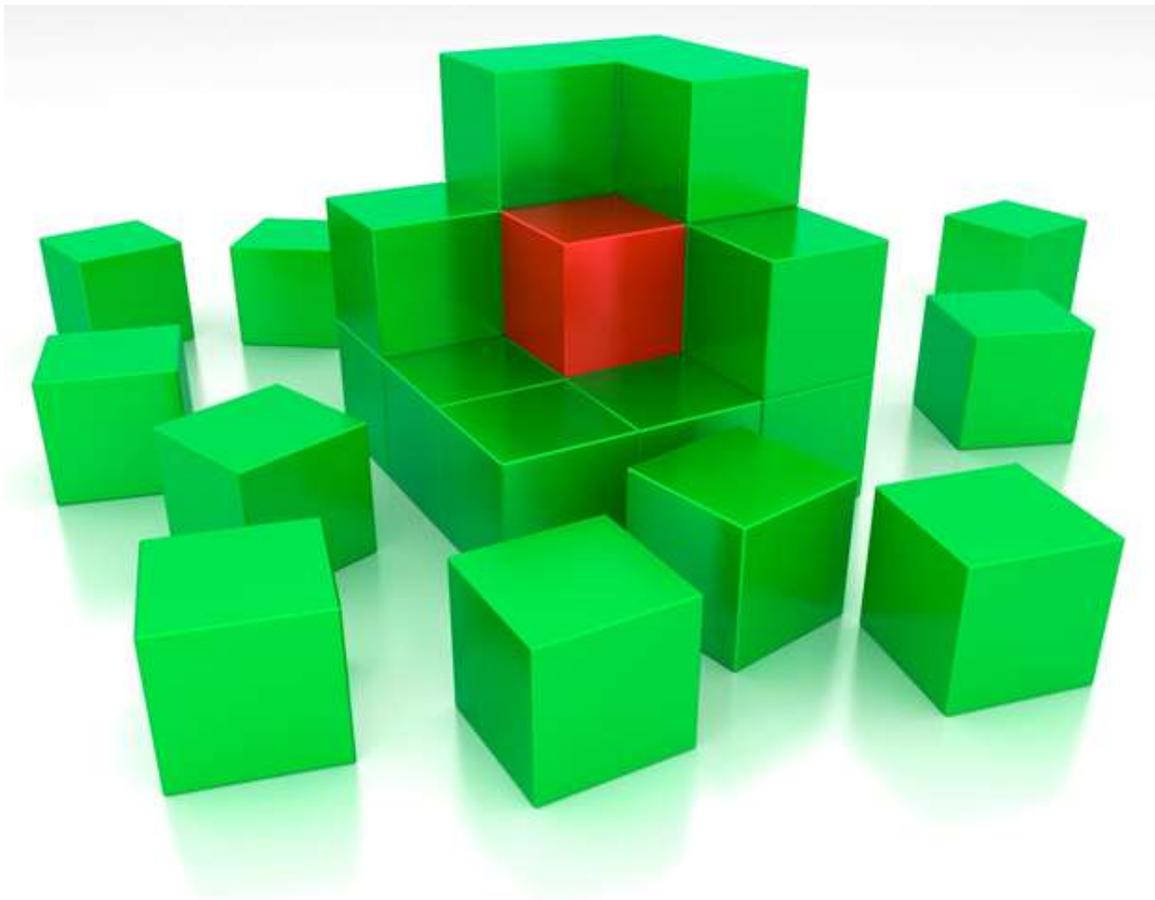




Sector Specific Inventory & Institutional Strengthening for PPP Mainstreaming

Karnataka Public Works Department

Pre-Feasibility Report on Rehabilitation & Reconstruction of Major Bridges on PPP basis



Submitted By
Deloitte Touche Tohmatsu India Private Limited

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ACRONYMS

BOT	Build Operate Transfer
COD	Commercial Operation Date
CRN	Core Road Network
DCA	Draft Concession Agreement
DPR	Detailed Project Report
FY	Financial Year
GoI	Government of India
GoK	Government of Karnataka
IRR	Internal Rate of Return
KSHIP	Karnataka State Highways Improvement Project
KRDCL	Karnataka Road Development Corporation Ltd.
MCA	Model Concession Agreement
MDR	Major District Roads
NH	National Highways
NPV	Net Present Value
PCU	Passenger Car Unit
PIU	Project Implementation Unit
PPP	Public Private Partnership
PWD	Public Works Department (Karnataka)
SH	State Highways
SPV	Special Purpose Vehicle
SRN	Strategic Road Network
ToR	Terms of Reference
TPC	Total Project Cost
VGF	Viability Gap Funding

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2 Toll Policy

2.1 Toll Policy of Karnataka

2.1.1 Government of Karnataka (GoK) notified the rate of Toll to be collected as Toll or User Fee for using a section of SH or MDR to be developed under PPP. Some key highlights of Toll Notification issued by GoK are as under:

- *This notification provides the definitions of key terms like “public funded projects” and “private funded projects” etc.*
- *The Base Year is defined from 1st April, 2008 to 31st March, 2009. The category wise Toll Rate is given in table below:*

Table 1: Base Toll Rates

Type of Vehicles	Basic Toll Rate (Rs. Per Km. and per trip) (4 Lanes & above)	Basic Toll Rate (Rs. Per Km. and per trip) (2 Lanes)
Car, Jeep, Van or Light Motor Vehicle	0.65	0.50
Light Commercial Vehicle, Light Goods Vehicles or Mini Bus	1.05	0.75
Bus or Truck	2.20	1.50
Heavy Construction Machinery (HCM) or Earth Moving Equipment (EME) or Multi Axle Vehicle (MAV) (three to six Axles)	3.45	2.25
Over-sized vehicles (seven or more Axle)	4.20	1.50

The notification also provides the provisions for yearly revision of Toll Rates which is dependent on the WPI.

The methodology for calculation of Revised Toll Rates is provided in table below.

Table 2: Revision of Toll Rate

Basic wholesale Price Index for the year ending 31st December, 2008 (WPI as on 27-12-2008 is 229.50)	WPI (A)
Wholesale Price Index for the year ended 31st December, 2009	WPI (B)
Formula for calculation New Toll Rate (w.e.f. 01-03-2010)	Basic Toll Rate X WPI (B) / WPI (A)

Illustration (for Cars):

Toll Rate for Year 2013 (1st April, 2012 to 31st March, 2013) for Car = 0.65 (basic toll rate) X (WPI of year ending on Dec 2012/229.50)

- *Daily Passes & Monthly Passes: the exempted Toll Rate is provided in table below for daily & monthly passes:*

Table 3: Discounts in Toll Rate

Amount Payable	Maximum no. of one way Journeys allowed	Period of validity
One and half times of the fee for one way journeys	Two	Twenty four hours from the time of payment.
Two-third of amount of the fee payable for fifty single journeys	Fifty	One month from date of payment.

- *Local Traffic: Local traffic exempted from paying tolls.*
- *The Toll Fee as well as passes notified under this notification shall be rounded off and levied in multiple of the nearest rupees five.*
- *Over-loading: Without prejudice to the liability of the driver, owner or a person in charge of a mechanical vehicle, which is loaded in excess of the permissible load specified category under this notification, shall be liable to pay fee at such rate which is applicable for the next higher category of mechanical vehicles.*
- *The notification also lists down the vehicles that are exempted from paying the Tolls.*

2.2 Comparison with other Toll Policies

2.2.1 Karnataka Toll Notification is slightly different than other states and National Highways Toll Notification. We have compared the key aspects of the Karnataka toll policy with the National Highways toll policy as well as the toll policy for Andhra Pradesh, Orissa and Rajasthan. The summary of comparison of key provisions is provided in table below:

Table 4: Comparison of Karnataka Toll Notification

SI	Aspect	Toll Notification as published by Karnataka Public Works, Ports & Inland Water Transport Secretariat	New Toll Policy as applicable for National Highways	Toll Policy as approved by Government of Andhra Pradesh for SH	Toll Policy as approved by Government of Orissa for SH	Toll Policy as approved by Government of Rajasthan for SH
1	Different Base Rate of Fee depending on lanes.	Different rates are specified for 4-lane and above and 2-lane roads.	Different rates are specified for 4-lane and above and 2-lane roads.	Rates are only mentioned for 4-lane roads.	Different rates are specified for Single lane, Intermediate lane, 2-lane and 4-lane roads.	For two lanes or more lanes the toll rates will be same.
2	Different treatments for structures e.g. bridge, Tunnel etc.	No such different treatments is prescribed for structures e.g. bridges, tunnel etc.	The toll rates for structures (only if the cost is more than INR 50 crores) are different from rest of the project highway, but will be levied together with the rest of the project highway at the same toll plaza.	No such different treatments is prescribed for structures e.g. bridges, tunnel and etc.	The toll rates for structures (only if the cost is more than INR 10 crores) are different from rest of the project highway, but will be levied together with the rest of the project highway at the same toll plaza.	The toll rates for structures including bypass (only if the cost is more than INR 5 crores) are different from rest of the project highway, but will be levied together with the rest of the project highway at the same toll plaza.
3	Different treatments for bypasses.	No such different treatment is prescribed for bypass.	The toll rates for bypasses (only if the cost is more than INR 10 crores) are different from rest of the project highway, but will be	No such different treatment is prescribed for bypass.	The toll rates for bypasses are different from rest of the project highway, but will be levied together with the	Same as structure toll rate

