9th Urban Mobility India Conference & Expo 2016
Planning Mobility for City's Sustainability

CABLE CAR IN URBAN INDIA
SCOPES AND OPPORTUNITIES

Dr. Pawan Kumar, Associate TCP
Town & Country Planning Organization,
Ministry of Urban Development, Govt. of India, New Delhi

E-mail : pawan612@gmail.com

Introduction

- Cable Car : Ropeway, Aerial Tram, Sky Tram, Aerial Tramway
- **Cable Car /Ropeway : Aerial Ropeway Transit (ART)**
- Cable Car /Ropeway is known as Udan Khatola (उड़न खटोला)

Ropeway in Deoghar, Jharkhand

- It is called as Gagan Khatola (गगन खटोला)

- Cable Car vehicles transport both passengers and materials in carriers suspended from cable (rope) and another moving cable (rope) provides propulsion and whole system is supported by a series of towers.
- Further, it is motor-less and engine-less vehicles and pulled by a cable (rope) that is rotated by a motor off-board.

Cable Car/Ropeway Technologies

i. Aerial Ropeway

- **Cable Configuration** : Cabins are suspended from fixed cables (Track ropes) and pulled by another cable (Haulage rope).
- **Detachability** : Cables can not be detached from the moving cable.
- **No. of Passenger Cabins** : 02
- **No. of Stations** :Multiple
- **Distance between Towers** : Less than 1000mt.

- **Capacity** : 2000-2800 pphpd @100-200 passengers/cabin
- **Speed** : 25-30 km/hr
- **Cost** : $10-30 million (US) / km.
- **Example Countries** :

-Portland Aerial Tram, Oregon, (USA),
-Aerial Tramway in Engadin (Switzerland),
-Port Vell Aerial Tramway in Barcelona(Spain),
-Cable cars Tramway in Albuquerque, New Mexico.
-Manali Ropeway, Himachal Pradesh

ii. Detachable Gondolas (Cable Propelled Transit)

- **Cable Configuration :** Cabins are suspended and pulled by the same cable (a moving loop of cable) .

- **Detachability :** Cables are set at regular interval and can be detached from the cable at the terminal for loading and unloading.

- **No. of Passenger Cabins:** Depends on line length & Headways.(No. may be up to 100 cabins)

- **No. of Stations** :Multiple

- **Dist. between supporting Towers** : 300mt to 3000mt

- **Capacity** : 3600-6000 pphpd @ 15-35 passengers/cabin
- **Speed** : 20-30 km.hr
- **Cost :** Depends on location, situation, and customization, etc. Cost for MDG is between $5-20 million (US) / km.
- **Countries**: Algeria, Brazil, Colombia, England, India , Singapore, Venezuela, etc.

Gulmarg-Gondola Ropeway , Jammu & Kashmir

Uses of Cable Cars

i. Tourism Purposes

Cable Car is attractions for pleasure trips to see 360 degree panoramic view.

To visualize natural beauty /natural scenery.

