Bangladesh:
Transit Fees for Indian Trucks

Report to World Bank
Final
December 30, 2010
# Table of Contents

Executive Summary  
1 Introduction  
2 Reasonable Transit Fees  
3 Methodology  
  3.1 Additional or incremental costs  
  3.2 Allocation of fixed costs  
  3.3 Allocation to vehicle types  
4 Transit Routes  
5 Capital, Operating and Maintenance Costs  
  5.1 Road capital costs  
  5.2 Operating and maintenance costs  
  5.3 Other costs  
6 Costs of Externalities  
  6.1 Emissions costs  
  6.2 Additional road congestion  
  6.3 Road accidents  
7 Traffic Volumes  
  7.1 Existing traffic volumes  
  7.2 Estimated transit volumes  
  7.3 Sensitivity of fee to changes in volumes  
8 Transit Fee Calculation  
  8.1 Calculation Details  
  8.2 Sensitivity analysis  
  8.3 International comparisons  
9 Avoided Costs  
10 Other Transit Issues  
  10.1 Border processes  
  10.2 Fuel  
  10.3 Hypothecation  

## Appendices

Appendix A: World Trade Organisation General Agreement on Tariffs and Trade Article 5  
Appendix B: Traffic Volumes
Appendix C: Details of Transit Fee Calculations

Tables
Table 1.1: Indicative transit fee ($US per truck per trip) ii
Table 7.1: Annual average daily traffic (AADT): Benapole to Tamabil (AH1) 15
Table 8.1: Indicative transit fee ($US per truck per transit) 17

Figures
Figure 2.1: Map of Indian States and Bangladesh 3
Figure 3.1: Overview of methodology 4
Figure 4.1: Asian highway routes 7
Executive Summary

The purpose of this report is to propose a transit fee—and a methodology for its calculation—for Indian trucks that conforms to the World Trade Organization (WTO) General Agreement on Tariffs and Trade (GATT)—that is a fee which is “reasonable having regard to the conditions of traffic” and which is non discriminatory.

The shortest route for transport of goods between Indian and their North East states is across Bangladesh. At the present time, there are no arrangements in place in regard to transit and India supplies its North East states via a much longer circuitous route, essentially around Bangladesh, that is entirely within India.

An efficient transit agreement would have mutual benefits for India and Bangladesh. India would benefit from lower transport costs for traffic to the North Eastern states and Bangladesh would benefit by the contribution made by transit fees to their fixed costs of road infrastructure as well as other economic benefits from providing services to trucks in transit.

We interpret “reasonable, having regard to the conditions of the traffic” as meaning that the transit fee should recover the cost of the provision and maintenance of roads and other infrastructure used by the Indian trucks and be calculated by a recognised methodology. GATT Article 5 makes it clear that transit is a right and thus no component of the fee can be of the nature of a tax or excise and cannot involve an incentive for the transited country beyond reasonable cost recovery.

We interpret “non discriminatory” as not favouring or penalising transit on the basis of country of origin.

Our cost allocation methodology therefore focuses on identifying clearly the additional costs—chiefly increased wear and tear on the roads—and establishing an appropriate allocation of fixed costs to transiting trucks—that is costs that will not change materially as a result of the additional transit traffic on Bangladeshi roads. Our suggested approach is to allocate fixed costs on a vehicle equivalent basis such that trucks, regardless of origin, all attract the same charge. We suggest this approach for three reasons:

1. It fully meets the WTO and GATT principles of reasonable and non discriminatory
2. It means that transit trucks are making a contribution towards the costs of future road upgrades to relieve the congestion that has been contributed to by the additional transit traffic; and
3. The avoided costs of the alternative longer route entirely within India are high.

In the interests of transparency, we suggest that the Government of Bangladesh establish processes to demonstrate that the revenue raised by imposition of the fee is seen to be spent on the transit route infrastructure as opposed to being seen as general income for the Bangladesh Government.

The costs we consider as underpinning the transit fee are:

- The capital cost of the road—that is the cost of acquiring the right of way, the civil works such as bridges, cuttings and embankments and the initial road base and bitumen seal; and
- The operating and maintenance costs including:
– Routine maintenance such as shoulder maintenance, vegetation management, drainage, signage etc
– Periodic maintenance—the replacement of the bitumen seal and associated works
– Rehabilitation—the replacement of the bitumen seal and the underlying road base; and
– Traffic control and enforcement.

For transit to be viable and effective and for benefits to both countries to be achieved, the customs and border processing processes and procedures will need to be efficient, speedy and low cost. We suggest that such a system should include such features as preregistration of companies, vehicles and drivers, sealed loads and prepayment of customs bonds.

The cost of externalities such as congestion, emissions and accidents can be managed. An allocation of the capital cost of road construction to transit vehicles will see them making a contribution to future road upgrades to relieve congestion.

In regard to emissions, the transit proposal will lead to a small overall reduction in emissions across India and Bangladesh made up of a large reduction in India and an increase for Bangladesh. This could be resolved by appropriate emissions accounting arrangements at the Government level, or more simply if the externality is priced by complementary fuel taxes in both countries.

We suggest that as quantifying both the likely increase in accidents and their costs is difficult, a condition of transit be that vehicles and drivers have appropriate insurance so that accident costs are covered on an as incurred basis.