SI	Aspect	Toll Notification as published by Karnataka Public Works, Ports & Inland Water Transport Secretariat	New Toll Policy as applicable for National Highways	Toll Policy as approved by Government of Andhra Pradesh for SH	Toll Policy as approved by Government of Orissa for SH	Toll Policy as approved by Government of Rajasthan for SH
			levied together with the rest of the project highway at the same toll plaza.		rest of the project highway at the same toll plaza.	
4	Annual Revision Date	Annual revision of rate of fee under this rule shall be effective from 1st April every year.	Annual revision of rate of fee under this rule shall be effective from 1st April every year.	Base rate is fixed as on the date of start of tolling. The revision of toll rates shall be done on the very same date every 2 year INR	Annual revision of rate of fee under this rule shall be effective from 1st April every year.	Annual revision of rate of fee under this rule shall be effective from 1st April every year.
5	Methodology for annual revision of Toll Rates	<p>The calculation of Revised Toll Rates is provided below.</p> <p>Toll Rate for year B = $\text{[Basic Toll Rate} \times \frac{\text{WPI-B}}{\text{WPI-A}}]$ WPI-A = WPI of the year ending on 31st Dec, 08 i.e. on 27th Dec, 08 and equal to 229.50 WPI-B = WPI of the year ending on 31st Dec of the preceding year. Basic Toll Rates are as mentioned in the</p>	<p>The calculation of Revised Toll Rates is provided below.</p> <p>Toll Rate for year B = $\text{base rate} + \text{base rate} \times \left\{ \frac{\text{WPI B}-\text{WPI A}}{\text{WPI A}} \right\} \times 0.4$ <p>The rates specified for Base Year shall be increased without compounding, by three per cent. each year with effect from the 1st day of April, 2008 and such increased rate shall be deemed to be the base rate for the subsequent years.</p> </p>	<p>The calculation of Revised Toll Rates is provided below.</p> <p>Toll Rate for year B = $\text{[Basic Toll Rate} \times \frac{\text{WPI-B}}{\text{WPI-A}}]$ WPI-A = WPI at the time of fixing the base toll rate. WPI-B = WPI at the time of revision. Basic Toll Rates are fixed at the time of start of tolling.</p>	<p>The calculation of Revised Toll Rates is provided below.</p> <p>Toll Rate for year B = $\text{base rate} + \text{base rate} \times \left\{ \frac{\text{WPI B}-\text{WPI A}}{\text{WPI A}} \right\} \times 0.4$ <p>The rates specified for Base Year shall be increased without compounding, by three per cent. each year with effect from the 1st day of April, 2011 and such increased rate shall be deemed to be the base rate for the subsequent</p> </p>	<p>The calculation of Revised Toll Rates is provided below.</p> <p>Toll Rate for year B = $\text{base rate} + \text{base rate} \times \left\{ \frac{\text{WPI B}-\text{WPI A}}{\text{WPI A}} \right\} \times 0.4$ <p>The rates specified for Base Year shall be increased without compounding, by three per cent. each year with effect from the 1st day of April, 2011 and such increased rate shall be deemed to be the base rate for the</p> </p>

SI	Aspect	Toll Notification as published by Karnataka Public Works, Ports & Inland Water Transport Secretariat	New Toll Policy as applicable for National Highways	Toll Policy as approved by Government of Andhra Pradesh for SH	Toll Policy as approved by Government of Orissa for SH	Toll Policy as approved by Government of Rajasthan for SH
		notification.	<p>WPI-A = WPI of the week ending on 1st week of Jan 2007 i.e. on 7th Jan, 07 and equal to 208.70</p> <p>WPI-B = WPI of the week ending on 1st week of that year i.e. on 1st week of Jan.</p>		<p>years.</p> <p>WPI-A = WPI of the week ending on 1st week of Jan 2010</p> <p>WPI-B = WPI of the week ending on 1st week of that year.</p>	<p>subsequent years.</p> <p>WPI-A = WPI of the week ending on 1st week of Jan 2010</p> <p>WPI-B = WPI of the week ending on 1st week of that year.</p>
6	Rounding-off of the Toll Rates	The fee as well as passes notified by this notification shall be rounded off and levied in multiple of the nearest rupees five.	The fee as well as passes notified by this notification shall be rounded off and levied in multiple of the nearest rupees five.	<p>The fee notified by this notification shall be rounded off and levied in multiple of the nearest rupees one.</p> <p>The fee for passes will be rounded off to the nearest rupees five.</p>	The fee notified by this notification shall be rounded off and levied in multiple of the nearest rupees one.	The fee as well as passes notified by this notification shall be rounded off and levied in multiple of the nearest rupees five.
7	Levying fees for Local Users	Local non-commercial users are exempted.	A monthly pass of INR. 150/- for the Base Year will be levied to the local non-commercial users as defined in the RFP. This fee will be revised annually and rounded off to the nearest 5 rupees as per the provision provided in the fee	<p>Car/Jeep/Van (non-commercial) are exempted.</p> <p>Car/Jeep/Van (commercial): INR150/- per month for 0 to 20 Km from fee collection booth.</p>	A monthly pass will be levied to local users.	Local non-commercial users are allowed to use monthly passes.

SI	Aspect	Toll Notification as published by Karnataka Public Works, Ports & Inland Water Transport Secretariat	New Toll Policy as applicable for National Highways	Toll Policy as approved by Government of Andhra Pradesh for SH	Toll Policy as approved by Government of Orissa for SH	Toll Policy as approved by Government of Rajasthan for SH
			notification.	Trucks: INR 25/- per crossing for 0 to 20 Km from fee collection booth.		
8	Exempted vehicles	Tractor trailers carrying agricultural produce are exempted from the toll payment. School buses are not exempted from paying toll.	Tractor trailers carrying agricultural produce are exempted from the toll payment. School buses are not exempted from paying toll.	Tractor trailers carrying agricultural produce are exempted from the toll payment. However a vehicle for agricultural produce being used by a trader will be levied toll. School buses are exempted from paying toll.	Two wheelers, Three Wheelers, Bus and Mini Bus are exempted.	Two wheelers, Tractor without trailers and tractor with trolley carrying agricultural produce are exempted from the toll payment.
9	Rate of fee for overloading	Without prejudice to the liability of the driver, owner or a person in charge of a mechanical vehicle, which is loaded in excess of the permissible load specified category under this notification, shall be liable to pay fee at such rate which is applicable for the	Without prejudice to the liability of the driver, owner or a person in charge of a mechanical vehicle, which is loaded in excess of the permissible load specified category under this notification, shall be liable to pay fee at such rate which is applicable for the next higher category of mechanical vehicles.	Without prejudice to the liability incurred under the Applicable Laws by any person driving a vehicle that is loaded in excess of the permissible limit set forth in such laws, the Concessionaire may, in its discretion, recover an additional fee. The Additional Fee shall not	Without prejudice to the liability of the driver, owner or a person in charge of a mechanical vehicle, which is loaded in excess of the permissible load specified category under this notification, shall be liable to pay fee at such rate which is applicable for the next higher category of	Without prejudice to the liability of the driver, owner or a person in charge of a mechanical vehicle, which is loaded in excess of the permissible load specified category under this notification, shall be liable to pay fee at such rate which is applicable for the

SI	Aspect	Toll Notification as published by Karnataka Public Works, Ports & Inland Water Transport Secretariat	New Toll Policy as applicable for National Highways	Toll Policy as approved by Government of Andhra Pradesh for SH	Toll Policy as approved by Government of Orissa for SH	Toll Policy as approved by Government of Rajasthan for SH
		next higher category of mechanical vehicles.		<p>exceed:</p> <p>(a) 50% (fifty per cent) of the Fee if the overloading of such vehicle exceeds 10% (ten per cent) of the permissible load but is not greater than 20% (twenty per cent) thereof; and</p> <p>(b) 100% (one hundred per cent) of the Fee if such overloading exceeds 20% (twenty per cent) of the permissible load:</p> <p>The above penalties would be in addition to the penal action under the applicable laws.</p>	mechanical vehicles.	next higher category of mechanical vehicles.