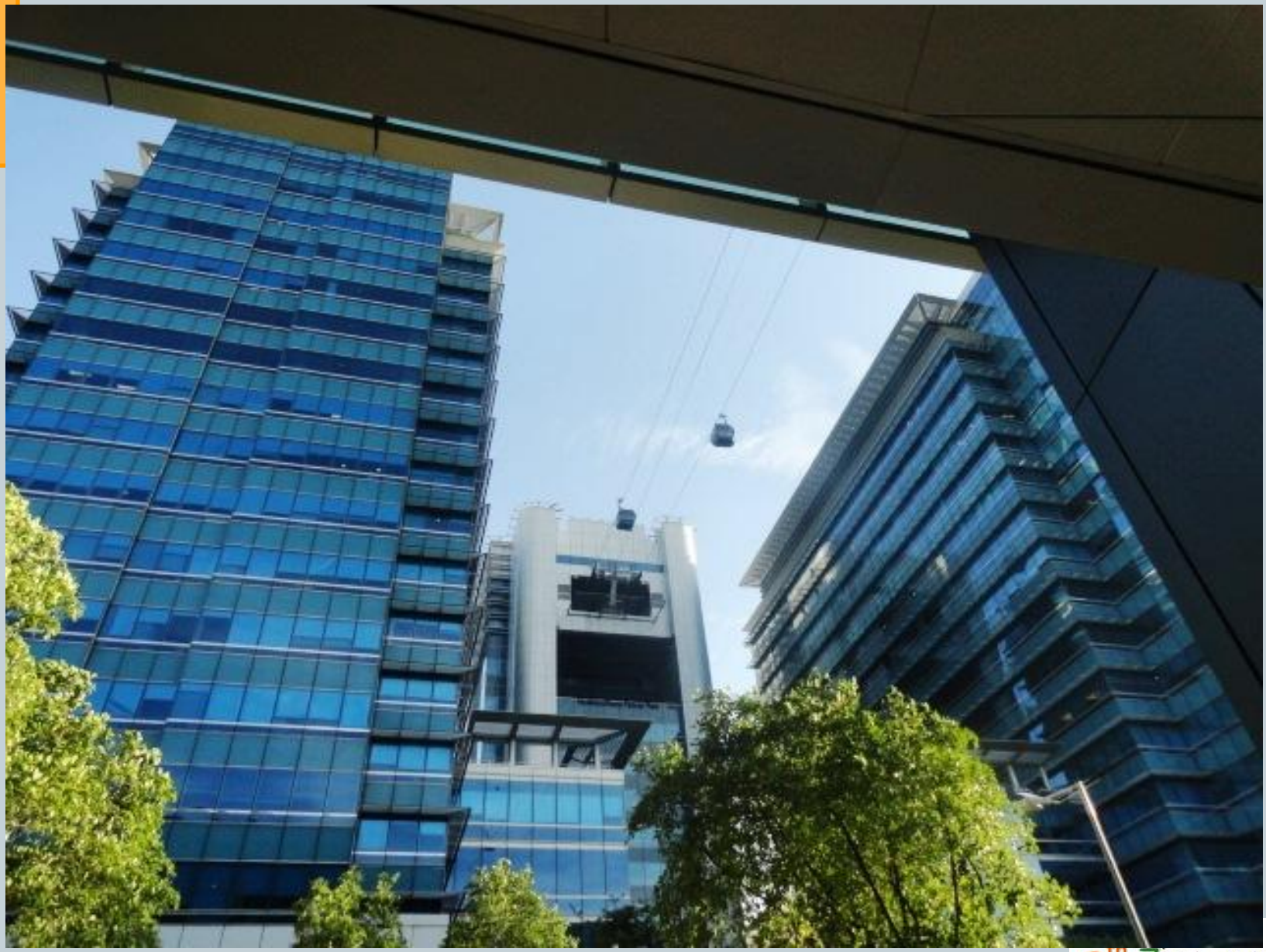
Manali Ropeway Cum Ski Centre, Himachal Pradesh

Opened in 1974, **Connectivity :** Mount Faber to Sentosa , **Purpose :** Tourism

Pioneer : -First to span a major harbour on Singapore South Shore.

Sentosa Island Gondola, Singapore

Pioneer : -First to implement Intermediate Station within a skyscraper.



Intermediate Cable Car Station within Skyscraper, Sentosa Insland, Singapore

ii. Religious Purposes

Religious Purposes to reach Mountain tops / Mountain Temples for worship.

Mansa Devi Udankhatola, Haridwar

It carries devotees to Mansa Devi Temple that sits at a top of hill.

Source: Wareholidays

Nainadevi Ropeway, Himachal Pradesh

- Located in Bilaspur .
- Operation was started for convenience of the devotees to Nainadevi Temple.

Ropeway to Shrine of Makhdoom Sahib, Kashmir

It is Kashmir Valley's first ropeway and State's second tourist-carrier.

Source: The Hindu

iii. Material Transportation

- Initially, a ropeway was used as a lifting device across the valley, rivers, canyons, etc. and get accessibility in high terrains.
- Later, the same was started to use in construction across the rivers and along the sea.

Ore Bucket carrying Minerals from Mayflower Mine ,Near Silverton, Colorado, USA.

Ropeway conveyor for Limestone transportation in Sweden

iv. Use as Mass Transit

Example 1: Roosevelt Island Tramway, New York USA

- Opening Year :1976 but modernized in 2010 as dual-haul aerial tram
- Purpose : provide connectivity between **island to Manhattan** as island was redeveloped to accommodate low-middle income housing project.
- Mode : Mass Transit Service for Commuters

- Line Length : 960
- Line Speed : 26 km/hr
- Cabin capacity :110
- Peak Headway : 8 minutes
- PPDPH :1500

- Integration : Ropeway is integrated with New York's Metropolitan Transit Authority Metro Card with metro and bus transfer.

