Executive Summary

1. Background

Indore, a historical city situated on the banks of rivers Khan and Saraswati, is the largest city of 'Indore Agro Industrial Region' of Madhya Pradesh. It is almost centrally located on the fertile Malwa Plateau at latitude 220 43' North and longitude 760 42' East and is the nerve centre of the economic activities of the state. The exact origin of the city is not known. The earliest record available about Indore was in the year 1791 when it was a small village known as Indrapur named after Indreshwar temple. Indrapur at that time was in Ujjain kingdom. In the first quarter of 18th century, Holkars made Indore as their capital and ruled Indore region till independence. Since then the city of Indore has developed as an important urban centre in the state of Madhya Pradesh.

The population of Indore is 1.6 million, is likely to rise to 2.5 million and 3.6 million by 2011 and 2035 respectively. This would incorporate surrounding settlements in the region.

2. Concept of Bus Rapid Transit System

Bus Rapid Transit System is a new form of public public transportation which is an emerging approach to using buses as an improved high-speed transit system.

Bus Rapid Transit involves coordinated improvements in a transit system's infrastructure, equipment, operations, and technology that give preferential treatment to buses on urban roadways.

2.1 Salient Features of BRTS

Bus Rapid Transit may also include any of the following features:

- Improved stations and shelters. Bus terminals and unique stations or shelters differentiate Bus Rapid Transit service from standard bus service. Intelligent Transportation System technologies. Advanced technology can maintain more consistent distances between buses and inform passengers when the next bus is arriving.

- Cleaner and quieter vehicles. Improved diesel buses and buses using alternative-fuels are cleaner than traditional diesel buses.
- Exclusive Lanes. Traffic lanes reserved for the exclusive use of buses help buses pass congested traffic.

Bus Rapid Transit also has the advantage of establishing a mass transit corridor and building Bus Rapid Transit systems can have lower capital costs than Other MRTS Options yet can often provide similar performance. Further, Bus Rapid Transit's flexibility may be a potentially valuable feature for many communities with sprawling patterns of development, where public transportation needs can be more complex and difficult to address than focusing on a single central business district.

3 Transport Operation Plan in CDP under JNNURM

3.1 Strategy

The strategies aim at covering the entire area and population of the city with an effective road network by 2011, as well as improving the surface condition of the roads by 2021. As the city is growing very fast the transportation requirements will be increased and providing an effective Mass Rapid Transit System for the City will fulfill these.

3.2 Institutions

- Indore Municipal Corporation
- Indore development authority
- M. P. Public Works Department
- Indore City Transport Services Ltd.

4 Objectives and Scope of Work

The objectives of providing BRTS in the city are:

- To increase the accessibility in the city
- To increase the speed of transportation
- To reduce the cost of public transportation and make it accessible to people of all the economic classes.
- To reduce the traffic congestion
- To popularize public transport and reduce the dependability over private vehicles
- To improve the traffic management in the city

- To improve the environmental conditions by reducing pollution.

Scope of this project is demarcated by assessment of the necessary infrastructure improvements along the corridor (s) for operation of BRT services. These would include identification of:

- Bus stops and bus shelters for use by BRT passengers
- Improvement to intersection control system along the corridor
- Development of pedestrian facilities along the corridors
- Street lighting along the corridor
- Signages
- ITS

- To develop conceptual design for the bus shelters and general signage's along BRT routes
- To identify location of Terminal(s) and develop conceptual plans
- To make a generalized estimate of cost of development of BRTS including phased development programme.
- To carry out an economic analysis of the proposed BRTS
- To recommend a model for private sector participation including identification and allocation of risks

Methodology to prepare a report based on various studies conducted including traffic surveys, topographical surveys and secondary data colleted from concern authorities. Accordingly engineering concept plan and amenities are designed.

5 Need of BRTS in the city

Indore is a fast growing industrial city of Madhya Pradesh. It is the only metropolitan city in the state. It stands 14th in terms of population size amongst the 35 metropolitan cities of India. Its population size was 1.6 million in 2001, and is projected to be 4.2 million by 2025.

