

APPENDIX-G

A SUPPLEMENTAL STUDY FOR TJ. BUNGA – TAKALAR ROAD
(JALAN LINTAS BARAT MAKASSAR)

Appendix G A Supplemental Study for Tj. Bunga – Takalar Road (Jalan Lintas Barat Makassar)

G-1 General

The existing Tj. Bunga – Takalar Road passes through Makassar City, Kabupaten Takalar and Kabupaten Gowa. The existing road is a mostly 4.5 m wide paved road. The Takalar Regency proposed to the Japan International Cooperation Agency (JICA) through South Sulawesi Province to conduct a pre-feasibility study for the Tj. Bunga – Takalar Road, which is an alternative route from Makassar City to Takalar and the southern part of South Sulawesi. JICA has accepted the proposal and the Study Team has conducted a supplemental study in addition to the F/S roads. **Figure G-1.1** shows the Tj. Bunga – Takalar Road (Jalan Lintas Barat Makassar).

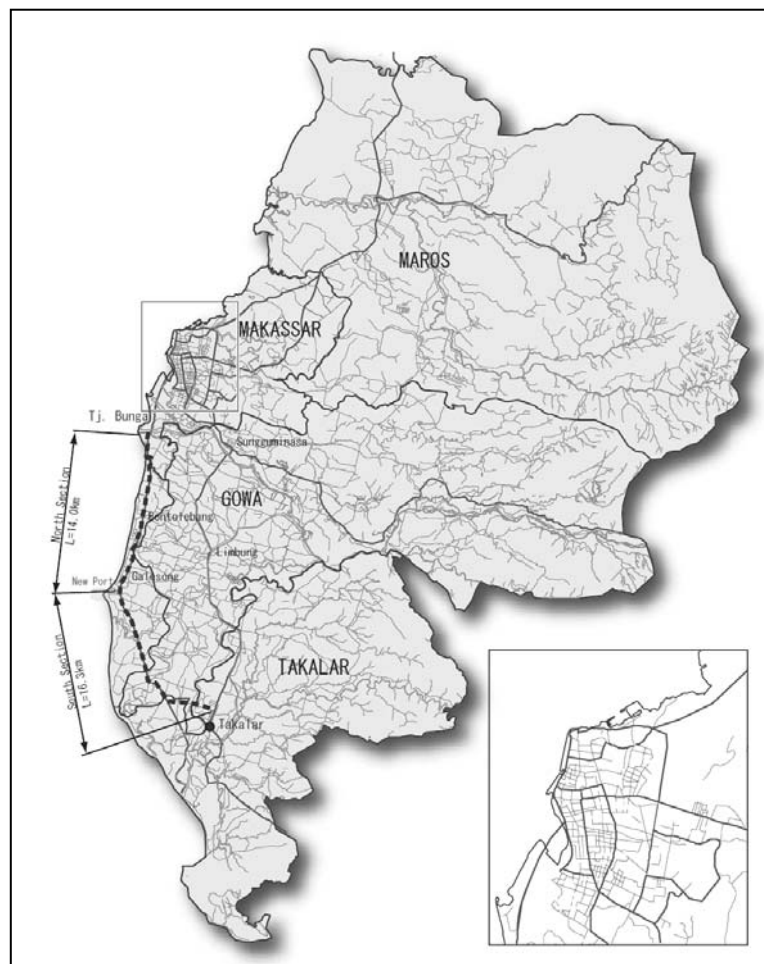


Figure G-1.1 Location Map of Tj. Bunga – Takalar Road

G-2 Development Concept and Route Selection

G-2.1 Arterial Road Network Plan for the Mamminasata Metropolitan Area

(1) JICA 1989 Highway Development Plan

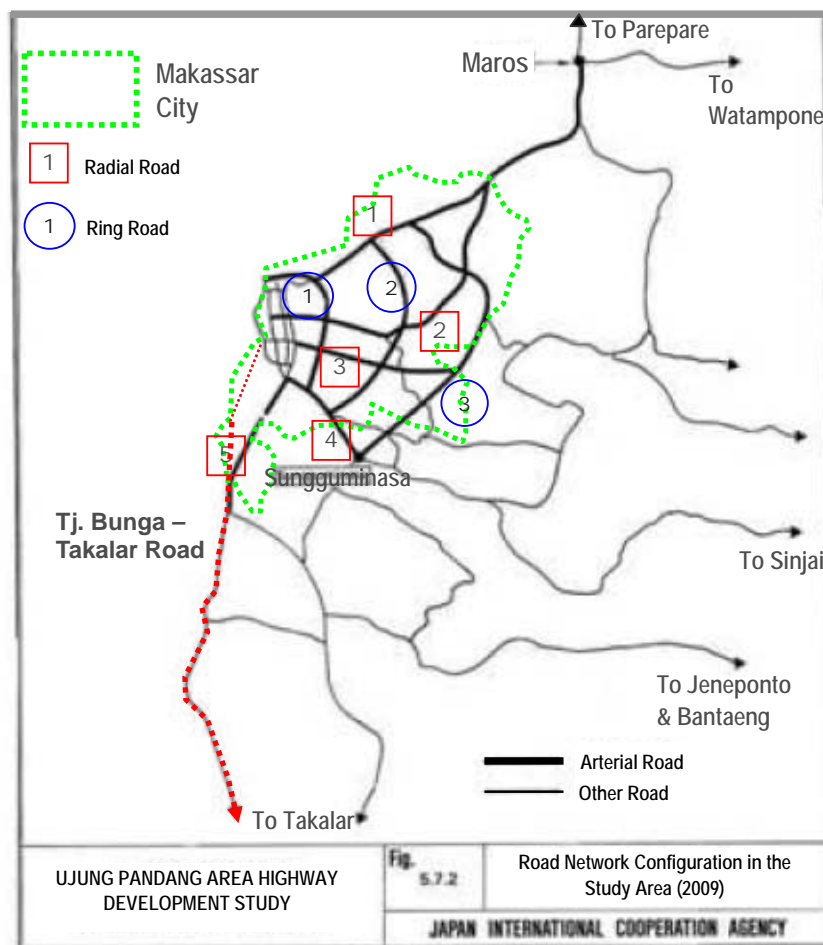
JICA conducted the “Ujung Pandang Highway Development Study” in 1989 (“the 1989 JICA Study or Plan”) for the target year of 2009. The trunk arterial road system in the Makassar Metropolitan Area was configured with five radial roads and three ring roads as listed below (also refer to **Figure G-2.1**). The Takalar – Jl.Tj.Bunga road is one of the radial roads in that plan.

Radial Roads:

- Jl.Tol.Ir.Sutami
- Jl. Jl.Urip Sumoharjo / Jl.Perintis Kemerdekaan
- Jl.Boulevard Pannakukang and its east and west extensions (Central Radial Road)
- Jl.Sultan Alauddin / Jl.Gowa Raya
- **Takalar – Jl.Tj.Bunga (South Radial Road)**

Ring Roads:

- Inner Ring Road (Jl.Andi Pangerang Pettarani / Jl.Tol Reformasi)
- Middle Ring Road (Jl.Ir.Sutami – Jl.Perintis Kemerdekaan - Jl. Sultan Alauddin)
- Outer Ring Road (Jl.Perintis Kemerdekaan – Sungguminasa)



Source: Ujung Pandang Area Highway Development Study, JICA

Figure G-2.1 Road Development Plan by JICA in 1989

These development plans are well coordinated with the Spatial Plan of Makassar City. Makassar City has developed the arterial road network as recommended in the 1989 JICA Study and completed most of them by 2005, except the Central Radial Road, South Radial Road (Tj Bunga-Takalar Road), Middle Ring Road, and Outer Ring Road.

(2) Road Development Plan of South Sulawesi Province

South Sulawesi Province has a trunk road network development plan evolving from the JICA 1989 plan for the Mamminasata Metropolitan Area. The development concept of ring and radial road network was adopted from the JICA 1989 plan. The Tj. Bunga – Takalar Road, which is a radial trunk road running along the coastal line in the JICA 1989 plan, connects the Makassar city center and Takalar town as shown in **Figure G-2.2**.

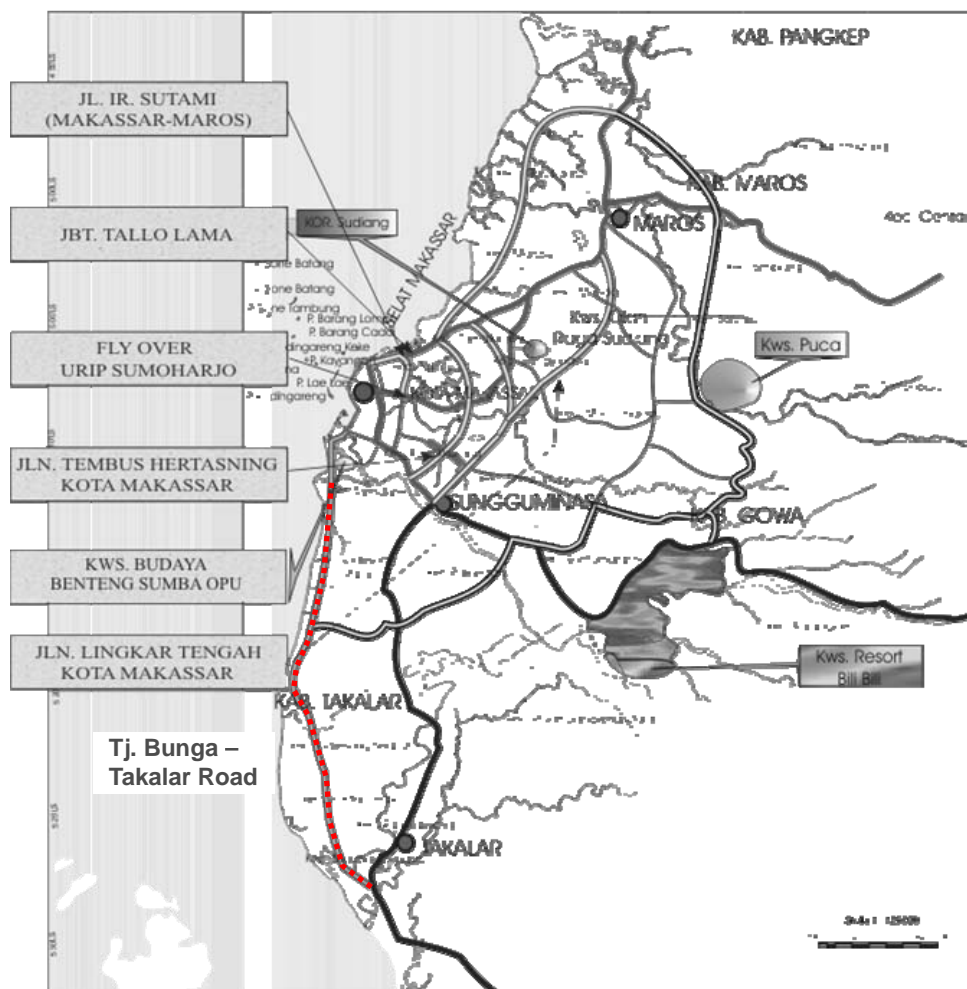


Figure G-2.2 Road Development Plan of South Sulawesi Province (2003 – 2012)

(3) Updated Mamminasata Spatial Development Plan

An Integrated Spatial Plan for the Mamminasata Metropolitan Area was established in 2005-2006 with the cooperation of JICA as shown in **Figure G-2.3**. A new port for cargo and passenger transports was planned at Galesong and its development was scheduled to be from 2007 to 2010.