Example 2: Medellin Metro-Cable, Colombia

- **Purpose** : Medellin located in Valley surrounded by hills. To provide connectivity to barrios (rural Settlements), **gondola system was developed to connect Medellin hill residents to Metro** .

- **Opening Year** : 2006.
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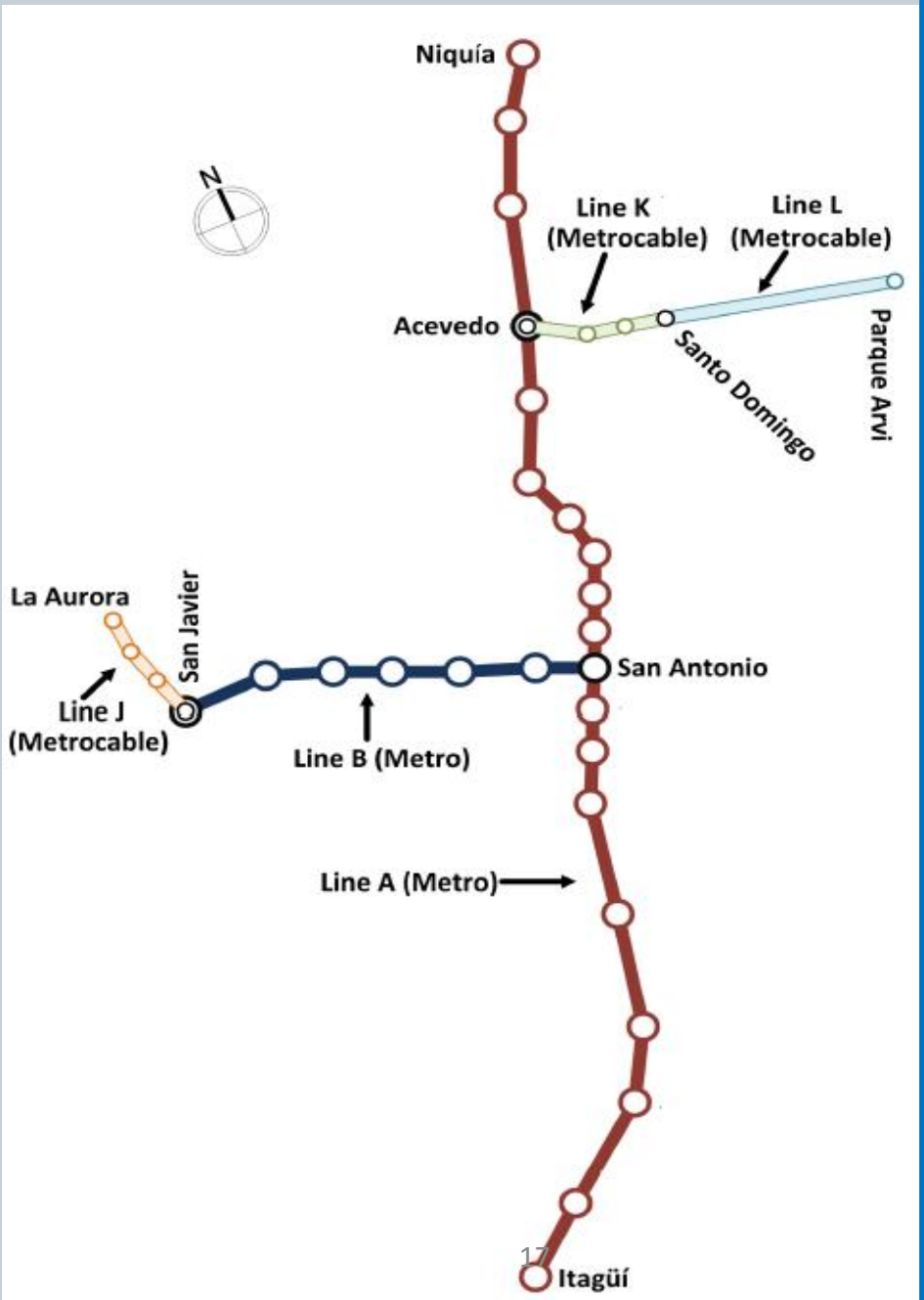
- First gondola line **(Line K)** was opened as complementary mode of transport to Medellin Metro.

