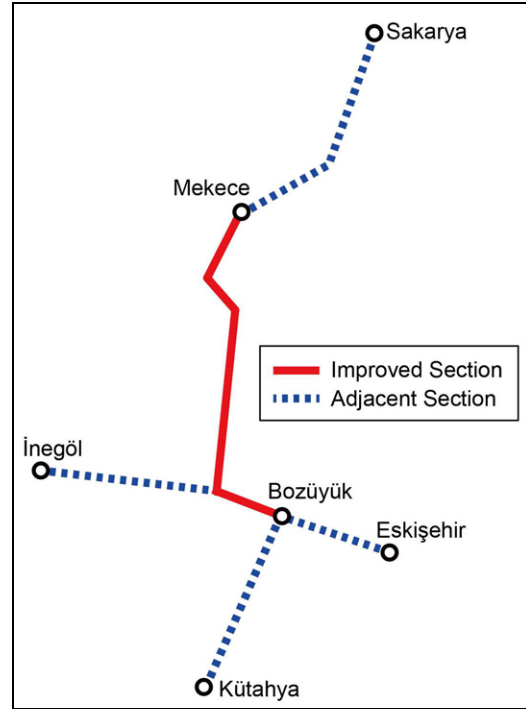


Figure 2 Neighboring sections

Table 10: Traffic Volume in Neighboring Sections

Unit: cars/day

|                             | Baseline                           | Actual          | Actual                  | Actual                   |
|-----------------------------|------------------------------------|-----------------|-------------------------|--------------------------|
|                             | 1998                               | 2011            | 2012                    | 2013                     |
|                             | 1 year before Project Commencement | Completion Year | 1 year after Completion | 2 years after Completion |
| Eskişehir - Bozüyük section | 12,472                             | 16,621          | 17,681                  | 19,737                   |
| Bozüyük - İnegöl section    | 6,240                              | 10,220          | 10,608                  | 11,783                   |
| Mekece - Sakarya section    | 11,693                             | 16,902          | 17,734                  | 21,298                   |
| Bozüyük - Kütahya section   | 5,257                              | 9,308           | 10,076                  | 12,348                   |

Source: KGM

##### (2) Cargo Damage

The questionnaire research for truck drivers included a question about cargo damage. 90% of the respondents answered “reduced” or “somewhat reduced” (see Table 11). As mentioned before, vibration improved after the project implementation, which resulted in reduced cargo damage. In a hearing at a tableware factory in the area targeted by the project, there was an opinion that tableware broken during its transportation has been reduced. In addition, as the State Road D650 is used as a route to transport agricultural products from

Antalya in the agricultural area to consuming city, İstanbul, and also to Europe for exportation, it is considered that the project has contributed to the distribution of agricultural products.

Table 11: Cargo Damage

|  |                                 | Reduced | Somewhat reduced | Somewhat Increased | Increased | Total  |
|--|---------------------------------|---------|------------------|--------------------|-----------|--------|
| Is damage on cargo reduced after the road improvement? | Number of Respondents (persons) | 29      | 28               | 3                  | 1         | 61     |
|  | %                               | 47.5%   | 45.9%            | 4.9%               | 1.6%      | 100.0% |

Source: Results of questionnaire study

### (3) Activation of Local Economy

In the ex-post evaluation, the questionnaire study for local residents (41 persons in total) was implemented at six places targeted by the project. The section has both comparatively large-scaled cities having a population of approximately 100,000 and small-scaled towns with a population of less than 1,000 people. Thus, the study took samples from both types of cities in profoundly different circumstances<sup>5</sup>. In the larger cities, more people than those in smaller towns stated opinions that both opportunities for employment and for starting a business increased (see Table 12 and Table 13). It is conjectured that residents answered “poor opportunities for employment” due to tendency not to build factories and/or commercial facilities in the smaller towns and many residents need to commute to neighboring towns for work. In regards to opportunities for starting a business, it is considered to have more advantages in the larger cities having many latent customers.