A maritime research center, an education center and a regional fish market were planned integrally with the port development as a local activity center. The Tj. Bunga – Takalar Road has an essential role for the development of the Galesong activity center.

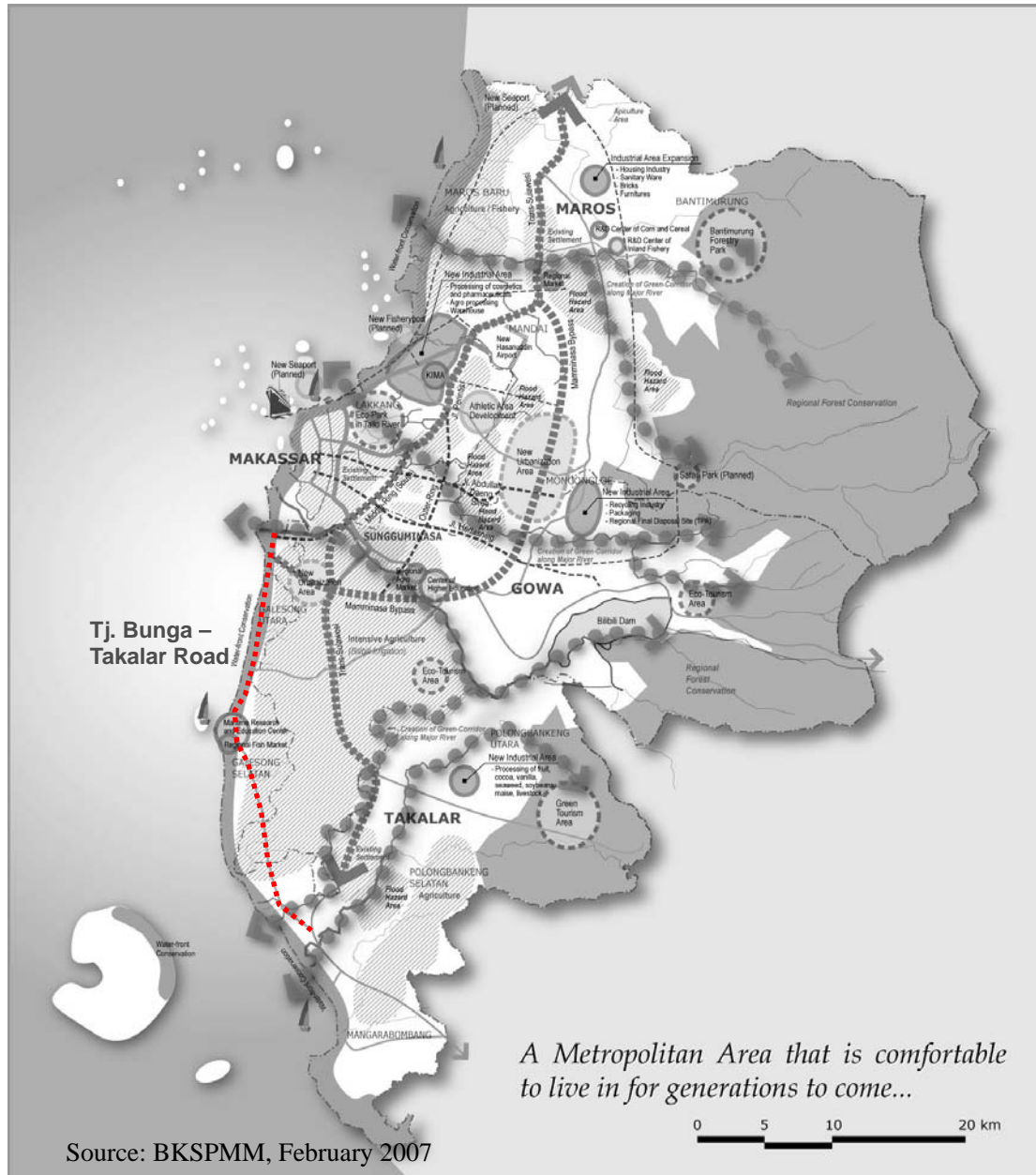


Figure G-2.3 Latest Spatial Development Plan of Mamminasata Metropolitan Area

G-2.2 Recommended Urban Arterial Road Network System for Mamminasata Metropolitan Area

Figure G-2.4 shows the urban arterial road network system recommended by the 1989 JICA Study, the Mamminasata Spatial Plan and by this F/S Study.

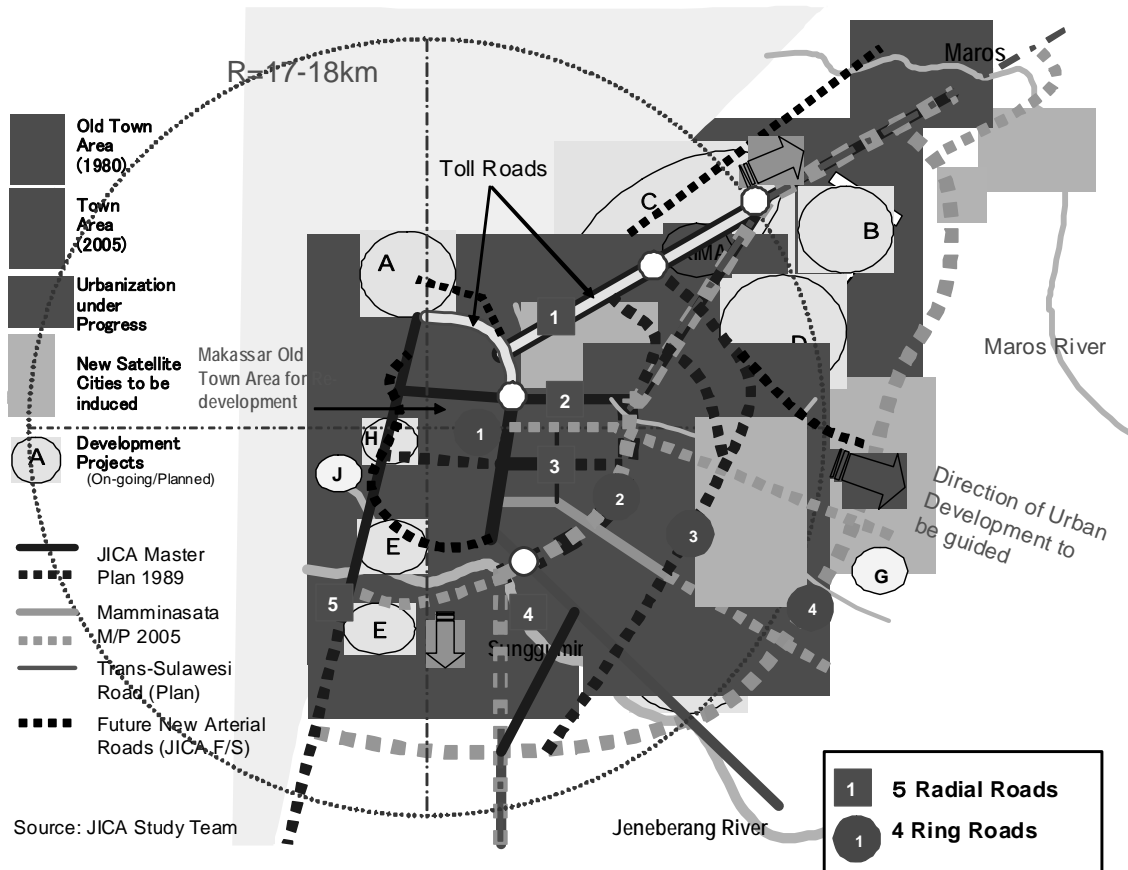


Figure G-2.4 Urban Arterial Road Network System for Mamminasata Metropolitan Area

The urban arterial road system is composed of five radial roads and four ring roads (including Mamminasa Bypass). The Takalar – Tj. Bunga road is one of the southern bound radial roads.

G-2.3 Traffic Demand Forecast for Tj. Bunga – Takalar Road

The forecast traffic demand in the Mamminasata Study was reviewed to avoid over-planning of road facilities. The present (2006) and future traffic demands for the trunk road network in the Mamminasata Metropolitan Area are indicated in **Figure G-2.5**. The traffic in 2015 was estimated at 15,000 - 18,000 pcu/day for the northern section and 4,000 - 10,000 pcu/day for the southern section of the Tj. Bunga - Takalar Road. The traffic in 2020 was estimated at 20,000 - 24,000 pcu/day for the northern section and 10,000 - 14,000 pcu/day for the southern section of the Tj. Bunga - Takalar Road.

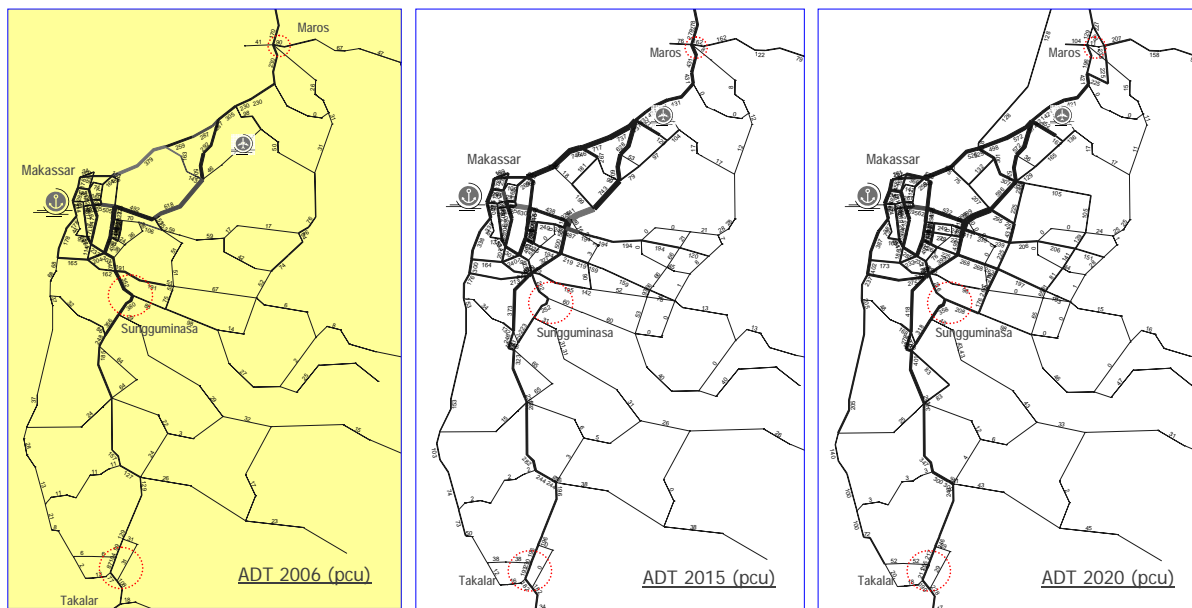


Figure G-2.5 Traffic Demand Forecast for Trunk Road Network in Mamminasata Metropolitan Area

G-2.4 Alternative Development Concepts

(1) Function of Tj. Bunga - Takalar Road

Floods did not occur at the Jeneberang River estuary since the Bili-bili dam was constructed in the early 1990s. A bridge was constructed at the mouth of the Jeneberang River in 2005 connecting Tj.Bunga (GMTDC) and the Jeneberang River south plain. Therefore, development of the area in the south of the Jeneberang River is unavoidable. An earliest improvement of the Jl.Tj.Bunga – Takalar (Jalan Lintas Barat Makassar) is recommended to regulate sprawled urban development.

