



SOCIO-ECONOMIC AND FINANCIAL ASPECTS OF FEASIBILITY STUDY

Presented By:

JOEL S. VILORIA, EnP.

Economist III

DPWH, PMO-Feasibility Studies



TOPICS

- ★ ROAD INFLUENCE AREA
- ★ TRAFFIC GENERATING SOURCES,
- ★ LOCAL ECONOMY, PRESENT POPULATION
- ★ POPULATION PROJECTIONS
- ★ INCOME and INCOME PROJECTIONS
- ★ DEVELOPMENT POTENTIALS and GROWTH TRENDS



TOPICS

- ✦ IDENTIFICATION OF PROJECT BENEFITS
- ✦ DIRECT BENEFITS
- ✦ INDIRECT BENEFITS
- ✦ FUTURE TRAFFIC VOLUME and TRAFFIC GROWTH RATES and
- ✦ BENEFITS FROM OTHER SOURCES



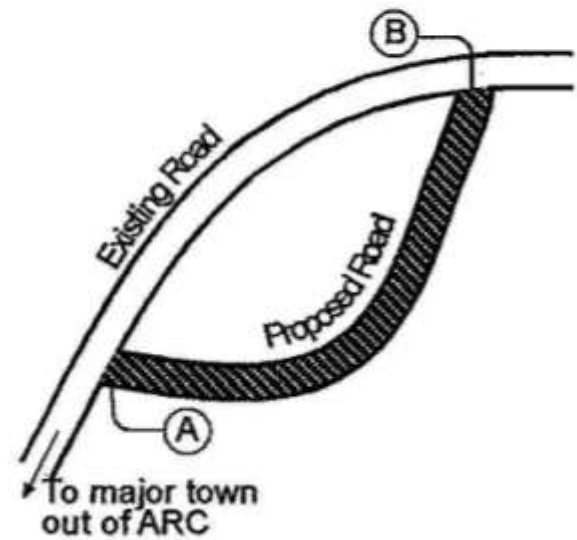
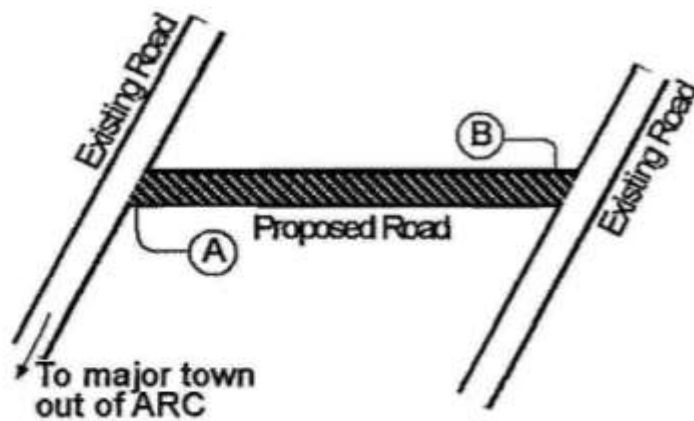
ROAD INFLUENCE AREA

- ★ *The Road Influence Area (RIA)* is the geographical boundary that would be affected by the construction, improvement or rehabilitation of a proposed road and/or bridge project.
- ★ *Direct RIA* refers to the area directly traversed by the proposed project.
- ★ *Indirect RIA* refers to the area not directly traversed by the proposed project but would benefit from its implementation.



