2016

Proposal of Personal Rapid Transit system to new town Kolkata city

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EXECUTIVE SUMMARY

1.1 Introduction

Kolkata also known as Calcutta ,the official name until 2001) is the capital of the Indian state of West Bengal. Located on the east bank of the Hooghly River, it is the principal commercial, cultural, and educational center of East India, while the Port of Kolkata is India's oldest operating port and its sole major riverine port. In 2011, the city had population of 4.5 million, while the population of the city and its suburbs was 14.1 million, making it the third-most populous metropolitan area in India. In 2008 its gross domestic product (adjusted for purchasing power parity) was estimated to be US$104 billion, which was the third highest among Indian cities, behind Mumbai and Delhi

In the pace of rapid urbanization and growing demand for housing and commercial spaces, the New Town, Kolkata was created in the eastern outskirts of Kolkata to serve the dual purposes of: establishing new business centre to reduce the mounting pressure on the existing Central Business Districts (CBD) and increasing housing stock supply by creating new residential units.

The New Town Kolkata Development Authority has been constituted under The New Town Kolkata Development Authority Act, 2007 (The West Bengal Act XXX of 2007) for rendering various civic services and amenities within New Town, Kolkata and it has come into effect since November, 2008.

The New Town Kolkata Development Authority Act, 2007, was passed by the West Bengal Legislature and the assent thereto of the President of India and it was published in the Kolkata Gazette Extraordinary of the 30th June, 2008 vide Notification No. 1088-L dated 27th June, 2008.

This Act has come into effect, retrospectively, from 28th December, 2006 and it extends to the whole New Town Kolkata area as described in Schedule-I appended to this Act.

The area of entire township is comprised of 34 Mouzas (both part and full) falling in areas of Airport Police Station, Rajarhat Police Station and Kolkata Leather Complex Police Station.

The Development Authority has been vested with the various powers and functions under the said Act.

NKDA had initially started functioning from its office at 03, MAR. New Town, Kolkata - 700156 and subsequently due to expansion of its activities another office of NKDA has started functioning from 01, MAR. New Town, Kolkata -700156

It is a transitional arrangement in the way of creation of an Urban Local Body (ULB).

Suitable for a grid based transport system. The travel characteristics of the population also show prevalence of short and medium distance travel that are more amenable to a network system of travel rather than dense linear corridor creation. A new system of Personalised Rapid Transit system had been jointly proposed by JPODS-ACTIS that does away with age long ills of traditional systems. Its advantage is in effectively decongesting the existing gridlocked transport network prevalent across the state. JPODS-ACTIS proposes to design build operate and transfer PRT system in the state of West Bengal under Rights Of Way (ROW)

The present proposal is for implementing a PRTS in Kolkata city (new town) linking the Narkel bagan to Thakdari road junction connecting via metro station - 2.4 km (Phase-1), having 5 stations initially a corridor is proposed which can later be made into a network system connecting several nodes of the city

1.2. PRT Corridor

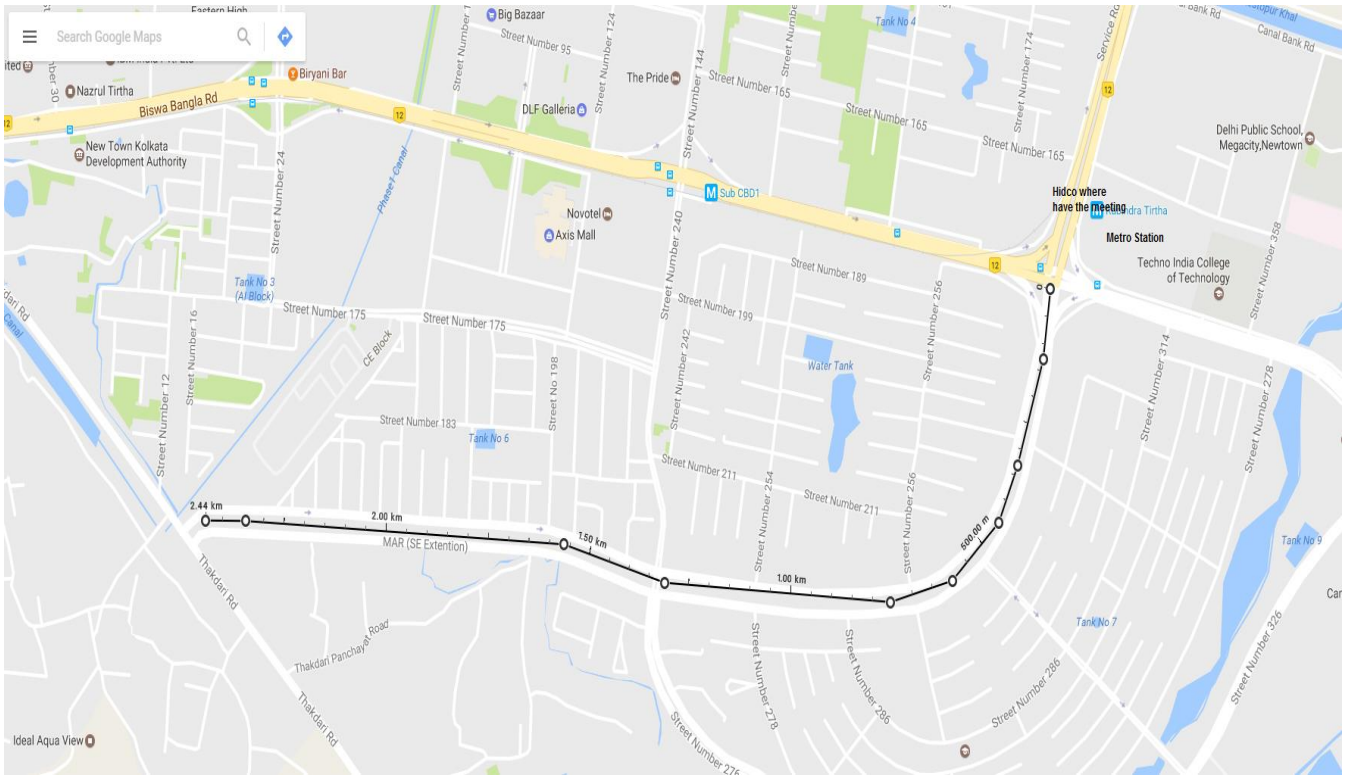
PRT system is proposed for Kolkata city (new town) from Narkel Bagan to Thakdari road junction .This proposal considered as a pilot project