Finally our proposed transit fee for the most likely and most commonly used transit route—the 495 kilometre Asian Highway 1 from Benapole to Tamabil that we have used as a representative route—is made up as follows:

Table 1.1: Indicative transit fee ($US per truck per trip)

<table>
<thead>
<tr>
<th>Charge Type</th>
<th>$US per trip</th>
</tr>
</thead>
<tbody>
<tr>
<td>Capital charge</td>
<td>$22.83</td>
</tr>
<tr>
<td>Routine Maintenance</td>
<td>$0.25</td>
</tr>
<tr>
<td>Periodic Maintenance</td>
<td>$18.53</td>
</tr>
<tr>
<td>Rehabilitation</td>
<td>$11.32</td>
</tr>
<tr>
<td>Traffic Control and Enforcement</td>
<td>$2.65</td>
</tr>
<tr>
<td>Total</td>
<td>$55.58</td>
</tr>
</tbody>
</table>

We note that these values are indicative only and are subject to a number of assumptions detailed later in this report. In addition the costs used are estimates and should be treated with caution. We suggest that our estimate of the fee be considered the midpoint of a range from $US45 to $US65—say plus or minus 20 percent.
We have performed sensitivity analysis on traffic volumes. If the volume of existing traffic on the transit route increased by 20 percent—this reduces the fee to $52.27 and if the volume of transit trucks increased from 60 percent of the potential total to 80 percent—this increases the fee to $61.90.
1 Introduction

The purpose of this report is to propose a transit fee—and a methodology for its calculation—for Indian trucks transiting across Bangladesh that conforms to the World Trade Organization (WTO) General Agreement on Tariffs and Trade (GATT)—that is a fee which is reasonable having regard to the conditions of traffic and which is non discriminatory.

The shortest route between Indian and their North East states is across Bangladesh. At the present time, there are no arrangements in place in regard to transit and India supplies their North East states via a much longer circuitous route, essentially around Bangladesh that is entirely within India.

In the remainder of this report we:

- Explain our interpretation of a “reasonable” “non discriminatory” fee in this context—Section 2
- Describe the methodology used for calculating the transit fee. We suggest that a range between incremental costs and fully distributed costs is cost reflective and thus reasonable. We include the capital and operating costs of the provision and maintenance of the roads and other infrastructure used to provide transit services—Section 3
- Define the typical transit route—we note that there are several alternate routes depending on the ultimate destination within India—Section 4
- Calculate the capital, operating and maintenance costs of the typical transit route. This will include civil works and bridges, pavement, operations and maintenance, and, policing and enforcement—Section 5
- Estimate the costs of externalities such as congestion, emissions and accident costs that will arise from transit vehicles and suggest ways to recover these costs—Section 6
- Calculate traffic volumes for the Indian transit task as well as the underlying Bangladeshi traffic on the route—Section 7
- Allocate the road costs to the various types and categories of vehicle and perform sensitivity analysis on traffic volumes—Section 8
- Estimate the avoided cost—that is the costs saved by Indian trucks from transit through Bangladesh—Section 9
- Outline at a high level the type of border and customs processing that will be needed if transit is to be viable—Section 10.
2 Reasonable Transit Fees

The WTO GATT recognises that landlocked countries have a right of transit through adjoining countries for their imports and exports under the provisions of Article 5 of the GATT. Furthermore, the country subject to transit has the right to charge fees that comply with the provisions of Article 5.

The full text of Article 5 is reproduced at Appendix A.

Article 5 states that in regard to fees:

\[
\text{All charges and regulations imposed by contracting parties on traffic in transit to or from the territories of other contracting parties shall be reasonable, having regard to the conditions of the traffic.}
\]

We interpret “reasonable, having regard to the conditions of the traffic” as meaning that the transit fee should recover the cost of the provision and maintenance of roads and other infrastructure used by the Indian trucks and be calculated by a recognised methodology. In other words, where the transited country incurs costs such as use of port or transport facilities, they are entitled to levy charges that compensate them for those costs—that is the charge should be broadly cost reflective.

To do otherwise would essentially amount to a tax on geography as a country that requires transit has—but for the provisions of Article 5—no negotiating power where transit must be provided by another country. This also applies in reverse; Bangladesh cannot “sell” the India to India transit services to any other country.

This is clear from a further reference in Article 5 in relation to fees and charges which states:

\[
\text{Traffic in transit…..shall be exempt from customs duties and from all transit duties or other charges imposed in respect of transit, except charges for transportation or those commensurate with administrative expenses entailed by transit or with the cost of services rendered.}
\]

In regard to non discrimination, Article 5 states that:

\[
\text{With respect to all charges, regulations and formalities in connection with transit, each contracting party shall accord to traffic in transit to or from the territory of any other contracting party treatment no less favourable than the treatment accorded to traffic in transit to or from any third country.}
\]

We interpret this to mean that where two countries have a right to transit through a third country, the transited country must charge both transiting countries’ traffic on a similar basis. That does not mean that the charges should be the same—because the transit services used may be different—but that the methodology behind the charges is the same and charges for the identical service are the same regardless of the country of origin.

It has been argued that Article 5 does not apply to the case of India seeking transit through Bangladesh to the north eastern Indian states of Assam, Meghalaya, Tripura, Mizoram, Arunachal Pradesh, Nagaland and Manipur. These states are not land locked and have access to India via a narrow strip of West Bengal in mountainous territory between Bangladesh and Nepal—the Shiligari Gap. Figure 2.1 shows a map of the region.

In this case, transit rights are being sought through Bangladesh to go—more conveniently—from one part of India to another.
However as a clarification of what transit means, at the Havana Conference in 1947, it was agreed that the following interpretive clause be added to the Havana Charter—the precursor of Article 5:

*a movement between two points in the same country passing through another country was clearly ‘in transit’ through the other country within the meaning of paragraph 1.*

This makes it clear that it was intended that Article 5 applies to the India—Bangladesh transit scenario and thus that the transit fee should conform to its provisions.
3 Methodology

We assume that the roads, bridges and other transport infrastructure to be used by the transiting trucks already exist and have adequate spare capacity at least initially—that is the granting of transit rights will not require any immediate building any new roads or modifications or upgrades to existing roads, specifically for the provision of transit. Of course, in the longer term, as volumes of both transit and Bangladeshi vehicles increase road capacities may need to be augmented.