Planning, development, operation and management of the transport system of Indore to meet the increasing travel demands of the city in an efficient, convenient, safe and economical manner is important to sustain the economic viability, productivity and competitiveness of Indore City.

A Comprehensive Traffic and Transportation Plan for Indore (CTTPI) have been prepared in 2004. The CTTPI has estimated the travel demand by 2025 to be 5.5 million person trips per day. In addition are the inter-city passenger trips on intra-city system, movement of goods modes and movement of through traffic. The plan has proposed development of an extensive road network system of radial and ring corridors, development and operation of Light Rail Transit System of 44.75 km, development and operation of bus system, development of passenger and goods terminals, a parking policy, traffic management particularly in the CBD and establishment of metropolitan transport authority.

Since the preparation of CTTPI, Indore City Transport Services Ltd (ICTSL) has been established, a Special Purpose Vehicle (SPV) to provide a dependable and good public transport service. ICTSL, in a short period of time, has introduced innovative schemes to improve the bus services in the city through promoting private sector participation in terms of investment on and operation of high quality buses under the overall planning and control of ICTSL. It is proposed to operate 500 buses by end of the Project.

To meet the large demand and improve the capacity and productivity of buses, ICTSL has proposed to plan, to develop and operate Bus Rapid Transit System (BRTS) in Indore.

In the context of rapid growth of the city, increasing mobility, high travel demand, increasing congestion, delays, accidents, need for conservation of energy, growing community consciousness towards environmental quality and to address a host of such other problems and objectives, public mass transport system of the city stands out as the most critical element. It needs to be rationally planned, efficiently operated and diligently managed to be effective and productive by itself and in turn enable the city to be productive and competitive.

6. Identification of Corridors for BRTS

On the basis of socioeconomic factors, travel demand pattern, road network characteristics and corridors are identified for developing the bus rapid transit system extending to a length of 89 Kms. with in the city. These corridors are:

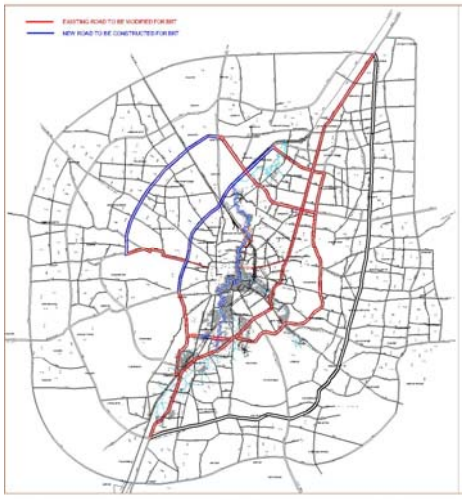
- Full Section Development of Roads with Barrier Segregated Bus Lanes for BRT
  - A.B. Road Corridor (Mangliya to Rau) -23.80 Kms
  - Eastern Ring Road Corridor -23.65 Kms
  - M.R.10 Corridor (Bypass to Ujjain Road) -8.71 Kms
  - River Side Road Corridor -14.50 Kms
  - Western Ring Road Corridor -15.90 Kms
  - RW-2 (Ujjain Road to Airport) -9.50 Kms

- M. G. Corridor (Shastri Bridge, Rajwada, Shastri Bridge Loop)

Newly Developed Roads to be improved to be used as feeder Roads

- R N T Road (Regal Statue to Sapna Sangeeta)
- Bhanwarkua to Gangwal Bus Stand Road
- Pratap Statue to Annapurna Road
- MIG to Subhash Nagar
- A.B. Road to Rajkumar Bridge
- Y. N. Road (Malwa Mill to City Center)
- Navlakha to Tower Square M.G. Road Corridor