1.3. Indicative System Configuration

Total Route Length (km)	2.4 km
Number of Stations	5
Number of Pods(2017)	75
Daily Passenger Carrying Capability	14.400
Indicative Project Cost (INR Crores)	112 cr (17 million)

1.4. Overall Project Cost

The Overall project cost is estimated at INR 112 Crores (17 million) for a dual track system including interest during construction, Project Management Consultancy, Pre- operative expenses etc. This is likely to vary depending on technology and detailed engineering analysis.



PRT Corridor: Phase-1 - **Figure 1 Route Map of Proposed PRT System**
From Narkel Bagan junction to Thakdari road junction

Apartment complexes in MAR (SE extention) road

The covering zones will be:3rd rotary bus stop-MAR(SE extention)—CE block new town-Street number 278-Thakdari road VIA- Thakdari junction and connecting from Metro rail

Total Five stations(5) including opposite direction –more station can be built depending upon the PPH and traffic study

Subject to detailing*, the detailed survey will be carried out after the proceed letter from the Government.

The above said calculations may vary depend upon the People per Hour (PPH)

Traffic Demand Estimates for the PRT System to Kolkata New town

A whopping 3.000 passengers per hour ply between 2.4 km as per the data

Traffic Demand Estimates for the PRT System

Year	Expected Passenger Demand per day
2016	900 per hour/16=14.400
2021	18.000
2031	21.600
2041	25.200

The expected PRTS ridership will be- 900 people per hour/16 hours=14.400 per day for overall 2.4 km -Pods will run from 06:00am – 11:00am -16 hours /as pods will run for 24/7 .the pods frequency will be every seven second/pods will wait for people

1.6. Present fare structure of Public Transport Modes

Table 1 Comparison of Fares city bus services and other IPT

S. No.	Type of Service	Minimum fare (INR)	Minimum Distance for Base fare	Incremental per km fare (INR)
1.	Bus	7	5 km	0.64
2.	JNNURM (AC)	15	20	1.91
3.	Multi Axle AC Volvo bus	70	20	1.30
4.	Metro	20	For 5.1 km	For 5.1 km
5.	Auto Rickshaw*	22	1.9 km	10
6.	Taxi	50.00	5 km	12

**Waiting charge: 0.50 INR for every 1/13 km or part thereof*

1.7. Project Proposal

The Project is supposed to be costing around Rs. 112 Crores (17 million) this will vary depending upon detailed specifications to be worked out during the detailed engineering design. A fare of Rs. 20 (30 cents) per passenger for 2.4 kilometres is proposed as the tariff with 5% escalation every year.

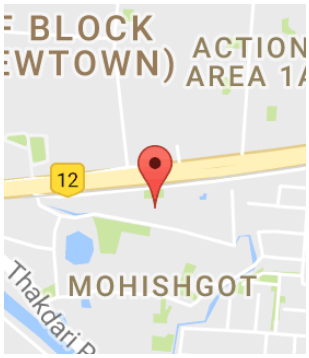
The system jointly proposed by JPODS-ACTIS as design, build, operate and transfer after 20 year period to the Government. The present proposed fare of Rs 8 (12cents) per kilometre for an air-conditioned most modern cab is much below the per kilometre rate of an auto rickshaw. (Refer table above) As this is a highly personalized and eco-friendly accident free travel option the proposed rate is reasonable. The fare is proposed as per passenger km at optimum number of passengers per pod or car. Pod car per km charge will be arrived at based on the present investment level. It may vary if there is delay in implementation.

1.8. Suggested Implementation

JPODS-ACTIS is submitting this as a solicited proposal (pilot project) for implementation from a New Town Kolkata Development Authority .NKDA as a SPV; raise necessary resources to carry out the project, without any financial commitment from the government.