The expected functions of Tj. Bunga - Takalar Road are as follows:

- Radial road contributing to harmonized urban development;
- Bypass for the traffic from/to Makassar City to/from the southern part of the Mamminasata Metropolitan Area;
- Access route for the coming in and out coastal road traffic (cargo and passenger) for the planned Galesong port;
- Reduction of traffic burden on the Trans-Sulawesi Mamminasata Road, especially around Sungguminasa; and
- Connection between the local activity center (maritime research center, education center and regional fish market, etc) and the national activity center city (Makassar).

(2) Basic Plan

The Tj. Bunga - Takalar Road is divided into two sections. The northern section is the section between Makassar City access to Bontolebang sub-district, Galesong sub-district and the planned Galesong port. The southern section is that between the planned Galesong port and Takalar Town.

The road development concept was established based on traffic demand and assigned road functions. Since earliest implementation of the existing road widening is expected for the planned Galesong port under limited budget, 1-lane 2-way road is the basic concept for the Tj. Bunga - Takalar Road. However, it is recommended that land acquisition for additional 2 lanes for the northern section, which will be used as a part of the Mamminasa Bypass/Outer Ring Road, should be made during the initial stage or development restriction should be imposed to maintain the required future ROW.

Three aspects (engineering, economic and environmental aspects) have been considered for the establishment of development concept for the Tj. Bunga – Takalar Road. The engineering aspect includes road functions, traffic demand and reduction of overburden on the Trans-Sulawesi Mamminasata Road. The economic aspect includes contribution to coastal traffic of cargo and passengers and marine products distribution. The major negative socio-environmental issue is land acquisition and resettlement.

Only two alternatives were set up, widening or zero option (without project), for evaluation. Alternative road development plans for the Tj. Bunga - Takalar Road are shown in **Table G-2.1**.

Table G-2.1 Alternative Development Plans for Tj. Bunga - Takalar Road

Section	Alt.	Development Concept	Length (km)	Location	Number of Lanes		Measures for Major Issues	
					Existing	Plan	Support of Coastal Transportation	Land Acquisition & Resettlement
North	1	Nil	14.0	Takalar	2	2	-	/
	2	Widening (2 lanes; 4m→7m)	14.0	Takalar	2	2	○	△
South	1	Nil	16.3	Takalar/Gowa	2	2	-	/
	2	Widening (2 lanes; 4m→7m)	16.3	Takalar/Gowa	2	2	○	△

Note: ○ Positive direct effective △ Some positive effective - No direct influence □ Recommended plan

(3) Standard Cross Section

The proposed standard cross-section for the Tj. Bunga - Takalar Road is 1-lane, 2-way road as illustrated in **Figure G-2.6**.

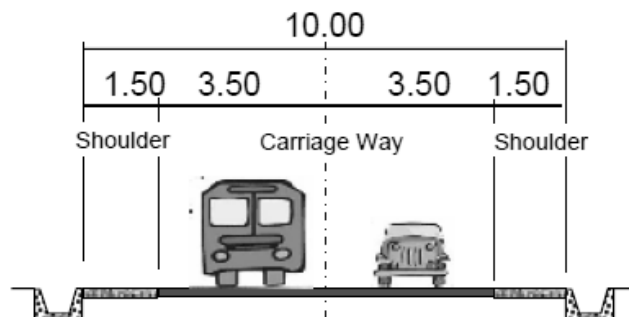


Figure G-2.6 Typical Cross Section of Tj. Bunga - Takalar

G-3 Evaluation and Recommendation on Alternative Plans

(1) Evaluation Method for Alternatives

An Initial Environmental Examination (IEE) was carried out based on the existing data, the data collected for the F/S roads, and site reconnaissance survey. Multi Criteria Analysis (MCA), which comprises engineering, economic and environmental elements (IEE results), was used for evaluation of alternatives.

(2) North Section

The existing road is mostly 4.5 m wide and the proposed improvement plan is to widen it to a 7.0m wide road. This widening alternative and the “without project” alternative (“Zero option”). were subjected to evaluation. The north section of the Tj. Bunga - Takalar Road is expected to ensure accessibility from the planned Galesong port to Makassar City and, therefore, adoption of road standard conforming with heavy vehicles is essential. The north section will also be used by commuter traffic to/from Makassar City. The JICA Study Team recommended the implementation of road widening based on the results of Multi Criteria Analysis (MCA) given in **Table G-3.1**.

Table G-3.1 Multi Criteria Analysis for Tj. Bunga - Takalar Road (North Section)

Evaluation Items	Weight				5 grades assessment		Converted score (Relative evaluation, average = 100)		Weighted score (* weight)	
	Level 1	Level 2	Level 3	Composite weight	Alternative 1	Zero Option	Alternative 1	Zero Option	Alternative 1	Zero Option
					Widening Road (14.0km)	existing road (14.0km)	Widening Road (14.0km)	existing road (14.0km)	Widening Road (14.0km)	existing road (14.0km)
Total				1.00	3.95	3.56	107.20	92.80	105.28	94.72
Engineering Aspect	0.40			0.40	3.75	3.50	105.56	94.44	41.33	38.67
1 Road Alignment			0.30	0.12	4	4	100.00	100.00	12.00	12.00
2 Construction Feasibility/ Flood			0.30	0.12	4	5	88.89	111.11	10.67	13.33
3 Traffic Demand			0.20	0.08	4	2	133.33	66.67	10.67	5.33
4 Road Network			0.20	0.08	3	3	100.00	100.00	8.00	8.00
Economical and Financial Aspect	0.30			0.30	4.00	3.50	107.14	92.86	31.71	28.29
5 Cost (Construction & Maintenance)			0.30	0.09	3	5	75.00	125.00	6.75	11.25
6 Economic Effectiveness			0.30	0.09	5	3	125.00	75.00	11.25	6.75
7 Impacts on Regional Economy			0.20	0.06	4	3	114.29	85.71	6.86	5.14
8 Others			0.20	0.06	4	3	114.29	85.71	6.86	5.14
Environmental Aspect	0.30			0.30	4.11	3.67	108.92	91.08	32.24	27.76
Social Environment		0.50		0.15	4.00	3.00	120.00	80.00	17.25	12.75
9 Migration of Populations Involuntary Resettlement			0.50	0.08	5	5	100.00	100.00	7.50	7.50
10 Existing Social Infrastructure and Services			0.25	0.04	3	3	100.00	100.00	3.75	3.75
11 Traffic Jam			0.25	0.04	4	1	160.00	40.00	6.00	1.50
Natural Environment		0.30		0.09	4.00	5.00	88.89	111.11	8.00	10.00
12 Flora, Fauna and Ecosystem			0.40	0.04	4	5	88.89	111.11	3.20	4.00
13 Geographical Conditions, Geological Conditions			0.30	0.03	4	5	88.89	111.11	2.40	3.00
14 Effect on the Natural/Ecological Reserves and Sanctuaries			0.30	0.03	4	5	88.89	111.11	2.40	3.00
Pollution		0.20		0.06	4.33	3.00	117.86	82.14	6.99	5.01
15 Air Pollution			0.50	0.03	4	3	114.29	85.71	3.43	2.57
16 Noise and Vibration			0.30	0.02	4	3	114.29	85.71	2.06	1.54
17 Water Pollution			0.20	0.01	5	3	125.00	75.00	1.50	0.90

(3) South Section

The existing south section of the road is 4.0 m – 4.5 m wide. There are two options: “Zero Option” or widening. This section is expected to improve accessibility between the planned Galesong port and Takalar Town. The JICA Study Team recommended widening to a 7.0 m standard road. The results of Multi Criteria Analysis (MCA) are given in **Table G-3.2**.

Table G-3.2 Multi Criteria Analysis for Tj. Bunga - Takalar Road (South Section)

Evaluation Items	Weight				5 grades assessment		Converted score (Relative evaluation average = 100)		Weighted score (* weight)	
	Level 1	Level 2	Level 3	Composite weight	Alternative 1	Zero Option	Alternative 1	Zero Option	Alternative 1	Zero Option
					Widening Road (16.3km)	existing road (16.3km)	Widening Road (16.3km)	existing road (16.3km)	Widening Road (16.3km)	existing road (16.3km)
Total				1.00	4.06	3.64	106.49	93.51	104.74	95.26
Engineering Aspect	0.40			0.40	4.00	3.75	103.47	96.53	40.67	39.33
1 Road Alignment			0.30	0.12	4	4	100.00	100.00	12.00	12.00
2 Construction Feasibility/ Flood			0.30	0.12	4	5	88.89	111.11	10.67	13.33
3 Traffic Demand			0.20	0.08	5	3	125.00	75.00	10.00	6.00
4 Road Network			0.20	0.08	3	3	100.00	100.00	8.00	8.00
Economical and Financial Aspect	0.30			0.30	3.75	3.50	103.57	96.43	30.86	29.14
5 Cost (Construction & Maintenance)			0.30	0.09	3	5	75.00	125.00	6.75	11.25
6 Economic Effectiveness			0.30	0.09	5	3	125.00	75.00	11.25	6.75
7 Impacts on Regional Economy			0.20	0.06	4	3	114.29	85.71	6.86	5.14
8 Others			0.20	0.06	3	3	100.00	100.00	6.00	6.00
Environmental Aspect	0.30			0.30	4.44	3.67	112.43	87.57	33.21	26.79
Social Environment		0.50		0.15	4.67	3.00	126.98	73.02	18.04	11.96
9 Migration of Populations Involuntary Resettlement			0.50	0.08	5	5	100.00	100.00	7.50	7.50
10 Existing Social Infrastructure and Services			0.25	0.04	4	3	114.29	85.71	4.29	3.21
11 Traffic Jam			0.25	0.04	5	1	166.67	33.33	6.25	1.25
Natural Environment		0.30		0.09	4.00	5.00	88.89	111.11	8.00	10.00
12 Flora, Fauna and Ecosystem			0.40	0.04	4	5	88.89	111.11	3.20	4.00
13 Geographical Conditions, Geological Conditions			0.30	0.03	4	5	88.89	111.11	2.40	3.00
14 Effect on the Natural/Ecological Reserves and Sanctuaries			0.30	0.03	4	5	88.89	111.11	2.40	3.00
Pollution		0.20		0.06	4.67	3.00	121.43	78.57	7.18	4.82
15 Air Pollution			0.50	0.03	4	3	114.29	85.71	3.43	2.57
16 Noise and Vibration			0.30	0.02	5	3	125.00	75.00	2.25	1.35
17 Water Pollution			0.20	0.01	5	3	125.00	75.00	1.50	0.90

G-4 Design

The design of the Tj. Bunga - Takalar Road principally followed the existing design of Perencanaan Teknis Jalan dan Jembatan Metro Makassar, KU. 08.08/SNVT/P2JMM-Bh/B/IX/253/ 2006, September 2006, Department Pekerjaan Umum Direktorat Jenderal Bina Marga, with a review based on site reconnaissance.