Table 12: Opportunity for Employment

|  |                   |                                 | Yes   | Yes to some extent | Not so much | No    | Total  |
|--|-------------------|---------------------------------|-------|--------------------|-------------|-------|--------|
| Do more people find employment after the road improvement? | Large-scaled city | Number of respondents (persons) | 4     | 4                  | 2           | 5     | 15     |
|  |                   | %                               | 26.7% | 26.7%              | 13.3%       | 33.3% | 100.0% |
|  | Small-scaled town | Number of respondents (persons) | 1     | 10                 | 4           | 11    | 26     |
|  |                   | %                               | 3.8%  | 38.5%              | 15.4%       | 42.3% | 100.0% |
|  | Total             | Number of respondents (persons) | 5     | 14                 | 6           | 16    | 41     |
|  |                   | %                               | 12.2% | 34.1%              | 14.6%       | 39.0% | 100.0% |

Source: Results of questionnaire study

<sup>5</sup> Concretely, Bozüyük and Bilecik were selected from the larger cities and Karaköy, Demirköy, Başköy and Mekece were selected from the smaller towns.

Table 13: Opportunity for Starting Business

|   |                   |                                 | Yes   | Yes to some extent | Not so much | No    | Total  |
|---|-------------------|---------------------------------|-------|--------------------|-------------|-------|--------|
| Do more people start businesses after the road improvement? | Large-scaled city | Number of respondents (persons) | 2     | 6                  | 3           | 4     | 15     |
|   |                   | %                               | 13.3% | 40.0%              | 20.0%       | 26.7% | 100.0% |
|   | Small-scaled town | Number of respondents (persons) | 1     | 6                  | 4           | 15    | 26     |
|   |                   | %                               | 3.8%  | 23.1%              | 15.4%       | 57.7% | 100.0% |
|   | Total             | Number of respondents (persons) | 3     | 12                 | 7           | 19    | 41     |
|   |                   | %                               | 7.3%  | 29.3%              | 17.1%       | 46.3% | 100.0% |

Source: Results of questionnaire study

### 3.4.2 Other Impacts

#### (1) Traffic Noise

The questionnaire for residents also included a question about traffic noise. In the large-scaled cities, 70% of the respondents answered “decreased” or “somewhat decreased”, and no resident answered “increased” or “somewhat increased” (see Table 14). On the other hand, in the smaller towns, 40% of respondents answered that traffic noise has “decreased” or “somewhat decreased” and 30% of the respondents answered “increased” or “somewhat increased”. Even though traffic in urban areas has decreased in Bozüyük and Bilecik which resulted in a decrease in traffic noise in areas where the State Road D650 cuts across residential areas, a certain number of residents in the smaller towns are concerned about traffic noise.

Table 14: Traffic Noise

|   |                   |                                 | Increased | Somewhat increased | No Change | Somewhat decreased | Decreased | Total  |
|---|-------------------|---------------------------------|-----------|--------------------|-----------|--------------------|-----------|--------|
| Has traffic noise increased after the road improvement? | Large-scaled city | Number of respondents (persons) | 0         | 0                  | 4         | 6                  | 5         | 15     |
|   |                   | %                               | 0.0%      | 0.0%               | 26.7%     | 40.0%              | 33.3%     | 100.0% |
|   | Small-scaled town | Number of respondents (persons) | 1         | 6                  | 9         | 5                  | 5         | 26     |
|   |                   | %                               | 3.8%      | 23.1%              | 34.6%     | 19.2%              | 19.2%     | 100.0% |
|   | Total             | Number of respondents (persons) | 1         | 6                  | 13        | 11                 | 10        | 41     |
|   |                   | %                               | 2.4%      | 14.6%              | 31.7%     | 26.8%              | 24.4%     | 100.0% |

Source: Results of questionnaire study

#### (2) Traffic Safety Recognized by Residents

The questionnaire for residents also asked about traffic safety. In the larger cities, 80% of the respondents answered “improved” or “somewhat improved” and no resident answered

“worse” or “somewhat worse” (see Table 15). Meanwhile, respondents in the smaller towns recognizing that traffic safety has “improved” or “somewhat improved” remained approximately 30% and respondents who answered “worse” or “somewhat worse” accounted for 50%. A reason for the difference of opinions between cities and smaller towns is that the State Road D650 divides the urban area into two parts and thus it is conjectured that local residents often cross the State Road D650. In hearing with residents in the smaller towns, the following opinions were heard: 1) a mirror needs to be installed as there is a blind spot at the exit of the passage under the State Road D650 (Karaköy), 2) persons who cannot walk properly do not want to use a pedestrian overpass because of its steep flight of stairs (Demirköy), and 3) there is no pedestrian overpass (Başköy).