NKDA is a nodal agency

New Town Kolkata Development Authority
City government office in India
Address: 03, Major Arterial Road, Kolkata, West Bengal 700156
Phone: 033-2324 2324



1.9 COMPANY PROFILE(S)

JPODS INC USA

JPods, Inc. builds and operates solar-powered computerized personal rapid transportation (PRT) networks. The company deploys networks of Horizontal-Elevators that provide commuter range travel using ultra-light, computer controlled vehicles that are suspended from **solar powered** overhead rail systems. JPods provides a reliable transportation system for passengers and cargo that runs on renewable energy sources and therefore is not subject to the price or availability of oil. The JPod vehicle (PodCar) has the capacity to hold
About four to six people or a cargo pallet yet it uses 7-15% the energy required by current modes of urban transport such as rail and car. Jpods can also work on power supply from state grid

Competitive Advantages

Product Design: Vehicles hanging from overhead rails (wheels-up vs. wheels-down) employs superior physics to reduce pod weight and energy consumption, increase ride stability and safety, and solve congestion issues in cities.

System Patent: Patent #6,810,817 was issued in 2004 and defines how Independently computer controlled Vehicles can talk to each other, make decisions together and behave intelligently to move physical packets (PodCars) in a distributed collaborative network. Currently, about 50 additional patents have been researched and identified by JPODS

Management Track Record: A strong team leads the company with an outstanding track record in leading manufacturing, logistics, process controls, power generation and high tech companies.

Scalability: Rapid deployment of the PRT networks would be achieved by a combination of the leadership, management expertise and networks of JPods and our allies. In particular, JPods holds the patent/technology and manufacturing knowledge/experience.

Company Details

Company started in 1999with the aim of reducing dependence on fossil fuels. Patent #6,810,817 was issued in 2004 for technology surrounding distributed computer networks that transport physical packets in Personal Rapid Transit (PRT) networks using Pod Cars

The uniqueness of the project

1. **Exceed 120 passenger-miles per gallon (51 km/litre)**
2. **Pay 5% of gross revenues to the aggregate rights of way holders (ROW holders are mostly city and other governments).**
3. **Exceed the safety of existing modes operating in the ROW.**
4. **Comply with ASTM International F24 Technical Committee. Theme parks safety standards. This standard has a track record about 80,000 times better than DOTs and a well-established insurance and inspection industry to enforce compliance.**
5. **Build under Solar powered mobility with people and cargo**
6. **Build with private capital.**
7. **No emission-no accidents –solve major traffic problem**
8. **Anti-vandalism .24/7 transport system**
9. **Women safety-round the clock video monitoring**
10. **Cheap mode of transportation-less construction cost compare to metro and mono rail-speed is 50 to 70km/hr can be increased to 100km/hr –less space for construction-construction time will be 6 to 8 months**

ACTIS INFRASTRUCTURE Pvt Ltd INDIA

Introduction of Personal Rapid Transit to India from Actis Infrastructure jointly JPODS

Company Description

Actis Infrastructure is a Private Limited Company registered under company's act 1956

Actis is a great growing infrastructure developer with an excellence in core development in infrastructure across globe

A robust infrastructure that provides the level of availability and response necessary in a global business environment

Actis infrastructure is an participating to build an efficient infrastructure setup can ensure a nations sustained economic growth

The company formed to fund the capital requirement of various infrastructure projects in the Groups Energy, Highways, Personal Rapid Transit and Evacuated tube transport technologies

Our public transit projects are: *Inspiring with innovations®*

Specialties: Actis Infrastructure is participating in Public transit and Personal Rapid Transit system Projects on finance operate transfer basis in a Public Private Partnership, PPP model

Mission Statement-Our success is based on understanding the commercial, community and environmental aspects of every project, we have the ability to deliver challenging and innovative buildings that become the catalyst for a wider generation, making real differences to the quality of people's lives

We have four market, leading business in professional services, construction services, support services and infrastructure investment

Procurement Division
Integrity in all business relationships. Excellent talent. Innovative solutions. This is what you can expect from Actis. We custom tailor our approach and expertise to meet our clients' project requirements. Our engineering services include preliminary and final design, program management, and construction engineering and inspection.

Actis provides construction engineering and inspection services for roadway, highway, airport, harbour, transit, and bridge and building projects throughout the Midwest. Our construction personnel are committed to working with clients to control the construction schedule, budget, and Quality Control and Quality Assurance (QC/QA). We also establish and manage safety programs and customize construction management services to address the unique requirements of each client and project.

Our construction engineering and inspection services include:

- Schedule and Budget Evaluations
- Construction Observation
- Value Engineering
- Constructability Reviews
- Project Scheduling and Permitting
- Quality Assurance/Quality Control
- Monitoring and Coordinating Daily Construction Activities

2.1 Traffic demand

The assessment of traffic demand for the present study has been based on the travel characteristics identified during the traffic studies conducted by Kolkata Metropolitan Development Authority KMDA- for Sustainable Transport Development in Kolkata City. The study revealed that the major traffic generation/Attraction nodes are cantered around the Railway station and the Central bus stand and New town (Salt lake city)- based on the OD matrix, the link volumes have been derived for the proposed PRT system, and using growth factors, the traffic demand has been projected for the horizon years.