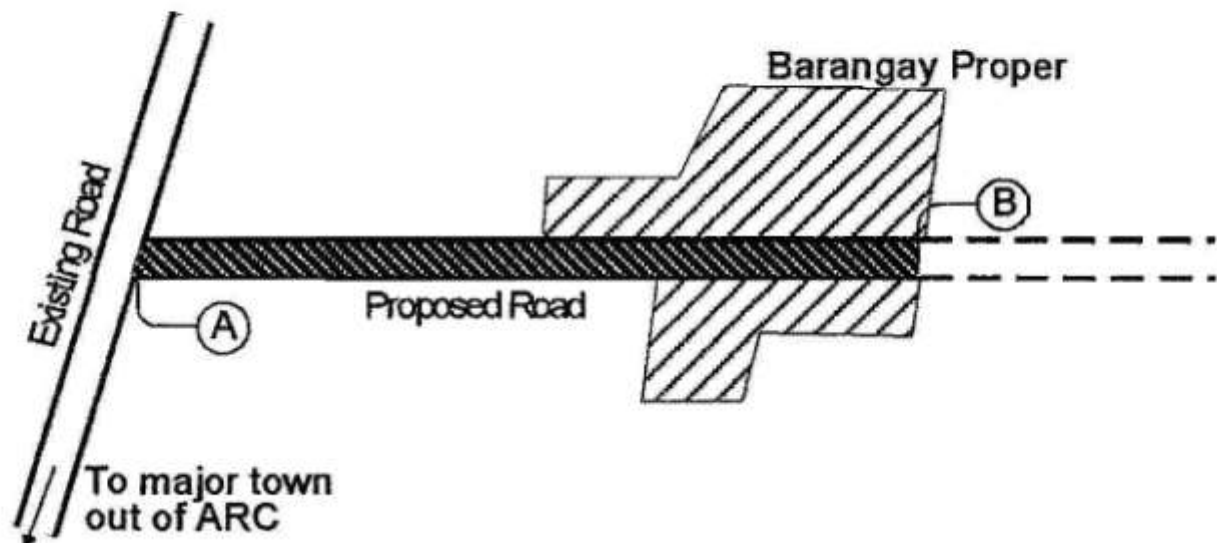
TYPICAL LOCATIONS OF THE PROPOSED ROAD

(1) EXISTING ROAD TO EXISTING ROAD

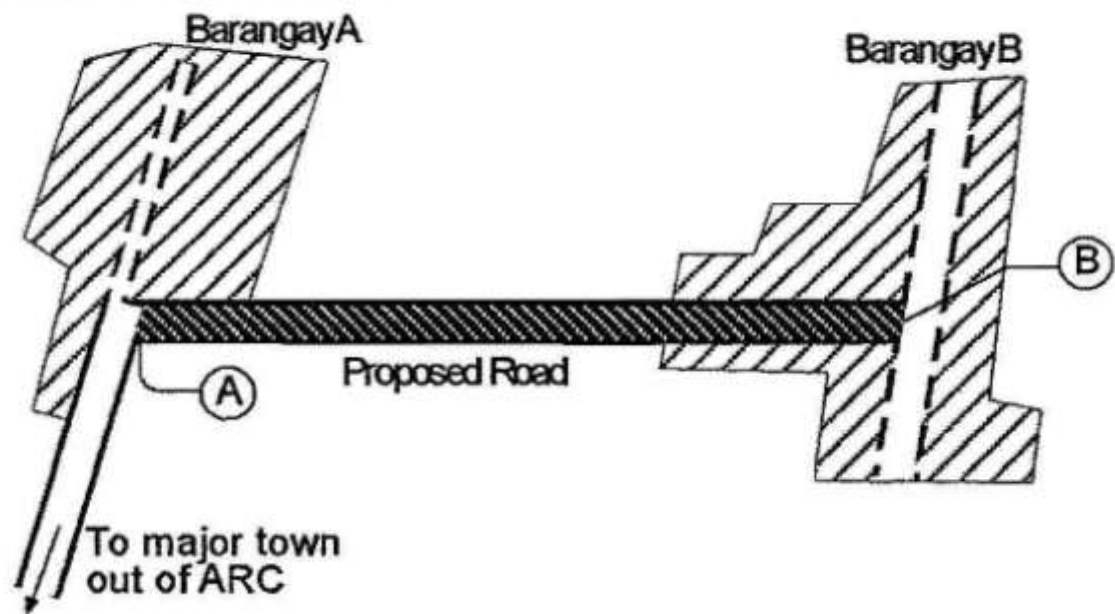




(2) EXISTING ROAD TO BARANGAY PROPER

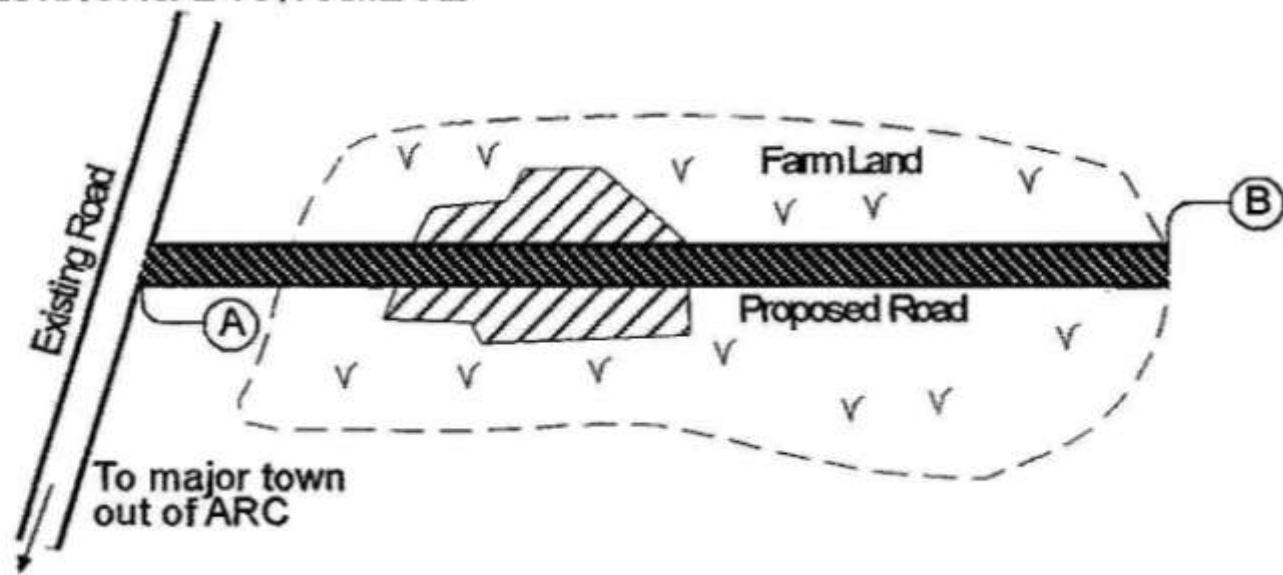


(3) BARANGAY TO BARANGAY





(4) EXISTING ROAD TO FARMLAND



MAP OF ROAD INFLUENCE AREA





TRAFFIC GENERATING SOURCES

★ DEMOGRAPHIC CHARACTERISTICS

1. Population
2. Family Income and Expenditures

★ REGIONAL AND LOCAL ECONOMY

1. Agriculture
2. Fishery
3. Forest Production
4. Industrial Production
5. Mining
6. Tourism
7. Etc.




POPULATION Growth

- ★ Population estimates are based on the official census conducted by the National Statistics Office (NSO).
- ★ Population Projections for the Philippines and its Regions, Provinces and Cities/Municipalities: 1980-2030”, medium assumption, prepared by the then National Census and Statistics Office in collaboration with the Inter-Agency Committee (IAC) on Population and Housing Statistics.



POPULATION Growth

- ★ Population Growth Rate (PGR) indicates how fast a population increases or decreases resulting from the inter-play of births, deaths, migration, and other reasons within a given period.




There are three (3) methods for computing the rate of growth based on the assumption with respect to the change:

Arithmetic Change - whereby it assumes that there are linear increases or decreases in population.

$$r = \frac{P_2 - P_1}{t (P_1)} \times k$$

Geometric Change - assumes that the population changes at a rate where the increments or decreases are compounded over a specified period. Demographers usually adopt this equation because population grows in a geometric fashion.

$$r = \text{antilog} \frac{\log \left(\frac{P_2}{P_1} \right)}{t} - 1 \times k$$



Exponential Change - it assumes an instantaneous growth rate, meaning compounding is done continuously.

$$r = \frac{\ln \frac{P_2}{P_1}}{t} \times k$$

Where: P_t = population in the later period

P_1 = population in the earlier period

t = time interval between two periods

r = rate of growth

$K = 100$



PGR FORMULA (%)