2.3 Key Observations on Comparison of Toll Policies

2.3.1 As mentioned in the above table, we have undertaken a comparison of five different Toll Policies of Road & Highways sector including the Toll Policy of Karnataka and NHAI. After the comparison, we have some observation related to Karnataka Toll Policy and some of important observations are as under:

- **Fee revision:** As per the notification, the user fee is revised on 1st April of every year. The fee revision is dependent on WPI of the last week of the preceding year. This provision makes the toll revision totally dependent on the movements of WPI which means the revenue realized by the Concessionaire is completely exposed to the WPI risk and hence increases the total risk perception of the project to the Concessionaire. The Toll Notification for National Highways in India includes a fixed component 3% annual revision and 40% of change in WPI.
- **Defining Local Traffic:** The Notification does not provide the definition of Local Traffic and it refers to the Concession Agreement for the same. GoK may decide to include the definition of the same to make the clauses more clear.
- **Toll Fee for Local Traffic:** The Notification exempts Local Traffic from using Toll Fee. However; GoK may decide to include provisions for Local Passenger Traffic to pay tolls and the rates for the same.
- **Location of Toll Plaza:** The notification does not provide any restrictions or any provisions on location of Toll Plaza (it refers to the MCA on the same). However; GoK may restrict locating the Toll Plaza within 10 kilometers of urban limits on similar lines to the Toll Notification used for Tolling on National Highways.
- **Structures:** The Toll Notification published by GoI for tolling on NHs has the provisions of differential toll rates for structures with costs more than a threshold amount compared to roads. The provisions also define the structures to avoid any doubts. This differential toll rates makes the project more viable as it boosts the revenue realized by the Concessionaire. However, while making provisions for the same, willingness of the users to pay the higher charges has to be taken into consideration.
- **Bypasses:** The Toll Notification published by GoI for tolling on NHs has the provisions of differential (i.e. 1.5 times of normal Highways) toll rates for bypasses with cost more than Rs. 10 Cr. This differential toll rates makes the project more viable as it boosts the revenue realized by the Concessionaire. However, while making provisions for the same, willingness of the users to pay the higher charges has to be taken into consideration.

3 Screening Exercise Methodology

3.1 Methodology adopted for analysis

- 3.1.1** To assess the financial viability of the individual Major Bridge packages as identified, we developed a screening model that analyses the cash flow of the projects based on the assumptions as discussed above in the report. The viability of any package on PPP is primarily based on its risk-return profile, which is ideally indicated by its Equity Internal Rate of Return (EIRR). EIRR is a function of cash inflows and outflows over the project life cycle.
- 3.1.2** The methodology and framework used for assessing the viability of any package based on the screening model involves, first, computing the individual EIRRs of the individual package, thereafter, a hurdle rate of 15% return of equity has been assumed that is the minimum return expectation of a private developer to take up and develop the project on BOT basis.
- 3.1.3** If the individual equity IRR for a package is more than 15% it has been assumed that the project would be able to attract private players and would be developed on a BOT basis without requiring a capital grant. However, if the equity IRR of a package is less than 15%, then it would require a grant to an extent that after availing of this grant the equity IRR becomes at least 15%. Therefore, the quantum of grant required in such cases would depend to what extent the IRR is below 15%.
- 3.1.4** A list of Major Bridges which require rehabilitation / reconstruction that has been provided by KPWD for the purpose of analysis is placed at **Annexure-A (Tables 1 to 3)**.
- 3.1.5** There are 29 Major Bridge projects that have been identified by KPWD and KRDCL. However for the purpose of the screening exercise only those projects have been considered whose PCU figures have been provided. Thus of the 29 identified projects, 27 have been taken up for the screening analysis. The details of these 27 projects are placed at **Annexure-A, Table 4**.
- 3.1.6** The civil construction cost for the KRDCL identified major bridge projects was provided as a part of the details of the project placed at **Annexure A, Table 4**. For the other identified projects, an assumption of Rs 40,000 per sq meter has been considered based on the discussions with KPWD officials.
- 3.1.7** To undertake the screening analysis, various scenarios/ sensitivities have been developed based on the toll rates that being notified in different states for Major Bridges including Karnataka. This approach has been undertaken as the existing toll policy of Karnataka does not specify different toll rate slab for major bridges.
- 3.1.8** Also, while estimating the toll rates, we have rounded up the toll rates to the next rupee value and not rounded off to nearest 5 as mentioned in the Karnataka Toll Policy. This

is because if we consider rounding off to 5 than in that case most of the projects would have zero toll rates.

3.1.9 The objective of the screening exercise is to identify the major bridge projects which could be taken up on various modes of delivery i.e. BOT-Toll (premium), BOT-Toll (with VGF), BOT-Annuity and EPC. The projects would be clustered into the following VGF range to assess their possible mode of development.

Table 5: VGF range considered for screening analysis.

S. No	VGF Range	Possible mode of development
1	0%	Projects falling under this range would attract premium and hence, these projects are highly viable.
2	0% to 20%	Projects under this range can be taken up on BOT-Toll basis with the State Govt. providing VGF support of up to 20% of the estimated project cost
3	20% to 40%	Projects under this range can be taken up on BOT-Toll basis with both State Govt. and Central Govt. providing VGF support.
4	40% to 50%	Projects falling under this range would require further detailed technical analysis and traffic study as the projects under this category may fall into viable range.
5	50% to 60%	Projects falling under this range would require further detailed technical analysis and traffic study as the projects under this range may fall into viable range.
6	More than 60%	Projects falling in this range would be non-viable on BOT-Toll basis and should be considered for BOT-Annuity or EPC mode of development.

3.1.10 The screening exercise was carried out considering five different scenarios based on the toll policy as notified in Karnataka, Orissa, Rajasthan and National Highway Authority of India (NHAI). The scenarios considered are given in table below:

Table 6: Scenarios considered for screening analysis

Scenario	Description
Scenario 1	Existing Karnataka Toll Policy – no specific rates for permanent bridges
Scenario 2	Karnataka Toll notification for permanent bridges or tunnel – 1997 dated notification providing for separate toll rates for bridges having cost more than Rs 50 lakhs.

Scenario	Description
Scenario 3	Orissa Toll Policy – provides for specific toll rates for bridges having cost more than Rs. 10 crore based on the length of the bridge
Scenario 4	Rajasthan Toll Policy - provides for specific toll rates for bridges having cost more than Rs. 5 crore.
Scenario 5	NHAI Toll Policy

3.1.11 The scenarios 6 to 10 are same as scenarios 1 to 5 but present result of the analysis of packages whereas the scenarios 1 to 5 are for individual projects.

3.1.12 In all 27 Major Bridge packages were analysed using the above discussed methodology. However it should be noted that in case of any change in the assumptions / project parameters used for developing the viability analysis, the projected financial indicators are likely to undergo a change that might significantly impact the mode of development (adversely / favourably) of the package.

3.1.13 The following table brings out the general assumptions as considered for the screening exercise.

Table 7: General Assumptions for Screening Model

Key General Assumptions	
Proposed Improvement	<ul style="list-style-type: none"> 2-lane
WPI (per annum)	<ul style="list-style-type: none"> 5.00% (Based on the WPI data for last 10 financial years as published by Ministry of Commerce, GoI)
Base Traffic Data	<ul style="list-style-type: none"> 7-day traffic census carried out in Year 2009 and further projected to Year 2011
Traffic Growth Rate	<ul style="list-style-type: none"> 5% per annum as per the MCA approved by GoI
Concession Period	<ul style="list-style-type: none"> 20 Years
Construction Period	<ul style="list-style-type: none"> 24 Months
Civil Construction Costs	<ul style="list-style-type: none"> The civil construction cost for the KRDCCL proposed bridges is taken as provided in the Data. For the rest, the cost taken on normative basis of Rs 40,000 per square meter
Total Project Cost	<ul style="list-style-type: none"> 115% of the estimated Civil Construction cost.
Construction Expenditure Schedule (Annual)	<ul style="list-style-type: none"> 24 months: 40%-60%
Debt Equity ratio	<ul style="list-style-type: none"> 70:30

Key General Assumptions	
Cost of Debt – Interest Rate (Annual)	<ul style="list-style-type: none"> 13.00%
Minimum Alternate Tax Rate Including Tax Surcharge	<ul style="list-style-type: none"> 20.01% per annum
Debt Repayment period	<ul style="list-style-type: none"> 13 years including construction and moratorium period
Tax Depreciation	<ul style="list-style-type: none"> WDV method Depreciation – 100% of asset Depreciation per year – 10%
Toll rate	<ul style="list-style-type: none"> Different toll rates based on the Scenario
Traffic	<ul style="list-style-type: none"> The PCU count for the major Bridge has been considered as provided in the report and where the same has not been provided, it has been arrived from the corresponding traffic data as provided by KPWD
Traffic Leakage	<ul style="list-style-type: none"> 15% of the estimated toll revenue