Kolkata City & Traffic

The demand for mobility has risen significantly all over the world as a result of the fast pace of Urbanization. The situation is no different in India. In India, personal vehicles have increased tremendously to take care of this rising need for mobility as provision of public transport has been Inadequate. This exponential growth of vehicles has led to traffic congestion which is a hindrance to mobility. Traffic congestion leads to increase in operating cost of vehicles, delay, pollution and stress. The problem is acute in the Indian city of Kolkata as the road space here is only 6% compared to 23% in Delhi and 17% in Mumbai. This paper makes an attempt to measure the external cost of congestion on the roads of Kolkata. The method used to measure the cost of congestion follows that of R. J. Smeed (1968). The result obtained or the cost of congestion estimated for the city of Kolkata indicates that there is a considerable monetary loss that is being incurred. An attempt to measure the cost of congestion in the city of Kolkata has not been made before, although studies have tried to estimate congestion in Kolkata city. Gurgaon today is obviously one of the most sought after cities in the country what with the rapid growth in the IT industry and the rise in the number of job opportunities in the city. With the rising population in the city there is also a corresponding increase in the number of vehicles in the city and a huge increase in the demand on land.
What adds to the traffic pressure in Kolkata city in particular is that there is very little scope for expansion of roads and the need to use existing roads for smooth movement of vehicles is even more pronounced. It thus becomes mandatory for the administration to ensure better parking facilities. So far, the government and the KMC have not taken this issue seriously and now the situation is such that it needs to be addressed seriously and effectively.

Congestion in Kolkata

Kolkata has a high and dense population. One of the reasons for this is migration from the neighbouring states.
Kolkata being a metropolitan city, people have migrated to Kolkata from other states. Another reason is the cross border migration from Bangladesh. Since the partition of India and through the Bangladesh War, the migration has continued and still continues because of the porous border between Indian and Bangladesh. But there was not enough work for such a large number of people and hence to survive these people took to hawking. Hawkers occupy a large section of road space in Kolkata. Not only the footpaths they encroach upon the roadways also. Encroachment of roads results in congestion (Chakrabartty & Gupta, 2014).

As compared to Delhi and Mumbai, Kolkata has a much smaller road space of around 6%. This space is further reduced due to encroachments. Moreover there is little scope of increasing the road space, at least in the core area, because it has built up in an unplanned way. Removal of encroachments involves social, political and economic costs. Building flyovers can ease congestion to some extent but there are hindrances to building them as well. In some areas, for building flyovers, land is required. Those living in these areas have to be relocated and this is resisted very strongly (Chakrabartty & Gupta, 2014).

There has been an increase in incomes particularly for the urban middle class family resulting in an increased demand for vehicle ownership in this segment given the inadequacy of public transport. Also the number of working women has increased leading to both an increase in demand and supply of cars. The women have added to the demand for personal vehicles. Given, insufficient and unkempt public transport, inconvenience and lack of safety on public modes, the women who can afford generally opt for personal cars. Moreover, availability and affordability of low cost cars have made it easier for urban women to avail of it. The government's policy of liberalization has made the terms of car import easier and also increased car manufacture in India. This increased availability of cars coupled with easy car loan policy of banks has increased car ownership. The lack of initiative in improving the public transport system which is inadequate as well as unattractive has increased the number of private vehicles on Kolkata roads (Chakrabartty & Gupta, 2014).

Mobility crisis begins to build up in a city when a large share of daily trips is made by personal vehicles that occupy more road space but carry fewer people, pollute more, and edge out walking, cycling, buses and intermediate public transport. Growing dependence of personal vehicles is already showing one of its worst impacts — Gridlocked road (Chakrabartty & Gupta, 2014).

The growth rate of cars has already overtaken that of two-wheelers in the city. Between 1998 and 2008 the car ownership by households has increased from a mere 1.73 percent to 11 percent in 2008, the ownership of two wheelers has increased from 5.67 percent to 16.5 percent. At the same time households that did not have any vehicle has fallen from 61 percent to 49.2 percent. Kolkata has 0.4 million cars as opposed to 1.3 million cars in Delhi which is severely gridlocked. What will happen if Kolkata has the same number of cars? Both cars and two wheelers occupy the maximum road space but carry just about 12 per cent of the daily trips in Kolkata.

Share of cars in the traffic volume on key roads can be as much as 40 per cent but they meet only 4 per cent of the travel needs. This clearly shows that car users are a very small minority in the city. But a lot of things can go wrong if the city continues to design itself for car owners ignoring the travel needs of the majority which is using public transport and walking (Citizens report, air quality monitoring in Kolkata).

A study was done by Switch ON, Environment Conservation Society, in Kolkata in 2013 and **Table 1** below gives a summary of their findings. They estimated the modal share of vehicles, road space share of vehicles and modal share of passengers on the city roads. It is clear from the above table that cars cater to only 6% of the passengers but occupies 29% of the road space while buses serve 76% of the population and occupy only 32% of the road space. So public transport should be promoted in Kolkata so that the problem of congestion is addressed.

Data and Methodology

Data for the study have been obtained from the Kolkata Metropolitan Development Authority's (KMDA) report on mobility in Kolkata, titled Comprehensive Mobility Plan, 2008. The data includes Passenger Car Units (PCUs) on a few arterial roads of Kolkata during the morning peak and evening peak, the length of the roads in kilometers and corridor speeds. The morning peak has been taken to be from 9 to 10 a.m. and the evening peak, from 6 to 7 p.m. in the KMDA survey. The roads considered in the study include, Vivekananda Road, Chittaranjan
Avenue (C. R. Avenue), Mahatma Gandhi Road (M. G. Road), R. G. Kar Road, A. J. C. Bose Road, Jawaharlal
Nehru Road (J. L. N. Road), Lenin Sarani, Deshapran Sashmal Road, Raja S. C. Mallick Road and

Table 1. Findings by switch ON.