$$\log \left[\frac{P_2}{P_1} \right]$$

$$r = \left[\text{antilog} \left(\frac{\text{-----}}{t} \right) - 1 \right] k$$

WHERE:

- ★ P_2 = population in the later year
- ★ P_1 = population in the earlier year
- ★ t = time interval between earlier and later years
- ★ r = rate of growth (%)
- ★ k = 100



POPULATION PROJECTION RIA

| | 2007 | 2011 | 2014 | 2019 | 2024 | 2029 | 2034 |
|--------------------------------|--------------|--------------|---------------|---------------|---------------|---------------|---------------|
| Baguio City | 301,926 | 318,154 | 329,648 | 348,492 | 365,905 | 380,437 | 394,723 |
| Engineer's Hill | 2,770 | 2,919 | 3,024 | 3,197 | 3,357 | 3,490 | 3,621 |
| Cabinet Hill- Teachers Camp | 4,222 | 4,449 | 4,610 | 4,873 | 5,117 | 5,320 | 5,520 |
| Legarda- Burnham-Kisad | 1,041 | 1,097 | 1,137 | 1,202 | 1,262 | 1,312 | 1,361 |
| Bagong Lipunan | 85 | 90 | 93 | 98 | 103 | 107 | 111 |
| Aurora Hill, South | 1,308 | 1,378 | 1,428 | 1,510 | 1,585 | 1,648 | 1,710 |
| RIA | 9,426 | 9,933 | 10,292 | 10,880 | 11,424 | 11,877 | 12,323 |



POPULATION GROWTH RATE (%)

| | 2007-2011 | 2011-2014 | 2014-2019 | 2019-2024 | 2024-2029 | 2029-2034 |
|----------------------------|-----------|-----------|-----------|-----------|-----------|-----------|
| Baguio City | 1.31 | 1.19 | 1.12 | 0.98 | 0.78 | 0.74 |
| Engineer's Hill | 1.32 | 1.18 | 1.12 | 0.98 | 0.78 | 0.74 |
| Cabinet Hill-Teachers Camp | 1.32 | 1.19 | 1.12 | 0.98 | 0.78 | 0.74 |
| Legarda-Burnham-Kisad | 1.32 | 1.20 | 1.12 | 0.98 | 0.78 | 0.74 |
| Bagong Lipunan | 1.44 | 1.10 | 1.05 | 1.00 | 0.76 | 0.74 |
| Aurora Hill, South | 1.31 | 1.20 | 1.12 | 0.97 | 0.78 | 0.74 |
| RIA | 1.32 | 1.19 | 1.12 | 0.98 | 0.78 | 0.74 |



INCOME AND INCOME PROJECTION

- ✦ Total Income

Statistics on Family Income and Expenditures from the NSO are limited only to national, regional and provincial levels. Hence, the average family income has been assumed to be on the same level with its mother province which is then multiplied by the number of families in the municipality to come up with the estimated total income for the respective municipality.

