

# Sky Bus Metro Rail Linking Cities in Himalaya Region

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**Abstract:** Skybus is the latest technology, economical, eco-friendly, reliable and most innovative but simple mode of transportation developed by Konkan Railway as a rail based futuristic urban mass transit system. Principle of sky bus metro rail tracks over-head carry wheels and driving bogie, with coach below. Sky bus failed in metro city but it will be a great success in Mountainous Region in lifting passenger and cargo to remote regions of Himalaya and improving economic and bring transportation cost down. Sky bus can fly over long clear span covering buildings, mountain even water bodies. Also can be used during disaster in evacuating people. Better performance than underground metro at one-fourth cost and ready in two years. Sky bus is the only metro system which carries cargo too.

**Keywords:** Aesthetic, Eco-friendly, Disaster Management, Rapid Transport system, Sky way, River bank, Sky bogie.

## I. INTRODUCTION

In June 2013, a multi-day cloudburst centered on the North Indian state of Uttarakhand caused devastating floods and landslides in the country's worst natural disaster since the 2004 tsunami. Though parts of Himachal Pradesh, Haryana, Delhi and Uttar Pradesh in India, some regions of Western Nepal, and some parts of Western Tibet also experienced heavy rainfall, over 96% of the casualties occurred in Uttarakhand. As of 16 July 2013, according to figures provided by the Uttarakhand government, more than 5,700 people were "presumed dead." This total included 934 local residents. The Indian Air Force, the Indian Army, paramilitary troops and NDRF team evacuated more than 110,000 people from the flood ravaged area. Similarly On 3<sup>rd</sup> September 2014, Heavy rains lashed Jammu and Kashmir, including the summer capital Srinagar, for the second consecutive day Wednesday, triggering flood threat across the Valley. The water level in Chenab, Jhelum and other major rivers and streams in the State has risen overnight. The incessant rains, which threw life out of gear across Kashmir, also triggered a flood alert in South Kashmir areas. Many areas in Srinagar were inundated Wednesday due to heavy rains, disrupting normal life across the summer capital. People alleged the district administration has failed to tackle the situation emerging due to continuous rains. Srinagar city witnessed traffic jams for throughout the day,

giving tough time to people. Over 250 people have died and thousands are stranded across the state, including Srinagar. The Army, IAF and NDRF are doing a massive round-the-clock rescue and relief operation, with 86 aircrafts and 30,000 troops. . If we have built Sky Bus in this Region the Scale of damage to life may have been reduced. Rapid transport system like Sky Bus can be built between the valleys and reduce the distance by half the time by the Road. Alignment of Sky Bus Route should be selected in such way the Maximum city in the mountain region is covered which lies along the bank or rivers. Sky bus is failed in Metro city but it will be Success in Mountainous Region. This can used as Disaster Management in rescue effort in evacuating people from the Region even road and Bridges are damaged in disaster prone area.

## ABOUT THE TECHNOLOGY.

### A. Sky Bus Technology

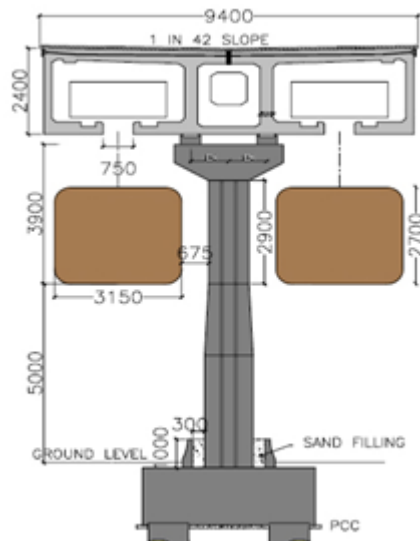
The Sky Bus technology offered by Konkan Railway Corporation meets the requirements, and re-defines the thinking and planning for urban transport being an Eco-friendly Mass urban transport system revolutionizing urban life. It is a patented technology developed for the new millennium and will cause a paradigm shift in urban transportation all over the world. Being an indigenous technology, it will place India on the forefront of the Rapid Transit Industry all over the world while providing the much needed alternative transportation solution, which is financially viable, environment friendly, synergizing well proven existing cutting edge technologies. Sky Bus is based on the concept of Sky Wheels presented in 1989 at the World Congress for Railway Research by Mr. B Rajaram, Managing Director of KRCL at Bologna University, Italy. The sky bus uses pre - fabricated latest construction technologies, which save time and money resulting in easy execution of the project in busy urban areas without disturbing the existing traffic pattern. All these structural engineering methods are well - proven. They have IT tools for economical communication and control. The 3 phase asynchronous AC electrical motor used for the propulsion of sky buses is also well proven and widely used abroad as well as in India. The fixed structure at 8 metres height above road level provides the support and guidance for powered bogies which can run at 100 kmph, with the coach shells suspended below, carry passengers in air conditioned comfort, can follow existing road routes, and while existing

traffic on roads continue. It is aesthetically pleasing and there is no concern of a claustrophobic feeling for road users. Aesthetic, and eco-friendly, the Sky Bus is protected against derailment, toppling or collision - by design as well as by construction, hence is safer than the existing rail based system. At the cost of Rs. 50 Crore per km. in India, the system is noise - free and pollution - free with a capacity to transport 36000 passengers per hour (pph), scalable to 72,000 pph as required. With no signaling and having no points and crossings, it is a unique mass-transit system that can be put up within two years in any crowded & congested city. In addition to moving people, the Sky Bus system can carry standard 20 ft. containers, boosting its capacity utilization to double that of other existing systems. Since it operates along existing roadways and within municipal limits, Sky Bus metro falls under tramway category, under Art 366(20) of the Constitution of India. In 2004 the konkan railway carried out a test of skybus in margao, Goa with a help of Goa state government .On 25 September, one employee was killed and three injured in an accident. The track ran 1.6 km, the test track was proposed to be extended to 10.5 km. Rajaram defended sky bus, stating that the accident was avoidable. The steepest gradient was 2%. The sharpest curve had a radius of 100m. The maximum radius of vertical curve was 3375m.