G-4.1 Roadway Design

(1) Geometric Design Standard

According to Perencanaan Teknis Jalan dan Jembatan Metro Makassar, KU. 08.08/SNVT/P2JMM-Bh/B/IX/253/ 2006, Standard Specifications for Geometric Design of Urban Roads, MPW, Indonesia, 1992 were applied for the geometric design of which standard elements are tabulated in **Table G-4.1**. The proposed design classification for the Tj. Bunga- Takalar Road is Type-II, Class-I.

Table G-4.1 Geometric Design Standards

Road Classification		Type-I		Type-II		
		Class-I	Class-II	Class-I	Class-II	Class-III
Design Speed (km/h)		100 or 80	100 or 60	60	60 or 50	40 or 30
Cross-section	Carriageway Width	3.5m	3.5m	3.5m	3.25m	3.25m, 3.0m
	Median	2.5m	2.0m	2.0m (1.0m)	1.5m (1.0m)	1.5m (1.0m)
	Shoulder Width (Right)	1.0m	0.75m	0.5m	0.5m	0.5m
	Shoulder Width (Left without Side Walk)	2.0m (1.75m)	2.0m (1.75m)	2.0m (1.5m)	2.0m (1.5m)	2.0m (0.5m)
	Sidewalk Width	-	-	3.0m (1.5m)	3.0m (1.5m)	1.5m (1.0m)
Horizontal Alignment	Min. Radius	230m	120m	150m	100m	30m
	Min. Curve Length a; intersection angle (degree)	1,000/a (140m)	700/a (100m)	700/a (100m)	600/a (80m)	350/a (50m)
	Omission of Transition	>1,000m	>600m	>600m	>400m	>150m
Vertical Alignment	Max. Grade	4.0%	5.0%	5.0%	6.0%	8.0%
	Min. Vertical Curve (crest)	3,000m	1,400m	1,400m	800m	250m
	Min. Vertical Curve (sag)	2,000m	1,000m	1,000m	700m	250m

Note: () ; Exceptional case

(2) Road Alignment

The proposed road starts at the south end of the Jeneberang Bridge in Tj. Bunga, passes through Galesong and ends at the intersection with the Trans-Sulawesi Mamminasata Road in Takalar Town as shown in **Figure G-4.1**. Since the terrain is flat and the road alignment follows the existing road, both horizontal and vertical alignments comply with the design speed of 60 km/hr.



Figure G-4.1 Plan of Tj. Bunga - Takalar

(3) Cross Section

Six typical cross sections are provided for the Tj. Bunga – Takalar Road as shown in **Figures**

G-4.2 to G-4.4. The typical cross section has 2 lanes (1 lane in each direction) with 3.5m lane width, 1.5 m shoulder and drainage or slope protection on both sides.

Type 1

The standard cross-section from Sta. 0+000 to Sta. 1+600 is widening of the existing 6 m wide travelway with asphalt concrete pavement to 7 m width. Side ditches on both sides are provided for residential and flat terrain sections. Slope protections on both sides are provided for plowland sections as illustrated in **Figure G-4.2**.

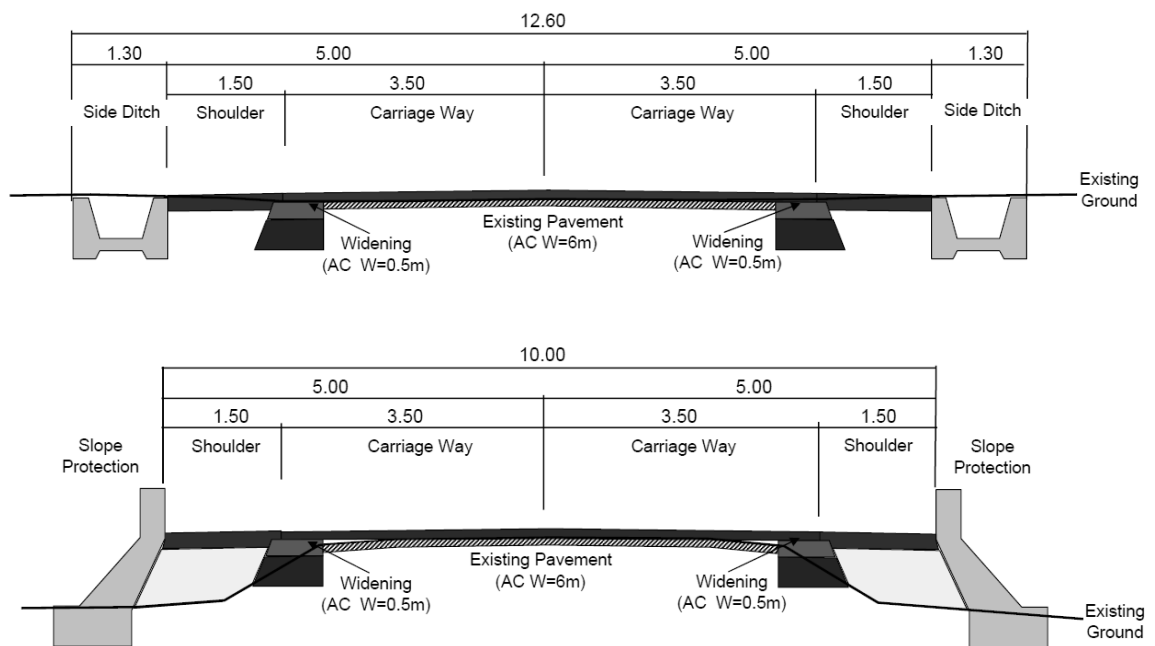


Figure G-4.2 Typical Cross Section (Types 1; AC)

Type 2

The standard cross-section from Sta. 1+600 to Sta. 25+800 and from Sta. 28+100 to Sta. 30+250 is widening of the existing 4 m road with asphalt concrete pavement to a 7 m wide road. Side ditches on both sides are provided for residential and flat terrain sections. Slope protections are provided for lowland sections as illustrated in **Figure G-4.3**.

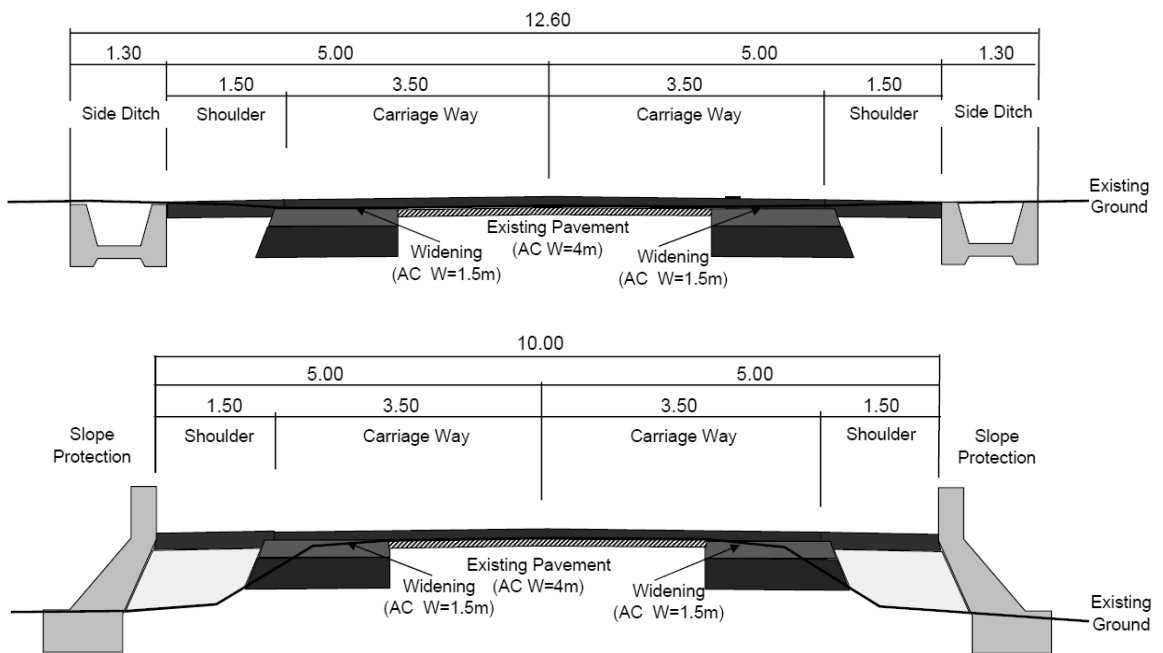


Figure G-4.3 Typical Cross Section (Type 2; AC)

Type 3

The standard cross-section from Sta. 25+800 to Sta. 28+100 is widening of the 3.5m wide road with cement concrete pavement to a 7.0 m wide road. Side ditches on both sides are provided for residential and flat terrain sections and slope protections on both sides for lowland sections as illustrated in Figure G-4.4.

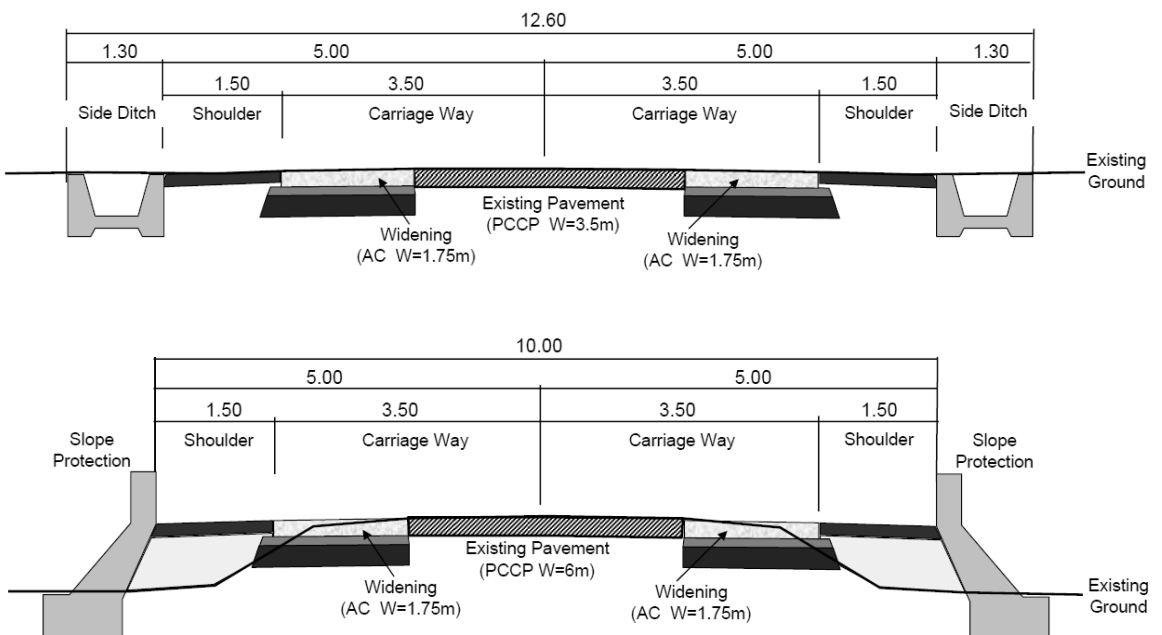


Figure G-4.4 Typical Cross Section (Type 3; PCCP)

G-4.2 Pavement Design

Since geological engineering survey for the Tj. Bunga Takalar Road was not carried out by the Study Team, the pavement structure design was made referring to Perencanaan Teknis Jalan dan Jembatan Metro Makassar, KU. 08.08/SNVT/P2JJM-Bh/B/IX/253/ 2006, September 2006, Department Pekerjaan Umum Direktorat Jenderal Bina Marga as shown in **Figures G-4.5 and G-4.6**.