Table 15: Traffic Safety Recognized by Residents

|   |                   |                                 | Improved | Somewhat improved | No Change | Somewhat worse | Worse | Total  |
|---|-------------------|---------------------------------|----------|-------------------|-----------|----------------|-------|--------|
| Has traffic safety improved after the road improvement? | Large-scaled city | Number of respondents (persons) | 4        | 8                 | 3         | 0              | 0     | 15     |
|   |                   | %                               | 26.7%    | 53.3%             | 20.0%     | 0.0%           | 0.0%  | 100.0% |
|   | Small-scaled town | Number of respondents (persons) | 1        | 6                 | 6         | 11             | 2     | 26     |
|   |                   | %                               | 3.8%     | 23.1%             | 23.1%     | 42.3%          | 7.7%  | 100.0% |
|   | Total             | Number of respondents (persons) | 5        | 14                | 9         | 11             | 2     | 41     |
|   |                   | %                               | 2.4%     | 14.6%             | 31.7%     | 26.8%          | 24.4% | 100.0% |

Source: Results of questionnaire study



Photo 3: Passage under the State Road D650



Photo 4: Pedestrian overpass on the State Road D650

### (3) Impacts on the Natural Environment

This project was formed before environmental guidelines for Yen Loan projects were applied, and an Environmental Impact Assessment was also not required according to the



laws and regulations of Turkey. Yet, it was agreed at the appraisal that an environmental assessment would be implemented in the early stage in order to properly carry out environmental countermeasures during the project implementation, and a report on environmental countermeasures was drafted in 2002 before civil works started. In this report, measures to reduce negative impacts on the natural environment, countermeasures against noise during construction works, waste-disposal plans, and the environmental monitoring plan were offered. According to those opinions suggested in the report, civil works was carried out. In the project completion report, it is mentioned that no negative impact on the natural environment has been observed. Also, no negative impacts have been found in the site survey at the ex-post evaluation.

#### (4) Land Acquisition and Resettlement

According to information provided by the executing agency, the area of land acquisition was 156.6ha. Affected Residents were 2,131 households and 284 houses (including non-dwelling structure such as barns). Compensations in cash were made to the households subject to land acquisition according to the laws and regulations of Turkey. If an agreement on compensation could not be reached with a rightful claimant, a third party estimated the value of the property and executed the land acquisition based on an executive order from the court. For public works that KGM implemented, although the number of the paid households with compensation was aggregated, the number of the resettled households was not aggregated based on a detailed categorization of paid households. Since TOR consultants' work for construction and supervision did not include aggregating the number of resettled households, the number of the resettled households was not determined.

In light of the above, this project has largely achieved its objectives. Therefore effectiveness and impact of the project are high.

### 3.5 Sustainability (Rating: ③)

#### 3.5.1 Institutional Aspects of Operation and Maintenance

At the time of the ex-post evaluation, KGM is an extra-ministerial bureau of the Ministry of Transport, Maritime Affairs and Communications, which is in charge of planning, designing and operation and management of expressways, state highways, and provincials roads. The Bilecik branch office of the 14<sup>th</sup> section General Directorate of Highways is in charge of the section targeted by the project.