3.1.14 Operations and Maintenance Costs

Table 8: Operations and Maintenance assumptions

Assumption Parameter	Assumption
Routine Maintenance	INR 0.01 Cr per km
Major Maintenance	INR 0.21 Cr per km per (Every 5 years with each maintenance spread over 2 years)
Toll Plaza Operation & Maintenance	INR 0.4 Cr per toll plaza per year
Management Expenses	INR 0.05 Cr per year
Insurance	0.15% per year

3.2 Methodology for calculation of Tollable Traffic

- 3.2.1** The base traffic for this analysis has been taken from Scott Wilson report. The State Highways wise traffic detail is provided for year 2010 in Scott Wilson report. However, as per the Toll Policy of Karnataka, certain categories of vehicles are not required to pay toll and thus they do not form part of the tollable traffic. The Scott Wilson report provides traffic details for each link id in PCUs and separate counts for each vehicle category are not provided. In view of this, using the PWD traffic data for 2010 for all State Highways, we have calculated average tollable traffic as percentage of total traffic. Such average percentage has been used for financial analysis of CRN. It may be noted that for each package the traffic profile would be different, which can be ascertained only after a detailed traffic study.
- 3.2.2** The table below provides the calculation used for estimation of tollable traffic in total traffic. Based on the data provided by KPWD, 153 State Highways traffic has been considered for the purpose of per PCU toll rate calculation which is covering the length of almost 21650 km.

Table 9: Average Tollable Traffic Calculation

Category	Tollable Traffic on all State Highways in Karnataka									Non Tollable Traffic on all State Highways in Karnataka							Total	
	Car & Jeeps	Vans & Tempos	Mini Buses	Buses	LCV	2 Axle Rigid	3 Axle Rigid	Multi Axle	Tractors with Trailors	Two Wheelers	Auto Rikshaw	Pedal Cycle	Cycle Rickshaw	Horse Drawn	woode n wheel	Rubber Tyre	Total Tollable Traffic	Total Traffic
PCU Factor	1	1	1.5	3	1.5	3	3	4.5	4.5	0.5	1	0.5	2	4	8	6		
Traffic (No.)	751105	274994	106566	231938	236888	498077	264269	100711	276339	1473977	479803	399012	10596	4779	47702	49541	2740887	5206297
Traffic (PCU)	751105	274994	159849	695814	355332	1494231	792807	453200	1243526	736989	479803	199506	21192	19116	381616	297246	6220857 (A)	8356325 (B)
Average % of Tollable Traffic																	A/B = 74%	

Source of Traffic: PWD

3.3 Methodology for Calculation of Per PCU Toll Rate

- 3.3.1** The Toll Policy of Karnataka provides per km toll rates for each category of vehicle. However, since we are using traffic in PCU terms, an equivalent per PCU per km toll rate has been calculated for financial analysis. Such per PCU per km toll rate would vary based on composition of traffic on a particular stretch and such composition can be ascertained only after a detailed traffic study. In view of this, the per PCU per km toll rate is calculated based on the category wise break up of traffic data for year 2010 of all State Highways in the state of Karnataka. Based on the data provided by KPWD, 153 State Highways traffic has been considered for the purpose of per PCU toll rate calculation which is covering the length of almost 21650 km.
- 3.3.2** As mentioned above, for the purpose of per PCU toll rate calculation, traffic figures for all the State Highways in Karnataka, as provided by PWD, have been considered. Out of this total traffic the categories of vehicles which can be tolled as per the Karnataka toll act have been identified and based on the toll rate provided in Karnataka Toll Policy for 1st March 2008 to 28th February 2009, the total toll revenue has been calculated and per PCU toll rate has been worked out.

Table 10: Per PCU Toll Rate Calculation

Category	Car & Jeeps	Vans & Tempos	Mini Buses	Buses	LCV	2 Axle Rigid	3 Axle Rigid	Multi Axle	Tractors with Trailors	Total
Traffic	751105	274994	106566	231938	236888	498077	264269	100711	276339	2740887
PCU Factor	1	1	1.5	3	1.5	3	3	4.5	4.5	-
Toll Rate	0.5	0.5	0.75	1.5	0.75	1.5	2.25	3	2.25	-
Total PCU	751105	274994	159849	695814	355332	1494231	792807	453199.5	1243526	6220857 (A)
Total Revenue	375553	137497	79924.5	347907	177666	747116	594605.3	302133	621762.8	3384163.5 (B)
Per PCU Toll Rate (B / A)	INR 0.544 (1st March 2008 to 28th February 2009)									

Source of Traffic: PWD

- 3.3.3** The PCU details of the projects has been taken as given in the KPWD data placed at **Annexure A**. For the projects whose PCU details were not provided, the same has been calculated based on the traffic census data provided by KPWD. In doing so, the location of

the respective bridge as given the KPWD data was mapped with the traffic data. Based on the corresponding traffic details, the PCU for respective projects was calculated.

3.4 Financial Indicators

- 3.4.1 Equity IRR:** The equity internal rate of return (EIRR) is a common financial valuation indicator used to calculate and assess the financial attractiveness / viability of capital intensive projects. This represents the yield of the project for the shareholders whose investments are remunerated with dividends.
- 3.4.2** To calculate EIRR the first step is to calculate the cash flow to the equity invested. This again is calculated by subtracting principal portion of debt repayment from Profit after Tax in addition to the depreciation and the operating expenses. The EIRR is the value at which if the above mentioned cash flow is discounted it yields the NPV value as zero. Hence, investors usually compare this value of EIRR with the Weighted Average Cost of Capital (WACC) to find out whether the yield of this project is more than the cost of investments.
- 3.4.3** It is to be noted that this indicator captures the effect of capital mixture and the amount of debt withdrawn whereas PIRR does not get affected by the amount of debt, the capital mixture and interest payments. Hence, EIRR it is much more popular indicator compared to others e.g. PIRR and commonly used by investors while evaluating investments. An investor looks for a higher value of this parameter while comparing two or more projects.
- 3.4.4 Viability Gap Funding:** Viability Gap Funding (VGF) or Grant means an equity support and/or O&M support extended towards the concessionaire on a one-time or deferred basis, with an objective of making the project commercially viable.
- 3.4.5** As per the “Scheme and Guidelines for Financial Support to Public Private Partnerships in Infrastructure, 2008”², the total Viability Gap Funding shall not exceed twenty per cent of the Total Project Cost; provided that the government or statutory entity that owns the project may, if it so decides, provide additional grants out of its budget, but not exceeding a further twenty per cent of the Total Project Cost. Further, VGF under this Scheme will normally be in the form of a capital grant at the stage of project construction. Proposals for any other form of assistance may be considered by the Empowered Committee and sanctioned with the approval of the Finance Minister on a case-by-case basis.
- 3.4.6** The rationale for a threshold under the extant guidelines is that if the VGF exceeds 40% of the estimated construction cost, the potential bidders cannot make realistic bids and the government must take on this risk. This is also important in the Indian context, as there is not much experience with PPPs and data on past traffic volumes is either not available, and where available, its reliability is doubtful. Moreover, traffic growth is also linked with the economic growth, which is again difficult to be predicted over long periods. As regards whether the current capping limit on VGF is appropriate or not, it is to be taken into account that if preliminary and pre-operative expenses incurred by the government are also considered, the government grant works out to be as high as half

the project cost even under the 40% VGF threshold level. Revising the VGF beyond 40% will imply giving more than half of the estimated cost to the private party as grant, which may not be prudent. In the absence of the capping limit to VGF support to 40%, the bidders may quote higher numbers and even the lowest quote would mean higher cost to government. This may also lead to cartelization, thereby reducing fair competition. Also, in case the support to the qualified PPP concessionaire is more than 40%, then his own risk exposure in the project reduces significantly. At the same time, lowering this limit is also not advisable as it would result in inviting bids for more number of projects on BOT (Annuity).