The total estimated municipal income is then multiplied by the Consumer Price Index (all items) for the corresponding region to arrive at constant prices and then projected using Gross Regional Domestic Product (GRDP) growth rate.



INCOME AND INCOME PROJECTION

- ✦ Per Capita Income

Income per capita for the influence municipality is estimated by dividing the total income at constant prices by the corresponding total population.




INCOME PROJECTION (IN PESOS)

| YEAR | 2007 | 2011 | 2014 | 2019 | 2024 | 2029 | 2034 |
|---------------------------------|------------|------------|------------|------------|------------|------------|------------|
| BAGUIO CITY | 14,131,377 | 17,907,829 | 21,388,931 | 28,758,485 | 38,667,218 | 51,990,003 | 69,903,153 |
| Engineer's Hill | 129,778 | 164,523 | 196,560 | 264,409 | 355,678 | 478,453 | 643,607 |
| Cabinet Hill- Teacher's Camp | 197,675 | 250,503 | 299,199 | 402,288 | 540,896 | 727,261 | 977,839 |
| Legarda-Burnham- Kisad | 48,740 | 61,766 | 73,772 | 99,190 | 133,366 | 179,318 | 241,101 |
| Bagong Lipunan | 3,980 | 5,043 | 6,024 | 8,099 | 10,890 | 14,642 | 19,686 |
| Aurora Hill, South | 61,241 | 77,607 | 92,693 | 124,631 | 167,573 | 225,310 | 302,940 |
| RIA | 441,414 | 559,442 | 668,248 | 898,617 | 1,208,403 | 1,624,984 | 2,185,173 |



PER CAPITA INCOME

| | 2000 | 2007 | 2013 | 2018 | 2023 | 2028 | 2033 |
|---------------------------------|--------|--------|--------|--------|---------|---------|---------|
| BAGUIO CITY | 46,804 | 56,287 | 64,884 | 82,523 | 105,676 | 136,659 | 177,094 |
| Engineer's Hill | 46,851 | 56,363 | 64,669 | 82,705 | 105,951 | 137,093 | 177,743 |
| Cabinet Hill- Teacher's Camp | 46,820 | 56,305 | 64,902 | 82,554 | 105,706 | 136,703 | 177,145 |
| Legarda- Burnham-Kisad | 46,820 | 56,304 | 64,839 | 82,521 | 105,678 | 136,675 | 177,150 |
| Bagong Lipunan | 46,824 | 56,033 | 64,774 | 82,643 | 105,728 | 136,841 | 177,351 |
| Aurora Hill, South | 46,820 | 56,319 | 64,911 | 82,537 | 105,724 | 136,717 | 177,158 |
| RIA | 46,829 | 56,322 | 64,928 | 82,593 | 105,778 | 136,818 | 177,325 |



PER CAPITA INCOME and POPULATION GROWTH RATE (%, RIA)

| YEAR | PER CAPITA INCOME GROWTH RATE | COMPOUNDED POPULATION GROWTH RATE |
|-------------|----------------------------------|---|
| 2007 – 2011 | 4.72 | 1.0132 |
| 2011 – 2014 | 4.85 | 1.0119 |
| 2014 – 2019 | 4.93 | 1.0112 |
| 2019 – 2024 | 5.07 | 1.0098 |
| 2024 - 2029 | 5.28 | 1.0078 |
| 2029-2034 | 5.32 | 1.0074 |




DEVELOPMENT POTENTIALS AND GROWTH TRENDS

- ✦ Trade and commerce
- ✦ Economic Zones
- ✦ Agro-industrial Prospects
- ✦ Employment opportunities.
- ✦ Major Infrastructure Projects



ROAD PROJECT BENEFITS AND TRAFFIC GROWTH RATES



BASIC TECHNICAL PRINCIPLES FOR THE DETERMINATION OF ROAD PROJECT BENEFITS

- ★ Those projects which are planned to reduce movement costs between points where there already exists significant traffic. This group is commonly termed as “*traffic road*” projects.
- ★ Those projects which are planned to provide roads to penetrate areas and do not currently enjoy year-round motorized vehicle access. This group is commonly called “*developmental road*” projects.



TRAFFIC ROAD PROJECTS

- ✦ road user or traffic cost savings (VOC) on normal traffic (AADT)
- ✦ road and bridge maintenance cost savings
- ✦ generated and diverted traffic benefits.

DEVELOPMENTAL ROAD PROJECTS

- ✦ Net Value Added (NVA) in agriculture
- ✦ road user savings accruing to generated agricultural and non-agricultural goods and passenger traffic.