On that basis, to determine the reasonable costs of transit such that the fee charged is cost reflective, there are three questions to be asked:

1. What are the additional costs that will be incurred directly by Bangladesh as a result of transit by Indian trucks?

2. What is an appropriate allocation of the fixed costs of infrastructure used by transiting trucks?

3. How do we allocate costs to the various classes and types of vehicles?

Our overall approach to these questions is summarised in Figure 3.1 and described in more detail in Sections 3.1 to 3.3.

Figure 3.1: Overview of methodology

3.1 Additional or incremental costs

Road surfaces wear and require resurfacing and rehabilitation at periodic intervals. Resurfacing we define as replacing the bitumen seal while rehabilitation involves replacing both the bitumen seal and the underlying road base. A road with high traffic
density may, for example, require resurfacing every four years and rehabilitation every twenty years. Road wear is directly related to heavy vehicle usage—more usage equals higher wear. Light vehicles and cars have much lower axle loadings than heavy vehicles and their impact on road wear is much smaller.

Thus the additional heavy truck movements of transiting vehicles will accelerate resurfacing and rehabilitation. As the period of time between resurfacing is directly proportional to heavy vehicle usage it is entirely reasonable that they bear these costs.

There are also some incremental costs associated with transit that may occur at border facilities as there will be more vehicles to check. To the extent that this requires additional staff or facilities, these costs should clearly also be attributable to transit vehicles.

In Section 3 we discuss the costs of externalities—congestion, emission and accident costs. For emission and accident costs we suggest ways in which these may be better dealt with outside the transit fee. We discuss congestion costs as part of the allocation of fixed costs in Section 3.2.

### 3.2 Allocation of fixed costs

The fixed costs of providing roads—that is those costs that do not vary according to changes in vehicle usage fall into two categories:

1. The capital cost of long lived items such as land acquisition, earthworks (cuttings and embankments) and bridges; and
2. Periodic maintenance costs such as vegetation management, clearing drains, traffic control and enforcement, and the like

For both these fixed costs the question arises as to how to allocate them to individual vehicles.

Economic theory suggests that any charge that is greater than incremental cost and less than standalone cost is efficient. Thus in these circumstances economists use Ramsey pricing which suggests that the optimal allocation of fixed costs to various classes of users is one where each user is allocated a share of fixed costs such that it does not distort their purchasing behaviour.

In this case, Ramsey pricing would suggest that Indian trucks be allocated fixed costs up to the level that their total charge is sufficiently less than their avoided cost—that is to not transit and travel the longer route entirely through India. This would result in Indian trucks being allocated a disproportionate share of fixed costs.

This is not appropriate as such a charge represents a tax on geography and Article 5 of the GATT on transit does not allow for taxes and duties—just recovery of costs. It also does not recognise that there is no market for transit services. Bangladesh cannot sell that transit service to any other buyer—and India cannot buy that service elsewhere. Thus this is a monopoly—monopsony situation where there is only a single buyer and a single seller.

It would also—as a methodology—not meet the “non discriminatory” requirement of Article 5 as a charge calculated on this basis would be different for different counties depending on their avoided costs.

Our approach is thus to allocate fixed costs on a vehicle equivalent basis such that heavy trucks regardless of origin all attract the same charge.
This means that transit trucks are making a contribution towards the fixed costs of the existing road infrastructure as well as to the costs of future road upgrades to relieve congestion that has been contributed to by the additional transit traffic. We discuss further the treatment of the costs of increased congestion and the investment required for future upgrades in Section 6.2.

We note that the issue of road user charges for vehicles in Bangladesh—similar to many countries in the world—is not explicit and comprehensive and we do not suggest that local trucks be charged on a similar basis. The extent to which roads in Bangladesh are funded from a combination of road user charges (and the level of those charges between classes of road users) and general taxation is a policy matter for the Government of Bangladesh.

3.3 Allocation to vehicle types

Once we have established the fixed and variable costs, we consider how they will be allocated to the various types and classes of vehicles. In our analysis we do not attribute any costs to non motorised vehicles or pedestrian traffic.

For the variable costs we allocate 80 percent of the costs to trucks. We do this on the basis that the majority of wear on road surfaces is caused by heavy axle load vehicles. For example, a road that is only lightly trafficked may require resealing at intervals of around twenty years—essentially on a time basis for weather related deterioration. However, a similar road, heavily trafficked with trucks may require resealing ever four years—on the basis of the increased wear from heavy vehicles.

For the fixed costs we allocate these costs to all commercial vehicles, regardless of axle loading or type of vehicles. We do this on the basis that roads have both a commercial and social dimension. From a commercial perspective—roads as a business—efficient provision and utilisation would occur if road costs were recovered from all users in such a manner as to ensure that each user would only travel on a road if their marginal benefit exceeded the marginal cost. However, as private travel has important social benefits, charging a commercial rate might reduce travel and thus this social benefit. Furthermore, as we discuss in Section 5.1 we calculate our annual charge for the capital cost of roads using the marginal discount rate—that is the cost of long term loan funds to the Government of Bangladesh. However as road construction is funded from a mix of loan funds and lower cost sources such as aid grants and taxation revenues, charges to non commercial users should reflect this lower cost of funds—the social discount rate.

However, for the purposes of transit fees, a commercial, marginal cost of funds should be used.
4 Transit Routes

At present, all traffic originating in the rest of India and destined for the North East states travels via the Shilliguri corridor—the narrow gap of India between Bangladesh and Nepal. The most logical alternative route through Bangladesh is from Benapole to Tamabil—this gives access to all of India’s North Eastern states—see map at Figure 2.1. It has the advantage of being part of the Asian Highway network (Route AH1) within Bangladesh so is already a recognised route for international trade—see map at Figure 4.1.

Figure 4.1: Asian highway routes

Source: Roads and Highways Department
There are a number of alternate routes that may be used depending on the origin of the goods within India and the destination within the North East states. Almost any of the western border crossings would be suitable as an entry point in some circumstances and any of the eastern border crossings would similarly be suitable for exit. Border crossings are marked on the map at Figure 4.1. We have chosen the AH1 route as a representative transit route.

