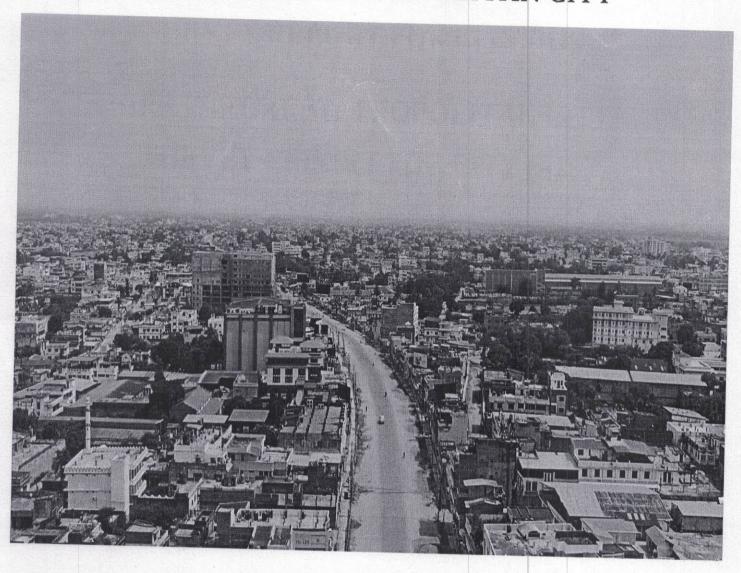
SURVEY REPORT FOR CITY BUS IN BIRATNAGAR METROPOLITAN CITY



Biratnagar Metropolitan Office of Municipal Executive



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Biratnagar Public Bus Accessibility and its Implications

Abstract

Growing demand for transport activities has raised numerous transport problems, mainly traffic congestion, unaccountable charges, no prominent services, less secured travel, issues. Efficient public bus services can only be one of the sustainable solutions for meeting local transport demands. But the inefficient operation of public bus services in most of the cities of Nepal has worsened the situation. The multiple and un organized service providers, in such open market, compete with each other for their own benefits by adding the number of vehicle services such as e rickshaw, tempo, mini busses and lot more which is purely hassle to community and people of Biratnagar, rather than providing excellent services to users.

This report thus aims to analyze the impact of such informal and unregulated transport system prevalent in Biratnagar focusing mainly on easy, convenient and secure point of views. This report is made for the case of Biratnagar where the public bus service need to be owned and operated by single service provider and need to be completely supervised by Biratnagar. The end Results show that considerable improvement in public transportation can be achieved by improving the public bus services. This report thus highlights the need for Biratnagar public transportation in improving access to good public bus services for the sustainable transport planning of the city.



1. Background

Unplanned urbanization, increasing motorization, limited transport infrastructure, increasing traffic congestion, and deteriorating air pollution has aggravated the transport system of Biratnagar. High urban density and concentrated development have increased traffic volume in the Biratnagar tremendously. In addition to that, the rapid growth of private vehicle within the limited transport infrastructure has worsened the peak hour travel as well as brought numerous transport-related challenges like energy security, pollution, accidents, and congestions. The enormous transport energy consumption due to inefficient travel necessitates the effective transport system in Biratnagar. Accessible, comfortable, convenient, and safe travel thus is a present need. Studies have shown that public transport is one of the efficient modes of transportation that transfer lager share of commuters to a long distance with less burden on the economy and environment. It is often considered as sustainable modes of transportation. It can play an essential role in reducing traffic congestion as well as air pollution, provided, it is accessible to all and accommodates the desired level of service. The first prerequisite for public transportation to become a possible alternative for the user is the existence of public transit in a user's neighborhood. Promotion of public transit is thus essential, whereas public transit accessibility is fundamental for an efficient transport service. In most of the developing countries, access to public transport is poor with longer access distance and longer travel time. Consequently, there is a sizeable increment in private vehicles due to its comfort and ease of reaching destinations. Such increasing transport activities without systematic planning often add problems to the existing situation. The accessible public transport is thus a present need for sustainable transport. Accessibility is generally the ability to approach facilities, it is also defined as making people travel less by providing facilities within a shorter distance of travel. It is the ease of reaching services/facilities/opportunities. Accessibility has wide range of dimensions, includes, spatial separation (i.e. travel time, travel cost, information, reliability), origins Public Bus Accessibility and its Implications in Energy and Environment: This survey presents the result of a study aimed at identifying the level of public bus accessibility in the Biratnagar, considering public bus access and travel time and the consequent impact on service operation inefficient. Competition between operators increases the number of operators in the same market-leading to the complex and incomprehensible network. Numbers of parallel service are in operation adding traffic volume and reducing operators' profitability. This leads to an increase in fare to recover their benefits, and ultimately, users have to pay more than the service they get. There are approx. 30 city routes (includes bus, minibus, microbus, e-rickshaw, tempo routes operating mainly within Biratnagar city routes. These vehicles are managed by several private operators' association. The public transport network of the Biratnagar along with population density is very high. It shows high population density in the core area supplemented by complex public transport network and sparse in the periphery with the fragile connections. The layout of the system is mostly radial that passes through the city center, and there is only one main road connecting most of the Biratnagar routes to the core and peripheral area which covers a significant part of the inner city. Urban households can access bus stop within 1 to 5 minutes against national average access time of 30 minutes.



2. Objectives of Study of Biratnagar valley transport system

Biratnagar, as the capital city of Koshi Province, is central to lot many developmental activities. The city is a node for connecting other parts of the state through a designated network. Biratnagar constitutes 19 wards. The total residential population in the Biratnagar is approximately 3 lakh and it is expected that long term and short term visitors too in Biratnagar is around 1 lakh which is estimated to be 5 lakh combined and is on increasing modality year to year. The high population density in the Biratnagar is due mainly to the high rate of immigration as it stands at the center of economic activities, education activities and health activities and majorly completely government of Koshi state is run from here. The total area of the Biratnagar covers 77 Km2 and its density is of around 3500/km2. The public transport system of the Biratnagar is generally owned and operated by private companies. There is no fixed bus schedule and is mostly random and uncertain. The demand-oriented transport service provides benefits to the users, but the operation of the routes is concentrated only in the well-established market. There is no guided regulation to access the roads that lead the users inaccessible to public transport where demand is limited. On the other hand, operators compete in running more services in the competitive lines, causing high traffic with high population density. Majority of intercity traffic in Biratnagar is still contributed by private vehicles this has happened only because of improper city bus availability. The increasing trend of e-rickshaw in Biratnagar due to secure access to the congested road and adjustable with limited space and the low capital cost and efficient short distance travel has made it popular in Biratnagar but this completely indicates the inefficiency of the transport system and highly unsecured mode of Transportation. The introduction of mass public transport that can sustainably meet mobility needs is a present need in Biratnagar.

- i. To identify and recommend potential routes to analyze the current travel patterns, population distribution, and the condition of the existing urban infrastructure in Biratnagar to determine the most suitable and efficient routes for operating Nagarbus services. By understanding where people travel frequently, how densely populated areas are, and the capacity of roads and supporting facilities, the study will propose optimal routes that can effectively serve the public transport needs of the city.
- ii. To compare vehicle technology on the basis of diesel considering technical, financial and environmental aspects; the objective focuses on studying and comparing in terms of how well they work, how much they cost, and how they impact the environment. The study will help to find out the most suitability for Nagarbus by looking at things like fuel efficiency, maintenance cost, pollution levels, and overall performance.
- To propose a tentative timeline for implementation and commencement of bus operations may focuses on outlining an estimated schedule for when various activities related to the Nagarbus project should begin and be completed. It includes planning the phases of implementation, setting target dates for launching services, and ensuring that the necessary preparations (infrastructure, vehicle procurement, staffing, etc.) are aligned with the timeline to achieve smooth commencement of operations.