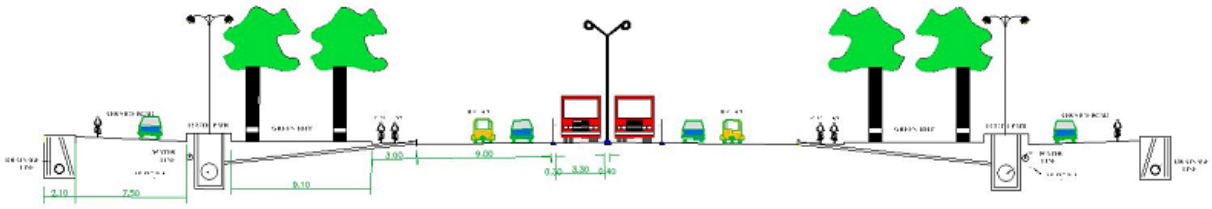
These corridors have been located in such a way that



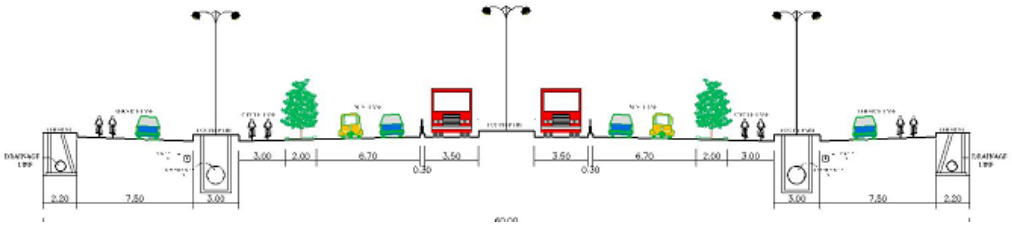
- Maximum of the population east of Indore reside within the 1 km distance from A.B. road and eastern ring road corridor.
- About 75 per cent professional education institutes are located on the outer ring of the city and maximum of the Student population reside within the walking distance of the proposed corridors (M.R.10, A.B. Road, western ring road).
- The proposed corridors are easily assessable from the existing road network of the city.

7 Cross-Section Design

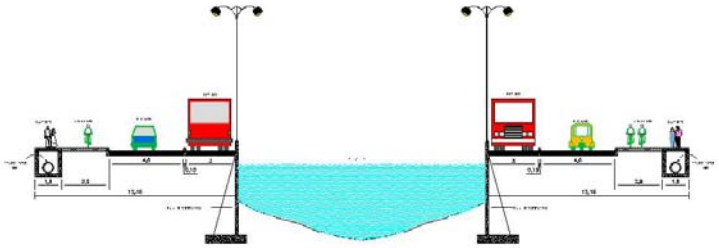
The cross section of proposed BRTS corridor has been done with design considerations for Bus lanes, Cycle/Cycle rickshaw paths, Pedestrian paths, Motorized vehicles, Segregated service lane, Parking of MV/service vehicles:



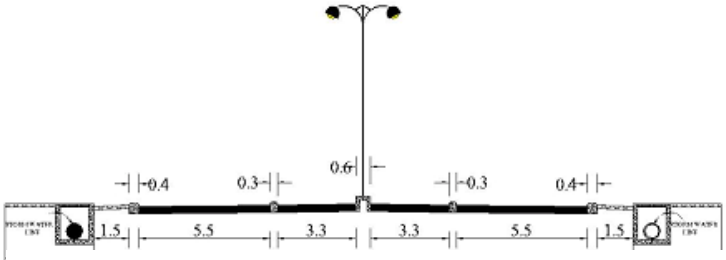
Proposed Road Section for 75 m exclusive bus lanes and bicycle tracks



Proposed Road Section for 60 m exclusive bus lanes and bicycle tracks



Proposed Road Section for river side corridor



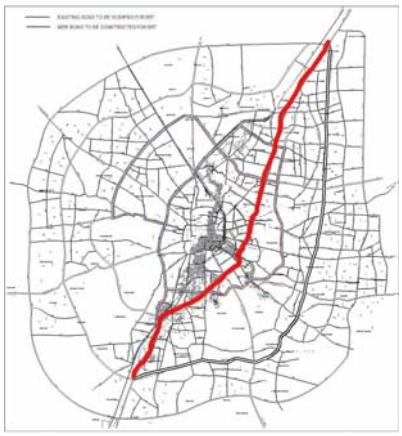
Proposed Road Section for 30 m road

9 Bus Stations and vehicles

There are 201 bus stations located over all the corridors. These Bus shelters located close to the junction are convenient for commuters. Bus shelters located close to the junction have no effect on the level of congestion at the junction.