	Private cars	Taxis	Auto	Buses all types	Bike scooters	Bicycles	Tram	Tucks vans
Vehicle model share	31%	20%	13%	15%	3%	2%	0%	4%
Vehicle Road share	29%	18%	7%	32%	4%	1%	1%	8%
Passenger Modal Share	6%	5%	7%	76%	3%	1%	1%	1%

Source: Report by Switch ON. http://switchon.org.in/India/congestionsurvey.pdf

A. Chakrabartty, S. Gupta

Jatindra Mohan Avenue. The value of time has been taken as Rs. 19 per passenger per hour. (Draft Final Report,KMDA, 2007). Smeed (1968) in his paper "Traffic Studies and Urban Congestion", has given an equation for the calculation of time lost due to congestion. In the paper the relationship between the average speed of traffic (v) and its Amount (q) is expressed as

$q = a - bv^2$ or $\left(\frac{v}{v_o}\right)^2 + \frac{q}{q_o} = 1$,

Where v_o is the speed under light traffic conditions and q_o is the maximum flow.
The time taken for a journey of length l is l/v at speed v and l/v_o at speed v_o. C is defined as the time loss due to congestion which is given by the difference between the time taken by vehicles when the speed is v and the time they would take if they were to move at the free flow speed or speed under light traffic conditions,

$C = q\left(\frac{l}{v} - \frac{l}{v_o}\right)$

The above formula derived by Smeed (1968) has been used to calculate the time loss on the roads of Kolkata. A pilot survey was done by the authors to find out the speed of cars and buses under free-flow conditions. The free flow speed of buses was found to lie between 30 to 40 km/hr while that of cars was found to be between 60 to 70 km/hr on Kolkata roads. The free flow speed for all vehicles in Kolkata has been taken as 50 km/hr. Which is a rough average of that of buses and cars?

Station wise matrix of passengers for PRT in the selected area 2016

No	Name of zone	1	2	3	Total
1	Howrah railway station	2.044	1.363	6.132	9.539
2	Central bus junction	2700	3100	1.434	2.131
3	HIDCO junction	825	206	1,100	7,234
	Total	**5.569**	**4.669**	**8.666**	**18,904**

Hence the daily demand for the initial year of 2016, considering induced and diverted traffic of 12% and growth rate of 6 %, daily demand will be in the range of 18,904 persons per day. The average daily passenger's capacity is-14.400

2.2 Alignment

The alignment considered for provision of PRT system as a pilot case basis with provision for introducing more number of stations as well as expanding into a network configuration. For the purpose of this report the basic alignment is considered from Narkel Bagan to Thakdari road junction. The PRT system can be further expanded to include outlying area also in the future phases to be developed onto a network. The other locations to be connected in phases are Bus terminal and feeder system to metro rail -which could be linked to the main network in future

2.3 Stations

The stations are 5 numbers in all including either terminus. However, nodes where there are other routes meeting the proposed alignment have potential to be developed as station later on (Traffic circle). The stations shall be having following features.

The station consists of an elevated platform for the loading and unloading of passengers and cargo. Stairs or an elevator may be used to reach the platform. As the passenger carrying pods/cars arrive at the station, these shall be switching to a siding of guide way. This allows other vehicles non destined at the station to continue along their path uninterrupted. A station can load and unload at multiple bays simultaneously. Those pods not carrying passengers will place themselves at the station, waiting for passengers.

Depending on the location, the station can be either placed over the road, or stationed within a building complex or on the median. The location also decided the number of berths to be provided where the vehicles can berth and permit embarkation and disembarkation as well as the holding capacity needed for layoff pods.

2.4. Land- (Government of West Bengal)

Land is the primary requirement for any infrastructure creation, however the PRT system brings in a radical change in the way land is used. Similar to the Power corporation cable & overhead lines, the tracks shall pass over existing roads and the supporting pillars shall be located along footpath or medians as appropriate. Only the station and depots for maintenance may require land. Wherever possible, the stations shall also be housed within the right of way. Hence for the project, Government shall permit use of space over a road along or across which the proposed system passes and may permit exemption of levy charges as may lawfully be levied in respect of the use of a road or bridge along or across which the system is laid. **Hence no additional land acquisition** is required for lying of tracks.

2.5. System design

The PRT system proposed for Kolkata city (new town) has been designed so as to cater to the peak demand that has been observed in the region. The average trip length has been considered as 1.5 km and thus the turnaround and service time for each pod arrived at.

2.5.1. Civil Infrastructure- Stations & Track

The layout of stations has been designed to provide general amenities like toilets, kiosks for refreshments, tea-shops, book-stands, etc. These have been layered in such a way so as to avoid unnecessary rush while at the same time promoting sales in the kiosks by rationally separating the paid areas from the unpaid zones.
PRT systems use offline stations so that all stopping traffic is diverted away from the main guide way, thereby discounting for time losses to the system due to stopping vehicles. In order to make the proposed Kolkata PRT system truly effective, a conscious attempt has been made in the design process to keep the capital and maintenance costs of stations at a minimum. Although all stations would eventually be individually tailored to ensure optimal integration within the local context (space available, surrounding development etc.), for the purpose of station design, 4 typical station typologies have been developed.
Stations may be located above, at, or below ground, or, due to the system's virtually silent nature, inside buildings. Stations can be enclosed or open-air, will always provide at least a minimal covering above the berth area and are designed to be suitable for 24-hour operation. To reach the platform level, passengers have to take stairs or elevator from the street level.