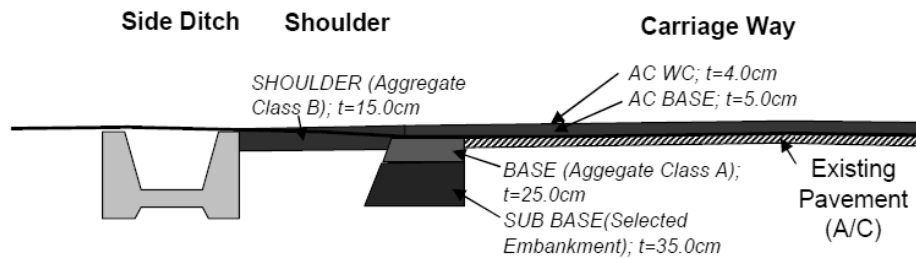


Figure G-4.5 Pavement Cross Section (A/C Section)

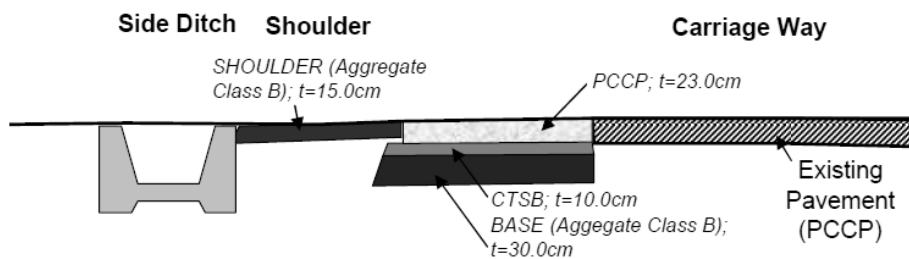


Figure G-4.6 Pavement Cross Section (PCCP Section)

G-4.3 Bridge Design

Thirteen bridges are located on the Tj. Bunga – Takalar Road as shown in **Figure G-4.7**. The existing condition and proposed improvement measures for these bridges are shown in **Table G-4.2**.

Table G-4.2 List of Bridgea on Tj. Bunga - Takalar Road

Bridge No.	Station	Existing Condition (m)		Proposed Improvement Measure
		Length	Width	
BR-01	3+675	38.0	4.6	Replacement-PC
BR-02	6+910	5.0	4.0	Replacement-RC
BR-03	7+950	11.6	3.2	Replacement-RC
BR-04	9+950	34.0	2.4	Replacement-PC
BR-05	12+300	3.0	4.0	Replacement-RC
BR-06	14+600	20.0	3.5	Replacement-PC
BR-07	14+725	2.7	4.3	Replacement-RC
BR-08	17+750	3.1	4.2	Replacement-RC
BR-09	19+500	16.5	3.2	Replacement-PC
BR-10	19+975	5.5	4.0	Replacement-RC
BR-11	23+900	22.0	3.0	Replacement-PC
BR-12	25+850	2.5	4.0	Replacement-RC
BR-13	30+100	9.0	4.5	Replacement-RC
Total		172.9	-	

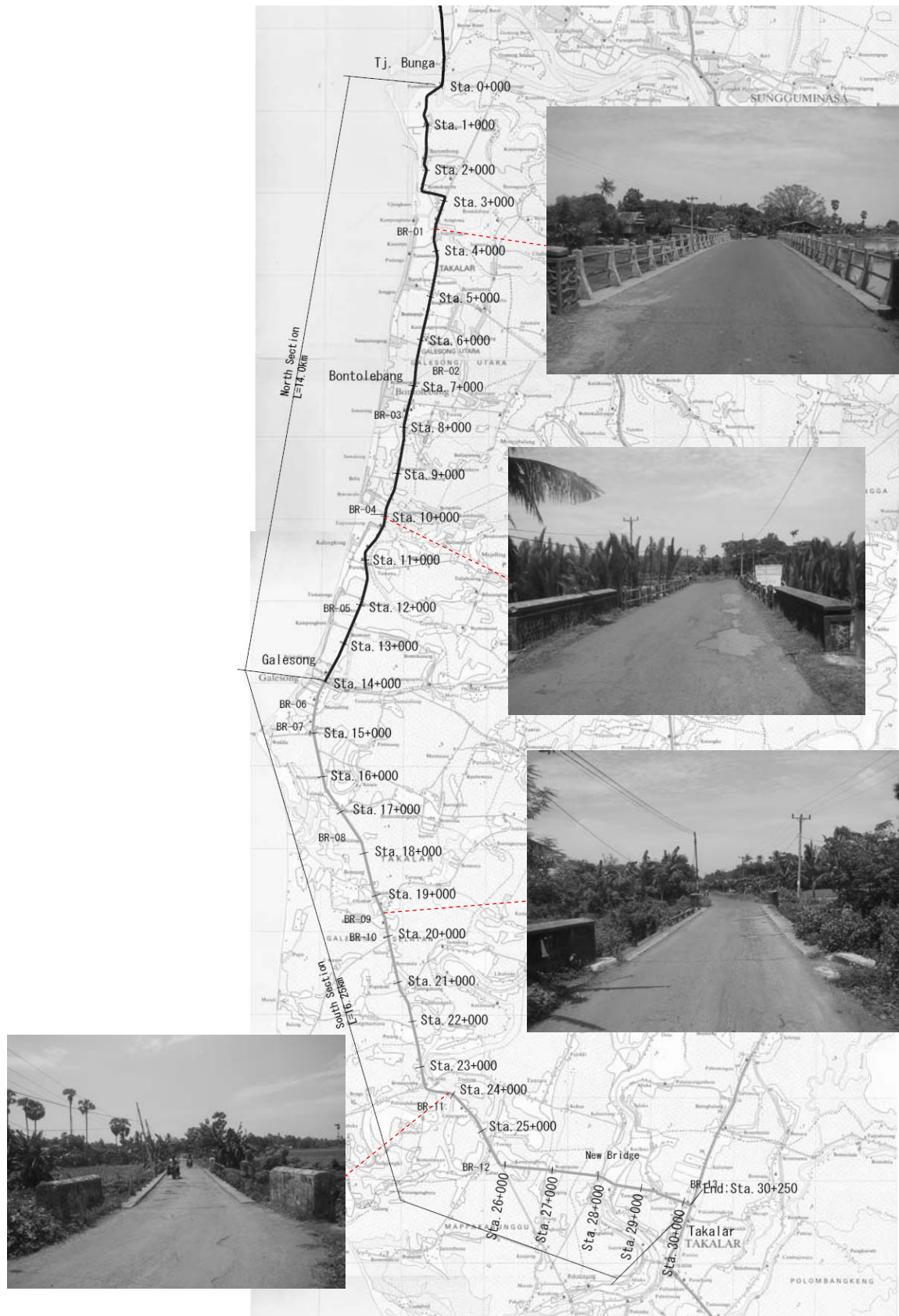


Figure G-4.7 Bridge Location on Tj. Bunga - Takalar Road

G-5 Cost Estimate and Economic Evaluation

G-5.1 Composition of Project Cost

The project cost consists of construction cost, detailed design and supervision cost, land acquisition and compensation cost and administration cost. The construction cost was estimated based on the result of preliminary engineering design, quantities of major work items, and assumptions on the percentages of overhead and profit of the contractor and physical contingency. The value added tax (VAT) of 10% and inflation (price escalation) were excluded in the economic evaluation but included in the financing plan under G-7, Implementation Plan. The maintenance cost for periodic maintenance and routine maintenance was also estimated.

The components of the project cost are shown in **Figure G-5.1**.

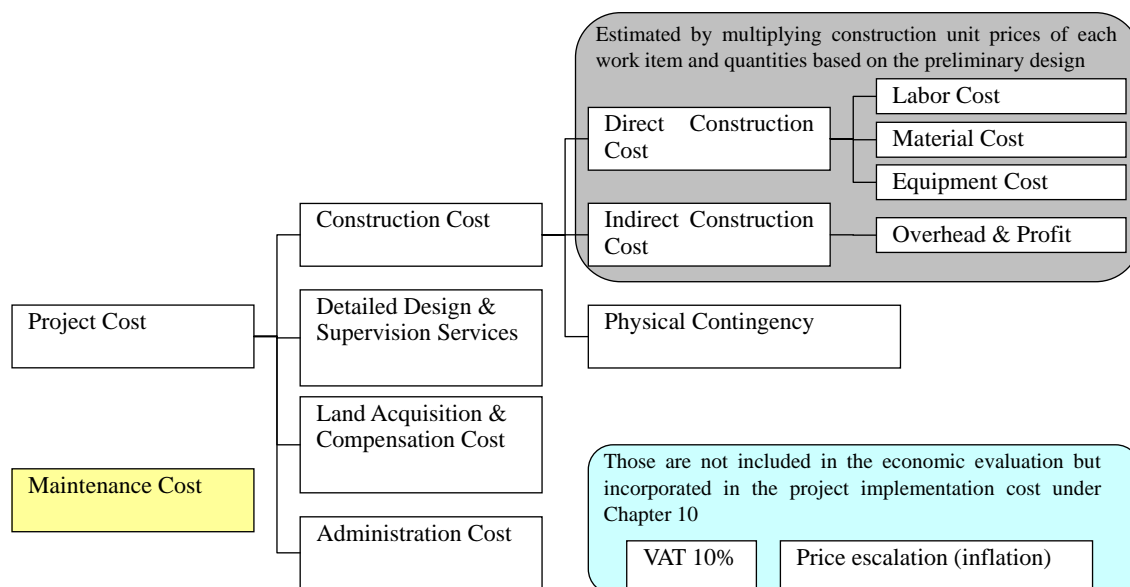


Figure G-5.1 Project Cost Components

G-5.2 Conditions of Cost Estimate

Cost estimate was made based on the following conditions.

- i) Time of cost estimate: November 2007
- ii) Foreign currency: US dollar
- iii) Exchange rate: 1 US dollar = Rp. 9,376 (Bank Indonesia, 30 November 2007)
- iv) Taxes: Not included in the economic evaluation but included in the project implementation plan as a part of the project cost.

(1) Construction Cost

1) General

The construction cost is composed of direct construction cost, indirect construction cost, and physical contingency. The direct construction cost consists of labor cost, material cost, and equipment cost. The construction cost was estimated by multiplying construction unit prices and quantities calculated based on the preliminary design. Physical contingency was considered to be 10%. Estimation was made by major work items quoted from the standard specifications of DGH, Indonesia, since they can be considered as the most general categorization of work items in Indonesia.

