*Technical Consultancy for Survey Investigation and Preparation for Detailed Project Report for Improvement of Road HAYULIANG-HAWAI (65.00 KM)) To NH Double lane Specification in Arunachal Pradesh*

ECONOMIC AND FINANCIAL ANALYSIS

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## ECONOMIC AND FINANCIAL ANALYSES

### 10.1 General

The preliminary project cost estimates have been prepared considering the various items of works associated with identified improvements so as to assess financial and economic costs for evaluating viability of the project.

The economic evaluation has been carried out within the framework of social cost benefit analysis. The essential objective of public expenditure is to maximize the returns on investment in economic terms. This objective is accomplished by determining the appropriate improvement proposal that leads to the minimum total transport costs in the case of road up gradation projects.

The economic analysis has been based on incremental costs and incremental benefits, i.e. comparing the total transport cost "with the project" and "without the project" which is the base case or the do minimum case. All costs and benefits considered in the study have been valued in monetary terms and expressed in economic prices for avoiding distortion in the input prices of labour, materials and equipment due to market imperfection.
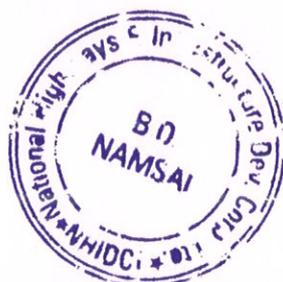
The comparison has been worked out section-wise on a yearly basis for the entire analysis period. The concept behind the approach is that if the project is implemented, the benefits will be the decreased transport (VOC & time cost) cost when compared to the costs of the alternative forgone, i.e. the base case or without project situation. The results have been expressed in terms of Economic Internal Rate of Return (EIRR) and Net Present Value (NPV).

The Economic Analysis has been carried out using HDM IV. The HDM Model has also been used for analyzing pavement options by generating economic cost streams and computing the EIRR and NPV for economic evaluation.

### 10.2 HDM Model Input Data

The following values have been considered as input data for the HDM Model.

**Analysis Period**

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The period of construction starts from mid 2014. In accordance with TOR, 30 years have been taken as analysis period for EIRR estimation. Analysis period is inclusive of construction period as well as benefit period.

A discount rate of 12% has been considered.

### Project Costs

The project costs include costs of road works and bridges/structures, land acquisition and environment costs and costs towards utility shifting etc, (including physical contingencies and engineering supervision and administrative charges) but excluding cost of Toll Plaza.

### Conversion Factor

A conversion factor of 0.85 has been used for converting financial costs to economic costs.

### Road and Pavement Characteristics

Road and pavement characteristics, which have been used as model input. These include road length, carriageway width, width of paved shoulders, existing pavement composition, sub-grade CBR, roughness of the existing road (IRI), structural number and cracking, raveling and other pavement distress parameters.
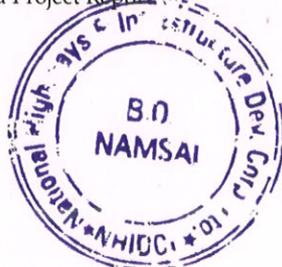
### Cost Inputs for HDM

Construction cost for economic analysis includes Land Acquisition and Resettlement & Rehabilitation cost but excludes toll plaza cost. The capital costs (civil costs) of the project road have been converted into economic cost by using 0.85 standard conversion factor.

The construction time for project is adopted as 30 months starting from mid 2014. The phasing of capital cost is presented as follows:

| | | |
|---|---|---|
| First Year (start at mid 2014) | : | 20% |
| Second Year (2015) | : | 40% |
| Third or final year (2016) | : | 40% |

### Routine and Periodic Maintenance Costs

In the "without project" situation, annual routine maintenance costs have been taken @ Rs.30000 per km for single lane. In addition, periodic maintenance cost for an overlay of 25 mm thickness along with some maintenance cost for signages, markings, traffic signs, attendance to structures and other works related to routine maintenance has been considered in every 5 years starting from 2014.

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### Traffic Volume and Composition

The daily traffic on the project road has been taken on the basis of the new link and four homogeneous. The vehicles have been regrouped under the following heads.

- Bus

- Minibus

- Car

- LCV

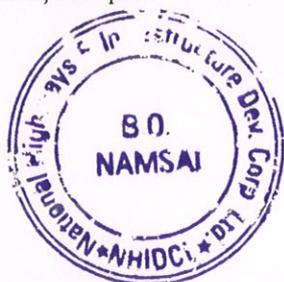- Two Axle Truck

- 3-Axle Rigid

- Multi Axle Truck

The effects of non-motorized traffic have also been included in the model.
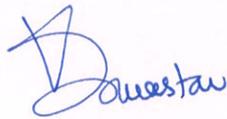
### Value of Cargo Time and Passenger Time

HDM generates average speeds of vehicles in "without" and "with" project conditions. Based on this, the time savings by vehicle type are calculated.

The value of time (VOT) of an average car passenger is taken as Rs. 42.00 per hour and for an average bus passenger as Rs. 28.00 per hour. The VOT per vehicle has been derived using average occupancy rates as obtained from surveys.

The VOT for goods in transit were worked out using the inventory method applying market interest rate on the value of a basket of goods in a truck load, taking into consideration both normal and perishable/high value goods. The VOT values for goods in transit have been derived as a weighted average based on the proportion of perishable/high value goods (e.g. fish/dairy products, electronic goods, motor vehicles, petroleum products etc.) and the remaining or non-perishable goods moving on this route. The perishable commodities constitute 5% while the rest constitute 95%. The VOT values for the non-perishable goods have been updated from the 1990 values estimated by Dr. L R Kadiyali in the Updated RUCS Study, to the 2009 values by applying Wholesale Price Index (WPI).

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### Economic Internal Rate of Return (EIRR) and Net Present Value (NVP)

The HDM-4 model has been used for economic analysis and the following results have been found. The EIRR @ 8.5% discount rate are determined using the model. The economic internal rate of return considered desirable for transport infrastructure projects in India is 12.5 percent. The project is found economically non viable.

## 10.3 Conclusion

The following conclusions can be drawn from the result of the economic analysis in terms of EIRR.

-   The project is economically non viable and to achieve the desired cut off rate of EIRR (12.5%).

The traffic projections show that even after 20 years, these roads don't require any major improvement other than strengthening. However, it requires two lane configurations for strategic purpose.

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