2.5.2. Track Alignment and Guide ways

Standard elevated guide ways would be 6 to 9 meters high with ramping up and ramping down depending on locations as and wherever required as non-standard ones. As project stretch has undulating topography, the guide way elevations can change. Gradients can be at a maximum of 10% on ascent and 6% on decent to be ergonomically acceptable to passengers.

Guide ways will normally be single or twin depending on network design configuration. Guide way supports will be of different types, namely, single or columns as portal frame, or with cantilever support, etc. Depending upon the ROW available, underground utilities and building projections etc. The exact locations of placement of columns with various combinations would be based on detailed engineering drawings. Column spans are normally 18 meters apart. Additional protection railings may be provided along the guide ways with covered mesh, wherever required

2.5.3. Typical Terminal Configurations

Figure 4: First floor plan of a typical 6-berth 'on-site' terminal station with turnaround facility for pods

2.5.4. Maintenance Yard and Control Room

Each system requires a maintenance depot, which should accommodate about 5% of the total fleet size. The control room for the system will also be located appropriately. The maintenance depot will be equipped with a repair and maintenance unit to perform regular preventive maintenance and repairs. The control room will be equipped with display systems for both the stationary and vehicle cameras. Intercoms at stations and in vehicles all connect to the control room as well.

2.5.5. Infrastructure and Structural Requirements

5 stations have been planned covering a route stretch of around 2.4 km. There will be two Terminal Stations, one at Narkel bagan junction and the other one at Thakdari road junction. There will be a (Traffic circle) X type route with stations along with MAR SE (extension) main road. In addition:-there will be one Maintenance Yard where maintenance and washing of pods will be undertaken. Apart from these, there will be an office space along with a Central Control Room from where all pod movements will be controlled.

Number of Pods –Requirement of pods in various years is given below.

Year	2017	2021	2031	2041
Number of Pods	75	92	119	154

Maintenance Yard : 1 number

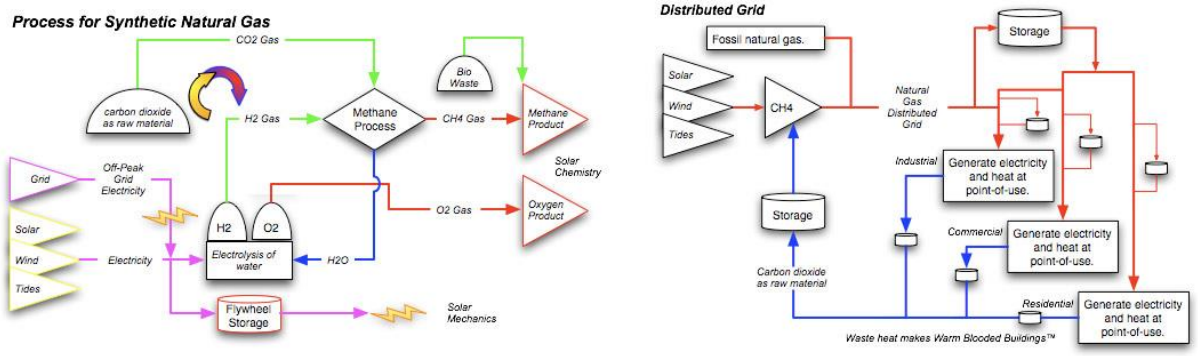
Central Control Room : 1 number

CCTV at each Station and along the Track Office, Control Room, Ticket Counters, and UPS Rooms air-conditioned Flap Gate Access System at Stations Multiple Independent sources of Power Supply (11 KV) for supply reliability Each station to have compact sub-stations for power step down and distribution 100% DG Power Back- up through dedicated DG set in each station.

Indicative values for different infrastructure parameters based on current assumptions have been stated in this chapter. These values would be subject to adjustments after detailed design and comprehensive ridership assessment.

2.5.6 Power Requirement

Total Power Requirement: approx. 100 KW per KM (Subject to detailing)-**Synthetic natural gas converting: Energy *serve*r: solar to methane process bio-waste**



Power supply source

The Source of Power Supply is proposed to be from State Electricity Board .The power for PRT Stations, Yard, Control Room will be from two independent receiving Substations (11 KV) for supply reliability and distributed in the form of loop / ring along the Track. From the ring it will be further tapped at different Stations, Main Yard and the Control Room. Compact Substations (CSS) have been planned for each PRT Station to avoid Voltage drop. Each Station and main Yard will have DG sets for Power Back up. Track lights (LEDs) will have Power Supply from the adjacent Station. Batteries for Pods will be charged at Stations and Yard.