The proposed system will have special low floor buses, which will be convenient for people to board and alight, preferably low floor and AC. They are accessible to the physically challenged and will assure level boarding.

10 Route Location



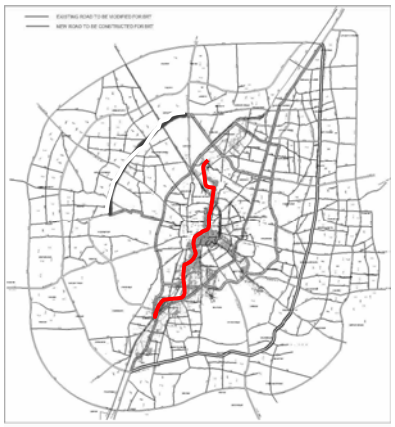
A. B. road Corridor (Mangliya to Rau): 23.8

Eastern Ring road corridor: 23.65 km.

M.R.10 Corridor 8.71 Km

Western Ring road corridor 23.65 KM

R.W. 2 Ujjain Road to airport 5.7 Km



River Side corridor: 14.5 K.m

Details of the corridors

S.No	Corridor	Length in Km	4 arm intersection	3 arm intrsection	Culvert /River	Bus Stop
1	A.B. Road Corridor	23.8	21	95	14	50
2	Eastern Ring road corridor	23.650	13	11	7	50
3	River side corridor	14.5	4	16	-	30
4	M.R. 10 Corridor	8.71	8	8	3	15
5	Western Ring Road Corridor	15.900	14	14	9	30
6	R.W.2 Road Corridor	9.000	6	6		18
7	M.G. Road Corridor	3.000	5	4		8

11 Finance and Implementation Mechanism

11.1 Implementation Agency

Indore City Transport Services Ltd (ICTSL) has been established as a Special Purpose Vehicle (SPV) to provide a dependable and good public transport service. ICTSL, in a short period of time, has introduced innovative schemes to improve the bus services in the city through promoting private sector participation in terms of investment on and operation of high quality buses under the overall planning and control of ICTSL.

The authorized capital of the company is Rs 25 lacs divided into 2.50 lacs equity shares of Rs. 10/- each. The initial paid up capital of Rs. 25 lacs is being held by the Indore Municipal Corporation and Indore Development Authority in equal proportion.

11.2 Phasing of the project

Project is phased in two phases, Phase 1 and Phase 1 A. In Phase 1, A.B. road corridor, eastern ring road corridor and River side corridors have been included, while phase 1 A consists of M.R. 10 corridor, Western Ring Road Corridor and M.G. Road Corridors and the feeder roads.

11.3 Cost Estimates

Estimated cost of creating infrastructure = Rs. 654.95 Cr.

Estimated cost for Operation and service Facilities= Rs. 213.20 Cr.

Total project cost (A+B) **= Rs. 868.15 Cr.**

Phase I = Rs. 492.06 Cr.

Phase IA = Rs. 376.09 Cr.

Project Cost Phase 1

Estimated Cost of creating Infrastructure for different BRTS Corridors in Phase I				
SN	IDENTIFIED CORRIDOR	LENGTH OF CORRIDOR (in Kms.)	TOTAL COST (in Cr.)	IMPLEMENTING AGENCY
1	A. B. Road (Mangliya to Rau)	23.8	173	ICTSL/MPPWD
2	Eastern Ring Road	23.65	152.06	ICTSL/IDA
3	River Side Road Corridor	14.5	125.2	ICTSL/IMC
	Total (A)	**61.95**	**450.26**	

Estimated Cost for Operation and Service Facilities in Phase I				
SN	SERVICES/ FACILITY	UNIT	COST PER UNIT (in Lac.)	AMOUNT (in Cr.)
1	Bus Stops and Shelters	328	10	32.8
2	Bus Terminals	3	200	6
3	GPS/PIS System	LUMPSUM		3
	Total (B)			**41.8**
	Total Project Cost Phase I (A+B)			**492.06**