BASIC VEHICLE OPERATING COSTS

Basic vehicle operating costs are, by definition, those incurred on a road with the following conditions:

- ✱ reasonably good paved surface, as found on some of the new asphalt concrete surfaces;
- ✱ at least 6.0 meters carriageway width, with shoulder widths of more than or equal to 2 x 2.00 meters;
- ✱ design speeds of not less than 70 kph for cars and 60 kph for trucks;
- ✱ minimum roadside friction and traffic volumes with no effect on driver behavior (free flow conditions); and
- ✱ average Philippine driver behavior.



The basic vehicle operating costs (BVOC) may be divided into three (3) components, namely:

A. RUNNING COSTS

- ☀ fuel costs
- ☀ lubricants costs
- ☀ tire costs
- ☀ spare parts and labor for maintenance and repair costs
- ☀ part of depreciation costs (distance-related).



B. FIXED COSTS

- ✦ **time-related depreciation costs**
- ✦ **opportunity cost of capital**
- ✦ **crew costs**
- ✦ **overheads**
- ✦ **licenses and registration fees and insurance**

C. PASSENGER TIME COSTS

- ✦ **value of passenger time**



BASIC VEHICLE OPERATING COSTS (2006 Prices)

| | Running (P/km) | Fixed (P/min) | Time (P/min) |
|------------------------|---------------------------|--------------------------|-------------------------|
| Car/Van | 8.244 | 0.354 | 1.157 |
| Jeepney | 5.688 | 1.736 | 1.714 |
| Bus | 8.976 | 2.094 | 6.492 |
| Truck | 11.544 | 2.459 | 0.000 |
| Motorcy cle | 1.032 | 0.096 | 0.684 |
| Tricycle | 1.260 | 1.128 | 0.257 |



ACTUAL VEHICLE OPERATING COSTS

dl-system - running costs

a. DL Values for Extra Running Costs

The dl-systems, which affects only the actual running cost calculations, simulates the extra running costs incurred by vehicles operating on roads with substandard road surfaces, conditions and geometric characteristics, or with other features which imply substandard conditions compared to the basic concept (BVOC).

The following dl-values for extra running costs are calculated for the following road elements:

- ✦ surface condition
- ✦ gradient
- ✦ roadside friction, volume capacity ratio:
- ✦ major intersections, narrow structure and sharp curves; and
- ✦ speed above optimum (least cost) speed.



dt-system, - fixed and time costs.

b. Travel Speeds and Passenger Time Costs

The dt-system (travel time under various road and traffic element conditions) is applied to fixed and time costs. The system operates on the basis of a set of travel time (TT per km) curves related to basic operating speed (BOS), passing sight distance (PSD) and the ratio between traffic volume and capacity of roadway (VCR).

☀ Basic Operating Speed

Basic Operating Speed is defined as the desirable and comfortable speed over a section of road at low traffic volumes and under favorable weather and light conditions, which is assumed to be equal to the average speed of a speed distribution at free traffic flow (VCR below 0.2).

The travel speed of individual vehicle is dependent on the following factors:

- The road characteristics**
- The traffic volume**
- The vehicle characteristics**



Vehicle Operating Cost (VOC) By Road Condition TRAFFIC ROAD APPROACH

| | | Cars | Jeepney | Buses | Trucks | Motorcycle | Tricycle | |
|------|----------------------------|--------------|---------------------|-------|--------|------------|----------|-------|
| | Economic BVOC | Running P/km | 8.244 | 5.688 | 8.976 | 11.544 | 1.032 | 1.260 |
| | 2006 Price Level | Fixed P/min | 0.354 | 1.736 | 2.094 | 2.459 | 0.096 | 1.128 |
| | | Time P/min | 1.157 | 1.714 | 6.492 | - | 0.684 | 0.257 |
| SCON | Pavement Type & Condition | dL-Values | Running Cost (P/km) | | | | | |
| | 1 Paved Good | 1.000 | 8.24 | 5.69 | 8.98 | 11.54 | 1.03 | 1.26 |
| | 2 Paved Good/Fair | 1.050 | 8.66 | 5.97 | 9.42 | 12.12 | 1.08 | 1.32 |
| | 3 Paved Fair | 1.170 | 9.65 | 6.65 | 10.50 | 13.51 | 1.21 | 1.47 |
| | 4 Paved Fair/Bad | 1.290 | 10.63 | 7.34 | 11.58 | 14.89 | 1.33 | 1.63 |
| | 5 Paved Bad | 1.430 | 11.79 | 8.13 | 12.84 | 16.51 | 1.48 | 1.80 |
| | 6 Paved Bad/Very Bad | 1.580 | 13.03 | 8.99 | 14.18 | 18.24 | 1.63 | 1.99 |
| | 7 Paved Very Bad | 1.890 | 15.58 | 10.75 | 16.96 | 21.82 | 1.95 | 2.38 |
| | 8 Gravel Good | 1.290 | 10.63 | 7.34 | 11.58 | 14.89 | 1.33 | 1.63 |
| | 9 Gravel Good/Fair | 1.410 | 11.62 | 8.02 | 12.66 | 16.28 | 1.46 | 1.78 |
| | 10 Gravel Fair | 1.600 | 13.19 | 9.10 | 14.36 | 18.47 | 1.65 | 2.02 |
| | 11 Gravel Fair/Bad | 1.720 | 14.18 | 9.78 | 15.44 | 19.86 | 1.78 | 2.17 |
| | 12 Gravel Bad | 1.870 | 15.42 | 10.64 | 16.79 | 21.59 | 1.93 | 2.36 |
| | 13 Gravel Bad/Very Bad | 2.010 | 16.57 | 11.43 | 18.04 | 23.20 | 2.07 | 2.53 |
| | 14 Gravel Very Bad | 2.200 | 18.14 | 12.51 | 19.75 | 25.40 | 2.27 | 2.77 |
| | 15 Very Bad stone pavement | 2.730 | 22.51 | 15.53 | 24.50 | 31.52 | 2.82 | 3.44 |
| | 16 Earth Bad | 2.200 | 18.14 | 12.51 | 19.75 | 25.40 | 2.27 | 2.77 |
| | 17 Earth Very Bad | 2.560 | 21.10 | 14.56 | 22.98 | 29.55 | 2.64 | 3.23 |
| | 18 Impassable | | | | | | | |