The AH1 route currently has one ferry crossing at Kalna which would impose additional costs for ferry transit and introduce delays for transiting vehicles. The Padma Bridge, due to start construction by the end of 2010 and be completed in 2013 will eliminate the need for this ferry crossing. We understand that the bridge will charge a cost reflective toll. We assume that the long waiting times at Kalna—quoted as 16 hours—and the ferry charges will ensure that transit traffic switches to the bridge when it is complete with the higher toll.

Our approach thus is to use the route we believe will be most widely used and calculate a single lump sum transit fee on a point to point basis. We do not believe that a per kilometre fee or a per tonne kilometre fee is administratively viable—given that there are a number of different entry and exit points and routes.
5 Capital, Operating and Maintenance Costs

In this section we estimate the following components of the proposed transit fee:

- The capital cost of the road—that is the cost of acquiring the right of way, the civil works such as bridges, cuttings and embankments and the initial road base and bitumen seal
- The operating and maintenance costs including:
  - Routine maintenance such as shoulder maintenance, vegetation management, drainage, signage etc
  - Periodic maintenance—the replacement of the bitumen seal and associated works
  - Rehabilitation—the replacement of the bitumen seal and the underlying road base; and
  - Traffic control and enforcement.

We also discuss the impact of bridge tolls and ferry charges as well as customs and border crossing costs.

In this report as we have used a variety of sources for cost data, both local and international we have, for consistency, expressed all costs in United States dollars. We suggest that the actual transit fee may also be specified in United States dollars to avoid any windfall gains and losses from Indian or Bangladeshi currency fluctuations.

Assumptions

In this section we make four key assumptions:

1. That Indian trucks will conform to Bangladeshi standard 10 tonne axle loading. Bangladesh’s loading has recently been increased from 8.4 tonnes to 10 tonnes despite some doubt that all roads have been constructed to this standard. However, overloading is reportedly rife. We assume that Indian truck loading will be checked on entry to Bangladesh to ensure compliance
2. That all trucks are of rigid two axle configuration and thus that the transit fee calculated applies only to that class of truck. Articulated vehicles would attract a proportionately higher transit fees from that calculated here
3. That the transit route is constructed to the current National Road construction standard in Bangladesh—that is a two lane highway with a crest width of 12.2 metres and a pavement width of 5.5 to 7.3 metres; and
4. That wear and tear on roads is largely caused by heavy vehicles and thus the bulk of periodic maintenance and rehabilitation costs can be attributed to heavy vehicles. This is reasonable as light vehicles have much lower axle loads—typically less than one tonne compared to ten tonnes for trucks.

5.1 Road capital costs

The capital cost of the road is all costs relating to its original constructions such as the cost of acquiring the right of way, the civil works such as bridges, cuttings and embankments and the initial road base and bitumen seal.

Full details of the calculations of capital costs and the annual capital charge are contained in Appendix C and summarised below.
We have used data from four sources to estimate current road construction costs of a standard construction National Road in Bangladesh—that is a two lane highway with a crest width of 12.2 metres and a pavement width of 5.5 to 7.3 metres. They are:

1. The Bangladesh Roads and Highway Department (RHD) estimates that the current capital cost of road construction for a two lane National Road standard road is 60 million Taka (Tk.) per kilometre—around $US0.851M at current exchange rates.

2. From the World Bank’s Road Costs Knowledge System (ROCKS), average construction costs for a two lane highway—the standard of most of Bangladesh’s national roads—in the Asian region is given as $US0.875M per kilometre in year 2000 dollars. Escalating to 2010 dollars (by the US CPI) gives an approximate current of $US1.105M per kilometre.

3. The Bangladesh Roads and Highways Department (RHD) reported in 1999 that the value of road assets was approximately $US 7.4 billion. Escalating that value and applying that to the road network at the time and assuming that regional roads are half the cost per kilometre of the national roads—reasonable as many are only single lane and zila roads (feeder roads) are one third the cost of national roads gives a cost for national roads as $US0.841M per kilometre; and

4. A selection of major road widening, upgrading and improvement projects—in essence new construction—provided by the RHD showed an average estimated expenditure of $US0.943M per kilometre. The sample of seven high priority projects totalled over 1200 kilometres of road.

These four sources all confirm similar costs and thus we have used the average—a construction cost of $US0.935M per kilometre for a national highway standard road.

To calculate an annualised cost for the capital construction we require the marginal cost of capital to the Government of Bangladesh—that is the highest rate they pay for capital. We use the November 2010 Government of Bangladesh 20 year bond rate of 9.45 percent to convert the capital cost into an annual annuity capital charge of $US0.910M per kilometre. We assume that the original road construction—that is the right of way acquisition, bridges and civil works have a 100 year life in this calculation.

5.2 Operating and maintenance costs

Full details of the calculations of operating and maintenance costs are contained in Appendix C and summarised below.

**Routine maintenance costs**—that is shoulder maintenance, vegetation management, drainage, signage etc was estimated in a 2006 World Bank study on road user charges in Bangladesh as Tk. 50,000 per year per kilometre on national highways—escalated to 2010 values by the Bangladeshi CPI this equates $US96 per kilometre per year and we have assumed that value. This estimate is for an optimised maintenance program—that is what should be spent, not what actual expenditure was in 2006. As we assume that Bangladesh is moving towards increased levels of maintenance over time we have used the optimised estimate.

---

1 Data provided to Castalia in December 2010

2 “Road User Charges Study”, March 2006 by WSP for the World Bank and Bangladesh Roads and Highways Department
**Periodic maintenance**—that is the replacement of the bitumen seal and associated works was estimated in the same report as 4,900,000 Tk. with rescaling necessary every four years on a road with an average traffic volume greater than 4,000 vehicles per day. In Section 7 our forecast traffic volumes on the transit route—including the additional Indian trucks is over 5,000 vehicles per day. The cost of 4,900,000 Tk. at four year intervals escalated to 2010 cost equates to an annual cost of $US 23,400 per kilometre.