The number of KGM staff members in 2014 was 15,084 persons (2,506 persons in the management section, 3,925 engineers, 8,653 workers for construction and for operation and maintenance). At the time of the ex-post evaluation, the outsourcing rate of operation and maintenance works of KGM reached 75% (in terms of the amount of money). In KGM,

operation and maintenance works both for daily and for regular intervals have been outsourced. As outsourcing increases, the number of KGM staff members has decreased by approximately 40% from the time of the appraisal, which brought about a remarkable decrease in the number of workmen. While operation and maintenance has been outsourced, contract management work and quality inspection after engineering work has been carried out by KGM. Since KGM had undertaken operation and maintenance by themselves before, they have staff members with knowledge and experience of quality management for engineering works. Also, KGM enhanced training programs in order to enable staff members to obtain adequate knowledge on contract management. In the section targeted by the project, 33 staff members (2 persons for management section, 4 engineers, and 27 workers for construction, and operation and maintenance) of Bilecik branch office are in charge of operation and maintenance. Also, in the project targeting section, the works of operation and maintenance have been outsourced.

In terms of institutional aspects, no problem which could impair sustainability was observed. As KGM is responsible for operation and maintenance of the section targeted by the project and a responsible branch of KGM is clearly assigned for operation and maintenance of constructed infrastructures. KGM, does have an established system for contract management and quality inspection of engineering works.

### 3.5.2 Technical Aspects of Operation and Maintenance

In KGM, staff members are employed based on the regulations for public officers of the Turkish Government. When employing a staff member requiring engineering ability, their technical capability is closely examined. Civil works engineers and mechanical engineers take six-month-training immediately after being employed. The training includes not only the relevant technologies but also contract management. KGM has conducted short-term trainings for all its staff members. In 2014, 11,883 persons in total joined 417 training courses. As part of highly specialized trainings (e.g. contract management based on FIDIC), it is possible to take lectures and join seminars outside of KGM. Also, when the government changes a procurement guideline, staff members sometimes take lectures in other ministries. According to hearings with staff members of the Bilecik branch office, they have sufficient capabilities to take charge of operation and maintenance.

Manuals for road operation and maintenance are distributed to KGM branch offices doing operation and maintenance. In addition, manuals for traffic signs are provided to the branch offices. Types of road operation and maintenance works are as follows:

Daily Operation and Maintenance (everyday): dealing with potholes<sup>6</sup>, painting road signs, changing reflective plates, cleaning drainage ways, snow removal, etc.

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<sup>6</sup> Holes appeared on the road because of subsidence of pavement and detachment of paved surface.

Regular Operation and Maintenance (every 5 years): overlay<sup>7</sup>, reconstruction, etc.  
 Urgent Operation and Maintenance (necessary): correspondence to disasters

For technical aspects, no major problem which could impair sustainability was discovered. KGM confirms technical capability when employing staff members and also provides them opportunities to take relative training programs. A system to conduct ongoing trainings after employment is established for contract management since it accounts for a larger proportion of KGM services.

### 3.5.3 Financial Aspects of Operation and Maintenance

Both general budgets and investment budgets in the Ministry of Transport, Maritime Affairs and Communications fluctuated in a stable manner for the past three years (see Table 16). Although there was rise or fall in accordance with the progress of large-sized construction works, investment budgets for the transportation sector has been relatively stable. At the time of the ex-post evaluation, , although special tax (fuel levy, etc.) and toll road revenue were not appropriated for the budget, both general budgets and investment budgets were allocated from the governmental budget. Both general budget and investment budget are used for the operation and maintenance of roads.

Table 16: General Budget and Investment Budget for the Ministry of Transport, Maritime Affairs and Communications

| Unit: Million TL      |        |        |        |
|-----------------------|--------|--------|--------|
|                       | 2011   | 2012   | 2013   |
| General Budget        | 2,841  | 3,091  | 2,987  |
| Investment Budget     | 12,106 | 11,096 | 12,358 |
| Transportation Sector | 10,393 | 9,659  | 10,916 |

Source: KGM

KGM's operation and maintenance budget for the road sector has increased remarkably from 2011 to 2012 and had remained at the same level in 2013 (See Table 17). In particular, the budget for regular operation and maintenance increased sharply in 2012, and desirable budget allocation was made to prevent damage of road infrastructures. In 2013, the operation and maintenance budget was 1,710 million TL (approximately 87,500 million yen). Since the overall length of the road network was approximately 66,000km, the budget per 1km was 1.33 million yen. In 1997 before the implementation of the project, the operation and maintenance budget was 21,500,000 million Old TL (approximately 17,100 million yen) and total length of the road network was approximately 62,000km, thus, the operation and maintenance budget per 1km was 0.28 million yen. The budget per 1km of road has

<sup>7</sup> Construction method of paving a new layer of asphalt on the surface of the road.

increased significantly in comparison of before and after the project implementation.