Phase	Activity	garbus Project Im	DICII	Koy Dolivoreblee
Phase1: Planning & Preparation	Project initiation.	10 days	=	Key Deliverables Feasibility report Demand assessment Route planning framework
	Route identification based on population density, travel demand, and infrastructure	10 days-15 days	-	Finalized route map Priority corridors identified
Phase2:	Detailed Project Report (DPR) preparation & approval	15 days - 30 days		DPR submitted and approved by local/federal authorities
Infrastructure &	Bus stop design and construction (shelters, signage, accessibility)	Months 1 – Months 2	-	Construction of basic urban transit infrastructure
Procurement Setup	Procurement of buses and depot setup	Months 2 - Months 3	-	Tendering and delivery of low-emissionNagarbuses Bus depot/maintenance facility completed
	Recruitment and training of staff (drivers, conductors, operations team)	Months 2 – Months 3	-	Trained personnel in place SOPs developed
Phase3: Pre-launch Testing & Public	Trial runs on proposed routes	Months 3 – Months 4	-	Operational readiness verified lssues identified and resolved
Engagement	Public awareness campaign and branding	Months 4 – Months 5	-	Citizens informed through outreach and media Branding visible on buses/stops
Phase4: Launch & Monitoring	Official launch of Nagarbus services Monitoring and first performance review	Months 3 – Months 6	=	Inauguration and start of regular operations Usage data collected Service adjustments if needed

3. Scope of Work

The fact for public transport in Biratnagar, encompasses a comprehensive approach to enhance urban mobility, infrastructure, and sustainability in this rapidly growing economic hub. It includes developing a strategic urban transport and land use plan to address congestion, improve accessibility, and align with Nepal's National Urban Policy (2007), focusing on the city's 155 km of paved roads, 160 km of gravel, and 140 km of unpaved roads. Institutional capacity will be strengthened by establishing an Urban Transport Section within the Department of Urban Development and Building Construction, supported by training programs and stakeholder consultations to ensure effective management. To a delastructures

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Infrastructure upgrades involve improving bus parks, such as the main terminal funded by the Town Development Fund, enhancing pedestrian and non-motorized facilities like cycle rickshaws, and supporting intermodal connectivity through the Biratnagar Integrated Check Post and the 18.6 km Jogbani-Biratnagar railway line for efficient passenger and cargo movement. Public transport services will be optimized by restructuring routes, introducing diverse vehicle types like buses and electric rickshaws, and piloting contracted bus services for reliability.

Safety and sustainability will be prioritized through dedicated lanes, eco-friendly transport options, and measures to protect vulnerable commuters, while addressing regional connectivity with India to bolster Biratnagar's trade hub status. This integrated plan, informed by initiatives like the Asian Development Bank's technical assistance, aims to create a safe, efficient, and inclusive public transport system tailored to Biratnagar's urban and cross-border needs.

3.1 Situation Assessment

The comprehensive review of current transport scenario in Biratnagar reveals several strengths, challenges, and opportunities. As one of Nepal's largest and fastest-growing metropolitan cities, Biratnagar faces increasing demand for organized, efficient, and sustainable urban mobility.

Review existing transport conditions in Biratnagar

The existing public transport conditions in Biratnagar are largely informal, unregulated, and insufficient to meet the growing mobility demands of the city's population.

The majority of daily commuters rely on e-rickshaws, cycle rickshaws, motorcycles, and private vehicles due to the absence of a structured public transit system. There are very few organized bus services, and those that do operate lack fixed routes, schedules, and fare systems. The road infrastructure is often congested, poorly maintained, and shared by multiple modes of transport without designated lanes or proper traffic management.

Bus stops and passenger facilities are minimal or non-existent, and there is no integration between various transport modes. Furthermore, the lack of dedicated pedestrian pathways and safety measures poses challenges for vulnerable road users. The increasing number of vehicles has also contributed to rising air pollution and traffic accidents.

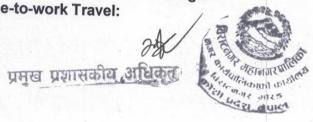
Overall, Biratnagar's current public transport system is inefficient, unreliable, and in need of a comprehensive upgrade to ensure safe, inclusive, and sustainable urban mobility.

Identify travel patterns and key demand corridors

To design an effective public transport system such as Nagarbus Sewa, it is essential to understand the existing travel patterns and key demand corridors within the city. This involves identifying where people live, where they work or access services, and how they currently travel between these points.

a. Common Travel Patterns in Biratnagar

Home-to-work Travel:



A significant portion of daily travel originates from residential neighborhoods (e.g., Hatkhola, Rani, Bargachhi, Tintoliya) to commercial and industrial zones such as Main Road, Bus Park area, and the Industrial Estate.

Educational Community:

School and college students travel from outlying residential areas to institutions located mainly in central Biratnagar, including Mahendra Morang Campus, Birat Science Campus, and nearby schools.

Market Access and Commercial Visits:

High movement is seen toward major commercial areas such as Pushpalal Chowk, Biratnagar Haat Bazaar, and Roadshesh Chowk, especially during morning and evening hours.

Border-Related Mobility:

There is consistent cross-border movement between Biratnagar and Jogbani (India) for trade, employment, healthcare, and shopping purposes.

b. Key Demand Corridors

Based on observed traffic volumes and land-use patterns, the following corridors are identified as **high-demand transport routes**:

Corridor	Start-End Points	Key Landmarks	Purpose	
North–South Corridor 1	Rani–BusPark–Tintoliya – Biratnagar Customs Office	Border point, commercial markets, municipal offices	Cross-border trade, jobs, shopping	
East–West Corridor 1	Bargachhi–Traffic Chowk– Mahendra Campus–Roadshesh	Educational and commercial Zone	Education, office travel	
Industrial Access Corridor	Tinpaini–Industrial Area–Sub- Metro Office	Factories, employment areas	Daily workers, logistics	
Residential to Market Access	Hatkhola–Main Road–Haat Bazaar–Pushpalal Chowk	Dense residential zone to main market	Shopping, services	
Periphery Connection Route	Bayarban–Budhanagar– Biratnagar Core	Suburban to urban mobility	Long-distance commuters	

Evaluate current public and private transport services

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The effective public transport system must be based on a clear understanding of existing services. In Biratnagar, both public and private transport modes are active, but they face challenges in terms of organization, coverage, and reliability. Below is an evaluation of the current **public and private transport services**:

a. Public Transport Services

Currently, organized public transport in Biratnagar is either minimal or non-existent. Public transport, in the true sense—municipality-run or regulated bus systems—is yet to be properly implemented.

Municipal Transport Services:

- No formal city bus service is currently operated by the Biratnagar Metropolitan City.
- Attempts to launch public buses in the past have lacked sustainability due to operational and financial issues.

> Challenges:

- Lack of fixed routes, schedules, and dedicated bus lanes.
- Absence of bus terminals and shelters.
- No proper fare regulation or passenger information system.
- Limited capacity to serve high passenger volumes, especially during peak hours.

b. Private Transport Services

The majority of transport services are run by private operators. These include:

E-Rickshaws (Safa Tempos)

- Operate on short routes with high frequency.
- Popular due to low fares and wide availability.
- Operate without structured routes, causing route overlaps and traffic congestion.

Auto-Rickshaws and Tempos

- Function as shared or individual hires.
- Offer flexibility but lack safety and comfort for long-distance commuting.

➤ Minibuses/Vans

- Operate on intercity and some inner-city routes.
- Overcrowded and poorly maintained; inconsistent service quality.
- Not integrated with any formal scheduling or ticketing system.

Private Vehicles (Motorcycles, Cars)

- Increasing use for daily commutes due to lack of reliable public transport.
- Contribute heavily to congestion, parking shortages, and pollution.

Route Selection and Network Planning 3.2

The successful public transportation system depends not only on route planning but also on the strategic placement of bus stops, efficient turnaround points, and seamless integration with other transport modes. These elements ensure that buses run on time, passengers board safely and conveniently, and the system is well-connected citywide.

Identify priority Routes for pilot and future phases

Route identification is based on population concentration, traffic flow analysis, commercial activity, transport gaps and connectivity to essential services.