**Rehabilitation**—that is the replacement of the both the bitumen seal and the underlying road base was estimated in the same report to be Tk. 14.9M per kilometre on roads with a average traffic volume greater than 4,000 vehicles per day and is forecast to be required at 20 year intervals. Escalated to 2010 this equates to an annual cost of $US14,300 per kilometre.

**Traffic control and enforcement**—this was estimated in the same report to be 5 percent of road maintenance costs and we have used this value.

### 5.3 Other costs

In this section we consider whether other costs such as ferry crossings and bridge tolls, and customs and border processing costs should form part of the transit charge.

**Ferry Crossing and Bridge Tolls**

The RHD currently administers and charges tolls on certain bridges and at all ferry crossings. It might be argued that we should reduce the fee by the toll and ferry charges to avoid double counting.

In regard to bridge tolls we have not done so on the basis that our averaging cost approach to the capital cost of road construction does not explicitly include the cost of individual bridges—which can be very high. From data obtained from the Planning and Programming Circle at RHD, the construction cost of a 60 meter span bridge would cost as much as four kilometres of national highway. We have identified 12 toll bridges on the AH1 route with tolls totalling 1191Tk. (about $US16.89). The 2006 Road User Charge report concludes that the bridge tolls are less than cost reflective on average. In addition, the bulk of the revenue raised comes from three bridges at Jamuna and on the Dhaka to Chittagong road which are not on the proposed AH1 transit route.

In regard to ferry crossings, the only crossing that we are aware of on the AH1 route is at Kalna which will be replaced by the Padma Bridge by 2013. We have no information on the ferry charges at Kalna. The economic case for the bridge is in part based on the current long delays—up to 16 hours—at the Kalna ferry crossing. The Padma Bridge when completed will likely have a cost reflective toll and as a major infrastructure project involving expenditure of around $2.9 billion is clearly not captured by our average cost analysis. The 2006 Road User Charge report concluded that ferry charges did not cover costs and represent a subsidy to users. We have not included any costs for ferry operations in our road capital costs and thus have not double counted any ferry charges.

**Customs and Border Crossing Costs**

In Section 10 we discuss the need for efficient customs and border processes to make transit viable. We have not estimated costs for this function for three reasons:

1. We have not been able to locate any information on these costs, either in Bangladesh or elsewhere
2. We believe that the costs will be small given that they will be largely customs staff costs and if the process is efficient the time and thus cost per vehicle will not be large; and
3. If there are any capital costs—such as dedicated holding areas for transit trucks at border crossings, then India may make a contribution to such costs. The costs and risks of investment in such facilities should not be solely the responsibility of the Government of Bangladesh.
6 Costs of Externalities

In this section we consider the impact of transiting vehicles on the costs to Bangladesh that might arise from increased emissions, additional road congestion and road accidents.

6.1 Emissions costs

There are two key factors in regard to emissions costs:

1. In an overall global sense, successful implementation of transit procedures for Indian trucks to travel across Bangladesh to reach the North East Indian states will lead to a reduction in emissions; and

2. Neither Bangladesh nor India has any binding liability for emissions at present.

Emissions will be lower

The direct route across Bangladesh is materially shorter—approximately 500kms versus 1100kms so fuel usage and thus CO₂ emissions will be reduced for the equivalent transport task.

However given that each country is responsible for emissions at a national level, it likely that at least in an emission accounting sense there will be an increase in Bangladesh’s emissions that will be more than offset by a larger decrease in Indian emissions.

Emissions liability

As neither Bangladesh nor India currently has any binding liability or obligations for emission currently, transit will not give rise to any costs or benefits.

In the future, there may well be binding international agreements that impose liability for emissions on governments. However, the degree to which this may impose costs and benefits on each country will depend on the manner in which carbon is priced in each jurisdiction.

As an example, if both countries implement a carbon price via a fuel tax, the transiting Indian trucks will pay the cost of the carbon externality—regardless of whether they purchase fuel in India or Bangladesh and there will be no uncompensated liability.

Proposed resolution

We suggest that any agreement between the two countries recognises the potential for mismatched gains and losses and agree on a process for resolution such that Bangladesh does not incur any uncompensated liability for the emissions of trucks in transit.

6.2 Additional road congestion

We understand that much of the likely transit routes are currently not highly utilised and thus Indian trucks—while a material volume are unlikely to add significantly to congestion in the short term. Nevertheless, over time as traffic volumes increase, additional congestion will arise.

Congestion costs are hard to quantify. However, what is clear is that in the medium to long term the additional volume of vehicles will “pull forward” the need to expand road capacity to relieve uneconomic congestion.

For this reason we suggest that if transit fees include a proportionate allocation of the capital costs of the roads used, transit trucks will be making an appropriate contribution towards the cost of upgrading roads in the future to relieve congestion. At least in a theoretical sense, roads are upgraded to a higher capacity to relieve congestion when the
cost of the upgrade is more than compensated for by the reduction in the economic and social costs of the congestion that it relieves.

We also note that, per unit of optimum capacity, larger capacity roads are less costly than lower capacity roads—that is there are scale efficiencies in road construction. Thus the capital cost of a four lane road is lower per unit at optimum capacity that a two lane road.3

Furthermore, we note that traffic congestion is “self selecting”—that is vehicles will use alternate routes to avoid congestion when it is economic to do so—when the additional costs of the detour are less than the lost time due to congestion.

This further supports our view that a proportionate allocation of the costs of a two lane National Road standard construction will appropriately compensate Bangladesh for the cost of future upgrades brought forward by the increased transit traffic.

6.3 Road accidents

The level of road accidents is very high in Bangladesh and the addition of material numbers of transiting trucks will add to this level.

To determine this cost as part of the transit fee would be very difficult, involving both estimates of the costs of property damage and personal injury and death arising from accidents as well as an estimate of the additional accidents caused by transiting trucks.