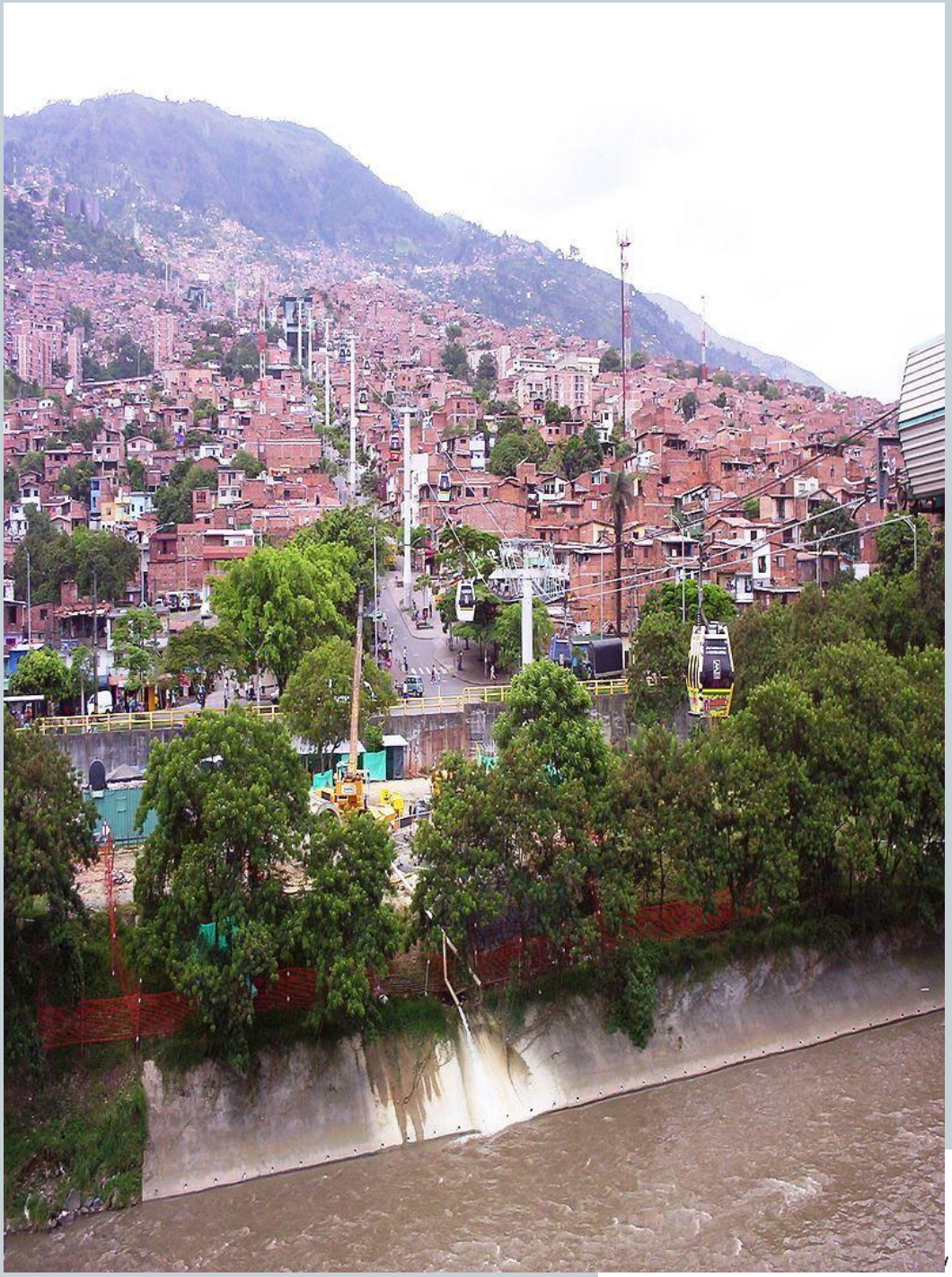
- **Mode** : Mass Transit Service



Line Length

Line K	=2789 mt
Line J	=2072 mt
Line L	=4595 mt

Line Speed	: 18-22 km/hr
Cabin capacity	: 10
Peak Headway	: 12-65 seconds
PPDPH	:550-3000



Cable Cars in India

Ropeway of Rajgir, Bihar

It runs to the top of Ratnagiri Hill and passes over 40mt high Vishwashanti Stupa.

It is single-person ropeway (one person at a time can take the ride).

Gulmarg Gondola, Jammu & Kashmir

- Asia's largest and highest cable car which connects Gulmarg to Apparwath Peak .

- Aerial Length :5000 mt(approx.) Height : 4200 mt (approx.)