Rout e Code	Start – End Point	Corridor Type	Key Puropse
NB-01	Rani Chowk– Bus Park – Pushpalal Chowk – Jogbani	Cross-border Corridor	Trade, border mobility, and central connectivity
NB-02	Biratnagar Airport – Roadcess – Haat Bazaar	East-West Main Route	City core linkage with airport access and colleges



NB-03	Hatkhola – Main Road – Bus Park – Bargachhi	Residential– Commercial	Internal residential to market & work
NB-04	Bayarban – Budhanagar -		zone linkages
	Hatkhola – City Core		Connectivity to outer wards and future
NB-05	Industrial Area –Tinpaini- Biratnagar Metropolitan Office	Industrial Corridor	growth zones Workforce mobility and institutional access

Proposed Route Network (Pilot Routes)

Future Routes (Expansion)

Route Code NB-06	Start - End Point	Corridor T	уре	Major Stops
NB-07	Buspark-Bargachhi- Indrapur-Duhabi	Regional Route	Expansion	
INB-U/	Airport-Katahari- Baijanathpur- Budhiganga	Airport-Perip	hery Link	Enable airport access from eastern fringe settlements

Estimate passengers load and route viability

Passenger Load Estimation was conducted using demographic data, field surveys, traffic counts, and stakeholder inputs that

- a. Average Daily Ridership Potential (Pilot Routes)
 - NB-01: 3500-4200 Passengers/day
 - NB-02: 2800-3600 Passengers/day
 - NB-03: 2000-2500 Passengers/day
 - NB-04: 1500-2000 Passengers/day
 - NB-05:1600-2200Passengers/day
- b. Peak Hours:
 - Morning: 7:30 Am -9.30 Am
 - Evening: 4:30 Pm- 6.30 Pm
- c. High-Demand User Groups:
 - Students and teachers (35%)
 - Health service users (20%)
 - Daily wage workers and vendors (30%)
 - Senior citizens and others (15%)
- d. Viability Indicators:
 - Strong demand along corridors with poor existing transport
 - High congestion levels creating a need for efficient alternatives
 - Availability of roads capable of supporting frequent bus operations
- Propose Bus stop locations, Turnaround points, and Integration with other Modes

a) Proposed Bus Stop Locations

Bus stops should be located at key trip generators, intersections, and densely populated zones, with an average spacing of 500-700 meters in urban areas and up to 1 km in less dense areas. Each stop should include:



Passenger shelters

Signage and route information

· Seating and lighting

Accessibility for differently-abled users

Bus Stop Locations (Pilot Routes)

Route Code	Start - End Point	Corridor Type	Major Stops
NB-01	Rani Chowk– Bus Park – Pushpalal Chowk – Jogbani	Cross-border Corridor	Rani Chowk, Bargachhi, Bus Park Customs Office, Jogbani Border Gate
NB-02	Biratnagar Airport – Roadcess – Haat Bazaar	East-West Main Route	Biratnagar Airport, Tinpaini, Mahendra Campus, Traffic Chowk, Roadcess, Haat Bazaar
NB-03	Hatkhola – Main Road – Bus	Residential-	Hatkhola, Main Rd, Bus Park,
	Park – Bargachhi	Commercial	Bargachhi
NB-04	Bayarban – Budhanagar –	Peri-urban	Bayarban, Budhanagar, Hatkhola,
	City Core	Connector	Pushpalal Chowk
NB-05	Industrial Area – Sub-	Industrial	Tinpaini, Industrial Estate, Sub-
	Metropolitan Office	Corridor	Metro Office

b) Turnaround Points (Termini/Depot Ends)

Efficient turnaround points allow buses to reverse direction with minimal delay. These should include layover areas, restrooms for staff, and basic maintenance facilities.

Bus Stop Locations (Pilot Routes)

S.n.	Location	Route Served	Remarks	
1.0	Rani Chowk	NB-01	Major border point; enough space for loop turnaround	
2.0	Biratnagar Airport	NB-02	Low-traffic area with available space	
3.0	Hatkhola	NB-03	Residential terminus; potential for min	
4.0	Bayarban Chowk	NB-04	Near industrial zone; space for layover and depot setup	
5.0	Tinpaini	NB-05	Outer terminus for suburban feeder routes	



c) Integration with Other Transport Modes

To ensure seamless multi-modal connectivity, key bus stops should be integrated with the following:

- i. E-Rickshaws & Tempos:
 - Designate shared mobility bays near bus stops (within 50m).
 - Coordinate with e-rickshaw unions to avoid route overlap and encourage last-mile coverage.
- ii. Intercity Bus Park:
 - ➤ Locate a major public transport stop within or adjacent to the Biratnagar Bus Park.
 - > Provide transfer options for passengers coming from other districts.
- iii. Border Checkpoint (Jogbani):
 - Coordinate with border control for a turnaround bay and terminal for cross-border travelers.
 - Serve both commuters and cross-border traders.
- iv. Educational Hubs & Hospitals:
 - Ensure direct stop access to Mahendra Campus, Science Campus, Birat Nursing Home, and Nobel Medical College (in future routes).

d) Infrastructure Enhancements Needed

S.n.	Component	Details
1.0	Bus Shelters	Standardized, weather-protected design with solar lighting
2.0	Passenger Information Systems	Route maps, digital displays, mobile apps
3.0	Smart Ticketing Integration	QR code, NFC, or smart cards for future scalability
4.0	Safety & Accessibility	Street lighting, tactile paving, CCTV at major stops, Zebra crossings near bus stops

3.3 Vehicle Technology Assessment

The choice of vehicle technology is pivotal to ensure economic viability, operational sustainability, and environmental compliance for the public bus transportation. A comparative study was conducted between **diesel**, **petrol**, and **electric** buses based on multiple performance indicators.

Cost-Benefit comparison of diesel, petrol and electric buses

Criteria	Diesel	Petrol	Electric
Capital cost (per units)	Moderate (NPR 40-50 lakhs)	Lower (NPR 40-50 lakhs)	High (NPR 90lakhs-1.2 crore)
Fuel/Energy cost	Moderate	High	Very low (Electric cost≈ 2 diesel)
Environmental Impact	High (CO ₂ , NOx emissions)	High (CO ₂ , more than diese	Zero tailpipe emissions
Government Subsidies	None	None	None
Ideal use case	Long routes, low-cost ops	Not ideal for mass transit	Urban core & green corridors



Lifecycle cost, Maintenance, and fuel Efficiency

Life cycle stage	Diesel	Petrol	Electric
Vehicle Lifespan	10-12 years	8-10 years	12-15 years
Maintenance Frequency	High (engine, gearbox)	High	Low (battery, motors only)
Typical fuel Efficiency	4-5 km/liter	3-4 km/liter	1.2-15 kWh/Km
Operational Downtime	Higher due to breakdowns	Higher	Lower (less mechanical stress)
Total Lifecycle cost	NpR 1.5-1.8 crore	NPR 1.6-1.9 crore	NPR 1.2-1.6 crore (with subsidy)

Vehicle type Recommendation by Phase

Phase	Recommended Vehicle Type	Justification
Pilot phase (1-2 years)	Diesel & Electric Mix	Use diesel buses for longer, high-volume cross-border routes (NB-01); deploy electric buses on short, high-frequency inner-city routes (NB-02, NB-03).
Scale-Up phase (3-5 years)	Electric Dominant fleet	Expand electric bus deployment on future routes (NB-04 to NB-07); leverage government EV grants and charging station rollout.
Long-Term phase (5-10 years)	Hybrid or Efficient Diesel Buses (optional for long Peri-urban routes	Until battery technology improves range; for long corridors like Indrapur, Duhabi

3.4 Suggest Suitable PPP Model ((e.g. BOT, BOOT, Viability Gap funding (VGF), Lease, operate - Transfer) Define roles and responsibilities of public and private stakeholders. Identify funding sources and revenue models.

The public transport in Biratnagar, to Build-Operate-Transfer (BOT) model with Viability Gap Funding (VGF) is a good choice. Biratnagar is a busy city that needs better public transport, like buses system. The BOT model lets a private company build and run the system while the government supports it with some funding (VGF) to make it affordable. This approach works well because it combines private skills with public goals. Below, The government and private company, funding sources, and how money will be made.



Roles and Responsibilities

- Government (Biratnagar Metropolitan City): The government plans the project, decides buses transport system, and provides land, permits, and approvals. The government also checks that the transport system is safe, affordable, and runs on time. After the private company runs it for a set time (e.g., 20–30 years), the government takes over the system.
- Private Company: The Company designs, builds, and runs the transport system. It pays for most of the project, manages daily operations (like driving buses or maintaining tracks), and makes sure everything works well. It collects money from passengers and hands over the system to the government when the contract ends.

Funding Sources

- Government Funding: The government can give up to 40% of the project cost through VGF, using its budget or loans from banks like the Nepal Infrastructure Bank. It might also get help from international groups like the World Bank or Asian Development Bank.
- Private Funding: The private company invests its own money or borrows from banks to cover the rest of the costs.

Revenue Models

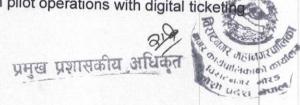
- Passenger Fares: The main money comes from should be affordable but enough to cover costs.
- Advertising: The Company can earn extra by putting ads on buses, stations, or apps.
- Shops at Stations: Renting out space for shops or cafes at bus stops or stations can bring in money.
- Government Support: If not enough people use the transport, the government might promise to pay some money to keep the project running.

