Next Generation Low Cost Toll Bridge - An Alternate for Existing National Highway Toll Gate

Gopikumar S[1], Ahmed Rabick A[2], Sheela Daniel R[3]

[1,2,3,]Department of Civil Engineering, SCAD College of Engineering and Technology, Tirunelveli, Tamil Nadu, India-627414

Abstract—The main aim of this study is to design, to make a prototype model on alternative for the existing national highway toll gate.

Keywords—Design, Prototype, Model.

I. INTRODUCTION

It remains our constant endeavour to push forward a developed nation. National highway authority of India (NHAI) maintains all national highway across India. (NHAI) is an autonomous agency of the government of India, responsible for management of a network of over 70000km of national highway in India. It is a nodal agency of the ministry of road transport and highway. In NH every 60km it has a toll plaza for service amount to the vehicles. The amount may vary from vehicles to vehicles and trips all human had faced the nuisance and uncomfortable in travelling while the vehicles crossed the toll gate. NHAI gives the maintenance sector and collecting booth to a private agency for yearly contract or decade contract.

Every vehicle owner paid the road tax at the time of vehicle purchasing or registration. But the NHAI collects money in highway; we have good idea to solve this problem without affecting the government income replacing all toll gates to toll bridge. Toll bridge is nothing but it is energy gaining bridge by various techniques. I briefly explain about this. Replacement of toll gate as toll bridge makes a vehicle free journey in highway. Bridge can absorb compression energy according to the vehicle gross weight. This idea can make energy production and avoid toll gate problem.

1.1 Literature

The Humber Bridge (HB) is the only estuarial crossing on the Humber and opened in 1981 and links Scunthorpe with Hull. The HB supports an approximate peak hour flow of 1,847 vehicles and off- peak hour flow of 900 vehicles. An economic impacts study was prepared by Steer Davies Gleave entitled ‘Humber Bridge Tolls Impact Study’ (2004) which assessed the impact of the bridge and the future of tolling for the bridge on the local economy and the social and cultural welfare of local residents. The levels of tolling applied at the time of the assessment of bridge tolling have resulted in a number of subsequent impacts to the surrounding businesses and communities. The area surrounding the HB is similar in nature to Halton, in that it is relatively economically deprived area (based on the 2004 Index of Multiple Deprivation). The Toll charges on the HB in 2008 are £2.70 per car. The HB Tolls Impact Study (2004) was

undertaken to quantify and assess the extent to which tolls on the HB may be constraining economic development of the Humber sub region and assess the socio – economic changes which may occur as a result of removal of tolls from this bridge.

1. Tolls should be retained and increased in line with inflation;
2. Weekend passes for the price of a return trip;
3. Free crossings should be provided to out-patients residing on the south bank, requiring treatment on the north bank (or their visitors should treatment be on an in-patient basis). This concession should be provided at the time of travel and not in a form that requires money to be claimed back;
4. Buses should travel for free, with investigation into a suitable P & R site on the south bank
5. A marketing campaign for these new initiatives, providing information on current debt repayment schedule, highlighting good financial management should be implemented.

1.2 Objectives

1. To save journey time.
2. Avoid manual workers in toll gate
3. To gain energy.
4. Eco friendly roadway.
5. Very useful to service road separation and junction

II. MATERIALS AND METHODS

A. Methodology

The proposed model work is to be executed based on the methodology framed as

Task-1	Selection of location for construction.
Task-2	Collection of construction material and find resources of material.
Task-3	Bridge constructing with full steel
Task-4	Bearing can automatically adjust the alignment.
Task-5	Spring absorbs compressions energy.