2) Construction Unit Prices

Construction unit prices include direct construction cost and indirect construction cost. The direct construction cost is composed of labor cost, material cost, and equipment cost, including all the relevant expenditures necessary to complete the work, such as taxes on the procurement of materials, operation cost of equipment, and so on. The indirect construction cost includes overhead and profit margin of the contractor.

The construction unit prices applied for the cost estimate were based on the standard unit prices in South Sulawesi Province (Harga Satuan Pokok Kegiatan (HSPK), 2006) and also on the comparison results of contract unit prices in the past and on-going projects. The sites of all the projects referred to are located in the Mamminasata Area, and the contracts related thereto were made in the period of 2005-2007.

The unit prices of major pay items applied for cost estimation are shown in **Table G-5.1**.

Table G-5.1 Unit Prices of Major Items

Item	Unit	Unit Price (Rp. per unit)
Mortared Stonework	m3	334,361
Common Excavation	m3	25,337
Common Embankment	m3	25,337
Selected Embankment	m3	63,654
Aggregate Base Class A	m3	230,015
Aggregate Base Class B	m3	205,723
Asphalt Concrete-Wearing Course (4cm)	m2	48,005
Structural Concrete Class K300	m3	677,124
Precast Unit Type I Girder (31m)	nos	189,264,348
Reinforcing Steel Deformed Bars D-32	kg	15,613

Source: JICA Study Team design

3) Indirect Construction Cost

Overhead and profit was assumed to be twenty percent (20%) of the estimated direct construction cost.

(2) Detailed Design and Supervision Services

The cost for detailed design and supervision services was assumed to be seven percent (7%) of the estimated construction cost.

(3) Land Acquisition and Compensation Cost

Fund sources for land acquisition and compensation would be provided by regional governments. On the basis of the current procedure of land acquisition and compensation in Indonesia, the transaction prices and *Nilai Jual Objek Pajak (NJOP)* prices informed verbally by each Kota/Kabupaten, the land acquisition and compensation costs were estimated as shown in the **Table G-5.2**.

Table G-5.2 Land Acquisition and Compensation Cost of Tj. Bunga - Takalar Road

No.	Item	North Section Makassar, Takalar (M Rp.)	South Section Takalar, Gowa (M Rp.)	Total (M Rp.)
1	Land Acquisition	17,850	18,050	35,900
2	Building Compensation	0	0	0
Total		17,850	18,050	35,900

Source: JICA Study Team estimation

(4) Administration Cost

The administration cost was assumed to be two percent (2%) of the estimated construction cost.

G-5.3 Project Cost

(1) Sectioning of Tj. Bunga - Takalar Road for Project Implementation

The project road was divided into two sections as shown in **Figure G-5.2**.

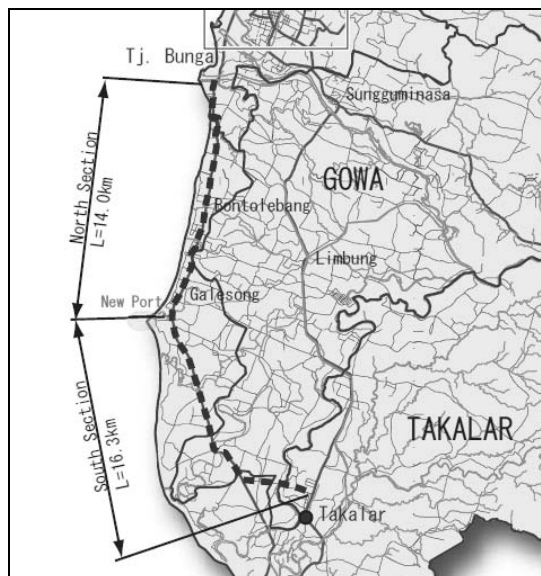


Figure G-5.2 Sections of the Project Road

(2) Major Construction Quantities

The estimated major construction quantities are shown in Table G-5.3. These were calculated by referring to the Perencanaan Teknis Jalan dan Jembatan Metro Makassar, KU. 08.08/SNVT/P2JMM-Bh/B/IX/253/ 2006.

Table G-5.3 Major Construction Quantities

Item	Unit	North Section	South Section	Total
Mortared Stonework	m ³	3,786	7,924	11,710
Common Excavation	m ³	1,481	2,362	3,843
Common Embankment	m ³	52,644	35,698	88,342
Selected Embankment	m ³	16,170	16,728	32,898
Aggregate Base Class A	m ³	11,550	11,473	23,023
Aggregate Base Class B	m ³	6,930	10,241	17,171
Asphalt Concrete -Wearing & Binder Course (4cm)	m ²	97,317	97,053	194,370
Structural Concrete Class K300	m ³	995	1,467	2,462
Precast Unit Type I Girder (16-35m)	nos	2	3	5
Reinforcing Steel	ton	131,063	188,453	319,516

Source: JICA Study Team design

Based on the unit prices and estimated construction quantities, the project construction cost was estimated as shown in Table G-5.4.

Table G-5.4 Construction Cost of the Project

Division No.	Item	North Section (M Rp.)	South Section (M Rp.)	Total (M Rp.)	Percentage
1	General	561	670	1,230	1.8%

2	Drainage	1,320	3,010	4,331	6.3%
3	Earthworks	6,528	5,755	12,283	18.0%
5	Granular Pavement	4,082	5,173	9,256	13.5%
6	Asphalt Pavement	10,549	10,517	21,066	30.8%
6.5	Concrete Pavement	0	1,662	1,662	2.4%
7	Structures	4,638	6,311	10,949	16.0%
8	Reinstatement and Minor Works	705	816	1,522	2.2%
10	Routine Maintenance Works	204	239	443	0.6%
-	Public Utility Relocation	3,737	1,915	5,652	8.3%
Total		32,325	36,068	68,393	100.0%
Physical Contingency (10%)		3,232	3,607	6,839	-
Total of Construction Cost		35,557	39,675	75,233	-
Percentage		47.3%	52.7%	100.0%	-

Source: JICA Study Team estimation

G-5.4 Maintenance Cost

Road maintenance activities are generally divided into two categories as listed below.

- i) Routine Maintenance including:
 - * Inspection and patrol,
 - * Cleaning of road surface/drainage facilities,
 - * Trimming/cutting of trees/grass,
 - * Pothole patching and crack sealing for AC pavement, and
 - * Minor repairs of miscellaneous facilities.
- ii) Periodic Maintenance including;
 - * Overlay for AC pavement at 5-year interval.

G-5.5 Cost Estimate for the Implementation Plan

The project cost distribution by fiscal year and in two contract packages: North Section (Section A) and South Section (Section B), in accordance with the planned implementation schedule is shown in **Table G-5.5**.

Table G-5.5 Cost Distribution for Implementation Schedule

Item	Estimated Amount (M. Rp.)	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Section A	14.0km																	
Land Acquisition and Compensation	17,850																	
Detailed Design and Supervision Services	2,489																	
Construction	35,557																	
Administration	711																	
Maintenance Routine																		
Maintenance Overlay per 5 Years																		
Section A	14.0km																	
Land Acquisition and Compensation	17,850	0	7,140	7,140	3,570	0	0	0	0	0	0	0	0	0	0	0	0	0
Detailed Design and Supervision Services	2,489	0	597	697	597	597	0	0	0	0	0	0	0	0	0	0	0	0
Construction	35,557	0	0	7,111	14,223	14,223	0	0	0	0	0	0	0	0	0	0	0	0
Administration	711	0	178	178	178	178	0	0	0	0	0	0	0	0	0	0	0	0
Maintenance	3,711						742	742	742	742	742	742	742	742	742	742	742	742
Maintenance Overlay per 5 Years	4,705										4,705							
Total	65,024	0	7,915	15,126	18,568	14,998	742	742	742	742	5,447	742	742	742	742	5,447	742	742
	(100%)	(0.0%)	(12.2%)	(23.3%)	(28.6%)	(23.1%)	(1.1%)	(1.1%)	(1.1%)	(1.1%)	(8.4%)	(1.1%)	(1.1%)	(1.1%)	(1.1%)	(8.4%)	(1.1%)	(1.1%)
Section B	16.3km																	
Land Acquisition and Compensation	18,050																	
Detailed Design and Supervision Services	2,777																	
Construction	39,675																	
Administration	794																	
Maintenance Routine																		
Maintenance Overlay per 5 Years																		
Section B	16.3km																	
Land Acquisition and Compensation	18,050	0	0	0	0	4,513	9,025	4,513	0	0	0	0	0	0	0	0	0	0
Detailed Design and Supervision Services	2,777	0	0	0	0	667	778	667	667	0	0	0	0	0	0	0	0	0
Construction	39,675	0	0	0	0	0	7,935	15,870	15,870	0	0	0	0	0	0	0	0	0
Administration	794	0	0	0	0	113	227	227	227	0	0	0	0	0	0	0	0	0
Maintenance	1,574									787	787	787	787	787	787	787	787	787
Maintenance Overlay per 5 Years	0										4,689							
Total	62,870	0	0	0	0	5,292	17,964	21,276	16,763	787	787	787	787	5,475	787	787	787	787
	(100%)	(0.0%)	(0.0%)	(0.0%)	(0.0%)	(8.4%)	(28.6%)	(33.8%)	(26.7%)	(1.3%)	(1.3%)	(1.3%)	(1.3%)	(8.7%)	(1.3%)	(1.3%)	(1.3%)	(1.3%)

G-5.6 Economic Evaluation

(1) Evaluation Methodology and Applied Data

Economic evaluation of the Tj. Bunga – Takalar Road was carried out with the same methodology and applying the same basic data for benefit estimation as explained in Chapter 9 (Section 9.2).

(2) Economic Cost

According to the overall implementation schedule, the construction of the Tj. Bunga – Takalar Road will be divided into two (2) phases, as follows:

- 1) Phase 1: North Section (14.0 km), 2008-2011 (2012 open)
- 2) Phase 2: South Section (16.3 km), 2011-2014 (2015 open)

The disbursement schedule in terms of economic costs including the land acquisition and detailed design for both phases is shown in **Table G-5.6**.

Table G-5.6 Disbursement Schedule

(Unit: Rp. million)

Year	Economic Cost	
	Phase I	Phase II
2008	7,915	
2009	15,126	
2010	18,568	
2011	14,998	5,292
2012		17,964
2013		21,276
2014		16,763
Total	56,607	61,296

	117,903
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Source: JICA Study Team

(3) Economic Benefit

1) Quantified Economic Benefits

The quantified economic benefits which will be generated from the Tj. Bunga – Takalar Road consist of the following two (2) types of road users' benefits:

- Savings in Vehicle Operating Cost (VOC Savings); and
- Savings in passenger Travel Time Cost (TTC Savings).

The above benefits were estimated quantitatively based on the “With and Without Project comparison method”. The same input data of unit VOC (Rp/km) and unit TTC (Rp/hour) which were used for the evaluation of other target roads such as the Mamminasa Bypass, Trans-Sulawesi Mamminasata Road, Hertasning Road and Abdullah Daeng Sirua Road were also applied for the evaluation of the Tj. Bunga – Takalar Road.