- **Two-stage ropeway :**

  1st Leg connects Gulmarg resort to Kongdori station (3747m) and

  2nd Leg connects Kongdori Station to Apparwath Peak .

- Hourly Capacity : 600-1500 PPHPD

- Joint Venture : Ropeway project is a joint venture of the Jammu and Kashmir Govt. and French firm Pomagalski.

Ropeway in North Eastern States

- Damovar Ropeway in Gangtok is a cable car located at Deorali .
- It has a ride from Deorali to Tashiling over the city of lower and upper Gangtok.

Selected Cable Cars in India

S.N.	NAME OF ROPEWAY	STATE	CITY/TOWN	CAPACITY (PPHPD)	NO. OF CABINS	CABIN CAPACITY	PURPOSE	LENGTH
1	Narmada Ropeways	M.P	Jabalpur	800 PPH	10	6	Tourist	535 M
2	Mansapurna Ropeway	Rajasthan	Udaipur	200 PPH	4	6	Tourist	362 M
3	Sanhati Park Ropeway	West Bengal	24 Parganas	150 PPH	2	6	Tourist	135 M
4	AMBY Valley Ropeway	Maharashtra	Lonavala	100 PPH	2	6	Tourist	140 M
5	Bhopal Ropeway	M.P	Bhopal	250 PPH	2	9	Tourist	360 M
6	Nainital Ropeway	Uttarakhand	Nainital		2	11	Tourist	750 M
7	Kempty fall Ropeway	Uttarakhand	Mussoorie	400 PPH	6	6	Tourist	125 M
8	DRV Ropeway at Darjeeling	West Bengal	Darjeeling	400 PPH	15	6	Tourist	2300 M
9	Dongargarh Ropeway	Chhattisgarh	Dongargarh	120 PPH	2	8	Tourist	650 M
10	Salkanpur Ropeway	M.P	Sehore	200 PPH	4	8	Tourist	790 M

Scope & Opportunities

1. Suitable in geographical & topographical barriers such as mountains, valleys, water bodies, etc. where very large infrastructure costs associated with to overcome these barriers may not permit conventional public transportation systems.

- Eastern States and Mountainous States may use such System.

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2. Construction of road / rail infrastructure is capital intensive & Challenging task in hilly terrain.

   Limited availability of land, steep slopes, rocky terrains, cost of cutting for tunnels, etc.

- May be opted as a mode of transport with updated Technologies.

3. Aerial Ropeway Technology is economical with compare to BRT/MRT.

Comparative Capital Cost of Construction

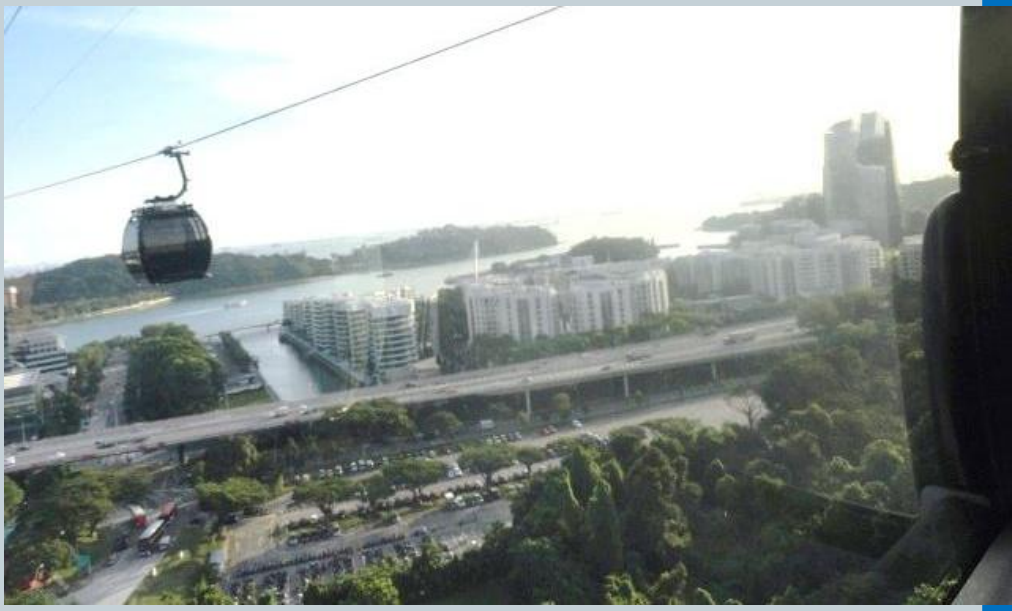
S.N.	Modes	Av. Cost/Km (Rs Crore)
i.	MRTS	250-400
ii.	BRTS	30-50
iii.	Cable Car	15-25

Source: Seminar Proceedings on Cable Car, Shimla, 2014 organized by IUT(India).