Implementation Roadmap

Phased implementation strategy

The successful rollout of the Biratnagar public transport system requires a phased and time-bound implementation strategy, integrating planning, procurement, infrastructure development, and operations. Below is the proposed roadmap divided into three strategic phase

- Phase 1: Pilot Implementation The core public transport system on priority corridors to validate demand, operations, and system design. Key Action:
 - Finalize routes NB-01 to NB-03 (core cross-border and eastwest corridors)
 - Procure a small fleet (10–15 buses, including a mix of diesel and electric)
 - Set up temporary depots and basic charging infrastructure
 - Install 20–25 bus shelters and smart passenger information systems (PIS)
 - Launch pilot operations with digital ticketing



Expected outcome:

- System trial on key routes with 8,500+ daily ridership
- Data for performance, ridership, and revenue generation
- Proof-of-concept to attract investment and partnerships

Phase2: Scale-Up phase

Expand services to peri-urban and industrial areas, scale the electric fleet, and enhance service quality.

Key Actions:

- Introduce routes NB-04, NB-05, and future corridors (D & E)
- Procure 30-40 additional electric buses
- Construct permanent depots, terminals, and charging stations
- Upgrade ITS: mobile apps, digital route maps, smart fare systems
- Expand shelters, signage, and turnaround infrastructure

Expected outcome:

- 60-70% citywide coverage with 20,000+ daily ridership
- Significant modal shift from private transport to public transit
- Public-private coordination framework fully operational

Phase3: Long-Term phase

Establish a fully electric, integrated and self-sustaining urban bus service.

Key Actions:

- Full fleet transition to electric vehicles
- Deep integration with other transport modes (rickshaws, taxis, regional buses)
- Adopt predictive analytics for service optimization
- Develop climate-resilient transport infrastructure
- Institutionalize financing, performance monitoring, and quality assurance systems

Expected outcome:

- 100% clean mobility coverage within Biratnagar
- Smart city-level transport management
- Long-term operational and financial sustainability

3.5 Provide a tentative timeline for feasibility, procurement, infrastructure steup, and full-scale operation.

The tentative timeline for the implementation of the public transport system in Biratnagar, divided into key phases: feasibility study, procurement, infrastructure setup, and full-scale



Tentative Implementation Timeline

S.N	Phase	Activities	Timeframe
1.0	Feasibility Study & Planning	 Demand analysis, route mapping Stakeholder consultations Drafting DPR and PPP model 	Month 1
2.0	Approvals & Tendering	- Government approvals (municipal/provincial) - Floating tenders for operators & infrastructure	Month 1 – Month 2
3.0	Procurement of Fleet & Systems	 Purchase or lease of buses Procurement of GPS, ticketing, CCTV systems 	Month 2
4.0	Infrastructure Setup	 Construction of depots, bus stops, terminals Installation of IT systems 	Month 2 – Month 3
5.0	Pilot Phase Operations	Soft launch on priority routesStaff training and trial runs	Month 2 – Month 3
6.0	Full-Scale Operations	 Launch across all planned routes Public awareness campaigns Performance monitoring 	Month 3 – Month 6

4. Recommended Approach: Public- Private Partnership (PPP) Model

The growing demand for efficient, affordable and modern urban mobility in **Biratnagar**, several infrastructure development and operational models were carefully evaluated. These included:

- Build-Operate-Transfer (BOT)
- Build-Own-Operate-Transfer (BOOT)
- Viability Gap Funding (VGF)
- Lease, Operate and Transfer (LOT)

Each models has unique advantages and limitations. However, after thorough consideration of Biratnagar's urban dynamics, financial ecosystem and institutional capacity. We strongly recommend the Public-Private Partnership (PPP) model as the most suitable and sustainable framework for developing the city's public transport system.

I. Shared Investment and Risk

The PPP model enables shared responsibility between the public and private sectors. The government can focus on policy, regulation, and partial funding, while the private sector brings in investment, innovation, and operational expertise-minimizing financial and operational risks on both sides.

II. Improved Service Delivery

PPP contracts are typically performance-based, meaning the private operator is incentivized to maintain high standards in vehicle quality, punctuality, safety, and



Customer service. This ensures better outcomes for passengers and long-term service reliability.

III. Access to Advanced Technology

Through private sector participation, the city can benefit from the adoption of smart transport technologies such as:

- Digital fare collection systems (QR Cards)
- GPS-enabled buses
- Real-time route tracking apps
- Environment-friendly electric or hybrid buses

IV. Financial Viability with Flexibility

PPP structures like VGF (Viability Gap Funding) and LOT (Lease-Operate-Transfer) can be adapted within the PPP framework to make the project financially viable. For example:

- The government can offer capital subsidies through VGF.
- Assets such as buses or terminals can be leased to private operators under LOT.

This flexible PPP design ensures that projects are both bankable for private investors and affordable for the public.

V. Sustainable Urban Mobility

A well-planned PPP model ensures long-term sustainability by:

- Reinvesting revenues into service expansion and maintenance
- Promoting eco-friendly transport alternatives
- Integrating transport planning with urban development goals

5. Implementation Timeline

Phase	Timeline
Detailed DPR, Stakeholder Finalization	Month 1
Procurement, Contracting, Infrastructure Setup	Month 1- Month 3
Trial Operations & Public Awareness	Month 2- Month 3
Full Operation Launch	Month 3- Month 6

6. Recommended Buses:

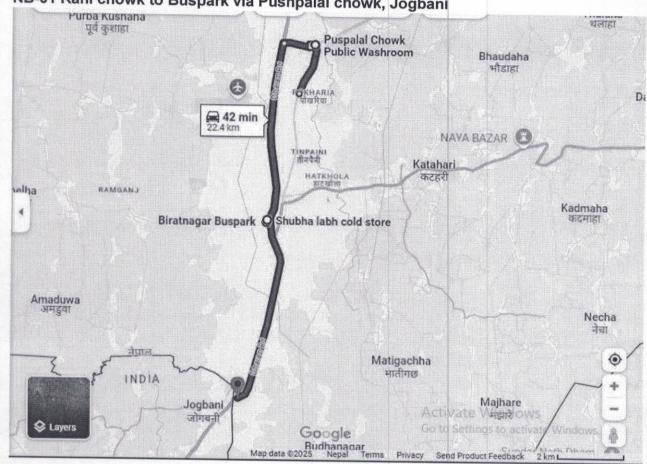
Here are attached details of few buses that can be feasible in Biratnagar



7. Recommended Route Maps:

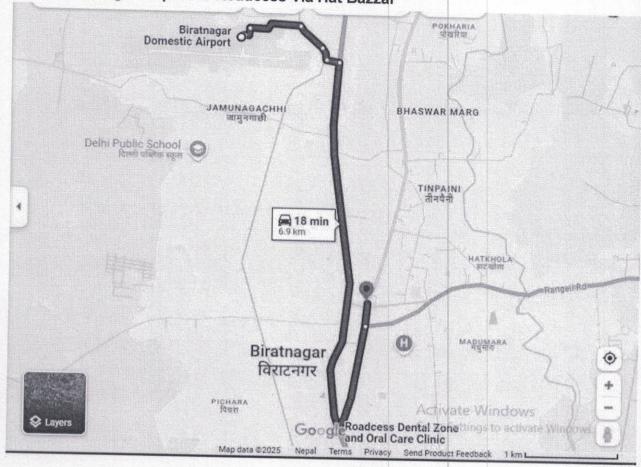
Few starting route map have been kept with this proposal