2) Total Benefits Estimated

The results of estimation of economic benefits of the Tj. Bunga – Takalar Road are shown in **Table G-5.7**.

Table G-5.7 Estimated Economic Benefits

(Unit: Rp. million)

	Year	Economic Benefit		Total
		VOC Savings	Travel Time Cost Savings	
Tj. Bunga - Takalar Road	2012	6,301	1,987	8,287
	2013	15,196	4,792	19,988
	2014	36,652	11,557	48,208
	2015	88,399	27,873	116,272

Source: JICA Study Team

(4) Economic Evaluation

1) Premises for the Evaluation

For the purpose of economic evaluation, the following preconditions were established:

- Price Level	: Constant 2006 prices
- Evaluation Period	: 30 years after the first opening to traffic
- Disbursement Schedule	: Assumed in accordance with the construction plan
- Residual Value	: No residual values were counted
- Opportunity Cost of Capital	: 15% (and 12% for reference)

2) Cost Benefit Streams and Evaluation Indicators

The cost and benefit streams are presented in **Table G-5.9**. The following three kinds of evaluation indicators were calculated based on the traditional Discount Cash Flow method (DCF):

- Economic Internal Rate of Return (EIRR)
- Net Present Value (NPV)
- Benefit/ Cost Ratio (B/C)

The results of evaluation are summarized in **Table G-5.8**.

Table G-5.8 Results of Economic Evaluation

Evaluation Indicators	Value
EIRR (%)	41.4%
NPV (Rp. million) (*)	181,485
B/C (*)	4.18

Source: JICA Study Team

(*): Discount Rate = 15%

The above results indicate that implementation of the Tj. Bunga – Takalar Road is economically very optimistic as the EIRR value is sufficiently higher than the opportunity cost of capital (discount rate) (>15%), NPV is positive (>0) and B/C ratio is higher than unity (>1).

Table G-5.9 Cost Benefit Streams

SQ No.		Year	Cost (C)						Benefit (B)	(Rp. Million)	
			Project Cost		O & M					Total Cost	Balance B-C
			Phase I	Phase II	Phase I		Phase II				
					Routine	Periodic	Routine	Periodic			
		2006						0	0	0	
		2007						0	0	0	
		2008	7,915					7,915	0	-7,915	
		2009	15,126					15,126	0	-15,126	
		2010	18,568					18,568	0	-18,568	
Phase I		2011	14,998	5,292				20,290	0	-20,290	
1		2012		17,964	742			18,706	8,287	-10,419	
2		2013		21,276	742			22,018	19,988	-2,030	
3	Phase II	2014		16,763	742			17,505	48,208	30,703	
4	1	2015			742		787	1,529	116,272	114,743	
5	2	2016			742	4,705	787	6,234	116,272	110,038	
6	3	2017			742		787	1,529	116,272	114,743	
7	4	2018			742		787	1,529	116,272	114,743	
8	5	2019			742		787	4,689	6,218	116,272	110,054
9	6	2020			742		787	1,529	116,272	114,743	
10	7	2021			742	4,705	787	6,234	116,272	110,038	
11	8	2022			742		787	1,529	116,272	114,743	
12	9	2023			742		787	1,529	116,272	114,743	
13	10	2024			742		787	4,689	6,218	116,272	110,054
14	11	2025			742		787	1,529	116,272	114,743	
15	12	2026			742	4,705	787	6,234	116,272	110,038	
16	13	2027			742		787	1,529	116,272	114,743	
17	14	2028			742		787	1,529	116,272	114,743	
18	15	2029			742		787	4,689	6,218	116,272	110,054
19	16	2030			742		787	1,529	116,272	114,743	
20	17	2031			742	4,705	787	6,234	116,272	110,038	
21	18	2032			742		787	1,529	116,272	114,743	
22	19	2033			742		787	1,529	116,272	114,743	
23	20	2034			742		787	4,689	6,218	116,272	110,054
24	21	2035			742		787	1,529	116,272	114,743	
25	22	2036			742	4,705	787	6,234	116,272	110,038	
26	23	2037			742		787	1,529	116,272	114,743	
27	24	2038			742		787	1,529	116,272	114,743	
28	25	2039			742		787	4,689	6,218	116,272	110,054
29	26	2040			742		787	1,529	116,272	114,743	
30	27	2041			742	4,705	787	6,234	116,272	110,038	
Total			56,607	61,295	22,260	28,230	21,249	23,445	213,086	3,215,828	3,002,742

EIRR		41.4%
NPV (Rp million)	Discount Rate 15%	181,485
	Discount Rate 12%	293,010
B/C	Discount Rate 15%	4.18
	Discount Rate 12%	5.23

Source: JICA Study Team

(5) Sensitivity Analysis

The robustness of economic feasibility of the Tj. Bunga – Takalar Road was tested by changing the related factors within a probable range. The considered test cases in this sensitivity analysis are as follows:

- Test 1: Project Cost: 10% up, Project Benefit: 10% down simultaneously
- Test 2: Project Cost: 20% up, Project Benefit: 20% down simultaneously
- Test 3: Evaluation Period: 20 years after opening instead of 30 years

The results of the three tests are summarized below:

Table G-5.10 Results of Sensitivity Analysis

Test Cases	EIRR (%)	NPV (*) (Rp. million)	B/C (*)
Original Case	41.4%	181,485	4.18
Test 1: Cost 10% up & Benefit 10% down	36.8%	151,906	3.42
Test 2: Cost 20% up & Benefit 20% down	32.5%	122,327	2.78
Test 3: Evaluation Period: 20 years	41.3%	166,488	3.93

Source: JICA Study Team

(*): Discount rate = 15%

The above results indicate the robustness of the economic feasibility of the Tj. Bunga – Takalar Road, showing that the EIRR value is higher than 15%, NPV is positive (>0), and B/C ratio is higher than unity (>1) in any cases considered for the sensitivity analysis.

(6) Conclusions of Economic Analysis

It is judged that the implementation of the Tj. Bunga – Takalar Road will be economically feasible and justified from the viewpoint of national economy. The Tj. Bunga – Takalar Road is an important coastal road intended to handle and distribute maritime products as well as for commuting. In order to provide good logistic services and efficient cargo transportation, sufficient road capacity should be provided. Therefore, widening of the Tj. Bunga – Takalar Road is essential and should be implemented in accordance with the proposed schedule.

G-6 IEE for Route Selection

(1) IEE and Route Evaluation Method

The objective of Initial Environmental Examination (IEE) is conducting an initial impact assessment on the alternative plans of the Tj. Bunga - Takalar Road. IEE was carried out based on the existing data, the data collected for the F/S roads, and site reconnaissance survey. It evaluated both negative and positive environmental impacts without prejudice (refer to **Tables G-6.1** and **G-6.2**). The IEE was conducted in accordance with the JICA guidelines.

Multi Criteria Analysis (MCA), which comprises engineering, economic and environmental elements (IEE results), was used for evaluation of the alternatives shown in **Tables G-3.1** and **G-3.2**.

(2) IEE Procedures

The IEE study was conducted in accordance with the methods established and used for the F/S road route selection in February - March 2007. Though a common IEE does not include MCA, the Study Team combined MCA and IEE to evaluate alternative plans in an integrated way.

(3) Summary of IEE

1) North Section

The north section passes in parallel with the west coastal line, and major land uses along the road side are groves, paddy fields (right photograph), and residential area including villages in two sub-districts. A new port has been planned in Galesong sub-district (local activity center) in collaboration with other planned public facilities such as maritime research center, education center and regional fish market. Fish farming, agriculture and commerce are currently the main regional economic activities of the residents. Most land owners expect urbanization development in this area for stable life in the future. Therefore, natural urbanization is unavoidable in this area.



As the population density is still relatively low, public facilities and lifeline are not yet well provided. Because the proposed alternative is widening of existing road, the biodiversity along the proposed route seems to be low. Common species of flora and fauna are found out around this area. However, EIA (AMDAL) should be conducted by the Praswil, South Sulawesi prior to the project implementation.

Some negative impacts (B-) are anticipated in 2 items for Alternative 1. Water pollution, noise and vibration caused by the operation of heavy equipment (machines and trucks, etc.) during the construction stage are anticipated. As the traffic will increase in the future, the air quality and noise will become worse compared with the present condition. On the other hand, positive impacts on local economy, land use and utilization of local resources are expected. Traffic jam on the existing road will be reduced while serious traffic jam is anticipated as the traffic volume will exceed the capacity in the without-project case.

Table G-6.1 IEE Matrix of Tj. Bunga - Takalar Road (North Section)

Item / Description	Alternative 1 Existing Road Widening (Length: 14.0km)						Alternative 2 (Zero-Option) Existing Road (Length: 14.0km)				
	Overall Evaluation	Pre- construction Stage	Construction Stage		Post- construction Stage	Overall Evaluation	Pre- construction Stage	Construction Stage		Post- construction Stage	
			Roadway Construction	Bridge Construction				Roadway Construction	Bridge Construction		
1 Migration of Populations Involuntary Resettlement a. Number of houses / building to be moved (no) b. Area of land acquisition required (ha)	C-	C- 0 13	-	-	-	-	-	-	-	-	
2 Impact on Local Economy (Employment, Livelihood, etc.)	B+	-	-	-	B+	C-	-	-	-	-	
3 Utilization of Land and Local Resources	B+	-	-	-	B+	-	-	-	-	-	
4 Social Institutions (Social Capital and Local Decision-making institution)	-	-	-	-	-	-	-	-	-	-	
5 Existing Social Infrastructure and Services	C+	-	-	-	C+	-	-	-	-	-	
6 Vulnerable Social Groups	C+	-	-	-	C+	-	-	-	-	-	
7 Equality of Benefits and Losses and Equality in Development process	C-	C-	-	-	C-	-	-	-	-	-	
8 Local Conflicts of Interests	C-	C-	-	-	C-	-	-	-	-	-	
9 Gender	-	-	-	-	-	-	-	-	-	-	
10 Children's Rights (interruption of children's schooling and increase in the number of children's traffic accidents, etc.)	C+	-	-	-	C+	-	-	-	-	-	
11 Cultural Heritage	-	-	-	-	-	-	-	-	-	-	
12 Infectious Diseases (HIV/AIDS)	C-	-	C-	C-	-	-	-	-	-	-	
13 Traffic Jam	B+	-	-	-	B+	B-	-	-	-	-	
14 Traffic accidents	C-	-	C-	C-	C+	C-	-	-	-	-	
15 Geographical Conditions	C-	-	C-	-	-	-	-	-	-	-	
16 Geological Conditions	-	-	-	-	-	-	-	-	-	-	
17 Soil Erosion	C-	-	C-	C-	-	-	-	-	-	-	
18 Faunal Ecology	-	-	-	-	-	-	-	-	-	-	
19 Flora Ecology	C-	-	C-	C-	-	-	-	-	-	-	
20 Effects on the Ground Water	-	-	-	-	-	-	-	-	-	-	
21 Effect on the Surface Water Body (River, Lakes, etc)	C-	-	-	C-	-	-	-	-	-	-	
22 Effect on the Coastal Environment	-	-	-	-	-	-	-	-	-	-	
23 Oceanographic Changes	-	-	-	-	-	-	-	-	-	-	
24 Effect on the Natural/Ecological Reserves and Sanctuaries	-	-	-	-	-	-	-	-	-	-	
25 Localised Climatic Changes	-	-	-	-	-	-	-	-	-	-	
26 Effect on the Global Warming Issues	C-	-	-	-	C-	C-	-	-	-	-	
27 Effect on Drainage and Floods	C+	-	-	-	C+	-	-	-	-	-	
28 Air Pollution	C-	-	-	-	C-	C-	-	-	-	-	
29 Water Pollution	B-	-	C-	B-	-	-	-	-	-	-	
30 Soil Pollution	-	-	-	-	-	-	-	-	-	-	
31 Solid Waste and/or Industrial Discharge Management	-	-	-	-	-	-	-	-	-	-	
32 Noise and Vibration	B-	-	C-	B-	C-	C-	-	-	-	-	
33 Large Scale Ground Settlement	-	-	-	-	-	-	-	-	-	-	
34 Emanating Odour	-	-	-	-	-	-	-	-	-	-	
35 Pollution on the Water Bottom/Sludge and Its Effect on the Aquatic Life	-	-	-	-	-	-	-	-	-	-	

Notes: A: Significant changes expected, B: Relatively significant changes expected, C: Not significant but subject to further study, "-": Neglectable impact, A+, B+, C+ indicates relatively positive changes, A-, B-, C- indicates relatively negative changes.