| | | Cars | Jeepney | Buses | Trucks | Motorcycle | Tricycle |
|------------------|--------------|-------|---------|-------|--------|------------|----------|
| Economic BVOC | Running P/km | 8.244 | 5.688 | 8.976 | 11.544 | 1.032 | 1.260 |
| 2006 Price Level | Fixed P/min | 0.354 | 1.736 | 2.094 | 2.459 | 0.096 | 1.128 |
| | Time P/min | 1.157 | 1.714 | 6.492 | - | 0.684 | 0.257 |

| SCON | Pavement Type & Condition | Fixed Cost (P/km) | | | | | |
|------|----------------------------|-------------------|--------|--------|--------|-------|--------|
| | 1 Paved Good | 0.327 | 1.603 | 1.933 | 2.270 | 0.096 | 1.692 |
| | 2 Paved Good/Fair | 0.354 | 1.736 | 2.094 | 2.459 | 0.105 | 1.692 |
| | 3 Paved Fair | 0.386 | 1.894 | 2.284 | 2.682 | 0.115 | 1.934 |
| | 4 Paved Fair/Bad | 0.472 | 2.315 | 2.792 | 3.278 | 0.192 | 2.256 |
| | 5 Paved Bad | 0.708 | 3.473 | 4.188 | 4.918 | 0.288 | 3.384 |
| | 6 Paved Bad/Very Bad | 0.850 | 4.167 | 5.026 | 5.901 | 0.384 | 4.512 |
| | 7 Paved Very Bad | 1.062 | 5.209 | 6.282 | 7.376 | 0.576 | 6.768 |
| | 8 Gravel Good | 0.354 | 1.736 | 2.094 | 2.459 | 0.115 | 1.934 |
| | 9 Gravel Good/Fair | 0.386 | 1.894 | 2.284 | 2.682 | 0.128 | 1.934 |
| | 10 Gravel Fair | 0.425 | 2.084 | 2.513 | 2.951 | 0.144 | 2.256 |
| | 11 Gravel Fair/Bad | 0.531 | 2.605 | 3.141 | 3.688 | 0.192 | 2.707 |
| | 12 Gravel Bad | 0.708 | 3.473 | 4.188 | 4.918 | 0.288 | 3.384 |
| | 13 Gravel Bad/Very Bad | 0.850 | 4.167 | 5.026 | 5.901 | 0.384 | 4.512 |
| | 14 Gravel Very Bad | 1.062 | 5.209 | 6.282 | 7.376 | 0.576 | 6.768 |
| | 15 Very Bad stone pavement | 2.124 | 10.418 | 12.564 | 14.753 | 1.152 | 13.536 |
| | 16 Earth Bad | 1.062 | 5.209 | 6.282 | 7.376 | 0.576 | 6.768 |
| | 17 Earth Very Bad | 2.124 | 10.418 | 12.564 | 14.753 | 1.152 | 13.536 |
| | 18 Impassable | | | | | | |



| | | Cars | Jeepney | Buses | Trucks | Motorcycle | Tricycle |
|------------------|--------------|-------|---------|-------|--------|------------|----------|
| Economic BVOC | Running P/km | 8.244 | 5.688 | 8.976 | 11.544 | 1.032 | 1.260 |
| 2006 Price Level | Fixed P/min | 0.354 | 1.736 | 2.094 | 2.459 | 0.096 | 1.128 |
| | Time P/min | 1.157 | 1.714 | 6.492 | - | 0.684 | 0.257 |