III. RESULT AND DISCUSSION

The toll bridge design prototype model is shown in figure. 1

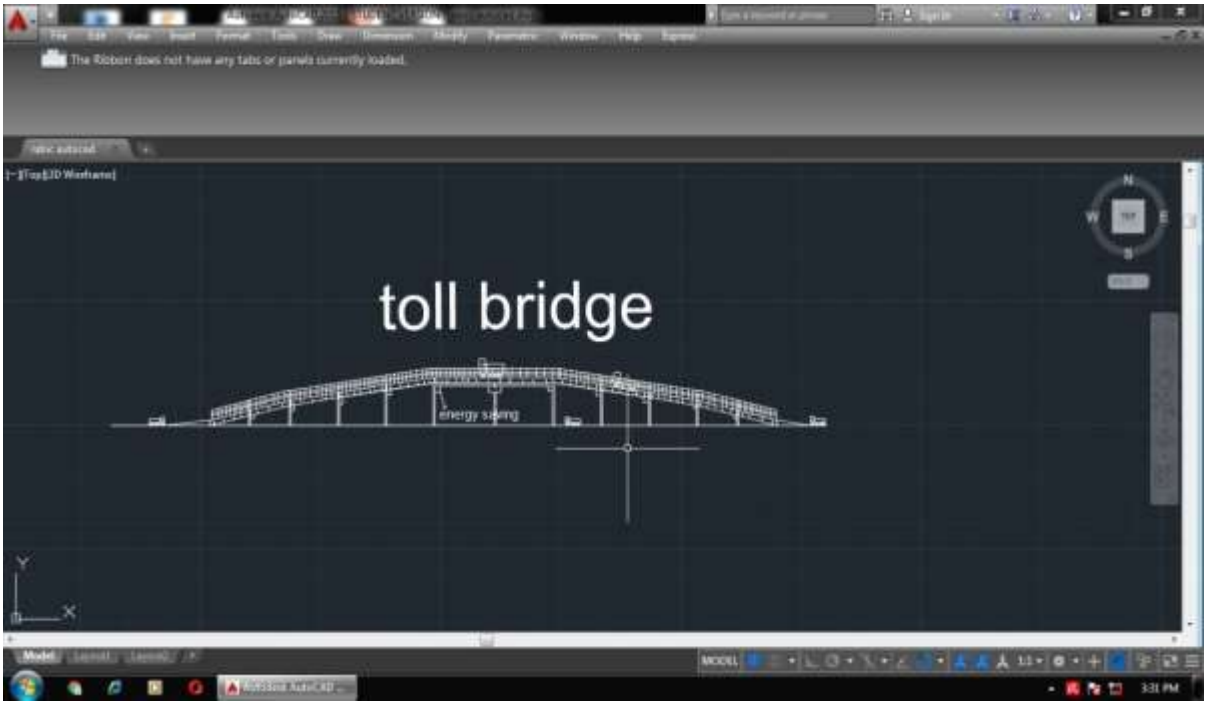

Figure 1: Proposed Model

Work Plan: Proposed Structure details (All dimensions are in inch)

Bridge type, structure and model	RCC, readymade and portable
Column size	6*6
Roof slab	4
Wall	3
Paint	Solar paint
Loads	live, dead, hydrostatic, wind, dynamic

Budget Particulars (In Rupees)

A. Non-Recurring (e.g. equipments, accessories, etc.)

S. No.	Item	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6
1	Check Post Lamp	1000	-	-	-	-	-

Sub-Total (A) = 1,000

B. Recurring

B.1 Consumables

S. No.	Item	Quantity	Week 1	Week 2	Week 3	Week 4	Week 5	Total
1	Cement	8 Bag	3200	-	-	-	-	3200

2	Aggregate	150 kg	4000	-	-	-	-	4000
3	Asphalt	10 Tonne	-	-	10000	-	-	10000
4	Automatic Gate	1	-	1700	-	-	-	1700
5	Painting	-	-	-	-	1000	-	1000
6	Steel	42 kg	-	-	3500	-	-	3500
7	Weight Gauge	10 Tonne						5000

Sub-Total (B.1) =28,400

Other items

B.2 Contingency	100
B.3 Overhead Charges	100
Sub-Total (B = B.1 + B.2 + B.3)	28,600
Grand Total (A + B)	29,600

IV. Conclusion

The proposed model would be cost effective if it is commercialized.

Acknowledgement

Authors are thankful to SCAD College of Engineering and Technology for financial assistance for this project work and for technical support in framing this paper.

References

1. Krishna Raju (2009) "Structural Design and Drawing Reinforced Concrete and Steel".
2. Punmia, B.C.(2000), " Theory of Structure", Lakshmi Publications, New Delhi
3. IS 456-2000 "Plain And Reinforced Concrete Code Of Practice".
4. SP 16" Design Aids For Reinforced Concrete".
5. IS 875-1987 Part 1&2"Design of "Loads for building".