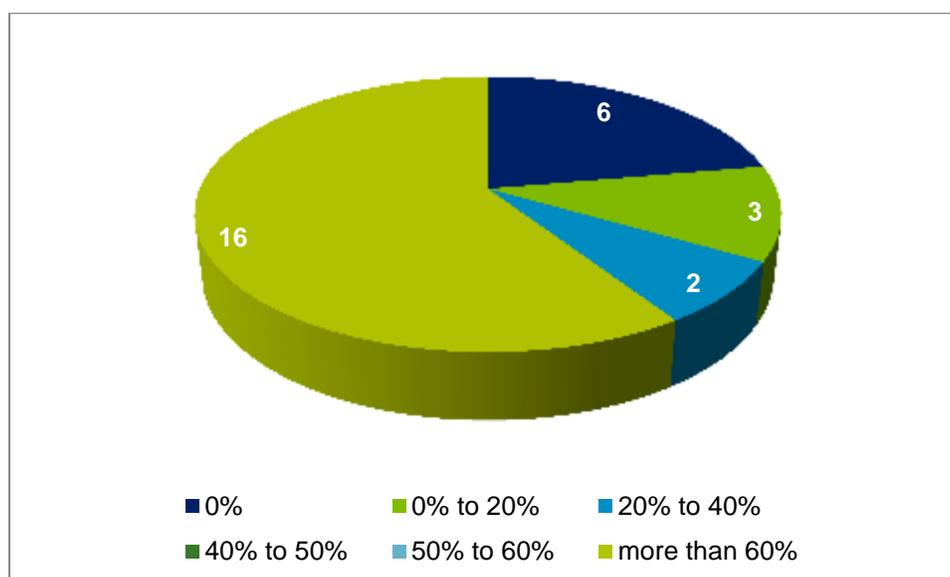
3.5 Scenario analysis and results

3.5.1 In order to undertake the screening exercise to assess the viability of the 27 major bridge projects, various scenarios were developed based on the Toll policy of Karnataka as well as some other states and NHAI. At present the existing Karnataka toll notification does not provide for any specific slab for estimating user fee to the use of permanent bridge or tunnel based on cost or length or any other parameter. However, there are States which have notified separate toll rates for the use of permanent bridge or tunnel. Even the Toll notification of National Highways Authority of India specifies a different toll rate structure for permanent bridge or tunnel based on the cost of such bridge or tunnel. This scenario analysis has been undertaken in order to understand the impact of the various toll rates structures on the viability of the identified major bridge projects and thus assist Karnataka Policy makers to devise a suitable Toll policy for the use state highways. The following sections presents the screening exercise results under different scenarios.

3.5.2 Scenario – 1: Based on existing Karnataka Toll Policy

3.5.3 According to the Public Works, Ports & Inland Water Transport Secretariat notification dated 26th May 2009 with respect to the determination and collection of Toll or user fee for projects to be developed under Public Private Partnership, there is no specific or different toll rates for bridges. Based on the screening exercise methodology detailed in **Section 3.1** and methodology for calculating per PCU rate as discussed in the **Section 3.3**, the viability analysis for 27 projects was carried out under this scenario. The result of the analysis is presented in the following figure. The project wise details of the Scenario -1 are placed at **Annexure B, Table -5**.

Figure 1: Scenario-1 Number of projects in different VGF range



3.5.4 The estimated VGF requirement for projects the fall in the range of upto 40% is about Rs 5.60 crore.

3.5.5 Scenario – 2: Based on Toll rates for bridges as per Karnataka Toll Policy

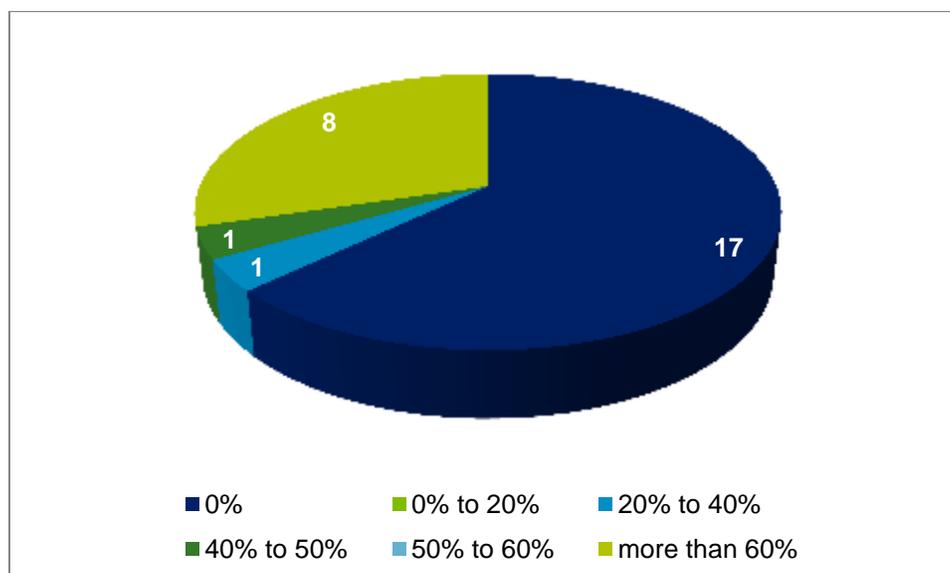
3.5.6 According to Karnataka Government Secretariat notification dated 1997, specific toll rates for bridges, cause ways and tunnels costing more than Rs 50 lakhs were notified. The rates are notified under different vehicle category are:

S.No	Particulars of vehicle	Rate (Rs)
1	Motor cycle, scooter or any other two wheeled mechanically propelled vehicle	NIL
2	Auto rickshaw, 3 wheeler scooter or auto driven light vehicles	3
3	Motor car, taxi, jeep, van and auto driven light vehicles	5
4	Bus, lorry and other heavy vehicles (excluding above vehicles) including multi axled vehicles	15
5	Other mechanically propelled heavy vehicles namely mobile cranes, earth movers which have more than two axles and vehicles trailers	15

3.5.7 Considering the above toll rates for the base year(2010-11), the traffic details as provided by KPWD and the methodology of arriving at per PCU rate for revenue estimation as detailed in **Section 3.3**, a per PCU toll rate of Rs 4.20 was arrived and considered for the analysis.

3.5.8 The result based on the above analysis is presented in the figure below. The details of the individual projects are placed at **Annexure B, Table - 6**.

Figure 2: Scenario-2 Number of projects in different VGF range



3.5.9 The estimated VGF requirement for the projects that fall into VGF range of up to 40% as identified in Scenario 2 is about Rs. 10.28 crore and that of in the range of 40% to 60% is about Rs. 2.48 crore.

3.5.10 Scenario – 3: Based on Toll rates for bridges as per Orissa Toll Policy

3.5.11 The Orissa State Road Tolls Rules – 2011 dated 23/6/2011 provide for the determination and collection of Toll or user fee.

3.5.12 The rules provide for specific rates for the stand alone double lane bridges with cost of investment exceeding Rs. 10 crore based on the length of the bridge varying from upto 500 meter to beyond 1000 meter. The rates as provided in the toll policy are:

Table 11: Toll rates for bridges as per Orissa Toll Policy

S.No	Length of bridge	Car, jeep, van or light motor vehicle	LCV	Tractor trailer	Trucks (2 axle)	Trucks (3 axle) & Multi axle vehicles (upto 6 axles)	Construction machinery & oversized Vehicles (more than seven axles)
1	Upto 500 m	5	8	12	15	20	30
2	500m – 1000m	8	15	18	22	30	40
3	Beyond 1000m	15	20	25	30	40	50

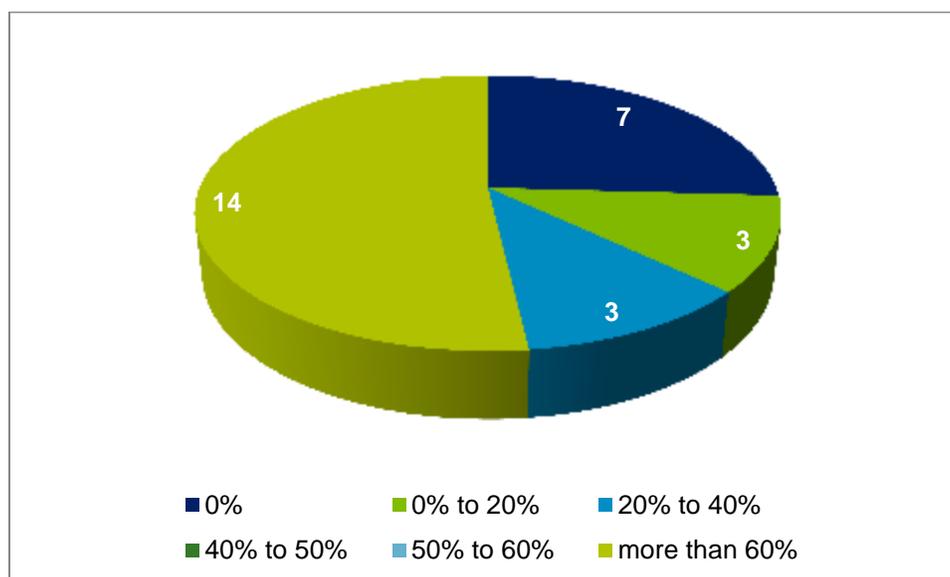
3.5.13 For the projects whose cost is less than or equal to Rs. 10 crore, the toll rate has been considered as Rs 0.544 per Km per pcu. This rate has been arrived at using the methodology as discussed in **Section 3.3** and based on the rates notified for various categories of vehicles for 2 lanes in the Orissa Toll Policy.