| SCON | Pavement Type & Condition | Time Cost (P/km) | | | | | |
|------|----------------------------|------------------|--------|--------|---|-------|-------|
| | 1 Paved Good | 1.068 | 1.582 | 5.993 | - | 0.684 | 0.385 |
| | 2 Paved Good/Fair | 1.157 | 1.714 | 6.492 | - | 0.746 | 0.385 |
| | 3 Paved Fair | 1.262 | 1.869 | 7.082 | - | 0.821 | 0.440 |
| | 4 Paved Fair/Bad | 1.542 | 2.285 | 8.656 | - | 1.368 | 0.514 |
| | 5 Paved Bad | 2.314 | 3.427 | 12.984 | - | 2.052 | 0.770 |
| | 6 Paved Bad/Very Bad | 2.776 | 4.113 | 15.581 | - | 2.736 | 1.027 |
| | 7 Paved Very Bad | 3.470 | 5.141 | 19.476 | - | 4.104 | 1.541 |
| | 8 Gravel Good | 1.157 | 1.714 | 6.492 | - | 0.821 | 0.440 |
| | 9 Gravel Good/Fair | 1.262 | 1.869 | 7.082 | - | 0.912 | 0.440 |
| | 10 Gravel Fair | 1.388 | 2.056 | 7.790 | - | 1.026 | 0.514 |
| | 11 Gravel Fair/Bad | 1.735 | 2.570 | 9.738 | - | 1.368 | 0.616 |
| | 12 Gravel Bad | 2.314 | 3.427 | 12.984 | - | 2.052 | 0.770 |
| | 13 Gravel Bad/Very Bad | 2.776 | 4.113 | 15.581 | - | 2.736 | 1.027 |
| | 14 Gravel Very Bad | 3.470 | 5.141 | 19.476 | - | 4.104 | 1.541 |
| | 15 Very Bad stone pavement | 6.941 | 10.282 | 38.952 | - | 8.208 | 3.082 |
| | 16 Earth Bad | 3.470 | 5.141 | 19.476 | - | 4.104 | 1.541 |
| | 17 Earth Very Bad | 6.941 | 10.282 | 38.952 | - | 8.208 | 3.082 |
| | 18 Impassable | | | | | | |



| | | Cars | Jeepney | Buses | Trucks | Motorcycle | Tricycle |
|------------------|--------------|-------|---------|-------|--------|------------|----------|
| Economic BVOC | Running P/km | 8.244 | 5.688 | 8.976 | 11.544 | 1.032 | 1.260 |
| 2006 Price Level | Fixed P/min | 0.354 | 1.736 | 2.094 | 2.459 | 0.096 | 1.128 |
| | Time P/min | 1.157 | 1.714 | 6.492 | - | 0.684 | 0.257 |

| SCON | Pavement Type & Condition | Total Vehicle Operating Cost (P/km) R+F | | | | | |
|------|----------------------------|---|--------|--------|--------|-------|--------|
| | 1 Paved Good | 8.571 | 7.291 | 10.909 | 13.814 | 1.128 | 2.952 |
| | 2 Paved Good/Fair | 9.010 | 7.709 | 11.519 | 14.580 | 1.188 | 3.015 |
| | 3 Paved Fair | 10.032 | 8.549 | 12.786 | 16.189 | 1.323 | 3.408 |
| | 4 Paved Fair/Bad | 11.107 | 9.653 | 14.371 | 18.170 | 1.523 | 3.881 |
| | 5 Paved Bad | 12.497 | 11.607 | 17.024 | 21.426 | 1.764 | 5.186 |
| | 6 Paved Bad/Very Bad | 13.875 | 13.154 | 19.208 | 24.141 | 2.015 | 6.503 |
| | 7 Paved Very Bad | 16.643 | 15.960 | 23.247 | 29.195 | 2.526 | 9.149 |
| | 8 Gravel Good | 10.989 | 9.074 | 13.673 | 17.351 | 1.446 | 3.559 |
| | 9 Gravel Good/Fair | 12.010 | 9.914 | 14.941 | 18.959 | 1.583 | 3.710 |
| | 10 Gravel Fair | 13.615 | 11.184 | 16.874 | 21.421 | 1.795 | 4.272 |
| | 11 Gravel Fair/Bad | 14.711 | 12.388 | 18.580 | 23.544 | 1.967 | 4.874 |
| | 12 Gravel Bad | 16.124 | 14.109 | 20.973 | 26.505 | 2.218 | 5.740 |
| | 13 Gravel Bad/Very Bad | 17.420 | 15.600 | 23.067 | 29.105 | 2.458 | 7.045 |
| | 14 Gravel Very Bad | 19.199 | 17.723 | 26.029 | 32.773 | 2.846 | 9.540 |
| | 15 Very Bad stone pavement | 24.630 | 25.947 | 37.068 | 46.268 | 3.969 | 16.976 |
| | 16 Earth Bad | 19.199 | 17.723 | 26.029 | 32.773 | 2.846 | 9.540 |
| | 17 Earth Very Bad | 23.229 | 24.980 | 35.543 | 44.305 | 3.794 | 16.762 |
| | 18 Impassable | | | | | | |