NB-01 Rani chowk to Buspark via Pushpalal chowk, Jogbani



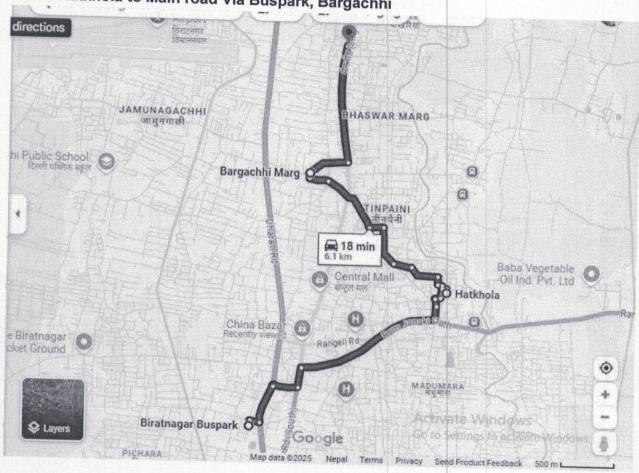


NB-02 Biratnagar Airport to Roadcess Via Hat Bazzar



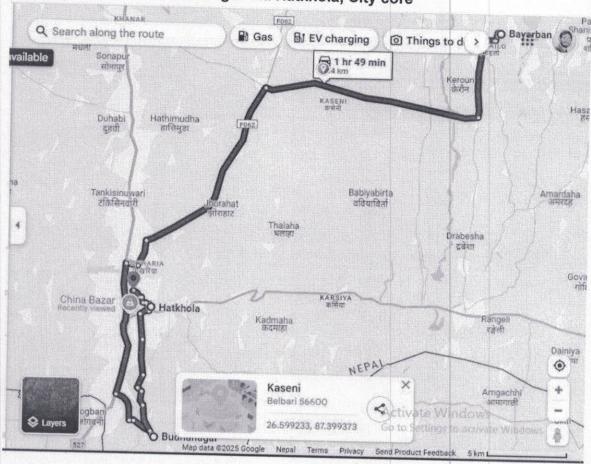


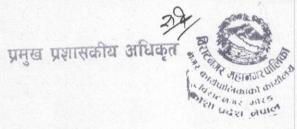
NB-03 Hatkhola to Main road Via Buspark, Bargachhi



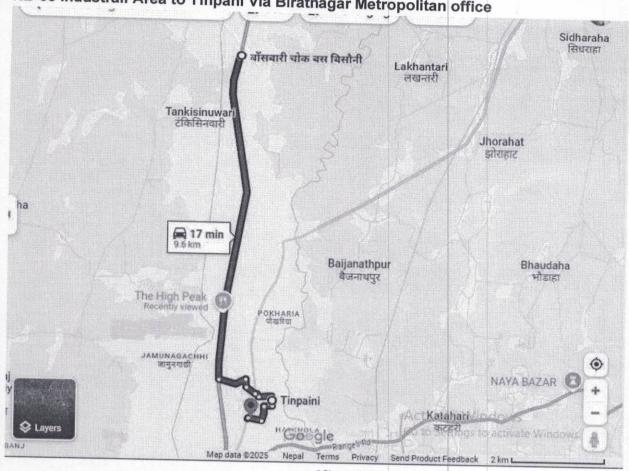


NB-04 Bayarban to Budhanagar Via Hatkhola, City core



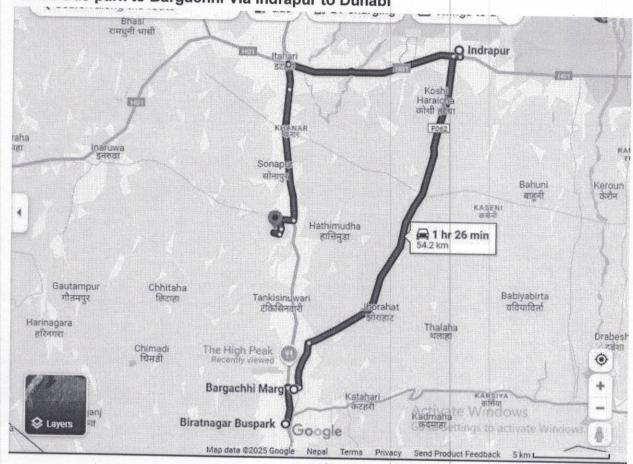


NB-05 Industrail Area to Tinpani Via Biratnagar Metropolitan office



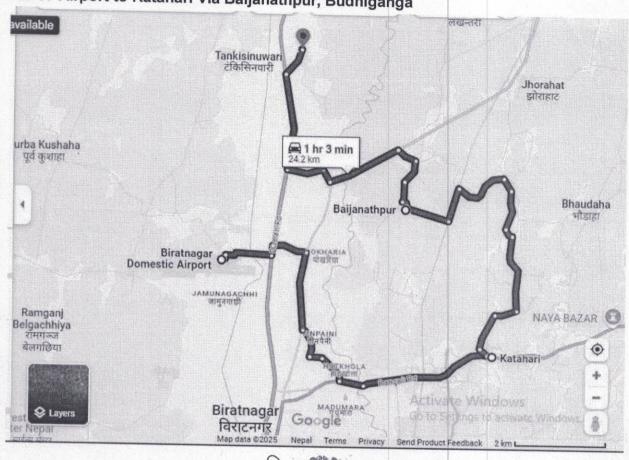


NB-06 Bus park to Bargachhi Via Indrapur to Duhabi





NB-07 Airport to Katahari Via Baijanathpur, Budhiganga

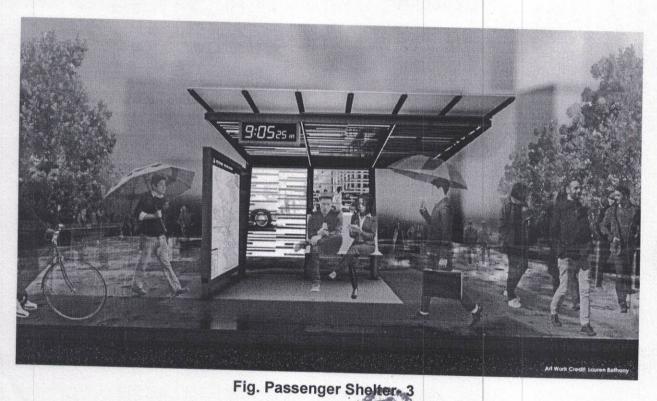




8. Recommended Passenger Shelter



Fig. Passenger Shelter- 2



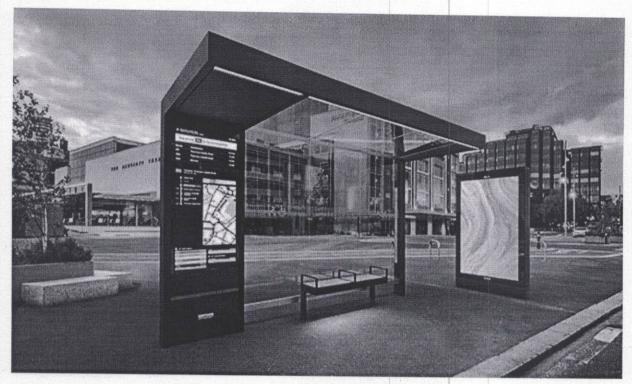


Fig. Passenger Shelter- 4

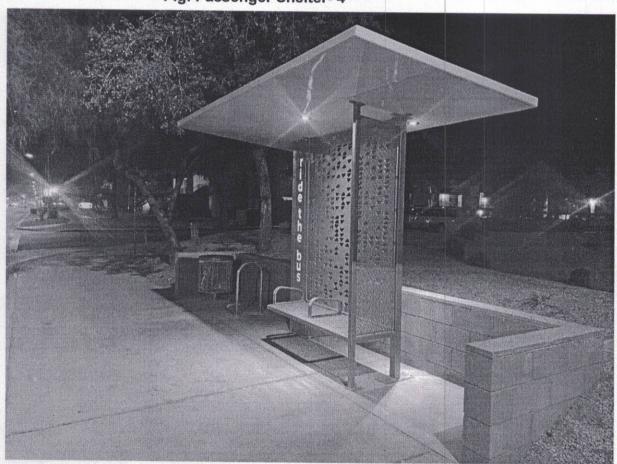


Fig. Passenger Shelter- 5



9. Recommended Passenger Information System

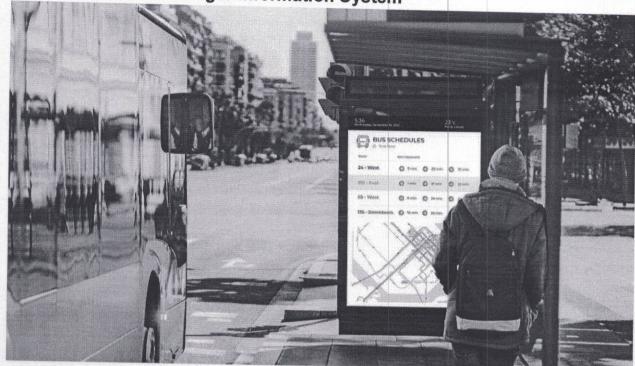


Fig. Passenger Information- 1



Fig. Passenger Information- 2





Fig. Passenger Information- 3

10. Finding and Discussion

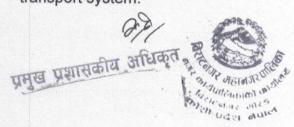
The survey analysis of the city road was carried out to measure the total travel time along the route. It shows that the journey can take 30 mins in off-peak-hour to 45 mins in peak hour. Travel time increases in morning rush hour and afternoon rush hour and reduces in other time of day. It is mainly due to the single shift working model that ends almost at the



same time in the evening inducing heavy traffic in the afternoon rush hour. The maximum difference between travel times is approx. 15 mins in peak hour. It thus shows that potential reduction of travel time can be achieved with proper management of traffic in peak hour by shifting traffic volume to an off-peak hour. Introduction of scheduled bus service is an alternative that supply service based on demand reducing the need for private vehicles to fulfill the growing demand. Also, the large-capacity bus transfers a large share of commuters that ultimately reduce traffic volume. Never the less, the primary strategy for controlling traffic volume should be reducing the need for private vehicles and un-managed public travel system by increasing the accessibility of public bus that meets the desired service level of users. Few starting route maps have been kept with this proposal.