We suggest therefore that as part of the transit agreement all trucks used for transit have appropriate and adequate levels of insurance so that the costs of accidents are met on an as incurred basis. We note that this insurance may be expensive and will reduce the benefit that India will receive from the transit arrangements.

If this were not so, four lane roads would not be built and two lane roads would be replicated instead. There are exceptions such as road construction in high density urban environments, but they do not apply to largely rural roads in Bangladesh.
7 Traffic Volumes

In this section we discuss the existing traffic volumes on the transit route and estimate the likely volumes of transit trucks. We also examine the sensitivity of the transit fee to changes in the transit volumes.

7.1 Existing traffic volumes

The RHD has supplied us with annual average daily traffic for 2007 for each of the segments of road that make up the AH1 route—see Appendix B for full details. A summary is shown at Table 7.1.

Table 7.1: Annual average daily traffic (AADT): Benapole to Tamabil (AH1)

<table>
<thead>
<tr>
<th>Vehicle Type</th>
<th>AADT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Truck – Heavy(^4)</td>
<td>270</td>
</tr>
<tr>
<td>Truck – Medium</td>
<td>970</td>
</tr>
<tr>
<td>Truck – Small</td>
<td>550</td>
</tr>
<tr>
<td>Bus - Large</td>
<td>670</td>
</tr>
<tr>
<td>Bus – Medium</td>
<td>730</td>
</tr>
<tr>
<td>Bus – Micro</td>
<td>630</td>
</tr>
<tr>
<td>Utility</td>
<td>330</td>
</tr>
<tr>
<td>Car</td>
<td>630</td>
</tr>
<tr>
<td>Other(^5)</td>
<td>1710</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>6520</strong></td>
</tr>
</tbody>
</table>

Source: RHD Road Network Database: Annual Report 2007 and Castalia

7.2 Estimated transit volumes

The total volume of goods estimated to be transported from India to the North East states via the Shiliguri corridor is estimated to be around 10 million tonnes per year.

However it is unlikely that all of this traffic would switch to the transit route for three reasons:

1. Some goods may not be suitable for transit—for example loads that cannot be easily be sealed or over length or overweight loads.
2. For that traffic consigned to destinations in the west of the state of Assam that are close to the Shiliguri gap, the transit route may not offer significant saving in distance; and

\(^4\)Transit trucks are heavy vehicles in this traffic classification

\(^5\)Auto rickshaws and motor bikes
3. The administrative processes suggested in Section 10 for efficient border crossing—such as pre-registration of companies, lodgement of bonds and appropriate insurance—may act as a barrier to smaller trucking operations or those that only transport goods to the North East states infrequently.

It will also take time for traffic to build up to its ultimate level.

For these reasons we assume that only 60 percent of the potential total tonnage will utilise the transit route through Bangladesh. We have assumed an average truck load capacity of 15 tonnes and thus the additional volume of transit trucks will be about 1100 trucks per day.

7.3 Sensitivity of fee to changes in volumes

These estimates of existing volumes and transit volumes are necessarily high level and should be treated with caution. The existing traffic volumes are based on 2007 data and have undoubtedly increased in 2010—possibly by as much as 20 percent, the approximate GDP growth over that period. The estimate of likely transit volumes is also subject to a wide range of variation.

This is particularly so as both these estimates are for a single representative transit route that we have selected from a range of possible routes. For this reason in our calculation of the transit fee we perform sensitivity analysis, increasing the existing volumes by 20 percent and increasing the transit volumes from 60 percent of the potential total tonnage to 80 percent.
8 Transit Fee Calculation

In this section we step through the calculation of the transit fee and detail the results of our sensitivity analysis. We also compare our fee to a number of similar fees charged internationally.

8.1 Calculation Details

From the per kilometre costs that we established in Section 5, we:

- Multiply by the 495 kilometres of our representative AH1 route to come up with annual costs

- Allocate the cost as follows:
  - Annuity capital cost—allocated on the basis of commercial vehicles only as it is not appropriate to allocate more than the social cost of road infrastructure to non commercial vehicles such as cars and motor cycles
  - Routine maintenance—similarly as this is a largely fixed cost we allocate this cost to commercial vehicles only
  - Periodic maintenance—as heavy trucks are the predominate cause of road wear and tear we allocate 80% of these costs to heavy trucks
  - Rehabilitation—similarly to periodic maintenance we allocate 80% of these costs to heavy trucks
  - Traffic control and enforcement—we add 5 percent to the cost of routine maintenance, periodic maintenance and rehabilitation to cover these costs.

The resulting transit fee—a lump sum for a truck transit on the AH1 route is shown in Table 8.1.

Table 8.1: Indicative transit fee ($US per truck per transit)

<table>
<thead>
<tr>
<th>Charge Type</th>
<th>$US per transit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Capital charge</td>
<td>$22.83</td>
</tr>
<tr>
<td>Routine Maintenance</td>
<td>$0.25</td>
</tr>
<tr>
<td>Periodic Maintenance</td>
<td>$18.53</td>
</tr>
<tr>
<td>Rehabilitation</td>
<td>$11.32</td>
</tr>
<tr>
<td>Traffic Control and Enforcement</td>
<td>$2.65</td>
</tr>
<tr>
<td>Total</td>
<td>$55.58</td>
</tr>
</tbody>
</table>

Full details of the allocation and calculations are given in Appendix C.

We note that these values are indicative only and are subject to a number of assumptions detailed in this report and apply only to a single representative route that we have chosen. In addition the costs used are estimates and should be treated with caution. We suggest that our estimate of the fee be considered the midpoint of a range from $US45 to $US65—say plus or minus 20 percent.

17
8.2 Sensitivity analysis
As discussed in Section 7 we perform sensitivity analysis for two scenarios:

1. Existing traffic volumes increased by 20 percent—this reduces the fee to $52.27; and
2. Transit volumes increased from 60 percent of the potential total to 80 percent—this increases the fee to $61.90.