3.5.14 Considering the above toll rates for the base year(2010-11), the traffic details as provided by KPWD and the methodology of arriving at per PCU rate for revenue estimation as detailed in **Section 3.3**, per PCU toll rate based on the length of the bridge was arrived and considered for the analysis. The rates per pcu are as under:

S.No	Length of Bridge	Rate estimated
1	Upto 500m	Rs 4.90
2	500m – 1000m	Rs 7.45
3	Beyond 1000m	Rs 10.72

3.5.15 The result based on the above analysis is presented in the figure below. The project wise details are placed at **Annexure B, Table - 7**.

Figure 3: Scenario-3 Number of projects in different VGF range



3.5.16 The estimated VGF requirement for the projects that fall in the VGF range of upto 40% is about Rs. 15.88 crore.

3.5.17 Sensitivity Analysis – 4: Based on Toll rates for bridges as per Rajasthan Toll Policy

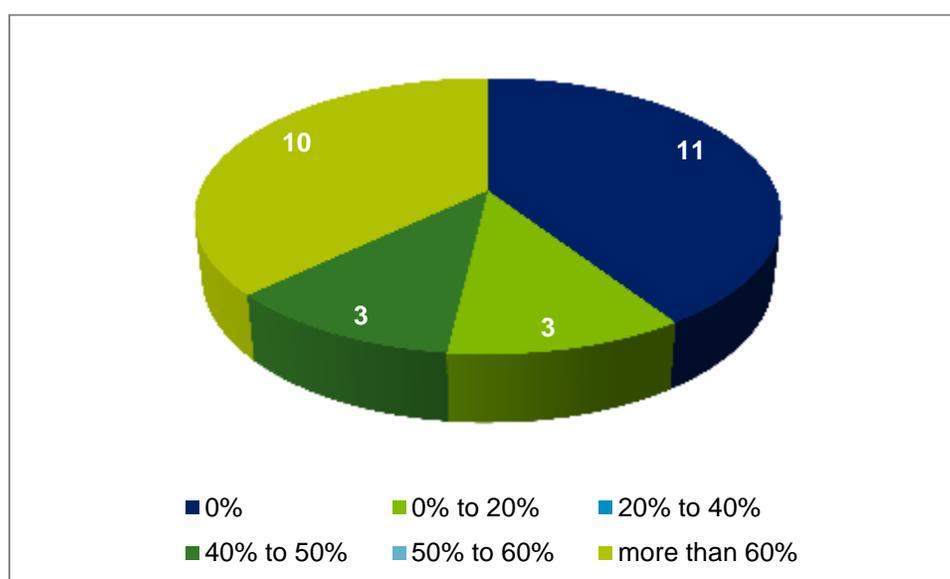
3.5.18 The Rajasthan Fee Rules Notification (PPP projects with VGF) dated September 22, 2009 provide for the determination and collection of Toll or user fee.

3.5.19 The rules also provide for specific rates for use of permanent bridge, bypass or tunnel constructed with cost exceeding Rs 5 crore. The rates of fee for the use of permanent bridge, bypass or tunnel constructed with cost exceeding Rs 5 crore are as follow:

S.No	Cost of permanent bridge or bypass or tunnel (Rs. Crore)	Car, jeep, van or LMV	LCV, LGV or mini bus	Truck or bus	HCM, EME or MAV	Oversized vehicles
1	5 to 7.5	5	7.5	15	22	30
2	For every additional rupees five crore or part thereof exceeding rupee seven point five crore and upto one hundred crore	1	1.5	3	4.5	6
3	For every additional rupees five crore or part thereof exceeding rupee one hundred crore	0.75	1.15	2.25	3.40	4.50

- 3.5.20** For the projects whose cost is less than or equal to Rs. 5 crore, the toll rate has been considered as Rs 0.76 per Km per pcu. This rate has been arrived at using the methodology as discussed in **Section 3.3** and based on the rates notified for various categories of vehicles for 2 lanes in the Rajasthan Toll Policy.
- 3.5.21** Considering the above toll rates for the base year (2010-11), the traffic details as provided by KPWD and the methodology of arriving at per PCU rate for revenue estimation as detailed in **Section 3.3**, per PCU toll rates based on the cost of the bridge was arrived and considered for the analysis.
- 3.5.22** The results based on the above analysis are presented in the figure below. The details of the individual projects are placed at **Annexure B, Table - 8**.

Figure 4: Scenario-4 Number of projects in different VGF range



- 3.5.23** The estimated VGF requirement for the projects that fall into VGF range of up to 40% as identified in Scenario 4 is about Rs. 0.61 crore and that of in the range of 40% to 60% is about Rs. 17.11 crore.

3.5.24 Scenario – 5

- 3.5.25** Under this scenario, we have assumed that projects whose cost is more than Rs 10 crore would be tolled as per the rates notified in the NHAI Toll policy for bridges and for the projects having a cost of less than Rs 10 crore, the rate considered in the **Scenario – 1** would be applicable.

- 3.5.26** The NHAI Toll notification dated January 12, 2011 provides for specific rates for use of permanent bridge or tunnel. The rates of fee for the use of permanent bridge or tunnel are as follow:

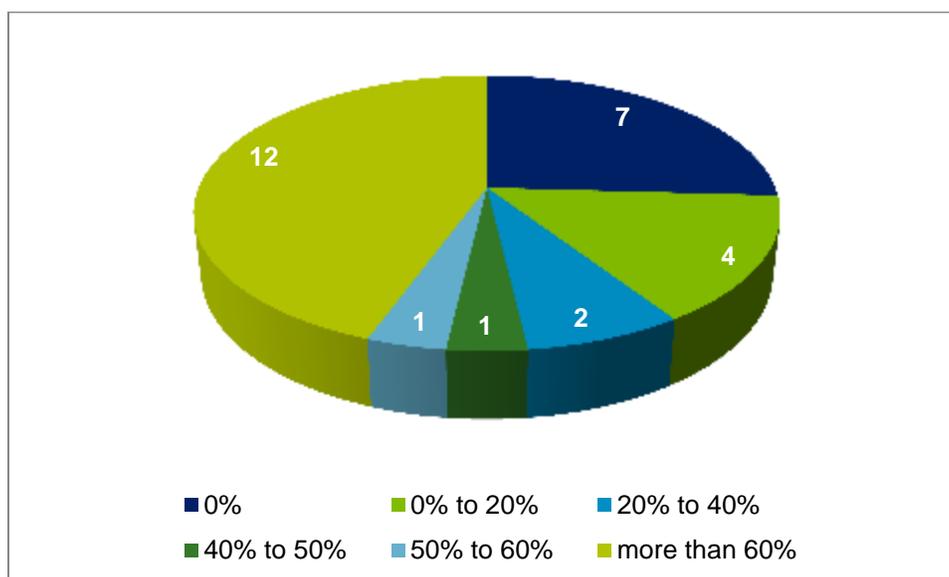
Table 12: Toll rates for bridges as per NHA Toll fee notification

S. No	Cost of permanent bridge or bypass or tunnel (Rs. Crore)	Car, jeep, van or LMV	LCV, LGV or mini bus	Truck or bus	Three axle commercial vehicle	HCM, EME or MAV	Oversized vehicles
1	10 to 15	5	7.5	15	16.50	22	30
2	For every additional rupees five crore or part thereof exceeding rupee fifteen crore and upto one hundred crore	1	1.5	3	3.30	4.5	6
3	For every additional rupees five crore or part thereof exceeding one hundred crore and upto two hundred crore	0.75	1.15	2.25	2.45	3.40	4.50
4	For every additional rupees five crore or part thereof exceeding rupee two hundred crore	0.5	0.75	1.5	1.65	2.25	3

3.5.27 Considering the above toll rates for the base year (2010-11), the traffic details as provided by KPWD and the methodology of arriving at per PCU rate for revenue estimation as detailed in **Section 3.3**, per PCU toll rate based on the cost of the bridge was arrived for projects having cost more than Rs 10 crore and considered for the analysis.

3.5.28 The results based on the above analysis are presented in the figure below. The details of the individual projects are placed at **Annexure B, Table - 9**.

Figure 5: Scenario-5 Number of projects in different VGF range



3.5.29 The estimated VGF requirement for the projects that fall into VGF range of upto 40% as identified in Scenario 5 is about Rs. 6.49 crore and that of in the range of 40% to 60% is about Rs. 17.80 crore.