11. Conclusion

The haphazard local transportation system of Biratnagar has tremendously increased unplanned and unsecured system. The availability of a large number of parallel transport service due to the open market service system has added huge traffic volume along the route. As a result, there is a high frequency of service availability, even in an off-peak hour. Public bus accessibility analysis of one of the primary roads of Biratnagar was assessed and analyzed based on travel time and frequency of service along the route. Physical access to the bus stop and geographical coverage in specific travel time budget was analyzed. The geographical categorization provides the basis for the transport planners to plan and implement transport policies. It can also be used to recognize the area with poor accessibility to prioritize investments in transport planning. Based on the frequency of service, energy consumption, and consequent emissions were determined. The result of the accessibility analysis shows the need of an integrated transport system for optimal operation of the bus service such that a planned, secured and significant reduction in energy and emission can be achieved without the need for massive investment. Improved accessibility to public transit attracts more users towards it that plays a vital role in assessing the secured and planned transport system.



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EV PASSENGER VAN 14 & 15 Seater

SPECIFICATION

Gross Vehicle Weight (G.V.W.)	3150l						
Kerb Weight	3150kg						
Max. Axle Load Rating (Front/Rear)	<2000kg						
	960/1040kg						
Wheelbase							
Overall Dimension	3050mm						
Design Body External	5320*1695*1990mm						
Wheel Track (Front /Rear)	3480*1541*1320mm 1470/1465mm						
Width Between wheel Arches	14/0/1465mm 1140mm						
Top Speed Performan							
Gradeability	100 km/h						
Min. Turning Radius	20%						
Acceleration Time	6.25m						
Endurance Mileage (Range) - WLTP	14s(0-80)						
Motor Type	235(NEDC)						
Max.Power	Permanent Magnet Synchronous Motor						
Max. Torque	85 kW						
	290 Nm						
Battery Type Battery							
Battery Capacity (kWh)	CATL Lithium Iron Phosphate						
Voltage	50.23 kWh						
Vehicle Voltage	334.88 Vdc						
Capacity * Quantity	12 Vdc						
	60Ah*1						
Charging Systems Charging Systems Charging Systems Charging Type							
Charging Socket Type	DC Fast Charge / AC Slow Charge						
	CCS 2						
Onboard Charger Max. Charging Current (A)	32						
Onboard Charger Max. Charging Power (W) OC (0% -100%)	6600						
Fast Charge / Slow Charge Charging Time (SOC 0%-100%)	≤1.5h (25°C)/≤7.5h(25°C)						
Brake							
Brake type	Front : Disc, Rear : Drum						
Automatic adjustment arm for brake clearance	Brake clearance self adjusting						
Braking Power Form	Vacuum Booster						
ABS + EBD	Vacuum Booster						
Additional Foot							
eat No. Additional Feat							
Jumber of speaker	14 & 15 Seater						
MP3 +USB , MP3(radio +USB interface)"	2						
MP5+MP3+USB+AUX, MP5 multimedia (Bluetooth radio MP3USB	/						
UX reverse image)	✓						
ir conditioning	Electric air conditioning						
WARRANTY 5 YEARS or 2							

THE NATION'S FUTURE RIDES WITH US



TECHNICAL SPECIFICATIONS

LENGTH 4920 mm	WIDTH 1905 mm	HEIGHT 1905 mm (without ORVM) 2255 mm	(With ORVM)	GROUND CLEARANCE	180 mm (Laden)						
TRANSMISSION 5 MT	SUSPENSION TYPE McPherson Strut with coil spring at front & Parabolic Leaf Springs with Dampers at rear	FRONT SUSPENSION	McPherson Strut with Wishbone Type	REAR SUSPENSION	Hydraulic Double Acting Telescopic Type	TYRES	195/R15	FUEL TANK CAPACITY	709	WHEELBASE	3200 mm
SEATING 18 + Driver	SEATING ARRANGEMENT First Row: Driver + Twin Co-driver Seat Second Row: 6 Seats	Last Row: 6 Seats	ENGINE CLASS	BS6 Using LNT & DPF Technology	ENGINE CAPACITY	2179 cc	POWER	100 PS @ 4300 rpm	TORQUE	200 Nm @ 1250-3500 rpm	NO. OF CYLINDERS 4 in-tine

For more information, please contact:

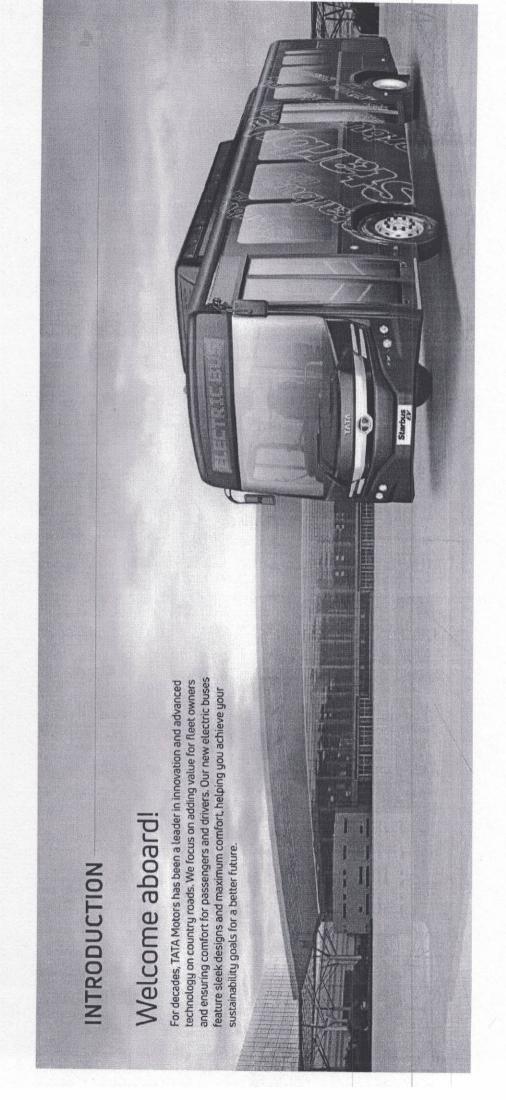
TATA Motors International Business - Commercial Vehicles, A Block, Shiv Sagar Estate, Dr. Annie Besant Road, Worli, Mumbai, Maharashtra - 400 018, India Tel.: 91 22 67577200 Fax: 91 22 67577225 | Website: www.tatamotors.com Safer Smarter Greener ntroducing Tata Motors range of EV buses.

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Regenerative Braking

 Reduced wear of conventional brakes for higher efficiency.

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 Efficient energy storage and rapid charging capability.

safety & ease of maintenance. Certified for sustainability,

rolling resistance drag

& kinetic resistance. aerodynamic drag, - Built to overcome



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1 iakh+ Starbuses on road.



(Powertrain . Well synchronized drivetine for

· Synchronous traction high torque and prove



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Eull Electric Drivetrain with zero emission for clean air.



customised as per applications Roomy interiors that can be customised as per application and regulations.



Provision for new-generation telematics for efficient and user-friendly vehicle maintenance and tracking.



Utility provisions like charging points and a Wi-Fi hotspot for



Intelligent Transport System (TTS). High safety and security with provision for an



Provision for a passenger information system with destination boards and audio announcements.







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Continuous monitoring of electrical systems for insulation.



Liquid cooling of battery & traction systems.