8.3 International comparisons
The calculated value for transit fees—$US55.58 compares with the following international transit fees:

- The Common Market for Eastern and Southern Africa (COMESA) fees are $US6 per 100 kilometres for rigid heavy goods vehicles (probably equivalent to Indian transit trucks) and $US10 for articulated heavy goods vehicles. Applied to the AH1 route this would equate to a fee of between $US30 to $US50
- Some European Union countries charge a per kilometre road user charge for heavy goods vehicle. The rate varies between 9 and 36 euro cents which equates to about $US60 to $US230 for the AH1 route. However this is for articulated heavy goods vehicles of much greater capacity than assumed in this study and on multilane freeways
9  Avoided Costs

In this section we estimate the costs avoided by Indian trucks and thus the benefits that they gain from transit arrangements.

The calculation of the distance saved is difficult as it is entirely dependent on the final destination of the goods within the Indian states and also their origin from within the remainder of India.

We have calculated that the additional distance from goods originating in India near Kolkata and destined for a point within India beyond the border town of Tamabil is in the order of 600 kilometres. We have used indicative operating costs for trucks in Bangladesh as we have no information on Indian trucking costs.

The RHD estimated that the vehicle operating cost for a truck was 17 Taka/km. This is the all up cost so includes capital, maintenance, labour (drivers’ wages) and fuel. Escalated to 2010 costs this equates to about $US0.35/km giving a potential gain from a 600 kilometre distance saving of around $US210. From this must be deducted the transit fee ($US56), the cost of bridge tolls ($US17) and the estimated Padma Bridge toll ($US36) to give a potential gain of around $US102 per trip.

This is the maximum potential gain, as it includes:

- The fuel saved as well as the reduction in variable vehicle maintenance
- The savings in drivers’ time; and
- The opportunity value of the increased availability of the vehicles as we have included a capital component in the vehicle operating cost.

This potential gain is further reduced by the administrative costs associated with the transit processes—particularly the lodgement of substantial customs bonds and the provision of suitable insurance to cover the personal and property costs of accidents. In addition, even efficient border processing will take time, adding to the transit cost. We have not quantified these additional costs.

The Indian Government pays quite substantial transport subsidies to the North East states and it might appear that suitable transit arrangements might eliminate the need for this subsidy—a clear gain to India. However we note that the subsidy is given on the basis of both the economic development disadvantage of these areas as well as the transport disadvantage. It is possible that some level of subsidy may continue even after transit arrangements are in place as part of the Government’s economic development strategy. For this reason it cannot be assumed that the current subsidy represents the benefit to India.

---


7 We base this toll on twice the existing Jamuna Bridge charge of 1250 Taka for a heavy truck. The Jamuna Bridge is currently the only bridge allowing access between east and west Bangladesh. The construction cost of the Padma Bridge at Kalna will be about double that of the Jamuna Bridge.
10 Other Transit Issues

10.1 Border processes

For transit to be viable and effective and for the benefits to both countries to be achieved, the customs and border processing processes and procedures will need to be efficient, speedy and at low cost.

We suggest that such a system should include:

- Pre-registration of trucking companies, vehicles and drivers such that border processes are limited to checking. As discussed in Section 0 registration needs to be accompanied by proof of agreed insurance
- Vehicles are to be checked for compliance with the Bangladesh 10 tonne axle loading limit
- Vehicle loads are to be sealed and unsealed at entry and exit by Bangladeshi customs with tamper proof seals; and
- Bonds are to be lodged to be forfeited if seals are not intact—the level of the bond to be calculated on a punitive basis to discourage arbitrage with normal import duties.

10.2 Fuel

We understand that diesel fuel is cheaper in Bangladesh than India. Obviously this will encourage arbitrage by drivers—trucks will enter Bangladesh empty and leave full. This will not create any costs for Bangladesh, if as we understand to be the case, the difference in fuel prices results from lower taxes in Bangladesh.

However, if there is any element of fuel subsidy in Bangladesh, then the price differential will result in the leakage of that subsidy to India. We suggest that to the extent there is a subsidy, such cost be added to the transit fee to preserve Bangladesh’s fiscal position.

10.3 Hypothecation

In the interests of transparency, we suggest as the proposed transit fee includes an allocation of fixed costs and a capital recovery component that the Government of Bangladesh establish processes to demonstrate that the revenue raised by imposition of the fee is seen to being spent on the transit route infrastructure as opposed to being seen as general income. In effect, this might be a precursor to a road fund set up from other road user charges.
Appendix A: World Trade Organisation General Agreement on Tariffs and Trade Article 5

Freedom of Transit

1. Goods (including baggage), and also vessels and other means of transport, shall be deemed to be in transit across the territory of a contracting party when the passage across such territory, with or without trans-shipment, warehousing, breaking bulk, or change in the mode of transport, is only a portion of a complete journey beginning and terminating beyond the frontier of the contracting party across whose territory the traffic passes. Traffic of this nature is termed in this article "traffic in transit".

2. There shall be freedom of transit through the territory of each contracting party, via the routes most convenient for international transit, for traffic in transit to or from the territory of other contracting parties. No distinction shall be made which is based on the flag of vessels, the place of origin, departure, entry, exit or destination, or on any circumstances relating to the ownership of goods, of vessels or of other means of transport.

3. Any contracting party may require that traffic in transit through its territory be entered at the proper custom house, but, except in cases of failure to comply with applicable customs laws and regulations, such traffic coming from or going to the territory of other contracting parties shall not be subject to any unnecessary delays or restrictions and shall be exempt from customs duties and from all transit duties or other charges imposed in respect of transit, except charges for transportation or those commensurate with administrative expenses entailed by transit or with the cost of services rendered.

4. All charges and regulations imposed by contracting parties on traffic in transit to or from the territories of other contracting parties shall be reasonable, having regard to the conditions of the traffic.