| | | Cars | Jeepney | Buses | Trucks | Motorcycle | Tricycle |
|------------------|--------------|-------|---------|-------|--------|------------|----------|
| Economic BVOC | Running P/km | 8.244 | 5.688 | 8.976 | 11.544 | 1.032 | 1.260 |
| 2006 Price Level | Fixed P/min | 0.354 | 1.736 | 2.094 | 2.459 | 0.096 | 1.128 |
| | Time P/min | 1.157 | 1.714 | 6.492 | - | 0.684 | 0.257 |

| SCON | Pavement Type & Condition | Total Vehicle Operating Cost (P/km) R+F+T | | | | | |
|------|----------------------------|---|--------|--------|--------|--------|--------|
| | 1 Paved Good | 9.639 | 8.873 | 16.902 | 13.814 | 1.812 | 3.337 |
| | 2 Paved Good/Fair | 10.167 | 9.422 | 18.011 | 14.580 | 1.935 | 3.400 |
| | 3 Paved Fair | 11.294 | 10.419 | 19.868 | 16.189 | 2.143 | 3.848 |
| | 4 Paved Fair/Bad | 12.649 | 11.938 | 23.027 | 18.170 | 2.891 | 4.395 |
| | 5 Paved Bad | 14.811 | 15.034 | 30.008 | 21.426 | 3.816 | 5.956 |
| | 6 Paved Bad/Very Bad | 16.651 | 17.267 | 34.788 | 24.141 | 4.751 | 7.530 |
| | 7 Paved Very Bad | 20.114 | 21.100 | 42.723 | 29.195 | 6.630 | 10.690 |
| | 8 Gravel Good | 12.146 | 10.788 | 20.165 | 17.351 | 2.267 | 3.999 |
| | 9 Gravel Good/Fair | 13.272 | 11.784 | 22.023 | 18.959 | 2.495 | 4.151 |
| | 10 Gravel Fair | 15.003 | 13.241 | 24.665 | 21.421 | 2.821 | 4.786 |
| | 11 Gravel Fair/Bad | 16.446 | 14.958 | 28.318 | 23.544 | 3.335 | 5.491 |
| | 12 Gravel Bad | 18.438 | 17.537 | 33.957 | 26.505 | 4.270 | 6.511 |
| | 13 Gravel Bad/Very Bad | 20.196 | 19.713 | 38.648 | 29.105 | 5.194 | 8.072 |
| | 14 Gravel Very Bad | 22.669 | 22.864 | 45.505 | 32.773 | 6.950 | 11.081 |
| | 15 Very Bad stone pavement | 31.571 | 36.228 | 76.020 | 46.268 | 12.177 | 20.057 |
| | 16 Earth Bad | 22.669 | 22.864 | 45.505 | 32.773 | 6.950 | 11.081 |
| | 17 Earth Very Bad | 30.169 | 35.261 | 74.495 | 44.305 | 12.002 | 19.843 |
| | 18 Impassable | | | | | | |



BENEFITS FOR TRAFFIC ROADS

Normal Traffic Benefits

are calculated as the reduction in economic transport costs before and after road improvement which would be experienced by the present and future road users exclusive of any generated or induced traffic. The savings are calculated as the difference between economic traffic costs with and without road improvement.

Maintenance Cost Savings

Maintenance cost savings are derived on the basis of comparison of road maintenance cost requirements in the WITHOUT and WITH project case scenarios.



The standard road maintenance requirement consist of:

Routine Maintenance Cost

are annual non-traffic related works consisting of vegetation control, cleaning of ditches, cleaning and repairs of culverts and traffic signs.

Periodic Maintenance Cost

covers all items of works that are normally affected by the level of traffic and includes road surface, resurfacing and shoulder repairs.



OTHER BENEFITS

Generated Traffic Benefits

Generated traffic benefits are calculated by adopting the rule recommended in the DPWH Highway Planning Manual. The approach assumes that generated traffic benefit is equivalent to a certain percentage of the total benefits from normal traffic depending on the present and improved situation of the project road.

Diverted Traffic Benefits

are calculated as the difference in vehicle operating costs between the present scenario (without the project), where identified divertible traffic currently passes the existing longer and more congested route, and the present scenario (with project)



TRAFFIC GROWTH RATE (TGR)

- ✦ Population growth
- ✦ Per capita income growth
- ✦ Income elasticity of demand for transport.

$$\text{TGR (\%)} = \left[\left(\frac{I \times E}{100} + 1 \right) \text{CP} - 1 \right] \times 100$$

Where:

TGR – is the traffic growth rate per annum;

I – is the growth rate (%) for per capita income in constant prices;

E – is the transport demand-income elasticity for the respective vehicle type;

CP – is the compounded population growth rate per annum.



EXERCISE # 1

Traffic Growth Rate (TGR)

Compute the TGR for all Vehicle Types for the period 2011- 2014

Given :

Compounded Population Growth - 1.0119
Per Capita Income Growth - 4.85

Transport Demand/Income Elasticities

| C/J/V | Jeepney | Buses | Trucks | M_Cycle | T_Cycle |
|-------|---------|-------|--------|---------|---------|
| 1.80 | 1.50 | 1.50 | 1.00 | 1.10 | 1.10 |



MARAMING
SALAMAT PO!