4. Considered as Environmentally Sustainable Transport (EST)

- Relatively Low Carbon foot prints.
- Electric Engine /Motor used at Stations.
- Greenhouse Gas emissions credit (Medellin Cable Car, Colombia).
- Cable car vehicles have no motors and therefore no noise and air pollution along the route.
- Little disturbance in Micro environment both during construction and operation.

Sentosa Island Cable Car Passing over Harbour



Cable Car in Rio de Janeiro, Brazil

5. Mass Transit

- Cable Car as Unconventional Technology (not like BRT/MRT)used as mass transit. **Its route design has little consideration for horizontal and curve alignment. It is comparatively easy in operation .**

- It follows a dedicated route having 5,000 passengers per hour per direction.

- Modern technology provides spacious cabin having capacity @ 30 - 50 persons.

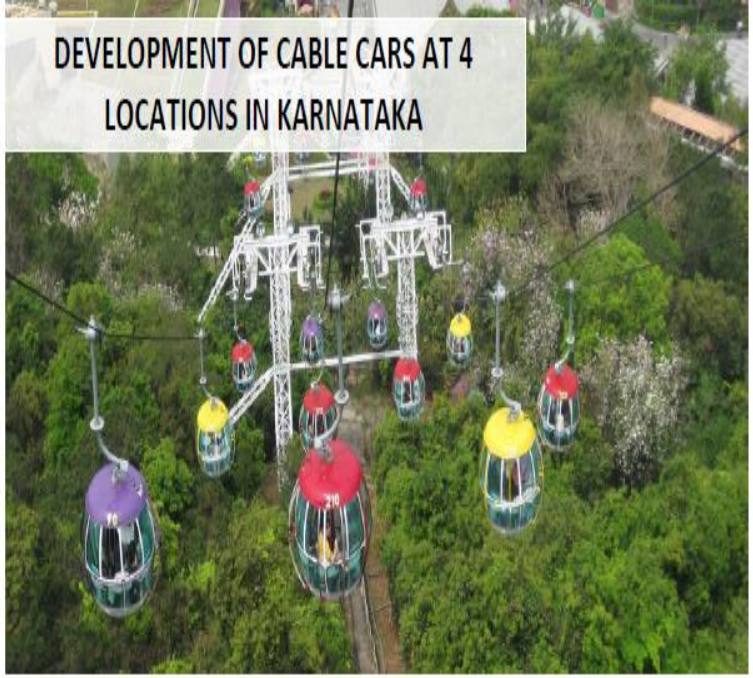
- Comparatively safer mode of transport.

- Direct connection between two points in spite of physical barriers and obstacles.

- Demands low space for towers & stations and are environmentally and cost effective mode of transport.

- Less capital, , maintenance, construction time, operating costs, etc.

Cable Car Mass Transit, to Launch in Lagos (2015)



URBAN DEVELOPMENT & HOUSING DEPARTMENT

GOVERNMENT OF SIKKIM, GANGTOK

REQUEST FOR PROPOSAL (RFP)

On behalf of Governor of Sikkim, proposals are invited from firms / agencies for selection as consultant for preparation of "Techno-economic feasibility report of cable car as public transport for Gangtok". The RFP document will be available for download at www.sikkimudhd.org from 07.03.2016

R.O. No. : 403/IPR/PUB/Classi/15-16 *Date : 04/03/2016*

PROJECT REPORT

Karnataka
One state. Many worlds.
Department of Tourism

TOURISM PROJECTS FOR INVESTMENT OPPORTUNITIES

INVEST KARNATAKA 2016

January 2016

RFP: Cable Car as Public Transport in Gangtok

6. Selection of Technologies and Purposes

- Purpose: Tourists to Mass Transit

- Selection of suitable Cable Car Technology/ART Technology may provide viable and feasible transit mode.

- Development of urban ropeway fulfills all three criteria of smart city:

i. Creation of infrastructure,

ii. Smart solution for smart mobility in undulating terrains

iii. Suitable for area based development.

(Retrofitting/New Development)

- Planning of ART Corridor may promote implementation of transit oriented development in newly developed or redeveloped areas.

THANKING YOU

FOR

YOUR KIND ATTENTION