Estimated Cost of creating Infrastructure for different BRTS Corridors in Phase I A				
SN	IDENTIFIED CORRIDOR	LENGTH OF CORRIDOR (in Kms.)	TOTAL COST (in Cr.)	IMPLEMENTING AGENCY
1	M.R.10 Corridor (Bypass to Ujjain Road)	8.71	53.73	ICTSL/IDA
2	Western Ring Road Corridor	5.7	47.91	ICTSL/IDA
3	RW-2 (Ujjain Road to Airport)	9	89.73	ICTSL/IDA
4	M.G.Corridor (Shastri Bridge, Rajwada, Shastri Bridge Loop)	3	9.5	ICTSL/IMC
5	Feeder Roads	19.1	3.82	
	Total (A)	**26.41**	**204.69**	

Estimated Cost for Operation and Service Facilities in Phase IA				
SN	SERVICES/ FACILITY	UNIT	COST PER UNIT (in Lac.)	AMOUNT (in Cr.)
1	Buses	500	30	150
2	Bus Stops and Shelters	144	10	14.4
3	Bus Terminals	1	200	2
4	Ticketing System	LUMPSUM		5
	Total (B)			**171.4**
	Total Project Cost Phase I (A+B)			**376.09**

11.4 Total Project Outlay

Source	Amount
• Grant from Central Govt under JNNURM scheme (50%)	-RS. 434.07 CR
• Grant under JNNURM by M.P Govt.(20%)	
• Contribution from ICTSL with Share from other Agencies IMC, IDA and MPPWD (30%).	-Rs. 173.63 Cr.
ICTSL to generate its 30% Share through • Public Private Partnership: ✓ Private Bus Operators ✓ Advertising Agencies ✓ Vendors for Ticketing ✓ GPS System	-Rs. 260.45 Cr.
200 Crores would be generated by PPP and the balance 60.45 Crores to be contributed by I.D.A. and I.M.C.	Total Rs. 868.15 Cr.

12.1 Implementation Mechanism

Indore City Transport Services Ltd (ICTSL) is the Nodal Implementation and Execution Agency for the Development of Bus Rapid Transit System in the City. The ICTSL will implement the project with Other Agencies such as Indore Development Authority, Indore Municipal Corporation and Madhya Pradesh Public Works Department.

The ICTSL will collaborate with the respective custodian agency of the Road Corridor for different Corridors. The construction and development of work will be carried out by ICTSL in co-ordination with the respective custodian agency of the respective Road Corridor and Operation and maintenance of the Bus Rapid Transit Service will be done by ICTSL itself.

12.2 Financial Mechanism

ICTSL Proposes to generate its 30% Share through Public Private Partnership by way of incorporating Private Bus Operators, Advertising Agencies, Vendors for Ticketing and GPS System, which is elaborated in detail in the Project Sustenance and Operation Plan.

ICTSL Proposes to generate approximately 200 Crores by PPP and the balance 60.45 Crores is proposed to be contributed by IDA and IMC.

12.3 Financial Internal Rate of Return

Calculation of FIRR					Rs. in Lacs
IRR is the rate of discounting which equates the present value of future net cash inflows with initial cash out flows.					
1. Initial investment					86815
2. Calculation of Net present value of Cash accruals for the period:					
Present value @ 13%					
Year	SPV Revenue	Bus Revenue	Total Revenue	Discounting factor	Present value
2006-07	65.47	758.10	823.57	0.884956	728.82345
2007-08	164.89	1683.72	1848.61	0.783147	1447.7289
2008-09	325.00	2808.90	3133.90	0.69305	2171.951
2009-10	1181.86	10110.00	11291.86	0.613319	6925.5061
2010-11	1300.04	11121.00	12421.04	0.54276	6741.6432
2011-12	1430.04	12233.10	13663.14	0.480319	6562.6615
2012-13	1573.05	13456.41	15029.46	0.425061	6388.4315
2013-14	1730.35	14802.05	16532.40	0.37616	6218.8271
2014-15	1903.39	16282.26	18185.65	0.332885	6053.7255
2015-16	2093.73	17910.48	20004.21	0.294588	5893.0072
2016-17	2303.10	19701.53	22004.63	0.260698	5736.5556
2017-18	2533.41	21671.68	24205.09	0.230706	5584.2577
2018-19	2786.75	23838.85	26625.60	0.204165	5436.0031
2019-20	3065.43	26222.74	29288.16	0.180677	5291.6844
2020-21	3371.97	28845.01	32216.98	0.159891	5151.1972
2021-22	3709.17	31729.51	35438.68	0.141496	5014.4398
2022-23	4080.08	34902.46	38982.55	0.125218	4881.313
Total	33617.73	288077.80	321695.53		86227.76