3.5.30 The following table presents the summary of the scenarios (1 to 5) as discussed above:

Table 13: Summary Table showing number of projects under Scenarios (1 to 5) in various VGF range

Scenario/ VGF Range	0%	0% to 20%	20% to 40%	40% to 50%	50% to 60%	more than 60%
Scenario 1	6	3	2	0	0	16
Scenario 2	17	0	1	1	0	8
Scenario 3	7	3	3	0	0	14
Scenario 4	11	3	0	3	0	10
Scenario 5	7	4	2	1	1	12

3.6 Packaging of the Major Bridge projects

3.6.1 As a part of the screening exercise, we tried to package the major bridge projects based on the geographical location in order to assess their viability. While the packaging of the projects require detailed technical study, for the purpose of this analysis, the 27 major bridge projects were packaged based on their geographical location i.e. their location based on the district. The Annexure B to this report table brings out the details of the district wise details of the projects. The following table presents the summary of the packaging as discussed above.

Table 14: Packaging Details

Sl. No.	DISTRICT	Length of Bridges (in Km)	Estimated Construction Cost (Rs Crore)	TOTAL PROJECT COST (Rs Crore)	No of Bridges
1	Belgaum	0.55	21.05	24.20	5.00
2	Bidar	0.39	11.55	13.28	4.00
3	Chikkodi	0.27	8.10	9.32	1.00
4	Dakshin Kannada	0.26	15.36	17.66	2.00
5	Dharwad	0.08	2.69	3.09	1.00
6	Gadag	0.17	15.10	17.37	2.00
7	Gulbarga	0.42	10.93	12.57	3.00
8	Haveri	0.12	2.98	3.42	1.00
9	Koppal	0.49	31.00	35.65	1.00
10	Mandya	0.35	25.02	28.77	2.00
11	Mysore	0.43	23.25	26.74	1.00
12	Tumkur	0.04	4.50	5.18	1.00
13	Uttar Kannada	0.07	2.10	2.42	1.00
14	Yadagiri	0.76	22.19	25.52	2.00

3.6.2 The methodology adopted for the analysis of the district wise packages as mentioned above is same as undertaken and detailed in section for the individual major bridge projects. However, following steps were also undertaken in addition to the methodology adopted for individual major bridge projects analysis:

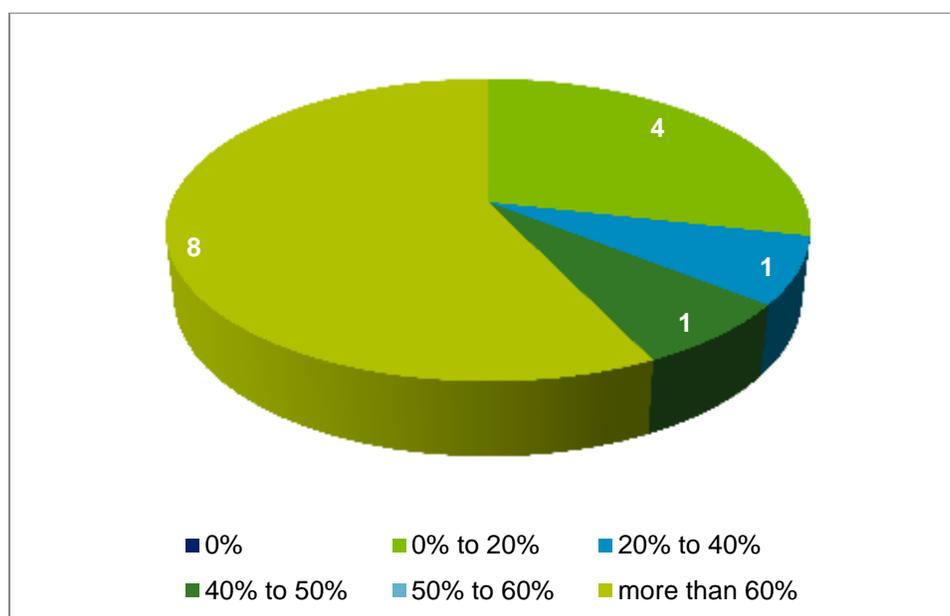
- 1.The Total Project Cost for the package as whole was considered to be the arithmetic sum of the cost of individual projects of the respective package.
- 2.The length of the package was considered to be the arithmetic sum of the length of individual projects of the respective package for the purpose of expenditure during operation period.
- 3.The management expense during operation period for packages having more than one project was considered as half of the sum of the individual projects of the respective package.
- 4.The revenue estimation for the package as whole was considered to be the arithmetic sum of the revenue estimated for the individual projects of the respective package.

3.6.3 The screening exercise for the packages as detailed above was carried out under the different scenarios as discussed in section. The following sections presents the screening exercise results under different scenarios.

3.6.4 Scenario – 6: Based on existing Karnataka Toll Policy

3.6.5 The result of the analysis of the packages based on the methodology as discussed above and considering the toll rates for revenue estimation as detailed in **Scenario -1** is presented in the figure below. The details of the analysis of the packages are placed at **Annexure C, Table - 10** to this report.

Figure 6: Scenario – 6 Number of packages in different VGF range

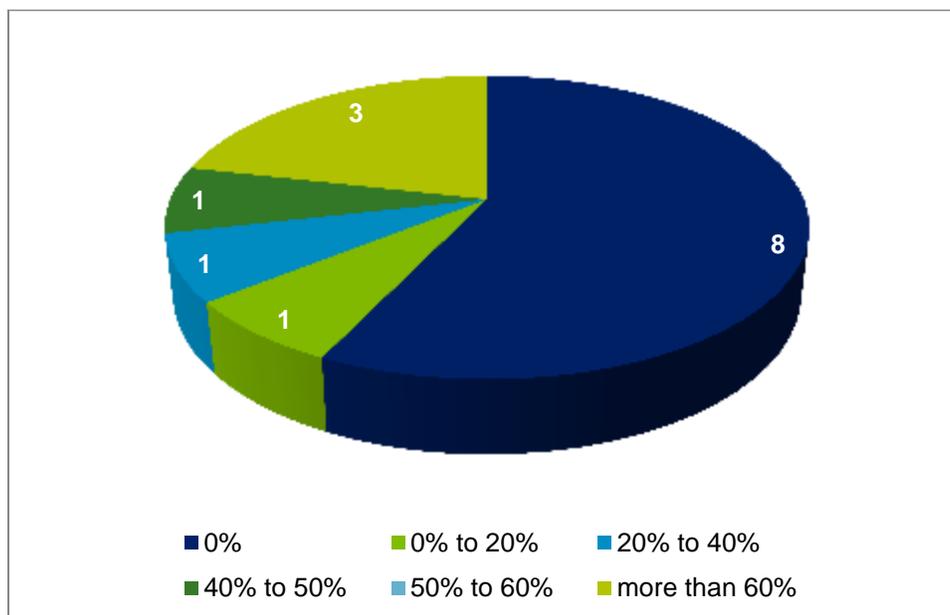


3.6.6 The estimated VGF requirement for the packages that fall into VGF range of upto 40% as identified in Scenario 6 is about Rs. 7.53 crore and that of in the range of 40% to 60% is about Rs. 11.39 crore.

3.6.7 Scenario – 7: Based on Toll rates for bridges as per Karnataka Toll Policy

3.6.8 The result of the analysis of the packages based on the methodology as discussed above and considering the toll rates for revenue estimation as detailed in **Scenario -2** is presented in the figure below. The details of the analysis of the packages are placed at **Annexure C, Table - 11** to this report.

Figure 7: Scenario – 7 Number of packages in different VGF range

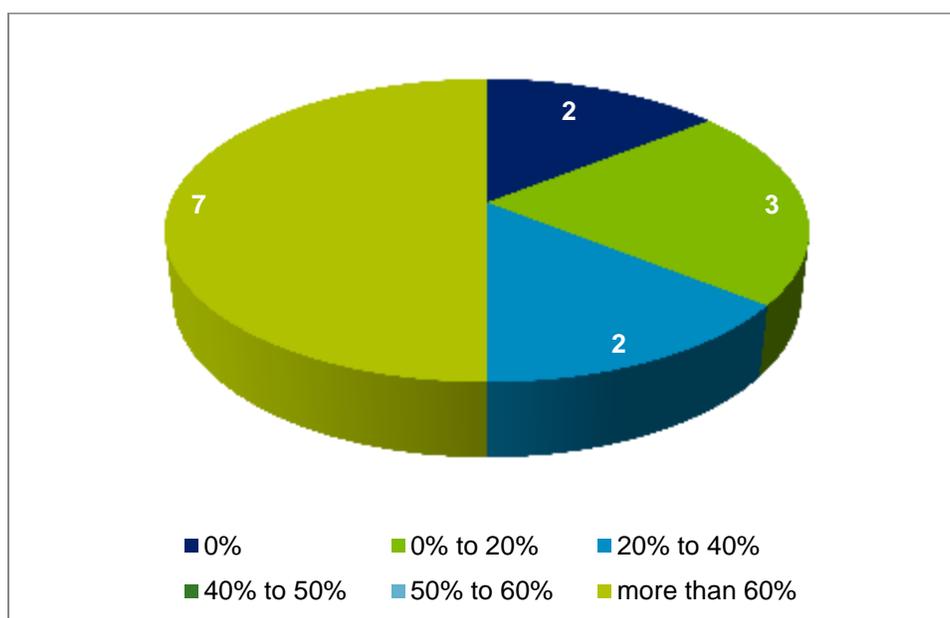


3.6.9 The estimated VGF requirement for the packages that fall into VGF range of upto 40% as identified in Scenario 7 is about Rs. 11.25 crore and that of in the range of 40% to 60% is about Rs. 2.48 crore.