2) South Section

The major land uses along the south section are groves, paddy fields, and residential area including a few villages. This section connects the new Galesong port and Takalar Town. Agriculture and commerce are currently the main regional economic activities of the residents.

As the population density is still relatively low, public facilities and lifeline are not yet well provided except in the area near Takalar Town. As the proposed plans is widening of the existing road, the biodiversity along the proposed route seems to be low. Common species of flora and fauna are found out around this area. However, EIA (AMDAL) should be conducted.

Some negative impacts (B-) are anticipated in 2 items for Alternative 1. Water pollution, noise and vibration caused by the operation of heavy



equipment (machines and trucks, etc.) during the construction stage are anticipated. As the traffic will increase in the future, the air quality and noise will become worse compared with the present condition. On the other hand, positive impacts on local economy, land use and utilization of local resources are expected. Traffic jam on the existing road will be reduced while serious traffic jam is anticipated in the without project case.

Table G-6.2 IEE Matrix of Tj. Bunga - Takalar Road (South Section)

Item / Description	Alternative 1 Existing Road Widening (Length: 16.3km)					Alternative 2 (Zero-Option) Existing Road (Length: 16.3km)				
	Overall Evaluation	Pre- construction Stage	Construction Stage		Post- construction Stage	Overall Evaluation	Pre- construction Stage	Construction Stage		Post- construction Stage
			Roadway Construction	Bridge Construction				Roadway Construction	Bridge Construction	
1 Migration of Populations Involuntary Resettlement a. Number of houses / building to be moved (no) b. Area of land acquisition required (ha)	C-	C- 0 16	-	-	-	-	-	-	-	-
2 Impact on Local Economy (Employment, Livelihood, etc.)	B+	-	-	-	B+	C-	-	-	-	-
3 Utilization of Land and Local Resources	B+	-	-	-	B+	-	-	-	-	-
4 Social Institutions (Social Capital and Local Decision-making institution)	-	-	-	-	-	-	-	-	-	-
5 Existing Social Infrastructure and Services	C+	-	-	-	C+	-	-	-	-	-
6 Vulnerable Social Groups	C+	-	-	-	C+	-	-	-	-	-
7 Equality of Benefits and Losses and Equality in Development process	C-	C-	-	-	C-	-	-	-	-	-
8 Local Conflicts of Interests	C-	C-	-	-	C-	-	-	-	-	-
9 Gender	-	-	-	-	-	-	-	-	-	-
10 Children's Rights (interruption of children's schooling and increase in the number of children's traffic accidents, etc.)	C+	-	-	-	C+	-	-	-	-	-
11 Cultural Heritage	-	-	-	-	-	-	-	-	-	-
12 Infectious Diseases (HIV/AIDS)	C-	-	C-	C-	-	-	-	-	-	-
13 Traffic Jam	C+	-	-	-	C+	B-	-	-	-	-
14 Traffic accidents	C-	-	C-	C-	C+	C-	-	-	-	-
15 Geographical Conditions	C-	-	C-	-	-	-	-	-	-	-
16 Geological Conditions	-	-	-	-	-	-	-	-	-	-
17 Soil Erosion	C-	-	C-	C-	-	-	-	-	-	-
18 Faunal Ecology	-	-	-	-	-	-	-	-	-	-
19 Flora Ecology	C-	-	C-	C-	-	-	-	-	-	-
20 Effects on the Ground Water	-	-	-	-	-	-	-	-	-	-
21 Effect on the Surface Water Body (River, Lakes, etc)	C-	-	-	C-	-	-	-	-	-	-
22 Effect on the Coastal Environment	-	-	-	-	-	-	-	-	-	-
23 Oceanographic Changes	-	-	-	-	-	-	-	-	-	-
24 Effect on the Natural/Ecological Reserves and Sanctuaries	-	-	-	-	-	-	-	-	-	-
25 Localised Climatic Changes	-	-	-	-	-	-	-	-	-	-
26 Effect on the Global Warming Issues	C-	-	-	-	C-	C-	-	-	-	-
27 Effect on Drainage and Floods	B+	-	-	-	B+	C-	-	-	-	-
28 Air Pollution	C-	-	-	-	C-	C-	-	-	-	-
29 Water Pollution	B-	-	C-	B-	-	-	-	-	-	-
30 Soil Pollution	-	-	-	-	-	-	-	-	-	-
31 Solid Waste and/or Industrial Discharge Management	-	-	-	-	-	-	-	-	-	-
32 Noise and Vibration	B-	-	C-	B-	C-	C-	-	-	-	-
33 Large Scale Ground Settlement	-	-	-	-	-	-	-	-	-	-
34 Emanating Odour	-	-	-	-	-	-	-	-	-	-
35 Pollution on the Water Bottom/Sludge and Its Effect on the Aquatic Life	-	-	-	-	-	-	-	-	-	-

Notes: A: Significant changes expected, B: Relatively significant changes expected, C: Not significant but subject to further study, "-": Neglectable impact, A+, B+, C+ indicates relatively positive changes, A-, B-, C- indicates relatively negative changes.

G-7 Implementation Plan

The executing agency will be the Public Infrastructure Agency (Dinas Praswil) of South Sulawesi Province as the Tj Bunga – Takalar Road will be upgraded from a Kabupaten road to a provincial road.

A recommended implementation schedule is shown in **Table G-5.5**. The project will be implemented in 2 phases: North Section (Section A) in Phase 1 from the Jeneberang River Bridge to Galesong and South Section (Section B) in Phase 2 from Galesong to Takalar Town. A series of steps will be required prior to the construction, including EIA (AMDAL), a detailed engineering

design review, land acquisition and resettlement.

There may be three possible funding options for the development and maintenance of the Tj. Bunga - Takalar Road as illustrated in **Table G-7.1**. Option A is to finance the Project by using the regional fund as much as possible, since the project will be developed and maintained as a provincial road. Option B is to finance the project using the fund of APBN from GOI as much as possible. Option C is a combination of Options A and B.

Table G-7.1 Base Project Cost and Funding Options – Tj. Bunga - Takalar Road

	Funding Option			Base Cost Bill Rp.
	Option A	Option B	Option B	
Phase 1 (North Section)				
1. Civil Works	APBD I	APBN	APBD I/APBN	35.6
2. Consulting Services	APBD I	APBN	APBD I/APBN	2.5
3. Land Acquisition	PBD I/APBD	APBD I/APBD II	APBD I/APBD II	17.9
4. Administration Cost	APBD I	APBD I	APBD I	0.7
Total				56.6
5. Routine Maintenance/yr	APBD I	APBD I	APBD I	0.7
6. Periodic Maintenance /5yrs	APBD I	APBD I	APBD I	4.7
Phase 2 (South Section)				
1. Civil Works	APBD I	APBN	APBD I/APBN	39.7
2. Consulting Services	APBD I	APBN	APBD I/APBN	2.8
3. Land Acquisition	PBD I/APBD	APBD I/APBD II	APBD I/APBD II	18.1
4. Administration Cost	APBD I	APBD I	APBD I	0.8
Total				61.3
5. Routine Maintenance/yr	APBD I	APBD I	APBD I	0.8
6. Periodic Maintenance /5yrs	APBD I	APBD I	APBD I	4.8

Note: VAT, Price Escalation and Contingency are not included.

Source: JICA Study Team

In Option A, the provincial budget of South Sulawesi Province (APBD I) will be used for the construction and maintenance of the Project, while the land acquisition cost will be covered by APBD I and II (Makassar, Gowa and Takalar). However, the annual size of the road construction budget of South Sulawesi Province has been Rp. 50 to Rp. 70 billion in the recent years. The annual funding requirement for the majority of the implementing years will be Rp 15 - 20 billion which might be too heavy for South Sulawesi Province.

Hence, Option B or Option C should be applied. It is recommended to designate the Tj Bunga – Takalar Road as a strategic national road since the project road is one of the arterial radial roads for the Mamminasata Metropolitan Area.

G-8 Conclusion and Recommendations

- 1) Floods did not occur at the Jeneberang Rive estuary since the Bili-bili dam was constructed in the early 1990s. A bridge was constructed at the mouth of the Jeneberang River in 2005 and connected Tj.Bunga (GMTDC) and the Jeneberang River south plain. Therefore, development of the south area is unavoidable.

An earliest improvement of the Jl.Tj.Bunga – Takalar (Lintas Barat) is recommended to regulate sprawled urban development.

- 2) This road link constitutes one of the radial roads (south radial road) in the Mamminasata Urban Arterial Road Network System and access to Galesong Port.

As the road passes in Makassar City, Takalar Regency and Gowa Regency through Galesong (local activity center), it is recommended to upgrade this road status from Kabupaten road to provincial road.

- 3) The economic analysis justified that the project is highly feasible as EIRR is 41.4% and NPV is Rp 181,485 million at a 15% discount rate. The project will support various regional development plans in the south of the Jeneberang River and Galesong Port.
- 4) As the project road is an alternative route between Takalar and Makassar, it will contribute to reducing traffic jam in the Sungguminasa Area. As rapid increase of traffic demand on the Tj. Bunga – Takalar road is forecast, the project is recommended to be implemented in the short term.
- 5) Stage construction approach should be taken. The recommended road improvement is widening of the existing 4.5 m road to 7.0m carriageway, except in the densely populated residential section in Bontolebang and Galesong sub-districts. However, ROW should be secured or development restriction should be made for the Mamminasa Bypass/ Outer Ring Road Section for 4-lane widening in the future.
- 6) A further study is recommended for the coastal route from Rebae to Buludoang to provide arterial access for facilitating agro- and aqua-industries in the south of the Polongbankeng area.
- 7) EIA (AMDAL) should be conducted prior to the project implementation in accordance with relevant laws and regulations.