2.5.7. Water Requirement

Total Water Requirement: approx 9 KLD

Broad items for water consumption

	:
Domestic Water	45 Litre / Person. / day
Floor Washing	: 3 Litre / Sq.mt. / day
	:
Public Toilet	15 Litre / Person / day
	:
Pod Washing	20 Litre / Pod

Water supply
It has been assumed that water will be available from the State Authority nearby Sources. Supply will be taken at a single point or each consumption Station nearby and multiple distribution points within the Consuming Station will be internally handled

2.5.8. Heating Ventilation and Air Conditioning (HVAC) Requirement

Total HVAC Requirement: approx. 140 TR[1] (including 23 TR standby)
Would be provided through Window / Split units (equivalent to 175 KW of power load)

[1] TR = Ton

HVAC Load

UPS Room	: 50 Sq.ft / TR
Office and Control Room	: 100 Sq.ft /TR
Ticket Counter	: 1 TR per Counter

2.5.9. Cleaning System

Cleaning to take place only in off-peak hours. At yard, washing similar to Car Wash Systems

2.5.10. Fire Fighting System

Fire Water Tanks with Pumps, Fire Hydrants, Fire Extinguishers

2.5.11. Maintenance

The PRT System generally has 30 pods per kilometre of guideway. The system requires regular periodic maintenance, therefore, one maintenance yard has been planned. It is planned that a pod comes for periodic maintenance to the yard once in 3 days. This is estimated based on various factors including the utilization factor.

2.5.12. Provision for Security

CCTVs are planned for the Stations, Yard and the entire track. Each Station is provided with Flap Gate Access Systems.

2.5.13. Ticketing System

Ticketing System would be Token or Smart Cards or Touch Screen system.

2.5.14. Other Features

Elevators: Each Station is provided with one Elevator for comfortable vertical Movement

2.5.15. Structural Design Specification

The project is located in a seismic zone classified as III as per IS 1893 (Part 1): 2002, and as such, the design and specifications are to be based accordingly to minimise the structural damages resulting from an earthquake.

Design Features

The entire track / guideway are elevated on M.S. Column resting on RCC Foundation and pedestal. The foundation would be on the basis of soil data analysis of the track alignment. The guideway would rest on MS Column, which supports the main built-up (Beam) section as well as secondary built-up beam. The secondary beam provided to place the precast RCC / GRP planks for the movements of Pods. In between two planks there would be cable tray for supporting various electrical and communications cables. For safety purpose, Railing (MS) would be provided up to height of 0.9 metre on both sides.

Safety certificate

JPods uses safety standards from ASTM International Technical Committee F24**. These standards resulted in the innovative spirit, care for customers and extraordinary safety record of the theme park industry.**

ASTM International, formerly known as the American Society for Testing and Materials (ASTM), they set the standard. We certify compliance of the design and build to that standard. The insurance company that provides the insurance confirms that we are in compliance. There are multiple checks with risks of law suit to anyone trying to avoid compliance. Personal Rapid Transit developed under ASTM leadership –

JPod Systems Codes and Standards

The following codes and standards apply to the design and construction of the JPod chassis:

Issuing Organization	*Code / Standard*	Title
ASTM International	ASTM F2291	Standard Practice for Design of Amusement Rides and Devices
National Fire Protection Association	NFPA 70	National Electrical Code
ASCE	ANSI/ASCE/T&DI 21-05	Automated People Mover Standards

Rescue-Rail networks

Solution: Deploy temporary Jpods networks to provide cleanup. Disaster relief. Food. Water and medical support

Rescue-Rail: JPODS networks tailored to be deployed over broken heavy infrastructure and to mitigate congestion and energy use in times of emergency

Uses of Rescue-Rail: Pre-position Rescue-Rail to deploy while infrastructure is unavailable and/or being repaired.

2.5.16. Staffing plan

The system requires decentralized control rooms, operating staff, and cleaning and maintenance. Initially PRT cabin attendants will service the stations. The staffing will grow and shrink based in system size, station number, and vehicle dissemination

2.5.17. Fare collection systems

The PRT stations, in all the locations in system will be integrated. The ticket management system will curtail the time spent by passengers in procuring tickets before boarding the PRT vehicle. There are a number of fare collection options that will be employed:

- Automatic Ticket Dispensing Machines (Such system helps in fast transactions and ease of use in entries and exits.

3.1. Project Duration

The project could become operational in 6-8 months from the date of receipt of all statutory approvals, utility shifting and vacant / clear possession of land & ROW for stations, yards and pillars.

3.2. Project Costs

The total Project cost has been worked out at INR 112 crores (17million) including the system cost, Interest During Construction (IDC), Project Management Consultancy (PMC), corporate office cost etc. This may be subject to change depending on technology and detailed engineering analysis, to be done prior to implementation.

3.2. Maintenance & Operation

The maintenance and operation cost has been worked out at INR 33.6 lakhs per annum initially.

3.3. Revenue

The fare for PRT system is kept comparable to the public modes of transport like Taxis and auto rickshaws as the system is more akin to the comfort provided by these modes in terms of point to point travel between stations.
For average trip length of 1 km, considering a Pod carries average of 4 persons, the fare is Rs 8 per person for 1 Km with 5% escalation every year.

Nominal revenue has been considered for Cargo. Advertisement and rentals from kiosk spaces at station etc

3.4. Viability

On preliminary analysis the project is self sustainable and may provide a return of 18 %. NKDA SPV will raise the required finance and carry out the project on its own without any financial burden on the Government. The proposed tariff can be reduced only if there is any capital grant from the government as Viability Gap Funding.