Real time alerts

Solution on electrical system

functioning.

Fire detection
& alarm system.

PASSENGER SAFETY

9

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Safeky ramp for specially abled citizens



Air suspension for protection from bumps on the road.

2 way communication and security cameras.



Panic and



Safety standard training of drivers & technicians.

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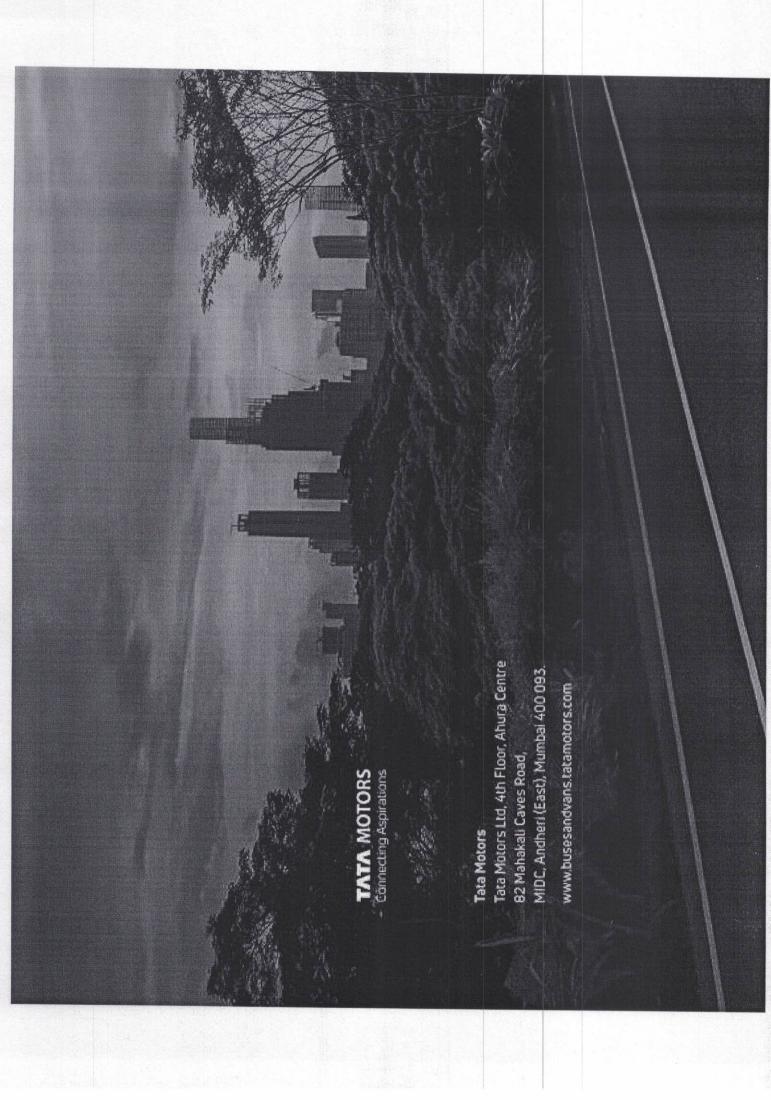
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Starbus EV

top buttons.

OUR PRODUCT SPECIFICATIONS

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1.3 hrs Charging Time



Motor Peak Power 60 kW



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Top Speed 100 kmph



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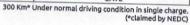
300Km* under normal driving condition

in single charge. (*claimed by NEDC)



ELECTRIC MOBILITY.

DIMENSION	AND WEIGHT
Length*Width*Height (mm)	4500*1680*2000
Wheelbase (mm)	3050
Curb weight (kg)	1575
POWER PA	ARAMETERS
Driving range (Km)	300*
Motor type	Permanent magnet synchronous moto
Transmission type	Single speed automatic
Max. power (kW)	60
Max. torque (Nm)	200
Battery capacity (kWh)	42
Battery type	Lithium iron phosphate battery
Max. slope of climb (%)	27
Max. speed (kmph)	100
Slow charging (0-100% SOC)	7-10 hrs
Rapid charging (0-80% SOC)	(20%-80%) 1.3 hrs, (0-100%) 2.5 hrs
Seating capacity	
Power battery manufacturer	11 CATL
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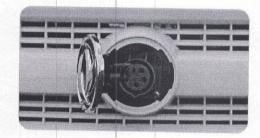
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DRIVING ME	CHANISM
Location of driving axle	Rearaxle
Min. ground clearance (mm)	188 Unladen
Brake type	Front disc / Rear drum
Steering system	Electronic Power Steering (EPS)
Tire model	185/70 R14
Min. turning radius (m)	5.25
Suspension front	McPherson independent suspension
Suspension rear	Leaf spring non-independent suspension
OTHER CONFI	GURATION
Anti-lock braking system (ABS)	Yes
Electronic brake-force distribution system (EBD)	Yes
Hill assist control	Yes
Reverse camera	Yes
Multimedia infotainment touchscreen system	Yes
A/C and heater	Yes
Knob based gear selector	Yes
Regenerative braking system	Yes













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Some of the equipments illustrated or described in this leaflet may not be supplied as standard equipment and may be available at extra cost • Technical specifications have been rounded-off to the nearest value • Please contact on numbers given below for further information.

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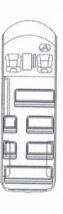
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KINGWIN EV Passenger Van specification

Hain parameters	
Seat	14 (2+3+3+3)
Dimension mm	5340x1700x2285 (High roof)
wheelbase mm	2890
Ground clearance mm	180
Gradient Max	25%
Twist and turn knob	ECO & NORMAL-Forward, NORMAL-Reverse gear
Motor type	PASA
Max rated Fower	80/50 kw
Max Iorque	310 Nm
Max Speed (locked)	100km/h
System and a solor and language	
battery quantity	CATI, 50.23 KWh
Charging system	<u>68/7</u>
Charging time	AC 8 Hrs, DC 20% to 80% 45 Minutes
Electronic control numbers	300km (NEDC)
Section for the party of the pa	3 in 1 controller
Daniely reduity System	Available
Rearayle	Plants dates
Front suspension	Dieta har entre de la contraction de la contract
Rear Suspension	TO STOLL COLORS AND THE COLORS AND T
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Brake System	Front disciBase drum
Brake assist system	APS-FPD
Seat belt	Available
Fire Extinguisher	Fire Extinguisher(0.5Kg)
Front fog lamp	Front fog lamp
Frent Window	Electronic power
Rearview Mirror	Electronic power
Steering Wheel	Adjustable four-spoke Leather
Rear door Wiper/Rear spray/Rear	Available
Functional equipment	
Rear ground-view mirror	Available
Mudguard	Front/Rear Mudguard
Rear door	Inner release lift gate
Confroi system	Center Controlled Door lock
representative Color	of the second se
Border Strins	WHICE CONTRACTOR
Wheel Rim	Short taken to the course
ŢIP	SUPEL WITH COVE
Front lamp	Allinges of the second
Rear lamp	Common Dear Command I amo
Glass side	COTHING AND LOCATION AND LOCATI
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Floor material	Udik gidy
Spark material	
instrument name	Fabric
Audiovisual	integral instrument panel
Reverse camera	PiD2+20 Left Sign
T-80X	With GPS and battery lock function
Air conditioning	With Front and Rear AVC
	011110 0100 MONORODO DE CONTRACTOR DE CONTRA



RANGE

GROUND

SEATER

KINGLONG

WARRANTY TERMS: 200000 KM OR 5 YEARS (WHICHEVER IS EARLIER) ON BATTERY & MOTOR

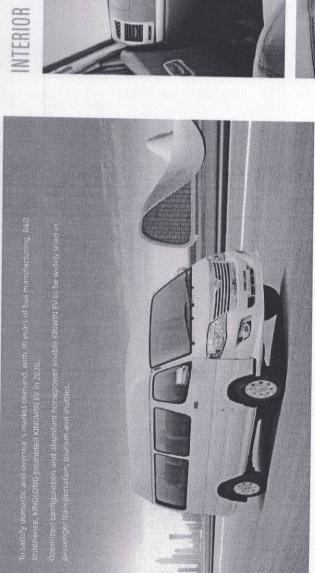
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CG Motors Showroom (Opposite to Bhatbhateni Parking) Bishainagar Bhatbhateni