Present value @ 12%					
Year	SPV Revenue	Bus Revenue	Total Revenue	Discounting factor	Present value
2006-07	65.47	758.10	823.57	0.892857	735.3308
2007-08	164.89	1683.72	1848.61	0.797194	1473.6966
2008-09	325.00	2808.90	3133.90	0.71178	2230.6492
2009-10	1181.86	10110.00	11291.86	0.635518	7176.178
2010-11	1300.04	11121.00	12421.04	0.567427	7048.032
2011-12	1430.04	12233.10	13663.14	0.506631	6922.1742
2012-13	1573.05	13456.41	15029.46	0.452349	6798.564
2013-14	1730.35	14802.05	16532.40	0.403883	6677.1611
2014-15	1903.39	16282.26	18185.65	0.36061	6557.926

2015-16	2093.73	17910.48	20004.21	0.321973	6440.8202
2016-17	2303.10	19701.53	22004.63	0.287476	6325.8056
2017-18	2533.41	21671.68	24205.09	0.256675	6212.8448
2018-19	2786.75	23838.85	26625.60	0.229174	6101.9011
2019-20	3065.43	26222.74	29288.16	0.20462	5992.9386
2020-21	3371.97	28845.01	32216.98	0.182696	5885.9218
2021-22	3709.17	31729.51	35438.68	0.163122	5780.8161
2022-23	4080.08	34902.46	38982.55	0.145644	5677.5872
Total	33617.73	288077.80	321695.53		94038.35

$$\text{Rate} = \text{Low Rate} + \frac{\text{Difference in lower Rate}}{\text{Difference in lower rate} + \text{Difference in Higher Rate}} \times \text{Rate Difference}$$

Low rate = 12%

High Rate = 13%

Difference in Low rate = 7223.347

Difference in High rate = 587.244

Rate Difference = 1

Rate = 12.92414

Financial Internal Rate of return is = 12.92%

12.4 Economic Internal Rate of Return (EIIR)

Calculation of EIRR Lacs								Rs.in
IRR is the rate of discounting which equates the present value of future net cash inflows with initial cash out flows.								
1. Initial investment								86815
2. Calculation of Net present value of Cash accruals for the period:								
Present value @ 23%								
Year	Fuel Saving	Time Savings	Safety Savings	Maintenance Savings	Net Surplus	Total Savings	Discounting factor	Present value
2006-07					823.5705	823.57	0.813008	669.56951
2007-08					1848.605	1848.61	0.660982	1221.8951
2008-09					3133.9015	3133.90	0.537384	1684.1083
2009-10	18000.00	500.00	100.00	270.00	11291.86	30161.86	0.436897	13177.639
2010-11	18000.00	500.00	100.00	270.00	12421.04	31291.04	0.355201	11114.616
2011-12	18000.00	500.00	100.00	270.00	13663.14	32533.14	0.288781	9394.9695
2012-13	18000.00	500.00	100.00	270.00	15029.46	33899.46	0.234782	7958.9722
2013-14	18000.00	500.00	100.00	270.00	16532.40	35402.40	0.190879	6757.5905
2014-15	18000.00	500.00	100.00	270.00	18185.65	37055.65	0.155187	5750.5367
2015-16	18000.00	500.00	100.00	270.00	20004.21	38874.21	0.126168	4904.6776
2016-17	18000.00	500.00	100.00	270.00	22004.63	40874.63	0.102576	4192.737
2017-18	18000.00	500.00	100.00	270.00	24205.09	43075.09	0.083395	3592.2363
2018-19	18000.00	500.00	100.00	270.00	26625.60	45495.60	0.067801	3084.6293
2019-20	18000.00	500.00	100.00	270.00	29288.16	48158.16	0.055122	2654.5955
2020-21	18000.00	500.00	100.00	270.00	32216.98	51086.98	0.044815	2289.4626
2021-22	18000.00	500.00	100.00	270.00	35438.68	54308.68	0.036435	1978.7342