3.6.10 Scenario – 8: Based on Toll rates for bridges as per Orissa Toll Policy

3.6.11 The result of the analysis of the packages based on the methodology as discussed above and considering the toll rates for revenue estimation as detailed in Scenario -3 is presented in the figure below. The details of the analysis of the packages are placed at Annexure C, Table – 12 to this report.

Figure 8: Scenario – 8 Number of packages in different VGF range

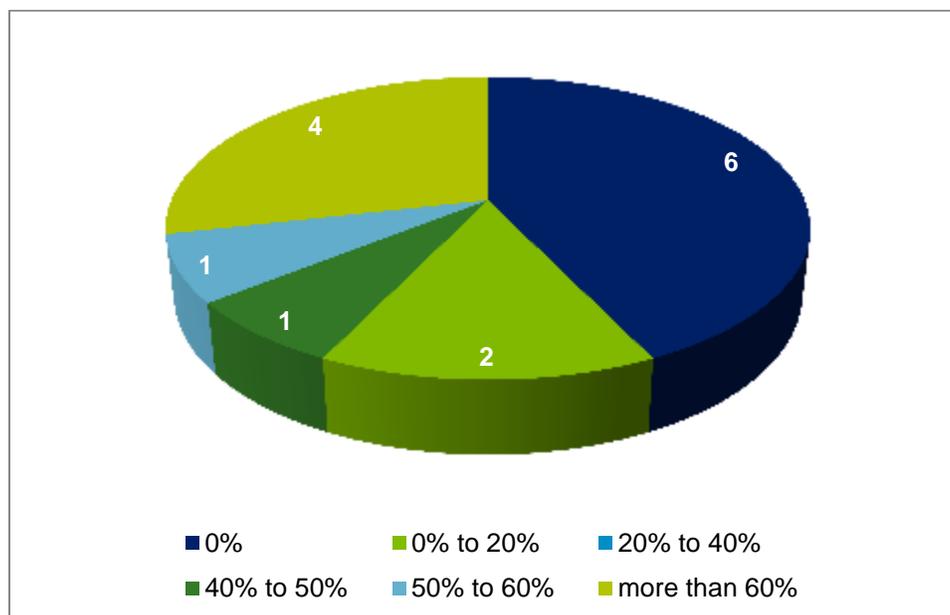


3.6.12 The estimated VGF requirement for the packages that fall into VGF range of upto 40% as identified in Scenario 8 is about Rs. 15.41 crore.

3.6.13 Scenario – 9: Based on Toll rates for bridges as per Rajasthan Toll Policy

3.6.14 The result of the analysis of the packages based on the methodology as discussed above and considering the toll rates for revenue estimation as detailed in **Scenario - 4** is presented in the figure below. The details of the analysis of the packages are placed at **Annexure C, Table -13** to this report.

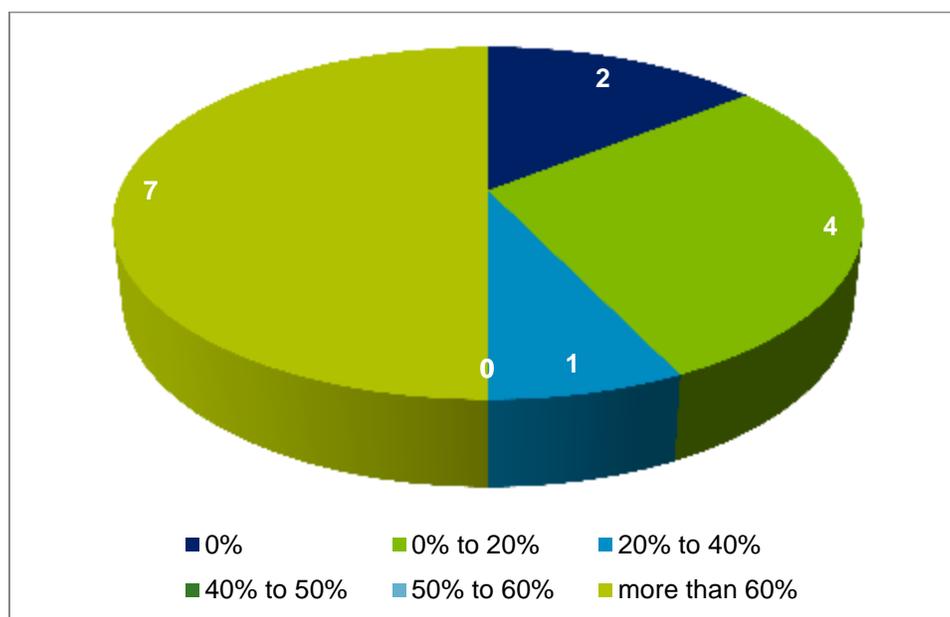
Figure 9: Scenario – 9 Number of packages in different VGF range



3.6.15 The estimated VGF requirement for the packages that fall into VGF range of upto 40% as identified in Scenario 9 is about Rs. 0.7 crore and that of in the range of 40% to 60% is about Rs. 16.33 crore.

3.6.16 Scenario – 10

3.6.17 The result of the analysis of the packages based on the methodology as discussed above and considering the toll rates for revenue estimation as detailed in **Scenario - 5** is presented in the figure below. The details of the analysis of the packages are placed at **Annexure C, Table -14** to this report.

Figure 10: Scenario – 10 Number of packages in different VGF range

3.6.18 The estimated VGF requirement for the packages that fall into VGF range of upto 40% as identified in Scenario 10 is about Rs. 6.02 crore.

3.6.19 The following table presents the summary of the scenarios (6 to 10) as discussed above:

Table 15: Summary Table showing number of packages under Scenarios (6 to 10) in various VGF range

Scenario/ VGF Range	0%	0% to 20%	20% to 40%	40% to 50%	50% to 60%	more than 60%
Scenario 6	0	4	1	1	0	8
Scenario 7	8	1	1	1	0	3
Scenario 8	2	3	2	0	0	7
Scenario 9	6	2	0	1	1	4
Scenario 10	2	4	1	0	0	7

4 Conclusion

- 4.1.1** This analysis is based on the 27 major bridge projects as identified by KPWD and KRDCL. The analysis has been undertaken in order to assess the impact of the various toll rates structures on the viability of the identified major bridge projects and thus assist Karnataka Policy makers to devise a suitable Toll policy for the use state highways.
- 4.1.2** To undertake the analysis, five scenarios were developed based on the toll policies as notified in different states and at central level (for National Highways). The analysis based on these scenarios was carried out for both the individual projects (Scenario 1 to 5) as well as for packages (Scenario 6 to 10).
- 4.1.3** From the Tables 11 and 13, it can clearly inferred that fewer projects/ packages are viable on BOT-Toll mode of delivery if we consider the existing Karnataka Toll Policy which does not specify for separate rates for Bridges. Of the 27 major bridge projects, only 11 projects are viable i.e. they fall in the VGF requirement range of up to 40%.
- 4.1.4** In case of assessing viability of projects/ packages based on toll rates which are derived on the basis of the estimated cost of the bridges i.e. scenarios 2, 4 & 5 (for district-wise packages - scenarios 7, 9 & 10) we find more number of projects coming in viable range of VGF requirement. Especially under scenarios 2 & 4 (for district-wise packages - scenario 7 & 9) we find maximum number of projects attracting premium i.e. having 0% VGF requirement.
- 4.1.5** Thus it can be concluded from the above analysis that separate toll rates for bridges based on the estimated cost of upgradation / rehabilitation of the bridge, as in the case of Rajasthan, NHAI and the 1997 dated Karnataka Toll notification, may be adopted as a part of the Toll Policy for Karnataka State highway in order to develop bridges on PPP basis without putting extra burden on the state exchequer. Also, the viable district-wise packages can be awarded to interested parties on PPP basis, subsequent to detailed technical and traffic study.



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