Table 17: KGM’s Budget for Operation and Maintenance of Road Sector

Unit: thousand TL

|                                     | 2011    | 2012      | 2013      |
|-------------------------------------|---------|-----------|-----------|
| Daily Operation and Maintenance     | 154,830 | 241,349   | 177,489   |
| Regularly Operation and Maintenance | 86,884  | 1,584,275 | 1,501,297 |
| Urgent Operation and Maintenance    | 19,116  | 32,911    | 26,521    |
| Total                               | 260,830 | 1,858,535 | 1,705,307 |

Source: KGM

In allocating the budget, state highways are given priority over provincial roads. Although introduction of a road operation and maintenance system<sup>8</sup> had been implemented at the time of the ex-post evaluation, it has not yet been put into practical use and the system has not drawn a budget for operation and maintenance.

For financial aspects, no problem which could impair sustainability was observed. Both general budgets and investment budgets have been stably allocated and the budget for road operation and maintenance has significantly increased in comparison of before and after of the project implementation.

### 3.5.4 Current Status of Operation and Maintenance

In the project targeting section, KGM staff members have inspected roads, bridges and tunnels twice a week, and assigned daily operation and management work to appropriate contractors. As far as the site survey could confirm, there was no observed rutting<sup>9</sup> or potholes, road markings have not disappeared, and snow was removed. In the section where the road had cracks, engineering works had been conducted to prevent pavement from peeling off. Also, at one place where the road shoulder was broken, repair work has been carried out. Regular operation and management has not been conducted in the section targeted by the project yet, since it is carried out on a 5 year basis.



Photo 5: Control Centre of Tunnel

Works for daily operation and maintenance of tunnels have also been outsourced to private enterprises and supervision has been carried out at a 24 hour a day control center.

<sup>8</sup> The proposed system includes an IT system consisting of a database (for data such as road conditions, passage volume, and record of operation and maintenance works), and a program of operation and maintenance planning.

<sup>9</sup> A hollow generated in the part where tires on the paved road touch it because of passive vehicles’ load.

The control center includes operating or supervising items such as: electric traffic signs, lights, power-distribution system, ventilation, temperatures (fire check), and road conditions (temperatures). Moreover, the weight of vehicles is being measured at the entrance of a tunnel (heavy vehicles are required to take a detour from the tunnel).

In the current status of operation and maintenance, no problem which could impair sustainability was found. Although some sections had damage to the facilities, adequate countermeasures had been carried out. Also, whereas there has been heavy freight vehicles traffic in the project targeting section, serious rutting has not occurred.

In light of the above, no major problems have been observed in the institutional, technical and financial aspects of the operation and maintenance system. Therefore sustainability of the project effects is high.

#### **4. Conclusion, Lessons Learned and Recommendations**

##### 4.1 Conclusion

The objective of this project was to improve State Road D650 and construct the Bozüyük bypass road to accommodate an increasing traffic volume, and thereby contribute to smoother freight logistics and vitalization of the local economy. The relevancy of this project is high as the project scope is consistent with the Turkish Government's policy to encourage a high-standardization of roads and with the necessity of handling an increase in freight vehicles. On the other hand, the efficiency of the project is low since the project costs exceeded the plan (due to difficult engineering works in mountainous areas), and the project period substantially exceeded the plan (due to a delay in procurement and prolonged construction works). The traffic volume in the section targeted by the project has increased mostly as forecasted and the number of freight vehicles has also increased remarkably. As the result of the road improvements, the average travel speed is faster and the number of traffic accidents has decreased. In addition, the following improvements have been seen; improved driving comfort, and a decrease in cargo damage. As effects sufficient for an industrial road project have been seen, effectiveness and impact of the project is high. Moreover, the executing agency has dealt with an increasing proportion of contract management in operation and maintenance by a training program. Major problems which could impair the project sustainability have not been observed in the management, technical, and financial aspects of the project. Thus, sustainability of the effects induced by the project is high.