MODE OF IMPLEMENTATION

The project shall be implemented by the SPV formed by NKDA and other private companies/ technology partners. The proposed tariff ensures reasonable return for the SPV. Hence the project is proposed to be carried out without any financial liability for the state. However, the SPV will have the right to fix the tariff to run the PRT system as a commercially viable project and the fare shall be regulated by the PRTS users

The SPV shall ensure the safety and overall economy of the system. If the Government wants the PRT system to be a heavily subsidised form of public transport to that extent, government can provide capital grant as a viability gap funding.

This PRTS proposal is placed before the government as a forerunner to implement PRT systems as alternate transport mode in West Bengal. NKDA shall form an SPV with the chosen technology partner to provide the committed level of service in terms of safety, low carbon footprint, speed, economy and comfort and above all sustainability as **design, build, operate and transfer after 20 year period to the Government.** The present proposed fare of Rs 20(30 cents) for 2.4 kilometres for an air-conditioned most modern cab for this pilot project alone. The fare is proposed as per passenger km at optimum number of passengers per pod or car based on the technology considered and presents investment level. It may vary if there is delay in implementation.

3.5. SPV

The chosen Technology provider and NKDA shall form an SPV for implementation, maintenance and operation of the system for 20 years, thereafter to be transferred to the government appointed agency for continued operation.

The fares for the transport system shall be the governing factor for making it attractive to the public. This is also a major factor that shall contribute to the returns from the project. Hence there can be guidelines stipulated in the concession agreement of the SPV for regulation by government from time to time, provided the SPV is assured of returns. Thus the SPV will have the right to regulate the tariff depending on the requirement of the situation.

3.6. Way forward

PRT has the promise of bringing in a radical change in the way movements of persons occur in a region. Rather than concentrating the traffic on a corridor, a PRT system has the flexibility of spreading the traffic uniformly over the network. It also promises a sustainable transport mode that is environment friendly, efficient, fast, economical and safe.

We would request the Government to entrust the implementation of PRT system as per this proposal.

4.1. Requests to Government

4.1.1. License

Government may grant approval to build a Personal Rapid Transit (PRT) System in Gurgaon city for the proposed route.

The proposed route network mentioned may be approved for implementation. However, the track length, location and number of stations may change depending up on actual site considerations, obstructions and also based on market demand.

4.1.2. Period of Concession

The concession period shall commence from the date of start of commercial operations and shall extend until a period of 20 Years.

After the initial concession period of 20 Years, the project may be transferred back to Government of West Bengal or the agreement can be renewed in mutually agreeable terms.

4.1.3 Land and Right of Way

Government may provide adequate vacant land and Right of Way (RoW) for the PRT System (stations, tracks, maintenance yard, control centre etc.).

RoW for elevated Guide way: Permission to lay track overhead and piers on road sides/medians. Each column will need approx 1 sq. meter land and the distance between two consecutive independent columns shall be approx 18 meters.

Based on site conditions, portal columns may also be required at certain locations, in which case the land requirement may vary from above.

Government may allot land free of cost for stations (no upfront payment / rentals)

Government may provide all land and RoW free of any encumbrances in the form of overhead and underground utilities, encroachments etc. Requirement of land will be limited to vacant land available only**. No acquisition or procurement is proposed.** In case, vacant land is not available, stations at elevated level with stairs /escalators to side of the roads shall be provided without affecting pedestrian movements.
Any shifting of utility lines would be undertaken but the Government prior to handing over of the site(s) and RoW to the Implementing Agency for commencement of construction

4.1.3. Other Terms

- Permission may be granted to the Implementing Agency to fix and collect appropriate fare from PRT users
- Exemption from Transport tax System.
- Exemption from payment of local taxes like Works Contract Tax may be granted as this is a public transport system
- Power and Water required may be made available to PRT at the rates applicable to public utilities
- PRT may be recognized as an Essential Consumer and uninterrupted power supply may be ensured

- Support and assistance in procuring all applicable permits, approvals for the Project including environmental protection and conservation of the Site and safety clearances.
- Make appropriate changes in development control guidelines e.g. ingress and egress into (and from) buildings, setbacks on plots, etc to for efficient implementation of the project.

- Permissions to:

1. Operate kiosks at each station for public amenities like tea / coffee stall, ATMs etc. on its own / revenue share / rent;
2. Operate the System 24 X 7 (24 hours a day, and 7 days a week) subject to demand; and Manage, operate and maintain the PRT and regulate the use thereof by third parties.
3. Assistance in obtaining license to operate the two-way communications system may be given.
4. Permission to collect parking fees from the Users at the designated area within the operational area of the PRT System may be granted to the Implementing Agency.
5. Permission to frame appropriate regulatory mechanism for safety certification, registration and framing of rules and regulations for the construction, operations and maintenance of the System may be granted
6. Any other issues that may arise during execution and operation and maintenance of the system may be decided by a Committee headed by the Chief Secretary with Principal Secretary (Finance) and Principal Secretary (Urban development) as members.

This proposal may be considered favourably by the government as it shall help to ease out the traffic congestion along the route without any financial commitment or burden from the part of the government and the same can be replicated in other parts of the city as well as the state successfully