## B. Sky Bus Specification

- i. The sky way consists of a concrete box structure 8.4 X 2.4 m. carried over a series of piers at a height of 9 - 10 m. above the existing river level.
- ii. In the middle of the river, pile foundations support 1 m. diameter columns approximately 8 m. high, and at a spacing of 15 m. all along the river way.

## 1. THE COMPONENTS OF SKY BUS



## FIGURE:-1 SCHEMATIC ARRANGEMENT

### 1.1 The components of Sky Bus are

- i) Sky way
- ii) Sky bogies
- iii) Sky coaches
- iv) Sky stations
- v) Switching arrangements for change of tracks

#### 1.1.1 Sky Way

- i) The sky way consists of a concrete box structure carried over a series of piers at a height of about 10 m above existing road level.
- ii) In the middle of roadway pile foundations support columns spaced at 15-25 m along the roadway in the median of the road.
- iii) Two rails fixed with appropriate fastenings within the concrete box support and guide the sky bogie.
- iv) There are no points & crossings.

#### 1.1.2 Sky Bogie

- i) Standard two axle bogies as used in Metros for speeds up to 100 Km/h are used (but can have higher speeds, if required up to 160 Km/h)- of Standard Gauge.
- ii) 3 Phase AC motors with regenerative power capability.
- iii) Third rail is used for current collection
- iv) Braking -

- a) Regenerative
- b) Disc brakes (Planned for series production)
- c) Emergency mechanical brakes

#### 1.1.3 Sky Coaches

- i) Double walled light shells with wide large windows are suspended from the sky bogies
- ii) Air conditioned and with automatic doors
- iii) Audio visual information to passengers
- iv) Special 4m or 2x2m wide sliding doors for quick entry and exit of passengers
- v) Each pair can carry up to 300 passengers.



**FIGURE: - 2 ARRANGEMENTS OF BOGIES AND SUSPENDED COACHES**

### 1.1.4 Sky Station

#### 1.1.4.1 Unlike conventional mass transit systems, Sky Bus needs smaller stations

- i) Service is at every 2 to 3 minute thereby there is virtually no waiting time for passengers.
- ii) Completely automated with access control by means of electronic prepaid cards.
- iii) Stations act as access facilities only and not as passenger holding areas.
- iv) Station at elevated from the ground level and easy to access in mountain region since all village town are located at high level.

#### 1.1.5 Switching arrangements

There are no points and crossings in Sky Bus Metro. The switching arrangements in the form of traverser or Y-connection / linearly shifting traverser/angular switch are provided at appropriate locations to shift the Sky Bus consists between track for the operational requirements and also for balancing the loads/ changing routes too as well as shift units to depot lines etc.

#### 1.1.6 Route along the River Bank



**FIGURE: - 3 Major Cities along the Bank of River**

Sky bus should be take along the river bank because most of cities are along the river bank. The sky bus can be built the concrete box structure along the river route carried over a series of piers at a height of 9 - 10 m. above the existing river level. Pile foundations support 1 m. diameter columns approximately 8 m. high, and at a spacing of 15 m. all along the river way. Himalayan region are tourist destination, the movement of people in all year. Transportation of cargo to improve the economy of the state can be done with the help of sky bus in this region. Sky bus will link all major cities in Himalayan region if implemented cutting cost in transportation will reduce. During disaster river flow does not change the course and alignment do not change. Figure 3 show before and after disaster stuck but river course did not change its path and direction of flow.

## II. ENVIRONMENTAL ISSUE

Unprecedented destruction by the rainfall witnessed in Uttarakhand state and Jammu & Kashmir was attributed, by environmentalists, to unscientific developmental activities undertaken in recent decades contributing to high level of loss of property and lives. Road and bridges constructed in haphazard style, new resorts and hotels built on fragile river banks and more than 75 hydroelectric projects in the watersheds of the state led to a "disaster waiting to happen" as termed by certain environmentalists. The environmental experts reported that the tunnels built and blasts undertaken for the 72 hydro electric projects contributed to the ecological imbalance in the state, with flows of river water restricted and the streamside development activity contributing to a higher number of landslides and more flooding. Pollution is also another cause in the Himalayan region with increase in traffic, urbanization, industrialisation and couple with reduction of the vegetation cover or tampering with soil or bed rock.

## IV. CONCLUSION

After the disaster struck at Uttarakand and Jammu & Kashmir, the region was totally isolated from rest of India and Local Administration totally failed. The Road, Air transportation was blocked, Bridge collapsed in all major routes, and the rescue operation was hampered. If we had Good Road Transportation system in Mountainous region, we would saved many precious life. We should Reintroduce Sky Bus transportation for passenger and cargo in Himalaya Region. The Region is surrounded by Mountain instead of zigzag road and road at the edge of mountains. If we use sky bus movement will be as far straight as possible and distance between cities less and travel time is less and for effective movement of Passenger and cargo.

*The path of river flow before and after is not changed only silt deposition on the river bed. We should consider Environment problem due to construction of Project Sky Bus in this Region and evaluate the Environment Impact assement for the project.*

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