In light of the above, this project is evaluated to be satisfactory.

## 4.2 Recommendations

### 4.2.1 Recommendations to the Executing Agency

The beneficiary survey showed that truck drivers and residents in Bozüyük and Bilecik recognized traffic safety had improved, but some residents in smaller towns felt traffic safety worsened. It is conjectured that the latter group used the improved section as a community road and felt an increase in danger due to an increase in the traffic volume. The executing agency has monitored traffic accidents on D650 and improved the sections where accidents occurred. An increase in traffic may increase risk of accidents in the smaller towns. It is desirable that the executing agency continues to monitor traffic accidents and construct speed bumps, pedestrian overpasses, underpasses, traffic signs, and mirrors when there is an increase in traffic accidents.

### 4.2.2 Recommendations to JICA

None.

## 4.3 Lessons Learned

### Points to note for a road project in a mountainous area

Road improvement projects often result in an increase in traffic accidents due to higher traffic volumes and faster travel speeds. Nevertheless, the number of traffic accidents decreased in the improved sections after the implementation of this project. Use of dividers, an increase of road width, and gentler curves and slopes were effective in the reduction of traffic accident. On the other hand, this project required road alignment after the commencement of civil work and the design change was one of the factors behind project delay and an increase of project costs. For a road project in a mountainous area, it is desirable to assess road alignment for smooth project implementation, design a road with an adequate attention to traffic safety, and estimate appropriate project costs under the proper design during the feasibility study.

### Measures to stimulate local economy in smaller towns

In general, there has been improvement in the impacts relevant to road traffic (such as active traffic in wider areas, contribution to cargo traffic and, less congestion). In smaller towns, however, it takes more time for incidence of the impacts relevant to the local economy (such as income, employment, and business opportunity). When constructing and rehabilitating roads, it is desirable to assess the undertaking of measures to stimulate the local economy in smaller towns (for example, posting a bulletin board for tourists, building roadside stations, etc.)

Comparison of the Original and Actual Scope of the Project

| Item                               | Plan  | Actual  |
|------------------------------------|---|---|
| 1.Project Outputs                  | <p>Civil Works:<br/> Road Construction: total 85.8km<br/> - Widening of the existing roads<br/> (2 lanes for one side) 42.2km<br/> - New road establishment<br/> (2 lanes for one side) 32.8km<br/> - Bozüyük bypass road<br/> (3 lanes for one side) 10.8km<br/> Bridge Construction: 32 places<br/> (total 2.1km)<br/> Tunnel Construction: 2 places<br/> (2.4km and 0.8km)<br/> Consulting Services:<br/> Overseas: 240M/M<br/> Domestic: 1,781M/M</p> | <p>Civil Works:<br/> Road Construction: total 85.1km<br/> - Widening of the existing roads<br/> (2 lanes for one side) 33.6km<br/> - New road establishment<br/> (2 lanes for one side) 41.4km<br/> - Bozüyük bypass road<br/> (3 lanes for one side) 10.1km<br/> Bridge Construction: 40 places<br/> (total 2.1km)<br/> Tunnel Construction: 2 places<br/> (2.4km and 0.8km)<br/> Consulting Services:<br/> Overseas: 232M/M<br/> Domestic: 2,121M/M</p> |
| 2.Project Period                   | September 1999 –<br>September 2005<br>(73 months)   | September 1999 –<br>September 2011<br>(145 months)  |
| 3.Project Cost                     |   |   |
| Amount paid in<br>Foreign currency | 22,465 million yen  | 29,101 million yen  |
| Amount paid in<br>Local currency   | 16,692 million yen<br><br>(local currency 37,800,000<br>million Old TL)   | 23,395 million yen<br><br>(local currency 404<br>million New TL)  |
| Total                              | 39,157 million yen  | 52,496 million yen  |
| Japanese ODA<br>loan portion       | 29,367 million yen  | 29,199 million yen  |
| Exchange rate                      | 1 Old TL = 0.000442 yen<br>(As of September 1998)   | 1 New TL = 57.91 yen<br>(Average between January 2001<br>and December 2011)   |