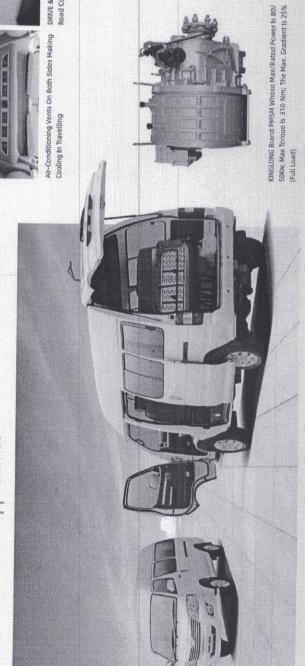
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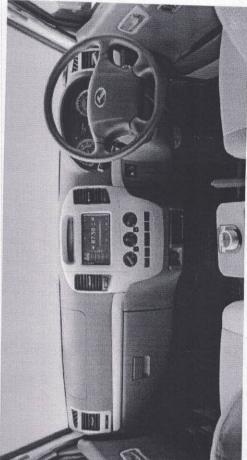
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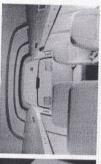
Stylish, Streamlined Appearance











14 Seats (2+3+3+3+3) Layout



Regeneration Function Extends The Running Range To 250Km(Full Load) CATL 50.232 Kw/h Battery Combing



Auxiliary Controller





PDU+DCDC+ OBC (Three-In-One)

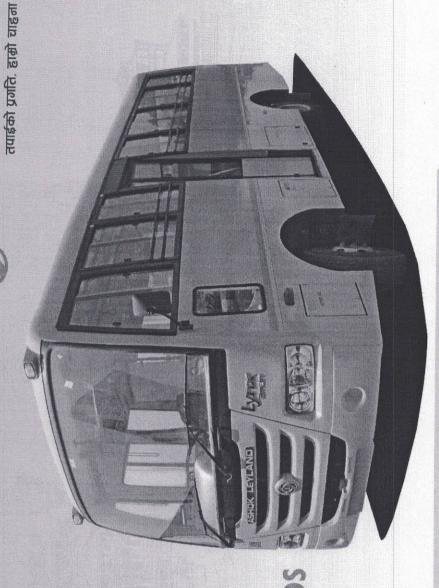


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Fuel efficient 'H'-series engine with Inline pump, better serviceability and ease of maintenance

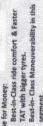






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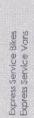
Filled with features and loaded with benefits, a front-engine mini bus with a 2 step entry. the Lynx Smart offers best in class comfort Ashok Leyland introduces the Lynx Smart, and a smooth ride on every road.

Salient Features:

- Inline engine for a smooth ride
- Higher power and torque for better pickup
- Integrated multiplexing with body control unit (BCU) for ease of diagnostics
- Compliance to urban bus Specification (UBS)-2



Original Quality Parts



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24/7



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300000 Kms* 24 x 7 National Helpline PIRE OT 1660 01 00041 3 years/

	TECHNICAL SPECIFICATIONS	51
Engine	"H-Series", 4 Cylinder, Direct injection Turbo Charged Diesel Engine with Inline FIP	Diesel Engine with Inline FIP
Engine Capacity	3839cc	
Maximum Power	120 HP (88kW) @ 2400rpm	
Maximum Torque	415 Nm @ 1400 rpm	
Jutch	330 mm Hydraulic clutch actutation with booster	
ransmission	Synchromesh 5 sppeed gear box (FGR6.5:1)	
uspension	Semi elliptical multi leaf at front and rear with	Parabolic Suspension with Shock abso
	Shock absorber	
teering	Integral Power Assisted Steering	
rakes	Dual Circult, full air 'S' Cam Brake system	
ectricals	12 volts, 120 Ah: Alternator capacity 65mps	
rres	7.50 X 16 -16PR	8.25 X 16 - 16PR

4900	5200
1550/2520 1550/2940	1550/3120
8270/2200/2743 9390/2200/2743	10320/2200/2743
18300	19000
9300	10000
900(E+2)	900(E+2)
40+D	44+D 46+D
	900(E+2) 40+D



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JAPANESE QUALITY



COMFORTABLE & QUIETER INTERIOR



BUILT WITH HIGH SAFETY STANDARD



CLASS LEADING



TECHNICAL SPECIFICATIONS	MITR
POWERTRAIN	
Engine Type	3L ZD30 DDTi Common Rail Diesel Engine (BS3)
Displacement/Cubic Capacity	2953 cc
Maximum Power Output (in kW)	87 kw @ 2750 RPM
Maximum Torque (in Nm)	320 Nm @1600-2400 RPM
Bore x Stroke (in mm)	96 X 102
Clutch	280mm dia, Single Dry Plate, Diaphragm Push Type
Transmission	Fully Synchromesh 5-Forward & 1-reverse
FUEL SYSTEM	t any synchroniesh 5-rorward & 1-reverse
Fuel Injection System	Bosch CRI 2.2 Common Rail
Fuel Tank Capacity (in litres)	
ELECTRICALS	60L (with longer neck)
Battery	B WE TO STORE THE PROPERTY OF A PROPERTY OF
Alternator	1 X 75 Ah
PERFORMANCE	90A
Restartability in 1st gear (in %)	
Max. Speed in Top Gear (in kmph)	34%
STEERING	100 km/h
Steering System	
FRAME	Hydraulic-assisted, Power Steering
Frame	Non-
BRAKES	"C" Section Construction - Straight Ladder type with Outrigger
Service Brake	
Parking Brake	Dual Circut, Hydraulic with Vaccum assist with LCRV
CONTRACTOR OF THE PROPERTY OF	Transmission mounted, Cable Operated, Mechanical linkage
SUSPENSION & TYRES	
Front Suspension	Parabolic - 4 leafs, Overslung Suspension with
***************************************	double acting shock absorbers
Rear Suspension	Parabolic - 4 leafs, Overslung Suspension with
	double acting shock absorbers
No. of Tyres	Front 2, Rear 4, Spare 1
Front	7.00 X 16-12 PR
Rear	7.00 X 16-12 PR
WEIGHT	7.00 X 16-12 PR
Kerb Weight (in kgs) -	
(Including driver's weight @ 75 kgs)	4025
Gross Vehicle Weight (in kgs)	
DIMENSIONS	6050
Wheel Base (in mm)	2700
Overall Length (in mm)	3700
Overall Height (in mm)	7060
Overall Width (in mm)	2630
Passenger Platform Height (in mm)	2080
Seating Capacity (in numbers)	860 mm
Min. Turning Radius (in metres)	27+1+Driver
Min. Ground Clearance (in mm)	7.2
All tills	198

FEATURES	STANDARD BUS
Comfort & Convenience	
Power Steering	
Tilt Steering	
Reclining & Sliding Driver Seat	
Partition behind Driver Seat	· · · · · · · · · · · · · · · · · · ·
Provision for Audio System Mounting in Dash Panel	<i>y</i>
Grab Rail on the Passenger Door	
Low Step-in Height for Passengers	
12v Mobile Charging Point (On Dashboard)	<u> </u>
Tool Kit	*********************************
Interiors	*
Digital Odometer	
Trip Odometer	
Dual Tone Vinyl Seats	
Flooring - Vinyl Button Type	
Roof Panel - Pre-Painted GI Sheet	
Lockable Glove Box	<u> </u>
Safety	
Speed limiter through Engine ECU	
Low Vacuum in Brake Booster Indicator	
Steering Lock with Single Key for Door & Fuel Tank Lid	
Safety Light in Door Footwell Area	
Passenger Door - Jack & Knife (opens inwards)	<u> </u>

COLOURS

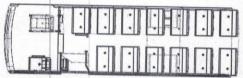
SALIENT FEATURES

- Internationally acclaimed LCV platform of Nissan
- Powered by Advanced 3L ZD30 DDTi Common Rail Diesel Engine
- A product of India's largest bus manufacturer, Ashok Leyland & Nissan, a global LCV player
- Enhanced passenger comfort with low NVH & quieter passenger cabin
- Class leading fuel efficiency
- · Low centre of gravity for improved stability
- Low turning circle radius for easy manoeuvrability

HIGHLIGHTS



ADVANCED 3L ZD30 DDTI COMMON RAIL DIESEL ENGINE



TOP VIEW OF SEATING ARRANGEMENT



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Authorized	Dea	ler
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*Disclaimer: Accessories shown are not a part of the standard equipment. The illustrations are only indicative and may vary from the actual vehicle. Ashok Leyland reserves the right to alter the technical specifications/designs without prior notice and without liability, in view of our policy of continuously improving our products.