5. With respect to all charges, regulations and formalities in connection with transit, each contracting party shall accord to traffic in transit to or from the territory of any other contracting party treatment no less favourable than the treatment accorded to traffic in transit to or from any third country.

6. Each contracting party shall accord to products which have been in transit through the territory of any other contracting party treatment no less favourable than that which would have been accorded to such products had they been transported from their place of origin to their destination without going through the territory of such other contracting party. Any contracting party shall, however, be free to maintain its requirements of direct consignment existing on the date of this Agreement, in respect of any goods in regard to which such direct consignment is a requisite condition of eligibility for entry of the goods at preferential rates of duty or has relation to the contracting party's prescribed method of valuation for duty purposes.

7. The provisions of this Article shall not apply to the operation of aircraft in transit, but shall apply to air transit of goods (including baggage).
## Appendix B: Traffic Volumes

Existing traffic volumes from Roads and Highways Department "Road Network Database: Annual Report 2007"

<table>
<thead>
<tr>
<th>Road No</th>
<th>Segment</th>
<th>Heavy</th>
<th>Medium</th>
<th>Small</th>
<th>Large</th>
<th>Micro</th>
<th>Utility</th>
<th>Car</th>
<th>Other</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>N706</td>
<td>Benapole - Jessore</td>
<td>100</td>
<td>789</td>
<td>555</td>
<td>733</td>
<td>498</td>
<td>279</td>
<td>65</td>
<td>296</td>
<td>828</td>
</tr>
<tr>
<td></td>
<td>Jessore</td>
<td>0</td>
<td>161</td>
<td>94</td>
<td>8</td>
<td>280</td>
<td>74</td>
<td>20</td>
<td>93</td>
<td>841</td>
</tr>
<tr>
<td>N805</td>
<td>Bhanga - Mollahhat</td>
<td>41</td>
<td>563</td>
<td>388</td>
<td>682</td>
<td>340</td>
<td>155</td>
<td>42</td>
<td>132</td>
<td>649</td>
</tr>
<tr>
<td>N8</td>
<td>Bhanga - Dhaka</td>
<td>285</td>
<td>766</td>
<td>423</td>
<td>660</td>
<td>2040</td>
<td>416</td>
<td>148</td>
<td>636</td>
<td>1627</td>
</tr>
<tr>
<td>N1</td>
<td>Dhaka - Dhaka</td>
<td>579</td>
<td>1964</td>
<td>1158</td>
<td>1260</td>
<td>1033</td>
<td>1375</td>
<td>613</td>
<td>1422</td>
<td>2891</td>
</tr>
<tr>
<td>N2</td>
<td>Dhaka - Sarail</td>
<td>596</td>
<td>1232</td>
<td>519</td>
<td>918</td>
<td>583</td>
<td>815</td>
<td>492</td>
<td>783</td>
<td>2373</td>
</tr>
<tr>
<td>N102</td>
<td>Sarail - Sarail</td>
<td>491</td>
<td>1075</td>
<td>634</td>
<td>656</td>
<td>744</td>
<td>665</td>
<td>403</td>
<td>676</td>
<td>3537</td>
</tr>
<tr>
<td>N2</td>
<td>Sarail - Tamabil</td>
<td>36</td>
<td>1174</td>
<td>658</td>
<td>452</td>
<td>310</td>
<td>1238</td>
<td>824</td>
<td>1291</td>
<td>947</td>
</tr>
<tr>
<td></td>
<td>Average</td>
<td>270</td>
<td>970</td>
<td>550</td>
<td>670</td>
<td>730</td>
<td>630</td>
<td>330</td>
<td>670</td>
<td>1710</td>
</tr>
<tr>
<td></td>
<td>Average Heavy Trucks</td>
<td>270</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Average Commercial Vehicles</td>
<td>4150</td>
<td>(all except cars and other)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Additional transit volumes

- Estimated total volume of NE India Traffic: 10 million tonnes per annum
- Estimated volume for transit traffic: 60%
- Average truck capacity: 15 tonnes
- Number of transit trucks per day: 1100

### Total commercial vehicles (including transit)

- 5250

### Total trucks only

- 1370
## Appendix C: Details of Transit Fee Calculations

### 1. Capital cost of Road Construction

<table>
<thead>
<tr>
<th>Construction Cost</th>
<th>$105,000</th>
<th>USD/km</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average construction cost (USD)</td>
<td>$105,000</td>
<td>USD/km</td>
</tr>
</tbody>
</table>

### 2. Maintenance and Operations

#### 2.1 Routine Maintenance

<table>
<thead>
<tr>
<th>Description</th>
<th>Cost (USD)</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vehicle Maintenance - March 2008</td>
<td>16,000</td>
<td>USD/km</td>
</tr>
<tr>
<td>Equipment Maintenance - March 2008</td>
<td>294.2</td>
<td>USD/km</td>
</tr>
<tr>
<td>Fuel and Miscellaneous - March 2008</td>
<td>63,500</td>
<td>USD/km</td>
</tr>
</tbody>
</table>

#### 2.2 Periodic Maintenance

<table>
<thead>
<tr>
<th>Description</th>
<th>Cost (USD)</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Annual Cost</td>
<td>1,843,400</td>
<td>USD/km</td>
</tr>
</tbody>
</table>

#### 2.3 Rehabilitation

<table>
<thead>
<tr>
<th>Description</th>
<th>Cost (USD)</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rehabilitation - March 2008</td>
<td>24,000</td>
<td>USD/km</td>
</tr>
</tbody>
</table>

#### 2.4 Safety and Enforcement

<table>
<thead>
<tr>
<th>Description</th>
<th>Cost (USD)</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pedestrian Safety</td>
<td>22,00</td>
<td>USD/km</td>
</tr>
</tbody>
</table>

### 3. Summary

<table>
<thead>
<tr>
<th>Description</th>
<th>Cost (USD)</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>55,18</td>
<td>-</td>
</tr>
</tbody>
</table>