2022-23	18000.00	500.00	100.00	270.00	38982.55	57852.55	0.029622	1713.7031
Total	252000.0	7000.0	1400.0	3780.0	315889.46	580069.46		82140.67

Present value @22%								
Year	Fuel Saving	Time Savings	Safety Savings	Maintenan Savings	Net Surplus	Total Savings	Discounting factor	Present value
2006-07					823.5705	823.57	0.819672	675.05779
2007-08					1848.605	1848.61	0.671862	1242.0082
2008-09					3133.9015	3133.90	0.550707	1725.8612
2009-10	18000.00	500.00	100.00	270.00	11291.855	30161.86	0.451399	13615.034
2010-11	18000.00	500.00	100.00	270.00	12421.041	31291.04	0.369999	11577.662
2011-12	18000.00	500.00	100.00	270.00	13663.145	32533.14	0.303278	9866.5895
2012-13	18000.00	500.00	100.00	270.00	15029.459	33899.46	0.248589	8427.0186
2013-14	18000.00	500.00	100.00	270.00	16532.405	35402.40	0.203761	7213.6343
2014-15	18000.00	500.00	100.00	270.00	18185.645	37055.65	0.167017	6188.9348
2015-16	18000.00	500.00	100.00	270.00	20004.21	38874.21	0.136899	5321.8578
2016-17	18000.00	500.00	100.00	270.00	22004.631	40874.63	0.112213	4586.6511
2017-18	18000.00	500.00	100.00	270.00	24205.094	43075.09	0.091978	3961.9434
2018-19	18000.00	500.00	100.00	270.00	26625.603	45495.60	0.075391	3429.9803
2019-20	18000.00	500.00	100.00	270.00	29288.164	48158.16	0.061796	2975.9956
2020-21	18000.00	500.00	100.00	270.00	32216.98	51086.98	0.050653	2587.6931
2021-22	18000.00	500.00	100.00	270.00	35438.68	54308.68	0.041519	2254.8203
2022-23	18000.00	500.00	100.00	270.00	38982.55	57852.55	0.034032	1968.817
Total	252000.00	7000.00	1400.00	3780.00	315889.46	580069.46		87619.56

$$\text{Rate} = \text{Low Rate} + \frac{\text{Difference in lower Rate}}{\text{Difference in lower rate} + \text{Difference in Higher Rate}} \times \text{Rate Difference}$$

Low rate = 22%

High Rate = 23%

Difference in Low rate = 804.56

Difference in High rate = 4674.33

Rate Difference = 1

Rate = 22.146847

Financial Internal Rate of return is = 22.15%

Gross Receipts (lacs Rs)	Net Profit (lacs Rs)	Cash Accruals (lacs Rs)
153.90	99.57	65.47
334.68	252.69	164.89
623.10	499.17	325.00
2,073.00	1,817.53	1,181.86

Unomptimized

Your Monthly Avg. # of Website Users 50,000

\- +

Your Current Conversion Rate 2%

Your Average Order Value $30

\- +

SUPPTIMIZE

New Conversion Rate **3.5%**

\- +

Average Order Value Increase **$5**

\- +

Current number of conversions per month

1,000

Current Monthly Revenue

$30,000

Additional revenue per month

$31,250

Total monthly revenue after increase

$61,250

% increase in revenue per month

104.17%

Yearly increase in revenue

$375,000